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IC-TELCON - 2020

Organized by: **Department of Electronics & Telecommunication & Electronics Engineering**



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In Association With

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THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY

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PREFACE

Thakur College of Engineering and Technology (TCET) with great pleasure invites you to ICTELCON 2020 organized by Electronics (ELEX) and Electronics & Telecommunication Engineering (E&TC) Department. International Conference on Trends in Electronics & Communication (IC-TELCON) aims to bring together researchers, engineers and students to exchange and share their experiences, new ideas and research results about all aspects in the fields of Electronics Engineering and Communication. IC-TELCON 2020 provides a platform to researchers from both academia as well as industry to meet and share cutting-edge development in the field and it aims to provide an opportune forum and vibrant platform for researchers.

This year, IC-TELCON 2020 is planned on 28th and 29th February 2020. IC-TELCON 2020 solicits research papers describing significant and innovative research contributions in the field of Signal Processing and Applications, Electronic Components, Devices and VLSI and Robotics Automation & Embedded System, Communication, Antenna and Microwave Engineering.

Electronics and Electronics & Telecommunication Engineering is considered to be the major discipline of engineering which can be considered as backbone of progress and technology. The aim of the IC-TELCON 2020 is to encourage Academic Teachers, Scientists, Students, Research Scholars and Industry professionals to innovate and invent new technology by incorporating their new ideas. IC-TELCON 2020 is a platform for discussions, deliberations and exchange of knowledge, to create new products and innovations in technology for the coming era. This year we have received 180 papers from all over the country. IC-TELCON 2020 has been able to associate with International Journal of Information Technology (BJIT) (Springer) and APPLE Academic Press. We have got affiliations with Scopus indexed journals and Scientific Research journals like IGI Global.

The organization of IC-TELCON 2020 is very much a team effort of TCET. I would like to take this opportunity to thank all the members of the conference committee, who have carried out a huge and complicated task to make such a grand event possible. I also wish to thank the Management of Thakur Education Group for providing us the world class infrastructure and unstinted support in all our endeavours to make this kind of event see the light of day.

Convener (IC-TELCON 2020)
Dr. Sandhya Save

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Circular Microstrip Patch Antenna For S Band Application

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***Abstract*— In the communication of wireless system antenna plays the very important role. For economical communication we have a tendency to need miniature sized antennas like microstrip antenna. A microstrip patch antenna fulfils all these requirements. In this paper, it proposes an efficient wide band circular polarization microstrip antenna is designed and simulated at operation frequency 2.492028 GHz. The selected microstrip antenna could be a dual-fed circular polarized microstrip antenna. Coaxial feeding technique has been used because it is simpler to implement. We used HFSS (high frequency structured simulator) package for simulation of antenna and to search out the results. We keep changing the design of antenna as our motive was to achieve miniature antenna with better results than conventional antenna's, simulation results shows that the designed antenna characteristic is suitable for satellite and wireless applications etc.**

Keywords—RHCP Circular Polarization, Dual Coaxial Probe Feeding, S-band, HFSS, Feed Point Location, FR_4 Substrate ect

I.. INTRODUCTION

In simplest style of Microstrip antenna, a stuff substrate is sandwiched between ground plane and a conducting patch. Microstrip patch antennas radiate primarily attributable to the fringing fields between the patch edge and therefore the ground plane. For good antenna performance, a thick stuff substrate having a low dielectric constant is fascinating since this provides higher potency, larger information measure and higher radiation.

However, such a configuration ends up in a bigger antenna size. Hence we have a tendency to style compact Microstrip patch antenna, substrates with higher dielectric constants that are less economical and end in narrower information measure.

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II. CIRCULAR PATCH ANTENNA

One of popular form of a patch antenna is the circular patch antenna, which has unique polarization properties due to its symmetry, and tends to have good beam width and return loss bandwidth when compared to a rectangle patch antenna. However, some studies have been conducted that use one probe feed but add some elements in the substrate in order to induce circular polarization. The beam width of a circular patch antenna is wider than that of a rectangular patch; it also has better side lobe suppression. Despite this a rectangle patch will have a greater maximum gain. A rectangle patch also has the advantage of a minimum return loss and VSWR that is less than that of a circular patch, yet a circular patch's bandwidth of these values is wider. If a matching network is used on a circular patch, then it would have a much better bandwidth than that of a rectangular patch antenna. The radius of a circle antenna has not been determined by the simple transmission model, but instead the more accurate cavity model has been used. The cavity model assumes that the antenna acts as a wave guide with its upper and lower walls as the top patch element and the bottom ground plane. As circular patch antenna is designed for S band having resonant frequency 2.492028 GHz.

For designing and fabrication of circular patch antenna, glass epoxy substrate which is also known as FR4 substrate having dielectric constant of 4.4 and thickness 3.2 mm is taken. The equivalent wavelength for resonating frequency is calculated as below:

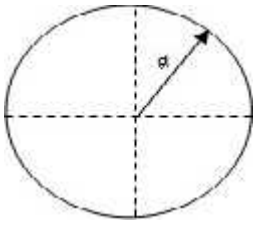

Fig. 1. Circle with radius a

Equivalent wavelength becomes 1.2cm. Now calculate radius of circular patch antenna.

Frequency=2.492

028GHz FR4=4.4

h=3.6mm=0.36cm

$$a \cong \frac{8.791x10^{9}}{[2.432028x10^{9}\sqrt{4.4} - \frac{0.36}{\sqrt{4.4}}}$$

……equation 1

For the best result we did optimization. After doing parametric optimization of antenna in HFSS, the optimization finalized value for radius of patch is taken 16.13mm.

Feed Location is between 0.3a to 0.5a.This means feeding location is somewhere between 5.214mm to 8.69mm. To find out exact feeding location. Parametric optimization was performed using HFSS software. After doing optimization final feeding location chosen as 5.3mm. At this location axial ratio, return loss and other antenna parameters gives best results.

III. SIMULATION OF CIRCULAR MICROSTRIP ANTENNA FORS BAND

As per mathematical analysis of circular microstrip antenna for S band, we got all dimensions for designing and simulation in HFSS software. For S band dimensions are as below:

Table 1- Dimensions for patch antenna and ground plane while simulation

Sr. No.	Parameter	Dimension
1	Radius of Main Circular Patch (r1)	16.13 mm
2	Dielectric Constant of FR4 Substrate	4.4
3	Height of Substrate	3.2mm
4	Dimension of Substrate (Ws × Ls)	40 mm × 40 mm
5	Dimension of Ground Plane (Wg × Lg)	40 mm × 40 mm

By following all simulation steps of HFSS software and using calculated dimensions, circular microstrip antenna look like shown in fig.2

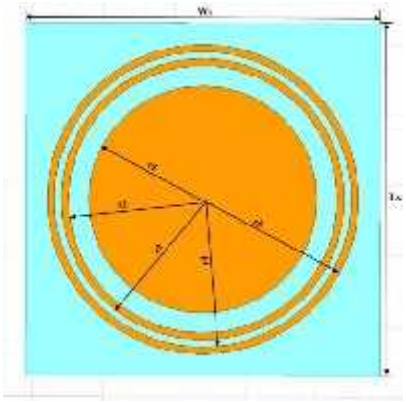

Fig. 2. The configuration of the Single band antenna design

IV. SIMULAT ION RESULT FOR S BAND ANTENNA

A substrate material is considered and simulated them by placing on the proposed model at 2.4 GHz. The parametric analysis is done for the different substrate with respect to parameters such as reflection coefficient (S11 ≤ 10dB), VSWR (2:1), impedance, peak gain (positive real value) and axial ratio. The determination is made on the basis of which substrate size, patch size and feed point showing good result regarding said parameters.

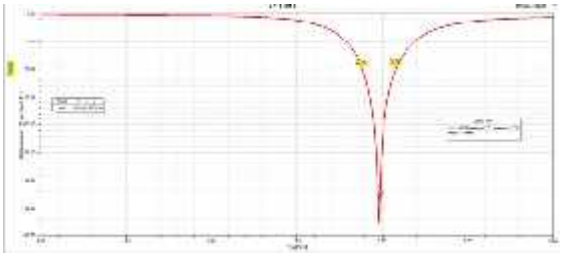

Fig. 3. Return Loss (S11 in dB) Vs Frequency (GHz) at s band

Figure 3 shows that return loss versus frequency of proposed one probe fed at 2.492028 GHz. From the result, return losses are noted as -33.3930 dB. The bandwidths for substrate are noted as 10MHz, which cover the 2.44GHz to

GHz band is obtained for FR-4.

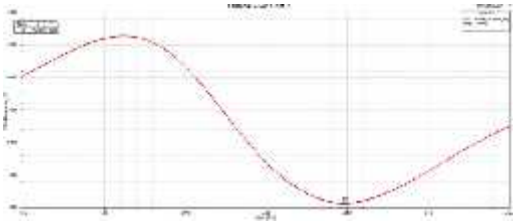

Fig. 4. VSWR of proposed patch antenna at S band

Figure 4 depicts the VSWR graph versus frequency proposed antenna for coaxial probe feed, at frequency

2.4GHz for circular polarization microstrip patch antenna for substrate FR4 and VSWR are noted as 1.0439 which shown in above figure 4 and it is also noted that good impedance matching for FR4 substrate. So, the overall performance from outcomes, it is also observed that good impedance coordinate with the coaxial probe feed technique, so Fr4 gives the good performance to us.

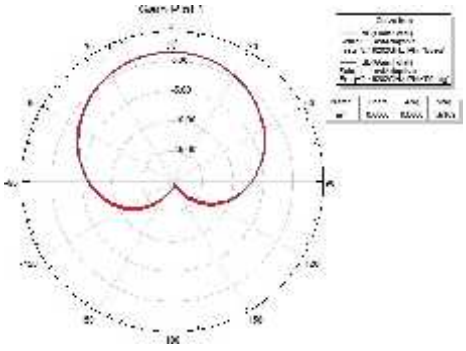

Fig. 5. Radiation Pattern (2D) RHCP of the Antenna at S band

The maximum gain is obtained in the boresight direction and this is measured to be 1.5169 dB for S Band, φ = 0 and φ = 90 degrees. The back-lobe radiation is sufficiently small. The 3D plots for the antenna at different angles, so that it is easier to understand the radiation from the antenna.

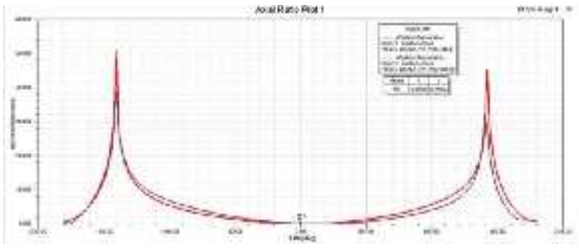

Fig. 6. Axial Ratio of the Antenna at S band

V. FABRICATION RESULTS

I. Fabrication Result of S band Antenna



Fig. 7. Return Loss (S11 in dB) Vs Frequency (GHz) measure in VNA for S band

The return loss (RL) performance of the fabricated circular microstrip patch antenna is measured on Vector Network Analyzer. Measured reflection coefficient for proposed circular microstrip patch antenna is depicted in figure 50. Measured results above shows that proposed circular microstrip patch antenna resonates at resonating frequency of 2.492028 GHz it shows the S11 is -16.22dB and 80MHz bandwidth (2.46203GHz to 2.54203GHz).



Fig. 8. VSWR of proposed patch antenna at S band measure in VNA

Measurement results of S band antenna shows VSWR of 1.37 at 2.492028 GHz. When VSWR is around 1, shows antenna is good transmitter and it also shows return loss is below -10 dB. This also shows antenna is nearly perfectly matched.



Fig. 9. Impedance Matching of proposed patch antenna at S band measure in VNA

When input impedance of antenna is purely resistive it will transmit EM energy and when its impedance is both resistive and reactive, it shows antenna is storing EM energy equivalent to reactive part. This can be easily predicted from smith chart. Measurement results of S band antenna shows impedance of 44.2+j13.2Ω . this shows antenna is nearly perfectly matched but it has inductive reactance of 13.2 ohm.

VI. CONCLUSION

Table II- Simulation result for circular microstrip patch antenna using hfss software:

Sr. No.	*Parameters*	*Values*
1	*Return Loss S11*	*-33.3930 dB*
2	*VS*	*1.04*
3	*Bandwidth*	*10MHz*
4	*G*	*1.5169 dB*
5	*Axial Ratio*	*0.1962 dB*
6	*HP*	*105.1176^0*

In above table the obtained simulated results of proposed antenna are given which are very fine enough i.e. return loss is -33.3930 dB and gain near about 2dB is obtained.

Above all measured results are cumulated in below table

Table III- Results of s band antenna after fabrication

Parameters	*Values*
Return loss(S11)	-
VS	*1*
Impedance Matching	*44.2+j13.2Ω*
Bandwidth	*80M*

In above table the measured results of fabricated antenna are given which are close to simulated results. In simulation we get return loss is -33.3930 dB and in fabrication we get return loss -16.22dB dB. Also in simulation we get 10MHz bandwidth but in fabrication we get 80 MHz bandwidth.

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DESIGN OF WIRELESS PULSE OXIMETER MEASUREMENT AND LOGGING

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Abstract— One of the most crucial tasks for doctors is to monitor their patients' vitals over a stipulated amount of time, in order to notice patterns indicating to the patient's overall health. Provision of keeping track of particular health indicators in real time, irrespective of the location of the patient or the health provider, is a crucial milestone in bettering health care services. Up until today, pulse oximeters have been constructed as single modular devices, that is, both the assessment and display modules are integrated on a specific device, which bring several problems: First, those devices lack effective data management functions. Limited by dimensions, power consumption and cost, these devices are still quite primitive, making it hard to accumulate and handle data. Second, these devices evaluate data and view the results on a single device, so the design of buttons and screen will undoubtedly lead to the increase of size, power consumption and cost. Considering the amount of data collected is small, transmitting it wirelessly is beneficial and effective. Based on the layout of the traditional non-invasive oximeter and the method of near infrared spectroscopy measurement, a wireless pulse oximeter is proposed in conjunction with a temperature sensing module, employing customized hardware supporting Bluetooth 4.0 low energy technology; combining the smartphone application with hardware. The setup uses a chip - CC2650 - to regulate red light LED and infrared light LED lighting alternately, sample pulse wave signal with Analog-to- Digital Converter (ADC) and structure data in a custom frame format, then sends relevant information to a smartphone with BLE. The smartphone extracts information from data packets using digital algorithm, thereafter calculates the value of oxygen concentration and senses the temperature, then finally presents them through the smartphone application interface. The processed data is simultaneously stored onto a memory card. The customized hardware setup is analysed with respect to it's power consumption and sampling frequency of oximeter module, for different data rates.

Keywords— Bluetooth, BLE, pulse oximeter, healthcare, wireless, WPAN

I. INTRODUCTION

Sensor is a device which detects or measures a physical property (such as pressure, light, etc.) and records, indicates, or otherwise responds to it. The proposed embedded system implementation involves detection of temperature and light.

Pulse oximetry is a procedure used to measure oxygen level in blood. It is designed to be non-invasive, effortless, and a diagnostic measure of oxygen delivery to the finger.

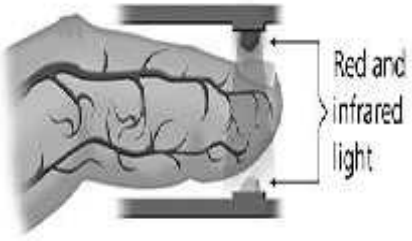

Fig.1. Pulse Oximeter

The oximeter is comprised of a sensing probe that attaches to a subject's finger and is connected to a data acquisition system for the calculation and display of oxygen saturation level. Deoxygenated haemoglobin allows more infrared light to pass through and absorbs more red lights. Highly oxygenated haemoglobin allows more red lights to pass through and absorbs more infrared light. The oximeter assimilates and gauges the amount of light at those wavelengths in accordance with the oxygen saturation (or desaturation) of the haemoglobin. The use of light in the absorbency measurement requires us to have a true "light-to-voltage" conversion using current as the input signal.

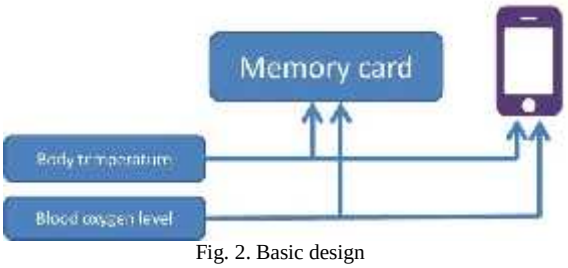

Fig. 2. Basic design

There are four challenges involved in the design, which is given as:-

- Real time data acquisition and logging.
- Sending the data to the mobile application via BLE.

- Designing a mobile application.

The controller periodically reads the temperature and the oxygen level data from the sensors and logs the same into the memory card. The frame format is employed for arranging the different data into the memory card and for the data packets used while transmitting to the mobile via BLE. This is helpful for the application to distinguish and interpret the data and process it accordingly.

In this paper, we examine the effect of throughput on power consumption for varying data rate. Ref [1], [2], [3] and [4] are papers are based on similar themed healthcare appliances, with fewer utilities.

II. BLE

Table 1 - Comparison of different wireless networks for healthcare

Technology/parameter	IEEE 802.11	Bluetooth	Zigbee
Range	100m	~10-50m	~10m
Cost	High	Low	Medium
Complexity	High	Medium	Low
Power consumption	High	Medium	Low
Size	Large	Small	Smallest

For low power requirement, Zigbee and Bluetooth are the contending options. Zigbee has two major disadvantages when it comes to implementation: it requires licensing, and it cannot connect to a smartphone. Hence, it is not suitable for an academic project.

Bluetooth is not the optimal wireless technology for wireless sensor systems. The main disadvantages of the traditional Bluetooth wireless technology are:

1. a very high power consumption of transceiver chips
2. a suboptimal timing behavior, e.g. long time duration for the connection setup time
3. a very complex protocol stack which results in the need of large memory allocation
4. large data packets with huge overhead during wireless transmissions

The size of the protocol stack is a significant difference between Bluetooth Classic and BLE. The size of the protocol stack of BLE is rather small compared to Bluetooth Classic. The complexity was reduced to obtain stack that doesn't demand too many resources for sensor node applications. Furthermore the separation between controller layers and host layers is realized. The stack can be realized on a single microcontroller due to its simple configuration. This leads to the fact that many transceiver manufacturers support the developers and researches with software stacks for free.

Another difference between BLE and Bluetooth Classic is the possible state machine. Fig. 4 shows the state diagram of the Logical-Link-Layer of a Bluetooth transceiver. It also depicts the state diagram of a BLE transceiver for comparison.

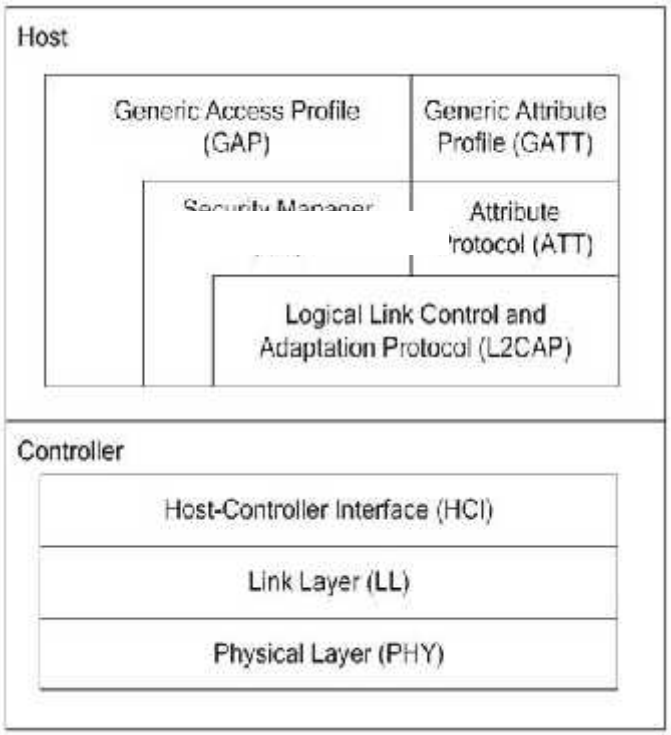

Fig. 3. BLE Stack

Reasons. The state machine of a BLE device has been kept very basic.
In the "Advertising State" BLE devices (so called advertisers) can transmit connectionless data like a broadcaster to scanning devices. Furthermore advertising BLE devices can indicate to scanning and initiating devices that they are accessible to go into a fixed connection. Only three of 40 data channels are used for the advertising communication. A device in the "Scanning State" (a scanner) and "Initiating State" will listen for packets from a specific advertising device. This device will than acknowledge these packets to initiate a new connection. A device in the "Connection State" is called being in a connection. There are two different roles within a "Connection State". These roles are named as "Master Role" and "Slave Role". When changing from the "Initiating State" to the "Connection State" the device has the Master Role. When entering the "Connection State" from the "Advertising State" the device fulfills the Slave Role. Important to know the Master defines all timings of the transmission.

III. IMPORTANT PARAMETERS

A. Connection Interval

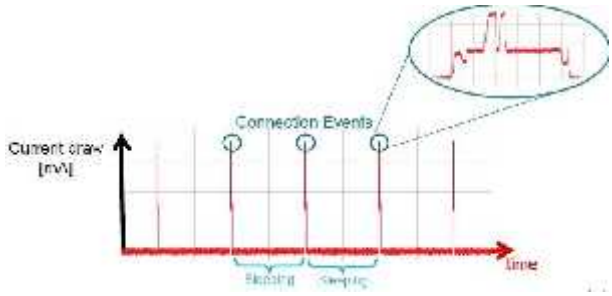

Fig. 4 - Connection interval

Peak current plays a part in the total power consumption, a device running the BLE stack will only be consuming current at the peak level while it is transmitting. Even in very high throughput systems, a BLE device is transmitting only for a small percentage of the total time that the device is connected.

B. Sampling Rate

The Sampling Rate determines the speed of the reading i.e. how many readings are taken per unit time. Eventually all the readings taken are averaged, to give the final value. So, the higher the sampling rate, higher is the accuracy of the reading received.

C. Data Throughput

In data transmission, network throughput is the amount of data moved successfully from one place to another in a given time period, and typically measured in bits per second (bps), as in megabits per second (Mbps) or gigabits per second (Gbps).

D. Power Consumption

The amount of current drawn by the crude implementation during reception and transmission is an indicator of how power efficient the system is.

We can identify the following trade-offs that influence the device performance:

1. Connection interval vs Power consumption: The shorter the connection interval time period the higher is the power consumption of the device.

2. Data throughput vs. Power consumption: The shorter the connection interval time period the higher is the data throughput of the device.

3. Sampling Rate vs. Power consumption: The faster the data acquisition rate or higher the accuracy we would want, more is the power consumption of the device.

IV. IMPLEMENTED SYSTEM

Fig. 5 describes the conceptual block of the modules which have been used for temperature and blood oxygen level measurement and logging. Fig. 6 describes actual set up of the modules which have been used for temperature and blood oxygen level measurement and logging. Fig. 7 shows the physical connection setup with respect to power supply.

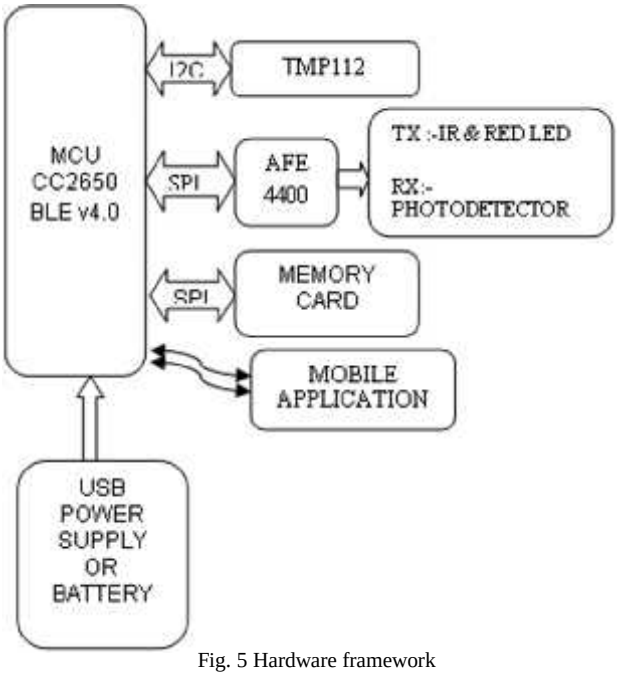

Fig. 5 Hardware framework

A. TMP112

TMP112 [5] is a low power digital temperature sensor especially designed for body temperature measurement with the accuracy of 0.5 degree Celsius. Ground pad and body of chip is thermal conducive. Resolution has been set to 12 bits. The voltage range for which it works is 1.4V – 3.6V. Oneshot/ConversionReady mode is used. The connection is achieved using I2C communication, the frequency of which is set at 400 kHz.

B. AFE4490

AFE4490 [6] is an analog front end IC specially designed for the pulse oximeter application. It is interfaced with the MCU over the SPI interface. It has 22 bit ADC resolution. It has integrated LED driver with the H-bridge, Push or Pull configuration. It has provision for the external 8 MHz crystal for timing accuracy to control the ON time of the LED. It is used to control the intensity and ON duration of the LEDs as well as to amplify, filter and read the signals from the photo detector. Power down mode is used to reduce power consumption and to provide flexibility to use on battery also. Clock frequency for SPI is set at 4MHz, and 4 wire SPI interface is used.

C. Memory Card

It is a generic micro SD card which is used for logging the data value. It has FATFS file system used for storing the data into the memory card. It is interfaced with the MCU over the SPI interface.

D. Power Supply

The system is presently powered by using three AA batteries in series i.e. 4.5V.

E. MCU

CC2650 [7] is a 32 bit ARM cortex controller with a dedicated ARM cortex M0 which runs the BLE and a dedicated ARM cortex M3 is used extensively for running application. It has maximum clock frequency of 48 MHz. It has enhanced peripheral support with various options for 16 bit and 32 bit timers giving much option for the application developers to invoke some critical task by timer interrupts. It has almost 31 GPIOs giving much flexibility for designing the hardware and interfacing the external sensors. It has special sensor controller region which can work autonomously when configured to extract or communicate with the external or internal sensors even when the main application is in sleep mode thereby increasing the battery life of the system. It has the comparatively lower power consumption profile in BLE standards. It has capacitive sensing functionality on its GPIO pins.

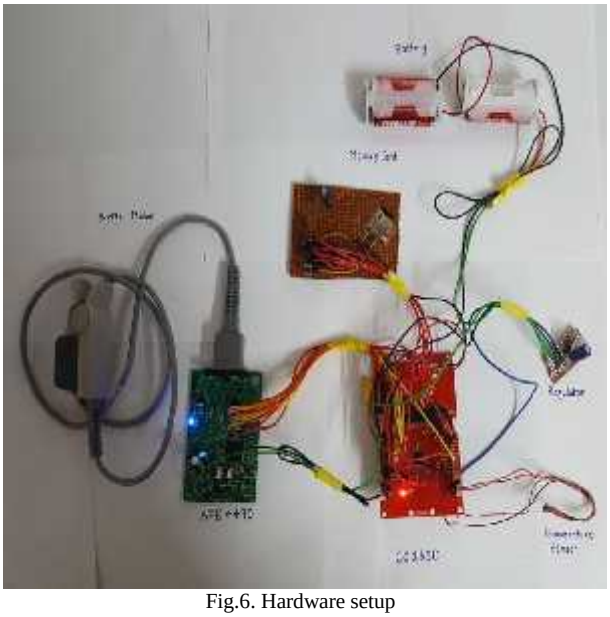

Fig.6. Hardware setup

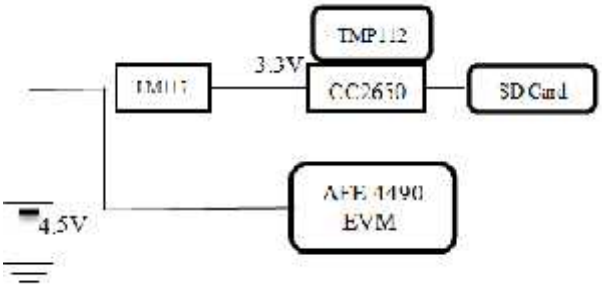

Fig. 7 Power supply connection of setup



Fig. 8- iOS app designed for communication with crude implementation

V. OBSERVATIONS

Battery strength : 1000 mAh

Advertising consumption : 21.122 mA

Throughput: 20 bytes (temperature data), 20 byte (SpO2 data)

Table 2 - Current draws of CC2650 at maximum throughput

Connection interval (msec)	**Connected (mA)**	**Connected + Notifications (mA)**
100	20.9578	21.42
500	20.875	21.1397
1000	20.8617	21.007

Table **3** - Current draw of AFE4400

Sampling rate (Hz)	**Current draw (mA)**
500	19.2
1500	35.5
2500	53.8

Table 4 – Power consumption vs. Sampling rate, for varying data rate

Parameters		**St**		**Battery life**	
Conn. int.	***Sampling rate***	***Conn.***	***Conn. +***	***Conn.***	***Conn. + Notif.***
100	500	40.157	40.6	24.9017	24.6184
	1500	56.457	56.9	17.7123	17.5685
	2500	74.757	75.2	13.3765	13.2943
500	500	40.07	40.339	24.9532	24.7894
	1500	56.37	56.639	17.7383	17.6554
	2500	74.67	74.939	13.3913	13.3440
1000	500	40.0617	40.207	24.9615	24.87129
	1500	56.3617	56.507	17.7425	17.69692
	2500	74.6617	74.807	13.3937	13.36773

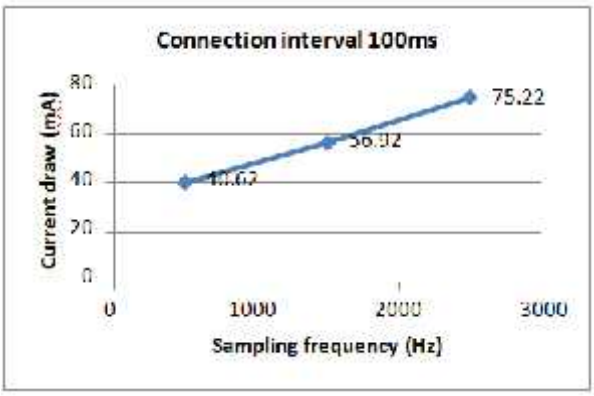

Fig. 9 - Power consumption v/s Sampling rate, for connection interval of 100ms

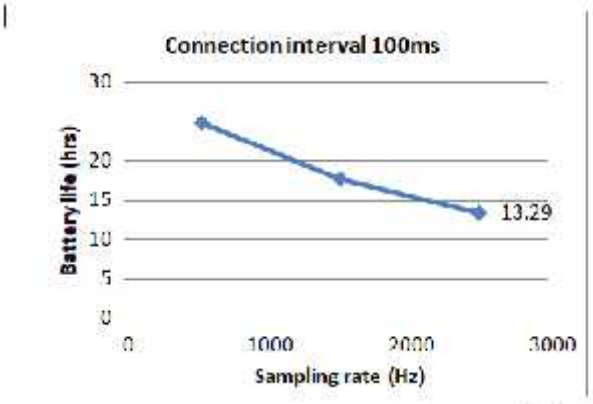

Fig. 10- Power consumption v/s Sampling rate, for connection interval of 100ms

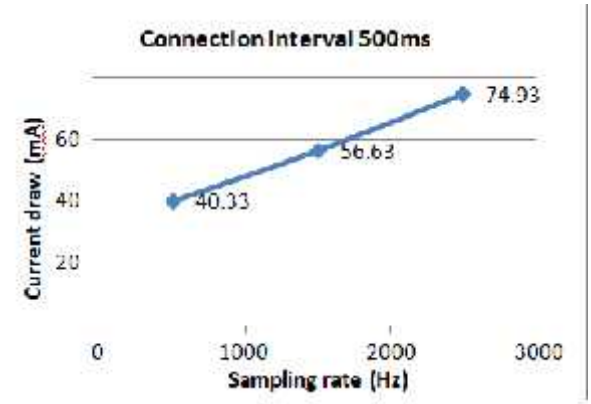

Fig. 11 - Power consumption v/s Sampling rate, for connection interval of 500ms

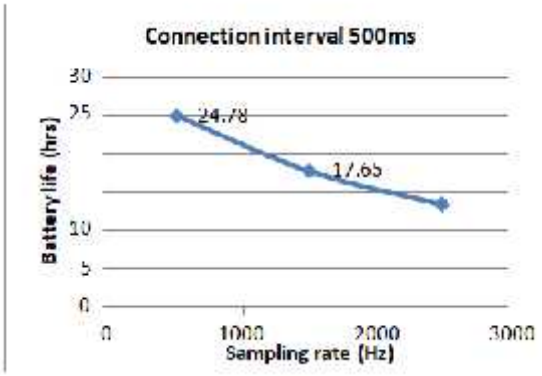

Fig. 12 - Expected battery life vs. Sampling rate, for connection interval of 500ms

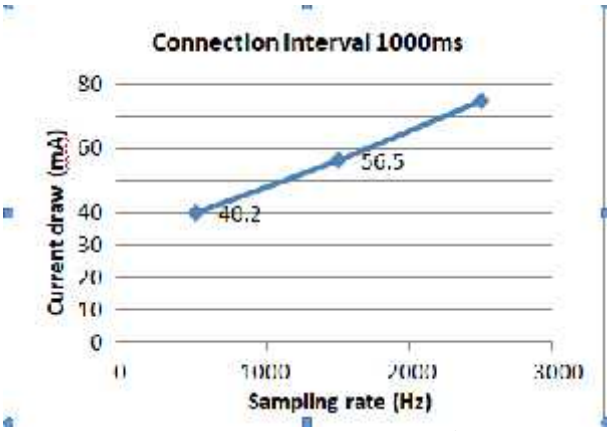

Fig. 13- Power consumption v/s Sampling rate, for connection interval of 1000ms

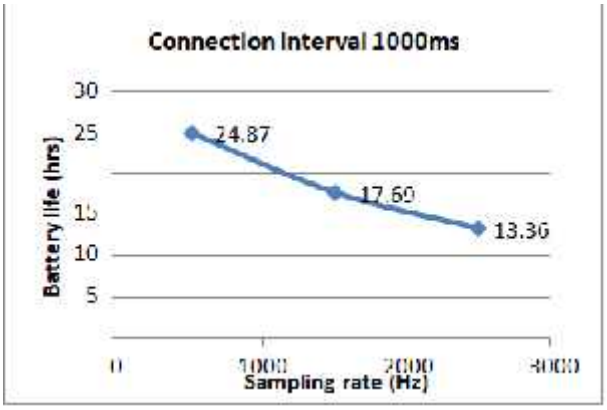

Fig. 14 - Expected battery life v/s sampling rate, for connection interval of 1000ms

VI. CONCLLUSION

The power consumption profiles for connection interval values of 100ms, 500ms and 1000ms have been observed at maximum throughput. The observed peak current values are higher than implementations in [1], [2], [3] and [4], because the sampling rate, and thus consequently, the accuracy is higher.

For previous research paper [8], observations had been made at minimum throughput setting. Capturing power consumption profiles at both, minimum and maximum throughput thus helps to estimate the range of BLE power consumption for given setup.

Table 6 – Relative change in BLE power consumption over throughput range

Connection interval (msec)	**Relative change in BLE power consumption (%)**
100	1.410851
500	1.146871
1000	0.621731

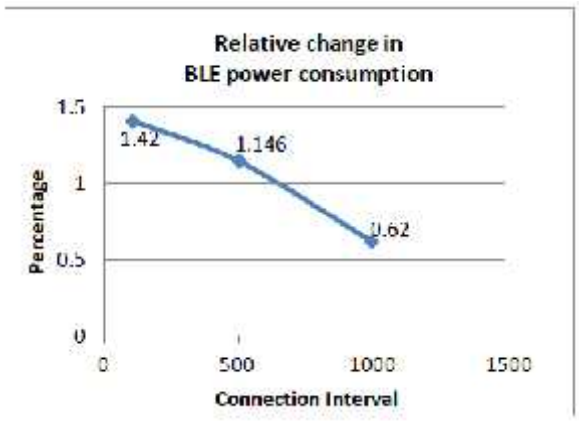

Fig. 15- Relative change in BLE power consumption over throughput range

Future scope of this crude implementation is in tele-medicine. In order to be able to convert this crude implementation into a successful product, investment in security reinforcement and cloud computing is necessary. Incorporation of Internet of Things technology would also be greatly beneficial for better monitoring of patients.

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A Review on Emerging IOT Solution In Market place From Industrial Perspective

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***Abstract*- Internet of things is dynamic global network having several components like RFID , Sensors & actuators & other instruments such as smart appliances that are becoming an integral part of future internet. A number of IOT solutions are provided by startups, small & medium enterprises, academic research institution, and private & public research organization making their way to market over the last decade. The purpose of this paper is to make survey on number of IOT solutions in market place based on trends, functionalities & applications. Apart from that focus is concentrated on to identify the trends, opportunities & open challenges in the industry based IOT solutions. The basis for classification is application domain we classify & discuss these IOT solutions under five different categories such as smart wearable, smart home, smart city, smart environment & smart enterprise. The main objective of this survey is to provide guidelines & conceptual framework for future research in the IOT & motivate & inspire further developments. It also emphasis on systematic exploration of existing research and potentially suggests number of significant research directions.**

***Keywords-Internet of things, Industry based* IOT solution, Smart enterprise.**

I INTRODUCTION

Internet of things is Network of network which can be formed by connecting massive numbers of objects, things, sensors & devices through communication & information infrastructure to provide value added services. The internet of things is simply allows people & things to connect anytime anyplace with anything & anyone. The main concern is connectivity to fulfill the vision of IOT. There are number of surveys conducted on IOT domain The base of these surveys depend on application domain where we classify & discussion is made on these IOT solution under five different groups such as smart wearable, smart home, smart city, smart environment & smart enterprise. The details of the survey explain in literature review considering methodology platforms used & also their advantages & disadvantages. This summary serves as base for guidelines & conceptual framework for future research.

II LITERATURE REVIEW

In 2010 ICIT [5] A. Dohr, R. Modre-Osprian presents a paper on' The Internet of Things for Ambient Assisted Living 'in which Keep In Touch (KIT) has been developed as a technology for collecting & forwarding necessary (health) data. KIT is based on RFID in Combination with Near Field Communication (NFC) & mobile phones. The system has several advantages such as No manual interaction (data entry via keypad) on the mobile phone is necessary. The effort for maintenance & management of devices in comparison to other methods (e.g Bluetooth) is low .It traditionally provides access to data stored on RFID Tags. It is suitable only for short-range communication between smart objects & KIT.(NFC 4 cm & RFID 100m) In 2013 IEEE[6] Elena I. Gaura, James Brusey presents a paper on' Edge mining the Internet of Things. 'in which Edge mining takes place on wireless, battery powered smart sensing devices that sit at the edge of internet of things. The application developer is not constrained in terms of platform or programming language—we have already deployed G-SIP edge mining systems on platforms as diverse as: Python on embedded Linux; Tiny OS on Telos motes; and Z-Stack on TI 8051.There are certain advantages in edge mining such as reduce the number of packets that must be sent, reducing energy usage & remote storage requirements also edge mining has the potential to reduce the risk to personal privacy through embedding of information requirements at the sensing points & limiting in appropriate use. Further work to continue to validate the edge mining approach, particularly to identify further applications that can benefit from current edge mining algorithms and develop new edge mining algorithms for new applications.Network Self Organization in the Internet of things.2013 IEEE[[3]Arjun P. Athreya and Patrick Tague has the goal of self-organization is to ensure connectivity of all network nodes to a data collector in a homogeneous network. The self organization involves grouping network nodes into clusters and then interconnecting clusters to a data Collector using multi-hop communications. Network availability to support IoT applications even during distressed times means that the common goal of Interaction among devices will still continue to hold good. Data from these devices during the times of distress allow for monitoring the environment's functioning and allow for command and control operations Prevent cascading effects of other environments failing if the data from current distress environments can reach in a timely manner for troubleshooting. In 2013IEEE [7] Meonghun Lee1, Jeonghwan Hwang2, and Hyun *Yoe3* describe Agricultural Production System based on IoT This paper designed the IoT-based monitoring system to analyze crop environment, and the method to improve the efficiency of decision making by analyzing harvest statistics Therefore, this paper developed the decision support system to forecast agricultural production using IoT sensors. This system was also a unified system that supports the processes sowing Seeds through selling agricultural products to consumers also paper designed a agricultural production system for the agricultural production using IoT technology and implemented it as GUI visualization software. The IoT-based agricultural production system has built on the long-standing desire of farmers to ensure their land remains productive into

the future. It also addresses the community's expectations and concerns for safe food and forenvironmental Protection. System has certain limited sensor set for specific crop analysis, lack of intelligence model

In 2013 P. Pyykönen*, J. Laitinen, J. Viitanen [8] depicts IoT for Intelligent Traffic System. which is implemented using road side units (RSU) with friction monitoring vehicles with environmental sensors and a database for data transfer through different platforms. The system is able to collect sensor data from stationary RSU stations or moving vehicles and store it to the database. The test results indicate that the developed IcOR friction monitoring unit is able to distinguish the different road weather categories (ice, snow, wet and dry asphalt) with Sufficient accuracy. Communication is implemented using a V2I/I2V IEEE 802.11p communication between RSUs and Vehicles or 3G/4G mobile connections. System has advantages such as Novel intelligent traffic model to provide real time information. Efficient applicability and functionality & easy way to connect sensor to system. Further can developed for route planning. More intelligent calculations using sensor can be estimate & lack of warning system.

In 2014 IEEE [9] 'Internet of Things for Smart Cities 'Andrea Zanella, Senior Member, IEEE, Nicola Bui, Angelo Castellani, Lorenzo Vangelista, Senior Member, IEEE, and Michele Zorzi, Fellow, IEEE presents paper is to discuss a general reference framework for the design of an urban IoT. Describe the specific characteristics of an urban IoT, & the services that may drive the adoption of urban IoT by local governments. The discussion by reporting our experience in the "Padova Smart City" project, which is a proof-of-concept deployment of an IoT island in the city of Padova (Italy) & interconnected with the data network of the city municipality. Platform such as web service approach protocols, and architecture for an urban IoT. Constrained Application Protocol (CoAP),Efficient XML Interchange (EXI), Network architecture,sensor system integration, service functions & management. In 2014 D.T.Young, C.L. Muller,P. Rose ,C. Lucas, J. Walden[10]International Road Weather conference discuss 'Winter Road Maintenance & the Internet of Things 'in which they presents on winter road maintenance has been adopt with coping with technological change with the various data stream historically managed by bureaus and, more recently, Sophisticated decision support systems. This paper describes the establishment of a winter maintenance demonstration corridor and corresponding IoT hub within a wider meteorological testbed in Birmingham, UK.. Metrological sensor network used, low cost air temperature sensor, Wi-Fi communication network, prototype model used for testing. aim of prototype is to access feasibility and ultimately the utility of data. The need to be able to change local settings for long term compatibility, as well as security / encryption / firewall issues make these largely unsuitable for such a task Likewise, batteries are very much a short term solution and other energy harvesting techniques (e.g. solar) provide a more sustainable, but significantly more expensive, solution The cost of deployment as well as ongoing maintenance and calibration costs is also significant. Article in MDPI journal 2016 Effective Sensor Selection and Data Anomaly Detection for Condition Monitoring of Aircraft Engines by Liansheng Liu, Datong Liu, Yujie Zhang and Yu Peng *[11] In a complex system, condition monitoring (CM) can collect the system working status. The condition is mainly sensed by the pre-deployed sensors in/on the system. we study a new scheme which includes sensor selection strategy & data anomaly detection by utilizing information theory and Gaussian Process Regression (GPR).Sensors used for aircraft CM Gaussian Process Regression (GPR) for anomaly detection..In this article we present one typical problem in engineering, which is how to select sensors for CM. Compared with the observing sensor selection method, the quantitative sensor selection method is more suitable for system CM and data anomaly detection. The effectiveness is expected to enhance the reliability and performance of system CM .In future work we will focus on how to utilize multidimensional data sets to carry out anomaly detection..The anomaly detection accuracy is expected to be further improved.In 2015(IEEE) Omer Berat Sezer, Serdar Zafer presents on [12]' Development of a Smart Home ontology & The Implementation of A Semantic Sensor Network Simulator: An Internet of Things approach. In this paper we present a smart home sensor ontology we developed that is a specialized ontology based on the Semantic Sensor Networks.(SSN) ontology We also present a simulation environment we developed for a smart home case using our ontology and presents early performance results. Based on the SSN and simulated the use of our ontology in the application program. We developed using Java, Active MQ RDF and Sesame Framework. The SSN ontology can describe sensors in terms of capabilities, measurement processes, and observations deployments. However it does not include metric terms about qualities(temperature, location, distance etc.).A Unified Semantic Knowledge Base for IoT Akshay Uttama Nambi S. N. Chayan Sarkar, R. Venkatesha Prasad [13]' 2015. (IEEE) presents Semantic Modeling is a key catalyst to support interoperability. In this work, They present a unified semantic *knowledge base* for IoT that uses ontologies as the building blocks. Most of the current ontologies for IoT mainly focus on resources, Assists in more accurate knowledge representation for IoT entities and .build upon, and extend the existing ontologies for IoT to support heterogeneity and seamless interoperability among entities .This unified knowledge base can be used by researchers for semantic service- composition, discovery and modeling for IoT in dynamic environments. Plan to exploit this unified knowledge base for developing an approximate service matching algorithm in real world environment.In 2015.IEEE[14] Adnan Akbar, Francois Carrez, and Klaus Moessner[' presents a paper on' Predicting Complex Events for Pro-Active IoT applications'. In their work they have explored a proactive approach by exploiting historical data using machine learning methods for prediction with CEP. They propose an adaptive prediction algorithm called adaptive Moving Window Regression (AMWR) for dynamic IoT data and evaluated it using a real-world use case. The platform for this work done using CEP (Complex event processing) and ML for IoT applications. The advantages of this propose a framework based on ML and CEP for predicting complex events for proactive IoT applications. They propose an adaptive prediction algorithm for dynamic IoT data streams and evaluated their method on a real-world data set & show that their proposed algorithm achieves an accuracy upto 90 %..

Further approach on high velocity data as well as on other IoT scenario are suggested.

In 2016.IEEE [15]'* Jongmin Lee ,Michael Stanley, Andreas Spanias, and Cihan Tepedelenlioglu presents a paper on Integrating Machine Learning in Embedded Sensor Systems for Internet-of-Things Applications in which they consider sensor data analytics where machine learning algorithms can be fully implemented on an embedded processor/sensor board.. They develop an efficient real-time realization of a Gaussian mixture model (GMM) for execution on the NXP FRDM-K64F embedded sensor board. They show the comparison of the resulting GMM Estimation at FRDM-K64F in real time and the estimates obtained by MATLAB off-line. They argue that the integrated. Sensor hardware and machine learning software has several benefits including enabling the sensor system to be continuously trained and retrained providing real-time analytics directly from the board, scalability in that the algorithms can also operate with attached heterogeneous sensors, reduction of sensor data traffic and potentially enhanced privacy by communicating parameters instead of raw data .In 2016 IEEE[16] Dongjun Kang, SeungHwan Kim, Tacklim Lee presents a paper on Energy Information Analysis Using Data Algorithms based on Big Data by platform in which they find out the optimal algorithm that efficiently manage the energy data based on Big data by comparing data which is analyzed using three algorithms The architecture depicts the process of data collecting, cleaning,& analyzing. Data is collected through the installed test-bed, and for better accuracy. Unnecessary data goes through the process of cleaning. Through Python, the cleaned data is then analyzed through three algorithms Decision Tree, Ridge Regression & Support Vector Machine. It helps in reduce the size of data, use for efficient energy management & Better accuracy with improved speed.The future work Can been seen to analyze system performance using other ML algorithms.

In 2016[17] M. Mazhar Rathore , Anand Paul , Awais Ahmad, Suengmin Rho Urban(Computer Networks Journel presents a paper on' Urban planning and building smart cities based on the internet of things using big data analytics' In this paper they propose a combined IoT based system for smart city development and urban planning using Big Data analytics. They also proposed complete system which consists of various types of sensors deployment including smart home sensors, vehicular networking, weather & water sensors, smart parking sensors & surveillance objects, IOT platform in A four tier architecture is proposed which include Bottom Tier which is responsible for IoT sources, data generations, and collections Intermediate Tier I that is responsible for all type of communication between sensors, relays, base stations ,the internet, etc Technology such as Zigbee Wi-Fi,3G/LTE/3GPP,WiMax & Ethernet are used. IntermediateTier II it is responsible for data management & processing using Hadoop framework. Top tier: is responsible for application & usage of the data analysis and results generated. The system efficiency is measured in term of throughput and processing time. System performance further analyzed using various platform.

Article in MDPI Journel 2016 [18] Data Analytics for Smart Parking Applications by Nicola Piovesan,, Leo Turi, EnricoToigo, Borja Martinez and Michele Rossi suggest the real-life smart parking systems where parking lot occupancy data are collected from field sensor devices and sent to backend servers for further processing and usage for applications. Our objective is to make these data useful to end users, such as parking managers & ultimately to citizens. The deployment is comprised of N-370 wireless sensors, where a node is located underneath each parking spot. Data were collected for six full months, An event-based simulator was built with the aim of designing the classification algorithms and Performing their fine tuning. Representative of real parking patterns. Real data, from a commercial deployment, were used to understand the peculiarities of real-world parking events and then assess the effectiveness of selected classification approaches, namely k-means, expectation maximization clustering and DBSCAN. An original classification algorithm, based on self-organizing maps, was also proposed and proven to be superior to existing techniques, especially as concerns the detection of outliers. The present work is a first step toward data mining for smart parking applications, but several questions remain open to further explorations They in fact believe that parking traces, besides being meaningful to street parking applications, also contain relevant information about how people behave, how neighborhoods are used (e.g., residential versus commercial) and may also reveal interesting facts about mobility help implement traffic management Solutions, etc. They leave these points open for future research.

In 2017[19] Parag Chatterjee, Ricardo Luis, Armentano Leandro, Javier Cymberknop presents a paper in International Conference on Machine learning and Data Science on Internet of Things and Decision Support System for ehealth applied to Cardio metabolic Disease This work discusses a specific aspect of this emerging field of IoT -based health related to remote patient monitoring system applied to cardio metabolic diseases. Such system counts significant towards decision support systems thanks to its efficient data analytics, enabling medical personnel to have a holistic visualization of the healthcare scenario. Two different condition dataset is prepared including the physiological parameters age,sex, systolic blood pressure, diastolic blood pressure, LDL cholesterol, HDL cholesterol, smoking habits, diabetes and body mass index (BMI), where the two parameters, smoking and diabetes, have only binary values to represent yes or no. Performing a k-means clustering on this dataset. IoT can significantly improve quality of life for the surging number of elderly people. An automatic and at -home procedure for assessment would reduce these costs significantly. Decision Support Systems loaded with the analysis logic could act as an assistive tool to the medical Professionals while suggesting treatment plans for their patients Also this makes personalized healthcare possible, Thus, IoT-based ehealth clubbed with data analytics opens newer frontiers to medical analysis and remote healthcare, thereby supporting efficient early detection and treatment with respect to public health. It Can be further analyzed on different ML algorithms. In 2017. (IEEE Journal) [20] An Ingestion and Analytics Architecture for IoT applied to Smart City Use Cases by Paula Ta-Shma, Adnan Akbar, Guy Gerson-Golan, They propose the hut architecture, a simple but scalable architecture for ingesting and analyzing IoT data, which uses historical data analysis to provide context for real-time analysis. They implement their open source components optimized for big data applications and extend them where needed. They demonstrate their solution on two real-world smart city use cases in transportation and energy management. They implemented a version of the Madrid Traffic use case on the IBM Bluemix platform, together with

collaborators from the IBM Bluemix Architecture Center. Bluemix is IBM's PaaS offering, providing micro services for the main components used in our hut architecture instance (Node-red, Apache Kafka, Apache Spark and Open Stack Swift).Their experiments using the hut architecture extend existing solutions by providing simple but integrated batch and event processing capabilities. it can also be applied to many other IoT scenarios such as monitoring goods in a supply chain or smart health care. A major benefit of adopting such architecture is the potential cost reduction at both development and deployment time by using a common framework for multiple IoT applications and plugging in various alternative

components to generate variations as needed. In future, they aim to evaluate their architecture on additional IoT applications where knowledge about complex events can contribute to more innovative and automated solutions. Furthermore, they intend to improve the process of automatic generation of threshold values by considering other machine Learning algorithms .They also plan to make their system more context-aware by ingesting and analyzing social media data.In 2017[21] an efficient approach for outlier detection in big sensor data of Health care. Research Article in wileyonlinelibrary.com/journal by Bharti Saneja & Rinkle Rani This paper proposes an outlier detection approach based on correlation and dynamic SMO (sequential minimal optimization) regression that is scalable to big data. Initially, correlation is used to find out strongly correlated attributes and then the point anomalous nodes are detected using dynamic SMO regression.For fast processing of big data, Hadoop MapReduce framework is used.. Experiments are performed on Dell Workstations T-5600 with INTEL Xeon e5 processor and 8 GB RAM. Java API of Weka is used for prediction, and parallel computation is done using multimode Hadoop cluster. The proposed approach efficiently detects the point anomalies as well as contextual anomalies. to cope with volume and velocity of data and to reduce the false alarm rate. So in future the proposed work .can be explored for anomaly detection from large datasets having nonlinear relationships. Also, in the proposed approach, static window size is considered, and in future, the concept of dynamic window may be used for better storage efficiency.In 2017(IEEE) [22].Understanding and Personalizing Smart City Services Using Machine Learning, the Internet-of-Things and Big Data by Jeannette Chin, Vic Callaghan, Ivan Lam. This paper explores the potential of Machine Learning (ML) and Artificial Intelligence (AI) to lever Internet of Things (IoT) and Big Data in the development of personalized services in Smart Cities. They do this by studying the performance of four well-known ML classification algorithms (Bayes Network (BN), Naïve Bayesian (NB), J48, and Nearest Neighbor (NN)) in correlating the effects of weather data especially rainfall and Temperature) on short journeys made by cyclists in London.. The data sets were provided by Transport for London (TfL) and the UK Met Office. They employed a random sample of some 1,800,000 instances, comprising six individual datasets, which we analyzed on the WEKA platform. The results revealed that there were a high degree of correlations between weather -based attributes and the Big Data being analyzed. Notable observations were that, on average, the decision tree J48 algorithm performed best in terms of accuracy while the kNN IBK Algorithm was the fastest to build models. Based on the results it was concluded that the kNN algorithms was not suitable for Small computations, such as IoT applications, due to the time required to train the algorithm and attributed to "cold start" constraint whereas decision tree algorithms were well suited for applications where accuracy was important.

In 2017[23] Predictive Analytics for Complex IoT Data Streams by Adnan Akbar, Abdullah Khan, Francois Carrez, and Klaus Moessner IEEE Internet of Things Journel. The implementation was done in python using Scikit -learn module The event collector module of CEP is listening to events and as soon as new events are available, it collects them, performs pattern matching using CEP engine and produces the complex events. The performance of the Prediction algorithm was validated on traffic data with accuracy up to 96%. Our experiments of using ML based predictions combined with CEP have shown an extra advantage on existing solutions by providing early warnings to traffic administrators about traffic events with high accuracy and given the generality of the Proposed architecture In future, they aim to evaluate our architecture for other IoT applications where early predictions about complex events can contribute to proactive solutions.

In IEEE 2017 [24] Weather Data Analysis and Sensor Fault Detection. Using An Extended IoT Framework with Semantics, Big Data, and Machine Learning by Aras CanOna, Omer Berat Sezer, Murat zbayoglu, Erdogan Dogdu. In this study, we used our Big Data IoT Framework in a weather data analysis use case. We implemented weather clustering and sensor anomaly detection using a publicly available dataset. We provided the implementation details of each framework layer (acquisition, ETL, data processing, learning and decision) for this particular use case. Our chosen learning model within the library is Scikit-Learn based k-means clustering. The data analysis results indicate that it is possible to extract meaningful information from a relatively complex dataset using our framework The CSV file is produced by using Node.js..fter producing file, Python script which is written for clustering is called by Node server. This script reads previously created file and the results are produced. Since the dataset does not have label, k-means unsupervised clustering method is employed in the Learning layer. Python-shell is used for running Python script. Possible Sensor faults and anomalies are emerged with using clustering method. This use case allowed us to present an example of how such a IoT Big Data framework can be used for such implementations. Can be further analyzed on different ML algorithms.

In 2017 IEEE [25] Petroleum Analytics Learning Machine' For Optimizing the Internet of Things Of Today's Digital Oil Field-To-Refinery Petroleum System 'by Roger N. Anderson,

IEEE International Conference on Big Data (BIGDATA) The Petroleum Analytics Learning Machine (PALM) is a machine-learning-based, "brutally empirical "an alysis system for managing the Internet of Things (IoT) in Upstream and midstream oil and gas operations. PALM was developed in the new unconventional shale oil and gas plays of America where the simultaneous analysis of hundreds of IoT attributes from hundreds of horizontal wells with thousands of hydraulic fracture stages must be analyzed in near real -time. PALM is a Lean Management software suite for the energy industry PALM utilizes Support Vector Machines, time-signatures, and real-time random forest and decision trees to maximize the performance of oil and gas wells and pipeline systems through the IoT. PALM uses open source algorithms programmed into Apps to apply machine learning, artificial intelligence, &

Weights and predicted oil, gas, and water production allows the forecasting of accurate Estimated Ultimate Recovery (EUR) over the lifetime of each well. Accurate EUR is key to planning oil, gas, & also water production, so that Adequate Return on Investment can be calculated. Operationally, volumes of water to be produced tomorrow can be anticipated

[8] trucks scheduled for hauling off the produced water. On the profit side, pipeline commitments for tomorrow's oil and gas can be pre-scheduled, & if necessary, rail transportation of liquids can also be booked, & refinery plans scheduled. Lowering costs and increasing profit are tied to better production as the result of using 'Big Data' machine learning

[9] multi-dimensional analyses techniques within PALM to teach quantitatively engineers and scientists to better integrate all relevant data from geology, to geophysics, reservoir monitoring, rock properties, drilling, hydraulic fracturing, and production. Decisions can be made better, faster, and easier
within energy companies. Can be further analyzed on different ML algorithms.

In 2018 [26] Machine Learning with Internet of Things Data for Risk Prediction: Application in ESRD by Zeineb Fki and Boudour Ammar, Mounir Ben Ayed Our research works aim to develop non-invasive methods that predict risk for dialysis patient in End-Stage Renal Disease (ESRD) at a smart home care system based on Internet of Things (IoT). In this paper, we describe our work in progress to predict dialysis biomarkers from IoT sensors. To address this problem, we present our ongoing research to develop a modern data analytics Environment using machine learning techniques.

Platform for this used are Raspberry PI ,NI Myrio, Arduino

Ethernet. By working with internet of thing in dialysis context. They harness the power of the internet and sensors for improving access to health care. In this paper, they present their work in progress to solve the problem of disease risk prediction using machine learning with IoT applied to dialysis patient in ESRD. The focus was becoming fluent in the type of health care that best serves our region. First result shows that the prediction of biomarkers value using the IoT sensors approach is very promising. By new technologies of connected objects we are able to complement and enhance core therapy functions but we do not substitute dialysis. They are preparing for an increasingly intelligent future. But more work needs to be done. In the future, they intend to further enhance the healthiness and reliability of the framework by developing intelligent algorithms that is in compliance with strict hospital safety rules.

IV CONCLUSION

The IOT has the tremendous potential to increase the availability of information in a very fast way and is likely to modify companies and organizations in virtually every industry around the world. As such, finding ways to hold the power of the IoT is expected to play a major factor into strategic objectives of most of the industry. The main objective of this survey is to employ as guidelines & conceptual framework for future research in the IOT & motivate & inspire further developments. It also emphasis on systematic exploration of existing research and potentially suggests number of significant research directions.

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A Review of IoT and Computuational Intelligence in Smart transportation

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***Abstract* – The internet of things (IoT) aims to extend the internet to real-world objects, connecting smart and sensing devices into a global network infrastructure by connecting physical and virtual objects and applications that have become master with connected devices give rise to their utilization in all forms of a modern city. As the volume of the collected data increases, data processing is the most important part to handle this tremendous data, Machine Learning(ML) and deep learning techniques are applied to further improve the intelligence and the capabilities of an application. The field of smart transportation has influence many researchers and it has been approached with both ML and IoT techniques. In this review, smart transportation is considered to be an Integrated term that covers accident prevention/detection, road anomalies. The purpose of this title is to make a review of ML, Deep learning techniques and IoT applications in Smart Transportation Systems and obtain a clear view of the trends in the mentioned fields and determine possible coverage needs also this paper provides a descriptive review of recently published studies in this field, briefing the current achievements and challenges.**

Keywords – IoT, Machine Learning, Deep Learning, Artificial Intelligence, Smart Transportation

I. INTRODUCTION

Recent technological advancement has impacted a change in lifestylesuch as a field of IoT (Internet of Things). The applications of IoTarevast and innumerable.Up till 2022, the count of connected devices surpassed the globalpopulation [1] and the number keeps increasing exponentially in the future. With the number of devices increasing, the amount of data collected by those devices is increasing as well so,new applications developed that analyze the collected data to make meaningful correlations and possible decisions, whichlead to Artificial Intelligence (AI) via Machine Learning (ML), Deep Learningalgorithms. Artificial intelligence (AI), and machine learning(ML), deep learning (DL) has seen a huge pace inrecent years. This growth has been influencing theadvancement in computing power. AI is "an area ofcomputer science that deals with giving machines the ability to look like they have own brilliance. Since mobility and transportation are important for a city to function properly, an innovative traffic and transportation infrastructure should be developed to save resources, improve efficiency and provide access to various services. Traffic problems are always increasing, and future cities can only truly be smart if they enable Smart Mobility. This concept is becoming more and more important since traffic congestion caused by the increasing number of people using different road infrastructures to travel to places are imposing extra costs that make all activities more expensive and put a constraint on the development. Smart Transportation applications such as smart parking and road traffic management, road anomalies, Traffic light detection, and sign detection are starting to be widely deployed around the world, bringing benefits to the cities, a better quality of life, reduced costs and more efficient energy usage.

This paper is organized as follows: Section II introduces the concept of IoT. This section briefly describes IoT key elements, application and challenges followed by Section III widely used algorithms, technologies & programming languages used for machine learning are explained. Subsection A will focus on references that use ML algorithms to support Smart Transportation. Subsection B covers all the deep learning algorithms. In subsection C, Machine Learning and IoT applications in smart Transportation are explained. Finally, the concluding remarks are presented in Section III.

II. INTERNET OF THINGS

In IoT terms, every connected device is nothing but a thing. Things normally consist of physical sensors, actuators, and an integrated system with a microprocessor or controllers. In IoT things get to communicate with each other is the machine to machine communication. The communication between the devices depends upon range short-range wireless technologies such as Wi-Fi, ZigBee or wide range technologies as WiMAX, LoRa and 5G play a vital role in smart transportation [2]. Due to the massive usage of IoT devices in all kinds of everyday life applications, it isessential to keep the cost of IoT devices

minimum. Along with this, IoT devicesable to handletasks like the data collection, machine to machine communication, and even some pre-processing of the datadepending on the application. Thus, it is necessary to find a balance in cost, processing power, and energy consumption when designing or selecting an IoT device. IoT is also tightly attached to"big data" since IoT devices continuously collect and exchange a huge amount of data. So, an IoTinfrastructure usually implements methods to handle, store, and analyze big data [3]. It has become acommon practice in IoT infrastructures, to use an IoT platform such as Kaa, Things board, Thing speak, to support the machine to machine communication, using protocols like MQTT, XMPP, and HTTP [4]. Additionally, IoT platforms offer monitoring,node management, data storing and analyzing,etc.

Depending on the application, it is sometimes necessary that someprocessing of data takes place in the IoT devices other than remotely located servers, nodes as it happens in the “cloud computing” structure. So, as the processing partially moves to the remote servers and some data analysis at the same sensor position, a new computing model is introduced, called "edgecomputing” [5]. However, since those devices are most of the time low-end devices, they may notbe suitable to handle enormous processing tasks. As a result, there is a need for an intermediate node,with enough resources, able to handle advanced processing tasks, physically located close to the endnetwork elements, to minimize the overload caused by massive sending of all the data tosome central cloud nodes. The solution came with the introduction of the new technology “Fog nodes” [6]. Fog nodeshelp IoT devices with big data handling by providing storage, computing, and networking services.Finally, the data are stored in cloud servers, where they are available for advanced analysis using avariety of ML techniques and sharing among other devices. Following are some of the great application of IoT.

Smart Homes:
In the smart home, all the devices, such as fridges, washing machines, or light bulbs, can communicate with each other or with predefined users via the internet, offering better monitoring and management of the devices as well as energy consumption optimization.

Health-care:
In health care, new devices have been developed to improve a patient's well-being wireless sensors can monitor state and report the data to thedoctor without the need for their physical presence. Also, sensors in the form of wearable devicesor small implants can track and report a wide variety of measurements, such as heart rate, blood oxygen level, blood sugar level, or temperature.

Smart Transportation:
Using sensors integrate to the vehicles, or mobile devices and devices installed in the city, it is possible to offer optimized route suggestions, easy parking reservations, telematics for public means of transportation, accident prevention and autonomous driving with numerous other application such as traffic light detection system, road anomalies.

Logistics and Supply Chain Management:
With the use of smart RFID tags, a product can be easilytracked from the production to the store, reducing cost and time significantly. Besides, smartpackaging can offer features such as brand protection, quality assurance, and client personalization.

Agriculture:
Will able to determine early stage nutrition deficiency, intelligent farming.

III. MACHINE LEARNING

According to the learning styles, machine learning techniques are broadly classified into supervised, unsupervised, semi-supervised and reinforced learning [8]. They are described here in brief.

1. Supervised learning – Supervised learning consists of input variables and an output variable. A supervised algorithmthen uses the training data to map inputs to the desired output. It is called supervised learning because it requireshuman interference in making predictions on the training data. The algorithm makes several iterations to get an acceptable level of output [3][4][11]. Supervised machine learning is classification and regression type.

- Classification – When the data is used to predict a category the data-point may belong to. For example, stating if an image is of an animal or a human. There can be two or more classifying categories.
- Regression – When the relationship between two variables needs to be defined and how the change in one variable affects the other, it becomes a regression model [12].

2. Unsupervised learning – A model is trained using unlabeled data where the model finds the structure on its own. Data is divided into clusters according to similarities and reducing the dimensionality makes complex data easy to analyze [11].

- Clustering – Grouping of variables into clusters according to some defined criteria and analysis is then performed in these clusters.

- Dimensionality Reduction – If the input data has high dimensionality, it becomes important to remove redundant, unwanted data.

3. Reinforcement learning– In this approach, the machine produces programs, called agents, through a process of learning and evolving. The agent learns from past consequences of its actions and selects the best possible solution through trial and error learning [8] [11]. Applications of this technique include Hidden Markov models [12].

4. Semi-supervised learning– The model can be trained using both labeled and unlabeled data. It is supposed to learn the structure and make predictions after organizing the data. Hence, it has some functionalities of both supervised and unsupervised learning [11].

A. Machine Learning Algorithms in Transportation

This section will focus on references that use ML algorithms to support Smart Transportation. The algorithms and their use will be thoroughly analyzed in the following subsections. In the following subsections, the mentioned ML algorithms are grouped by their algorithm type and they are briefly analyzed.

Ensemble

Ensemble algorithms address a problem, by training multiple classifiers and combining their results. In this way, the systems can use the weak classifiers which are easily constructed and gain the quality of a strong classifier [14].

In [13], the author Ghosh gives the idea to prevent road accidents by creating a framework to detect the driver's consciousness. The input data are collected by a camera fixed in front of the driver, to track eye movement and head nodding. Then, Human HAAR features [15] are selected from an extracted integral image, which becomes the input for the Adaptive Boosting algorithm. Ada Boost is nothing, but the ensemble algorithm used together with other weak classifiers to form a strong classifier.

The author Hou and sun [16] developed four models, to forecast short-term and long-term traffic flow in work zones. They compared the results of the method using the following three metrics: (a) Root Mean Square Error(RMSE), (b) Mean Absolute Error (MAE), and (c) Mean Absolute Percentage Error (MAPE). The results of this research showed that RF outperformed the implemented baseline predictor, the regression tree and a Feed-Forward Neural Network in all three measurements for both long and short-term dictions.

In [17], wong set goal is to identify road surface abnormalities. This is achieved by collecting data using accelerometer sensors with Arduino microcontrollers and then applies a set of feature selection and ML algorithms on the data. For the feature selection three techniques are used, Ranker, Greedy Algorithm, and Particle Swarm Optimization (PSO). Consequently, three ML algorithms are compared, k-Nearest Neighbour (kNN), RF, and Support Vector Machine (SVM).

In [18], the authors use RF in comparison with SVM and ANN, to detect road accidents. For the data collection a traffic simulation environment, SUMO [20] is used.

Finally, in [19], author neetha gives five ML algorithms are trained using a labeled set of data. The data consist of speed and location data and the label of whether the respective path was congested or not. The tested algorithms are RF, decision tree, MLP, SVM, and Logistic Regression and the evaluation was based on Precision, Recall, and Accuracy, and lead to the result that the Logistic Regression slightly outperformed the other methods due to the power of regression methods against time-dependent data.

Bayesian

A Bayesian network is represented by a Directed Acyclic Graph (DAG). A Bayesian network is a model that describes all the variables and their relationship. Thus, the observation of some variables in a Bayesian network can give information about the state of another set of variables in the network [21].

In [22], Colombaroni uses a method called Bayesian Network Seasonal Autoregressive Integrated Moving Average, to achieve short-term traffic forecasting. The implemented method is a combination of a Bayesian Network and an ARIMA model as an estimator. The results indicate that both deep learning algorithms and the Bayesian method offer similar results in short-term traffic forecasting.

Markov Models

Markov Models are stochastic sequence models based on probability distribution. The simplest Markov model is a Markov chain. Each state is represented by a probabilistic function of a state. Every HMM can be characterized by the number of the hidden states, the number of system outputs and the state transition probability distribution [23].

Marczukin his paper [24], face motion intention inference, by enabling a cooperative vehicle perception. With the vehicle's cooperative sensing, the perception range is increased, by better perception quality and enough response time for autonomous triggered actions. This is done using a simplified version of a Coupled Hidden Markov Model (CHMM). The model is trained by using velocity records of various driving profiles of a

vehicle sequence. A coupled HMM is a form of HMM, better suited for scenarios where number of processes is taking place.

To establish a parking space detection system, the authors in [25] use a combination of an SVM and a Markov Random Field (MRF) algorithm. Huang first obtain input data from cameras fixed at parking lots. The images are pre-processed, and the most useful features are extracted. Then the SVM is used to classify parking slots to free or occupied.

In [26] Zhoupro posed a group routing suggestion algorithm is based on MDP. Instead of finding the best route for asingle vehicle, group routing will be suggested based on vehicle similarities and V2V communication to minimize traffic congestion. The MDP is a model suited for optimization and decision-making problems.

Decision Tree

Decision trees are structures that deal with classification tasks and they represent a decision process with several possible outcomes. A decision tree is built top-down and consists of several nodes, where every node can be either a class or a condition that will drive a testing item to a class. It is a simplistic approach to classification problems. A new classification sub-process takes place at every level of a decision tree, breaking the main task to smaller sub-tasks by Utg off.[28]

In [19]Neetha, istesteda decision tree among the other four ML algorithms (RF, MLP,SVM, and Logistic Regression), to predict traffic congestion. The decision tree performed well with the other algorithms in terms of precision, recall and accuracy, but Logistic Regression was slightly better.

Among the ML algorithms implemented in [16], the authors tested a Regression Tree for short-term and long-term traffic flow in work zones. In a regression tree, the independent variables are used to fit a regression to the response variable.

Clustering

Clustering is an unsupervised method to classify elements into discrete groups based on their similarities or discovered patterns is defined by Jain, A.K[29]. Contrary to the classification methods, in clustering, there are no known labels to train a model.

In [30], the Kanoh suggest a Fuzzy C-Means clustering method to make short-term traffic predictions. in a regular clustering method, an instance mus tpart of one of the examined classes, in Fuzzy C-Means, every instance belongs to a given class to a certain degree.

In [32],Yanghasaim is to optimize the traffic network configuration by determining the best number and location of the processing centers for a sum of suppliers. Yang use K-Means to calculate the distance of the suppliers and the centers, to minimize the cost.

Mamun proposed method to find the location of road anomalies suchas bumps, speed breakers, and potholes, in [33] uses mobile devices to collect data from their accelerometers. The data are then sent to the nearest fog node for further processing. K-Means isused to cluster the data and find the threshold values that distinguish a road anomaly from a normal road.

The same approach uses by Ghadge for road anomalies detection in [34]. The authors use mobile phones to get raw data of accelerometers and GPS. The data are pre-processed, root mean square is applied on the accelerometer data, threshold values are defined for the z-axis and k-Means is used to cluster the data used to train the system.

B. Deep Learning Algorithms in Transportation

The term Deep Learning encloses powerful methods for reinforcement learning able to process a large amount of unstructured data. Deep learning techniques are suited for big-data handling and computationally intense processes like image pattern recognition, speech recognition and synthesis. Like ANNs, with deep learning, deep neural networks are created. The word ‘deep’ refers to the large number of hidden layers that compose the neural network. The number of layers in a deep learning technique is tight to the number of calculated features. In deep learning, the features are automatically estimated and there is no need for feature calculation and extraction before applying such a method. Additionally, a large variety of network structures is introduced with the advance of deep learning [35].

A deep learning approach based on Convolutional Neural Networks (CNN) is used in [36].CNN's are widely used in the research for image recognition. A CNN is a type of ANN from it consists of an input, an output layer, and some hidden layers. A significant characteristic of CNN is that multiple neurons use the same filters. Neurons are units that apply a transfer function on the weighted sum of its input signals [37].

The author summarized studies whose main purpose is the pavement distress detection using deep learning techniques. The reviewed studies apply CNN and DCNN methods in a wide variety of image datasets, such as Google Street View images, smart phone images, and 3D images constructed with specialized hardware (e.g., a Ground Penetrating Radar.

In research about traffic accident hotspots and their automated detection and classification [48],the authors train an Inception Neural Network to help with the image classification. Analysis of on-road data obtained from the Swiss Road Authority (FEDRO) shows that there is a connection with the accident occurrence and the actual accident spot.

Instance-Based

Instance-Based algorithms perform data classification based on the comparison of new test data, directly to the training instances. The comparison based on a similarity function and its output is fed into a classification function is described by Han in his paper [47].
Instance-based algorithms store training instances in their memory, therefore they can be pretty memory consuming as the data are increased. Between an FF-NN, and Regression Tree, the instance-based algorithm *k*-Nearest Neighbor (*k*-NN)is used by Munoz- *k*-NNisan algorithm used for supervised classification and regression. The main principle of *k*-NN is that similar data have minimum distance with each other. *k*-NN is run multiple times on the testing data to select the ideal *k* factor that minimizes the errors while classifying data.

Regression Analysis

Methods in the regression analysis category try to construct mathematical models able to describe, or identify, the relationship between two or more variables. The dependent or response variable is the system's output. By fitting a regression model to the system, the relations between the dependent variable and the independent ones (regressors) can be discovered. some of the methods used by Kingma, D.P[43] to perform traffic congestion predictions. Logistic regression is applicable when the dependent variable has binary values. Since it is regression analysis, logistic regression is suitable for prediction tasks in ML.

C. Machine Learning and IoT Application in smart Transportation

Accident Detection/Prevention

Accident Detection and prevention is an important part of smart transportation and a key activity for every smart city since an operating prevention method can help save human lives. An accident prevention system can notify the driver about critical situations and allow them to act promptly. Accident detection can also reduce the accidents number and the traffic congestion, by determining accident-prone areas or accidents that have taken place in the live traffic areas and it is found that ML has been proven very useful in detecting road accidents or detects patterns that could lead in new accidents and notify drivers to avoid them. The authors Liu and kim in [24] developed a method for cooperative vehicle perception, using a CHMM method so that information can be shared among vehicles on time to avoid accidents.
NN Real-time autonomous accident detection is performed in [47], by analyzing data obtained from road sensors with an FF-NN, a Regression Tree, and the *k*- NN algorithms. V2V communication together with the use of an RF method compared with an SVM and an ANN is used for accident detection in the roads by Subasiin [18].
A novel approach put up by Park to detect objects in the blind spot of smart vehicles is used by Kwonin [42], using an FCN method. The DRAM method developed in [47] can be also used for road accident detection since it can help with multiple object detection from image data. In the research [13], the drivers' consciousness is monitored with image data, processed by AdaBoost to prevent possible accidents. An Inception Neural Network is used in [48], to detect accident-prone areas.
Wortmann in his research [48] propose an IoT cloud platform that will enable traffic visualization and early notifications about sudden slowdowns that can lead to accidents.

Road Anomalies Detection

Road anomalies detection has a significant role in smart transportation since the road conditions have a crucial impact on many areas of transportation. The main purpose of a road anomaly detection system is the detection of bumps and pot-holes on the roads and the notification of the drivers. Bad road conditions can lead to vehicle damage, road accidents, and traffic congestion. The problem of detecting road anomalies is a task very suitable for some ML techniques, so the literature review edhere follows the ML direction too. Accelerometer data collected from mobile devices are processed with an FF-NN to detect pot-holes.
According to Puspo, J.A accelerometer data are also used in [33], clustered by the K-Means algorithm to distinguish normal from abnormal roads. A similar approach to detect road anomalies is used in [34],and the data in this research are also clustered using the k-Means method.
Wong, J.S, in [17] compare the methods *k*-NN, RF, and SVM for the task of road abnormalities detection. The author Gopalakrishnan in [40] has conducted a detailed review of deep learning techniques applied for pavement distresses detection. Furthermore, a review of the existing and emerging deep learning frameworks used for road anomalies detection is performed.

IV. CONCLUSION

A review of IoT and Computational Intelligence put up for smart transportation applications. This review gives the broad variety of Machine Learning algorithms that have been proposed and tested for Smart Transportation applications also representing the type and use of IoT data in these different applications is ideal for ML utilization. On the other hand, given the current applications and infrastructure available regarding IoT and ML, Therefore, there is a definite need for development coverage in different areas, from the ML and IoT perspective, in the future. Regarding the IoT approaches for the smart

transportation application categories, route optimization, parking, and accident prevention/detection, pavement distress and anomalies and sign detection have been the most popular among them. Considering the problems that the smart transportation applications address some common points of interest have been identified from this review is there will be huge work required in pavement distress, where an individual could study the development of distresses concerning time. Finally, recent advances in automated captioning of images using CNN and neural networks hybrid architectures, which combine the power of computer vision with natural language processing, may become a hot area of research in futureforachievingtexturalrepresentationofpavementimage sdescribing the type, extent, and severity of distresses.

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A Comparative Study of 5th Order Hairpin and Parallel Coupled Bandpass Filter with Various Microstrip Bandpass Filter Techniques

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***Abstract*—Several major techniques used in the advancement of microstrip based filters with its fundamental characteristics are presented in this paper [2-6]. Microstrip is unique and contains an RF/microwave filter based on the microstrip structure. Printed circuit filters are more advantageous compared to rectangular or coaxial waveguide filters according to itslow cost, repeatability, high accuracy, and small in size and easy to integrate with active circuits [2].**

In this paper, the Parallel-Coupled and Hairpin filter are simulated in Genesyskeysight software by designing5th order for the frequency range of 9GHz to 9.4GHz in the X-band with a center frequency of 9.2 GHz having fractional bandwidth of 4%. This design developed with RT/Duroid 5880 substrate, the relative dielectric constant of 2.2 and with thickness is 0.508mm with a loss tangent of 0.0009. The motivation to use RT/Duroid 5880 substrate in microstrip filters is it's low cost and easily available in the market. In realization of the result show the center frequency value of the filter which is equivalent to specification and simulation of the specified filters. The proposed results from symmetrical structure show a simple and reduce in design and which improvised stop-band characteristics compared with conventional filter structures. The similar prototype representation of the proposed Hairpin and Parallel-Coupled filter structure is designed and tested in Genesyskeysight simulation software.

Keywords—Bandpass Filter, Microstrip Line Filters, Hairpin Filter, Parallel Coupled Filter.

I.INTRODUCTION

The study discusses the distinctive behavior of RF filters which is based on microstrip structure. The end coupled filter comprises of an easy structure and fabrication. Based on the theory of microstrip lines which carry electromagnetic waves in a transmission line which consist of a conducting strip a microstrip, dielectric and ground plane [1]. Another one is a microstrip filter with a parallel-coupled line, but this filter has the disadvantage of having large physical dimensions. The length of the filter is about half that of the end-coupled type filter. The bandwidth of parallel-coupled is larger as compared to the end coupled. To minimize the size of the half-wavelength resonator filter required a hairpin microstrip line structure [2]. The ideal interdigital filter having characteristics that consist of arithmetical symmetry which is considered as advantageous as compared with combline filters and other filters. Comblinebandpass filter of an array element of coupled resonators of line elements lumped capacitance loaded in between another end of resonator element and ground. One of the typical folded-line resonator filters which are conventional hairpin line filter [3]. Hairpin-line bandpass filter is small in size and designed by folding the resonators of parallel-coupled, in half-wavelength resonators. Pseudo-interdigital filters can be performed in a combination with hairpin and interdigital line resonators. Interdigitalbandpass filter designed in quasi-TEM-mode transmission line resonators elements. Each resonator element is quarter wavelength long at a mid-band frequency which is short-circuited at one end and open-circuited at another end [7]. Our proposed work focuses on the design and performance comparison of a parallel-coupled microstripbandpass filter with hairpin bandpass filter with respect to the compact size, insertion loss and return loss when implemented using RT/duroid 5880 substrate. To design this filter and to perform simulation results, Genesys software can be used. The filter design is chosen in the X band frequency for various RADAR applications.

II.FILTER DESIGN PROCEDURE

The Chebyshev filter illustrates a better performance compared to the Butterworth filter in terms of frequency response and its cutoff [1]. The insertion loss method which is a standard method in adopting the design as the network synthesis characteristics allow accuracy in frequency response analysis. Chebyshev response would satisfy a requirement for the sharpest cutoff in frequency response as compared to other types of responses. Since it isChebyshev prototype, so prototype parameters are $g_0 = g_6 = 1$, $g_2 = g_4 = 1.3712$, $g_1 = g_5 = 1.1468$, $g_3 = 1.9750$.The filter order will be selected to achieve the desired bandwidth while reducing the physical size of the filter. The required order for a filter meeting the given specifications are calculated below using equations [4-5].

1) To find number of order of filter

$$N \geq \frac{\cosh^{-1}\sqrt{\frac{10^{0.1*L_A}-1}{10^{0.1*L_A}-1}}}{\cosh^{-1}*\Omega_s} \qquad (1)$$

L_A =Stop band attenuation

N= Order of filter

2) Center frequency (Fc)

$$F = \frac{F1+F2}{2} \quad (2)$$

3) Fractional Bandwidth (FBW)

$$FBW\% = \frac{F_2 - F_1}{F} * 100 \quad (3)$$

4) Effective dielectric constant

$$\varepsilon_e = \frac{\varepsilon_r+1}{2} \quad (4)$$

5) Quasi-static analysis for very thin microstrip

$$\varepsilon_e = \frac{\varepsilon_r+1}{2} + \frac{\varepsilon_r+1}{2} * (1+1 * \frac{h}{W})^{-0.5} \quad (5)$$

6) Extended Quality Factor (Q- Factor)

$$Q_{e1} = \frac{g_0 * g_1}{FBW} \quad (6)$$

7) Mutual coupling coefficient between adjacent resonators is calculated by

$$M_{i,i+1} = \frac{FBW}{\sqrt{g_i \; g_{i+1}}} \quad \text{for i =1 to n-1} \quad (7)$$

The mutual coupling coefficient between two resonators $M_{i,i+1}$, and Quality factor at the input and output Qe_1 and Qe_n are the design parameters for the hairpin filter.

8) Resonator Width: -The value of W (the width of the resonator line) is achieved by using the following calculations

$$\frac{W}{h} = \frac{2}{\pi}\left((B-1)\ln(2*B-1) + \frac{\varepsilon_r-1}{2*\varepsilon_r}\left(\ln(B-1) + 0.39 - \frac{0.6}{\varepsilon_r}\right)\right)$$

$$B = \frac{60\pi^2}{Z_0\sqrt{\varepsilon_r}} \quad (8)$$

9) The guided wavelength of the quasi-TEM mode of microstrip is given by

$$\lambda_g = \frac{c}{f(GHz)\sqrt{\varepsilon_r}} \quad (9)$$

10) Length of resonator

$$l = \frac{\lambda_g}{4} \quad (10)$$

11) Tapping point 't' for hairpin filter

$$t = \frac{2*L}{\pi} \sin^{-1}\left(\sqrt{\frac{\pi * Z_e / Z_0}{2*Q_e}}\right) \quad (11)$$

Z_e is characteristic impedance of hairpin line, Z_0 is terminating impedence and L is about $\lambda_g / 4$

Design specification of parallel coupled bandpass filter

1) The design equations for this type of filter are given by [7]

$$\frac{J_0}{Y_0} = \sqrt{\frac{\pi * FBW}{2 * g_0 * g_1}} \quad (12)$$

$$\frac{J_{j,j+1}}{Y_0} = \frac{\pi * FBW}{2} \frac{1}{\sqrt{g_j g_{j+1}}} \quad \text{j=1 to n-1} \quad (13)$$

2) The values of the even and odd mode impedances were computed using equations

$$(Zoe)_{j,j+1} = \frac{1}{Y_0}\left[1 + \frac{J_0}{Y_0} + \left(\frac{J_0}{Y_0}\right)^2\right. \quad (14)$$

$$(Z_0)_{j,j+1} = \frac{1}{Y_0}\left[1 - \frac{J_0}{Y_0} + \left(\frac{J_0}{Y_0}\right)^2\right] \quad (15)$$

The specifications of the dielectric material and of the filter are listed in Table 1 and Table 2

Table 1 Specification of Dielectric material

Sr. No	Parameters	Values
1	Substrate	RT/Duroid 5880
2	Dielectric constant	2.2
3	Substrate thickness	0.508mm
4	Loss tangent	0.0009

Table 2 Design Specifications of the Filter

Sr. No	Parameters	Values
1	Filter order	N=5
2	Pass band center frequency	9.2 GHz
3	Pass band ripple	0.1dB
4	Start frequency	9 GHz
5	Stop frequency	9.4 GHz

6	Input output impedance	Z= 50 Ohms

III. RESULTS AND SIMULATION

The filter structure is realized using a 0.508mm thick RT/duroid 5880 substrate with dielectric constant of 2.2. Simulation is carried out using Genesyskeysight software and all the necessary parameters of the proposed filter are determined.

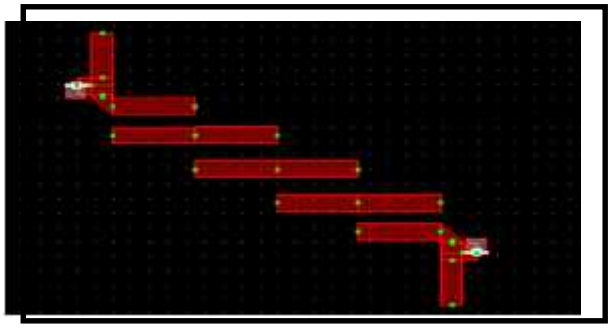

Figure. 1 Parallel Coupled Microstripbandpass filter



Figure. 2S_1 and S_2 of 5th Order Parallel CoupledMicrostripbandpass filter

Figure. 1 Shows the structure of a Parallel Coupled microwave bandpass filter. The characteristics of the proposed Parallel Coupled microwave bandpass filter shown in figure. 2. That uses quarter- wavelength line resonators. They are position in such a way that they are parallel to each other quarter of their length [2]. The bandpass filter is having an insertion loss of -2.054 dB across passband while the passband return loss was better than -39.601 dB across required band 9GHz to 9.4GHz. The performance characteristics can be achieved by Genesys software. Significantly, that the design can be easily developed to handle and permit configurability which can be easily integrated with various applications.

Following result shows simulation of 5th Order Hairpin bandpass filter



Figure. 3Microstrip Hairpin bandpass filter structure



Figure. 4S_1 and S_2 of 5th order Microstrip Hairpinbandpass filter

Figure. 4 is a simulation result that shows good S_2 curve for the bandpass filter response. The center frequency of 9.2GHz with an insertion loss of -1.889dB and return loss of -39.203dB. It can be seen that return loss, as well as insertion loss has improved considerably. Improved response characteristics are the reason why tapped structures are used.

IV. CONCLUSION

Overcoming the limitations of recent works in microstrip filters two filter results are simulated. According to the design principle of microstrip Parallel-Coupled and hairpin X band bandpass filter, the initial parameters of filter are obtained, then it makes use of Genesys simulation software, determine the parameters of the filter. Comparative study of themicrostrip hairpin filter and Parallel-Coupled bandpass filter, a Hairpin filter has the advantages of small size, easy integration, low cost, and relatively simple design, especially the wide stopband. The compact size with a very low insertion loss of the resultant designed filter can be recommended as a good candidate for possible use in future applications.

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1G to 4G: Evolution of Wireless technology

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***Abstract*—Wireless technologies today are such that they are able to provide higher throughput, extensive spread of services, improved user performance and better calling services. This involves all various technologies which will be able to, provide and support various real time applications. They also must support portable devices and have seamless mobility management. 4G/ LTE networks are purely data-based network services based on TCP/IP Protocol. One of the main research challenges for 4G-Network is the to develop such a system which will adapt very rapidly to changing channel conditions. Also there arises an issue to develop such common standards which would ensure a greater coverage and enhanced user performance. In this paper there is an attempt discover the different problems and challenges related to 4G – networks in today's era of wireless technology. When though the device being by user have become more commanding but they are still vulnerable to attackers outside. This paper tries to cover all the possible security aspect as also the future scope of wireless technology.**

Keywords—4G Networks, handoff, mobility, CDMA, LTE, SDR, Wi-Fi

I. INTRODUCTION

In the last few years, cell phone has become a need of the hour. They have become integral part of our daily routine. Owing to their capability of multitasking they are required everywhere. This led to emergence of different seamless wireless techniques. This included the first Generation, 2G,3G and 4G system as well. The ongoing research suggest that these networks may include both wireless as wired systems. It will be then be able to provide seamlessly handover between heterogeneous networks to guarantee the continuity of an ongoing application session and data transfer. The 4G network has numerous nodes in it. These nodes are connected with multiple interfaces at the same time to ensure good quality services to end users. The 4G has been developed with the aim of providing transmission rates up to 20 Mbps while simultaneously accommodating Quality of Service (QoS) features [1]. The main aim of 4G was to be to replace the entire core of cellular networks with a single worldwide cellular network completely standardized based on the IP for video, packet data utilizing Voice over IP (VoIP) and multimedia services [1]. The currently emerging techniques will provide high quality audio-video services via software upgrades. These updates are on daily basis keeping the system intact and secured from virus and spam. The entire system will be based on IP networkthe entire core of cellular networks with a single worldwide cellular network completely standardized based on the IP for video, packet data utilizing Voice over IP (VoIP) and multimedia services [1]. The currently emerging techniques will provide high quality audio-video services via software upgrades. These updates are on daily basis keeping the system intact and secured from virus and spam. The entire system will be based on IP network

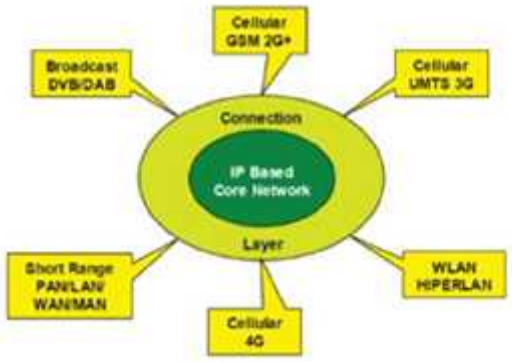

Fig 1 seamless connection of networks

II. Evolution of mobile standards

First generation the foundation for the mobile standards began in the 1970s. They were termed as 1G. These systems were analog systems. Voice was the main traffic which was to be transmitted. The data had no real priority in these systems. Plain TDMA and FDMA standards were mostly being used. The system was being easily being tapped and could be listened by someone else hence there was no security and privacy in the systems being used. These standards included NMT, AMPS, Hicap, CDPD and Mobitex.

2G (Second generation)

1980s saw the 2G systems coming up. However, the systems were still mainly for voice communication but the change was it was based on digitized techniques.

These systems provided circuit- switched data communication services at a low speed [2]. The main purpose of these systems was commercial uses. They were mainly developed for financial uses.

The 2.5G

2.5G is the generation between 2G and 3G technologies. It was not an official define standard but was rather developed for commercial purposes and need of the market owing then. It employed both packets as also circuit switch network features. It made use of existing CDMA standard as also GSM architecture and provided data as the main traffic. Thus, it had the name 2.5G as it made use of both 2G and also 3G systems.

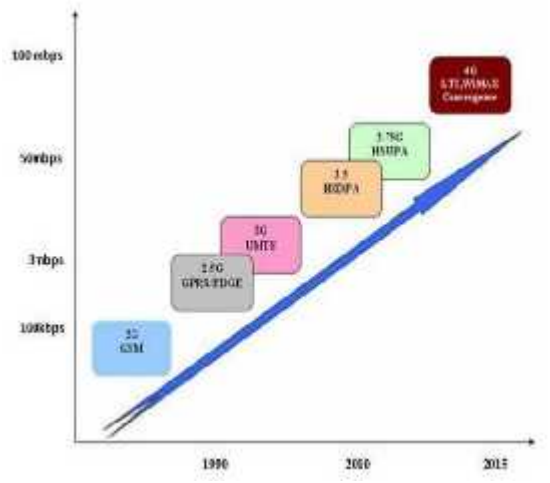

Fig 2 evolution of wireless networks

3G (Third generation)

As the no of subscribers kept on increasing there became a demand for increased capacity so as to comprise more users. Hence the demand for more better generation or standard of system was felt. Owing to these 3G system were developed. It consisted of various nodes which included packet switched as also circuit switched domain.

3GPP

It is known as 3rd Generation Partnership Project. It started in 1998. It was developed so as to support 3G UMTS standards. The initial 3GPP release were segregated into phase 1 and phase 2 respectively. After every release the 3GPP will update the various section according to that standards. Some of these included Release 99. It was UMTS network which had WCDMA radio element included in its architecture 3GPP release 14,15,16 will incorporate the much awaited 5G spectrum allocation.

LTE (Long Term Evolution)

Long term evolution was 3GPP release 8. It all begin in December 2008. Its need was felt because its specifications were being stable in nature also there needed to technology to accommodate as there was much traffic load due to ever increasing subscribers. Also, there was a need for high data speed. MIMO i.e. multiple antennas began to be included in this system. It was the first wireless standard Where MIMO was being utilized.

TABLE 1 SHOWS 1G,2G,3G AND 4G CHARACTERISTICS

Generation	Standard definition	speed	Technology	Period Features
1G	Analaog	14.4	AMPS	Only for voice traffic
2G	Digital	9.6/14.4	TDMA	Voice traffic but digitized
2.5G	Packet Data	171.2 Kbps	GPRS	Multimedia support
3G	Digital	3.1 Mbps	CDMA	Higher speed
4G	Broadband IP services	100-300 Mbps	WiMax	HD streamin

III. 4G Standards

The International Telecommunications Union (ITU) has defined an International Mobile Telecommunications-Advanced (IMT-Advanced) standard for 4G wireless networks. This standard provides the specifications of radio access parameters and core 4G wireless networks. The 4G system must satisfy the following criteria: (1) high data rate, which is 100Mbps for mobile devices and 1Gbps for computer devices [3], (2) larger capacity and better service in terms of Quality, and (3) enhanced performance The other two main important aspect to be taken into consideration while planning and designing a network is bandwidth or the spectrum efficiency and different methods used to allocate them.

The network has been giving the subscriber a very good experience and performance. It is such that the users are able to have

A 4G system must have the capacity to provide all the requirements that are been specified by the ITU in IMT Advanced. Many of these services include telephony, web access, TV, video conferencing, gaming:

1. Ability to support user friendly multimedia services and internet

2. High speed, high capacity and low cost per user.

3. Mobility support across the global and scalable have more users

4. Seamless integrity so as to provide Quality of services (Qos) to, users.

IV. 4G Architecture and it's working

The Architecture requires various elements that are required to be pre-installed between the base stations and mobile stations so as to maintain call session. The architecture mainly has these three sections: User Equipment (UE), Evolved Universal Terrestrial Radio Access Network (E- UTRAN), and Evolved Packet Core (EPC). The user equipment is connected with EUTRAN base stations through the eNode B. The eNode B will exchange certain information and signaling messages so as to establish connection. This is done via some protocols or certain standards. The E-UTRAN will connect to the EPC which is an IP-based infrastructure, whereas the EPC on the other will be connected to the provider of the network.

The 4G network architecture is much better evolved in contrast to 3G systems. The main changes include as follows

:(1) It consist of eNode B which is a major change. It is considered as improvised base station and (2) The access Gateway will combine mobile management entity (MME).it is needed especially for Evolved Packet core (EPC) The identification of user equipment, the mobility of user and ensuring adequate security for users via various security algorithms is done by MME. The network can support

various types of structure.

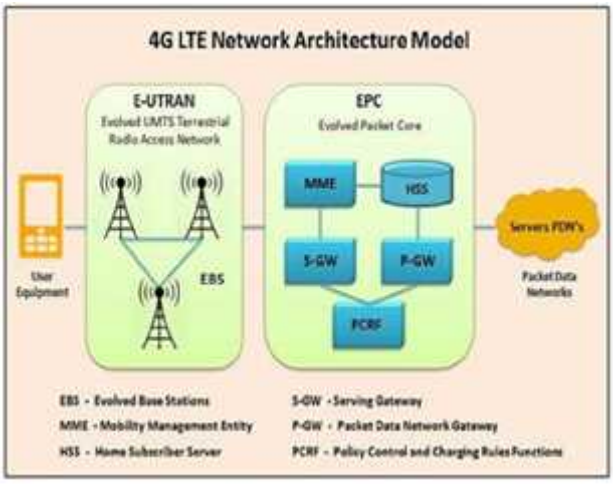

Fig 3 4G Architecture

Evolved Packet core main function was to communicate with internal as also outside world networks. Multimedia applications which were IP based also formed a part of it. It mainly consisted of various sections. Some of these include HSS, MME and P-GW. The main purpose of home subscriber server was to maintain all the information about subscribers using the service in a centralized database.

High level signalling operation were being taken care by MME. Mobility management and forwarding data was handled by signalling Gateway. The data was being sent from PDN Gateway to base station. Allocation of IP address to every subscriber was mainly being done by packet data network gateway. Packet had to be filtered. It would ensure that unnecessary traffic can be avoided. PCRF as the name implies was mainly used to for making all the decision related to policy as also it included predefined rules and tasks which were to be performed regularly to ensure smooth operation.

V. Advantages of 4G

- Pure IP based services: 4G network is based on TCP/IP network. So, it is completely data-based services. Owing to that the availability of spectrum is more. Thus, the throughput will be greater.

- More services and Applications: The bandwidth spectrum of these systems is very high. Thus, it ensures that user can access real time applications and video browsing quality will be very excellent.

- Speed: The speed for systems which are portable in nature is 100 Mbps. such systems include mobile whereas fixed or device which are very slow in motion is 1 Gbps.

Smooth Hand Off: Due to enhanced level of protocols being used the handoff procedure taking place is very even and thus the probability of call drop is reduced. It ensures that user can access his services very smoothly.

- Low Latency: Delay or variation in packets received will be very less due to which there is no issue of lagging and response time of the system will be very faster as compared to other network. 4G technology reduces latency to 1/100th of a second which is about 10ms

VI. Challenges in 4G

There are number of research challenges which need to be solved in order to achieve 4G network goals. These challenges are listed below:

- Security and privacy: LTE are a combination of different networks. Each network will have its own security protocol and standards. Also, there is interoperability in between them as all vendors use their

own configuration and facilities in them. Monitoring, detecting, analysing and preventing worms and viruses on wired networks is very difficult but the same tasks on wired, wireless, and mobile networks combined is be even more difficult and challenging task [4].

• Network Detection: Devices used in these networks consist of various nodes which are connected to multiple interfaces. Thus, it allows each node to be accessed by various types of networks simultaneously at the same time for various applications. Thus, it is necessary to discovery what type of network is available at that time for usage. This is one of the issues in 4G systems networks. The remedy to this issue is Software define Radio. The technique is one which has the elements being implemented on software instead of usual hardware board or development board that are being commonly used. Being implemented on software it has the name Software Defined Radio. It can be controlled remotely

• Access technologies: Being a heterogenous network

4G has number of radio channel systems. The subscriber needs to continuous hop in between these systems in order to have the coverage as also maintain quality over the entire range over which the user might go across thus adding a complexity to system deployment and planning. Such systems are very complex in nature to design.

• Nature of Network architectures: 4G systems are not single homogeneous networks. They are combination of heterogeneous networks. They depend on different network architecture so as to support routing and transporting packets. The interconnection of these networks in an integral manner helps to facilitate the cooperation between them which is another research challenge [5].

TABLE 2 SHOWS CHALLENGES AND ISSUES IN 4G

Challenges	Cyber attacks	Security and privacy methods
A resilient 4G/LTE	privacy attacks: Tracing, privacy spoofing	authenticatio n and encryption mechanism
Tracking location of devices	Integrity: cloning, spam messages, blocking	Hashing and encryption, authenticatio
Effective software defined Network (SDN)	FIFO redirecting, physical attacks	Firewall systems, signature-
Collaborative 4G/LTE security approaches	Authentication attack: Password reuse, password	Encryption and authenticatio n techniques

Varying Network conditions: There exist different varying conditions in the network. This may include latency, bandwidth, jitter, etc. this all affect the quality of service which is being provided. Thus, the user may not get proper call quality. Such problems need to be looked after.

• Large number of service providers: There are a very number of network operators in the market which provide network services. Whenever there is a requirement for handover condition there must be a co-ordination and co-operation among these different providers so as to ensure that the call is completed i.e. there is a successful handoff and there is no call drop

• Charging and Billing issues: There may be instance where a user may switch from one network to another. Generally, such cases arrive when there is handoff. Since users using these services are in motion most of the time. Thus, at such times the call session may have different call rates and charges. One challenge is to keep track of charges per use per segment of a session that is being used during their network, service or content of the session that is taking place. [6].

• Designing such a system which can easily adapt to changes nature of channel as also providing the system, to scale up a greater number of subscribers in it. The security of data and user privacy are a major concern in these systems. There may be a large number of devices connected with network. Owing to which there might be result in more attacks on the network making it more vulnerable.

• It is necessary to intercept denial of service attacks by intruders those continuously try to invade the system network and try to gain access to it. This may affect the user privacy and security

• To ensure that when devices are lost, they must be able to track them. For this purpose, the tracking must be enabled. The presence of equipment in a specific cell in a cluster is tracking of the device. It should be ensured that these devices are not breached from security aspect.

• There is a need to establish trusted connections as the technologies are evolving very rapidly. From the perspective of security, it is need to encrypt and decrypt the data at sender and receiver end respectively so as to provide access only to legitimate users. Rather than separate algorithms for security purposes there should exist combined systematic technique is required from the point of view of security.

VII. Scope in 4G

There are several technologies suggested to deploy

In the 4G and these may include:

• Software Defined Radio (SDR): They are radio communication mainly developed to overcome

issues in LTE networks. They mainly involve hardware components such as mixers, demodulators, detectors, etc. being implemented on software instead of generally used hardware or development board. Hence the name software defined network. They are access remotely and given commands. It ensures more reliability as doing work manually is more error prone and expensive.

• Orthogonal frequency-division multiplexing (OFDM): here frequency division multiplexing is used as a modulation technique where multiple carrier is being used for the purpose of modulation. OFDM are used modulation techniques from fourth generation only. Massive MIMO techniques are being implemented in 4G system.

• Multiple-input and multiple-output, or MIMO: Involves the use of multiple antennas at both the transmitter and receiver end of the systems respectively. All of these delivery methods are typified by high rates of data transmission and packet-switched transmission protocols. 3G technologies, by contrast, are a mix of packet and circuit-switched networks [7].

• Fast security: There is a rapid need to ensure security in these networks. Due to use of smart phones the subscriber downloads a lot of data and applications which are not needed. The level of security should be such that it should block third spam apps and ensure security. There must be proper encryption and decryption of data and ensure that there is access to legitimate users only. A lot of room for development is there in this aspect.

• Bandwidth usage management: Bandwidth is one of the primary requirements for any network operation and usage. The bandwidth must be managed efficiently. The bandwidth must be higher so as to avoid probability of call drop and effective handover procedure [8]. Call drop will affect Qos. A proficiency management of bandwidth will assure users quality in the service they access

• Handoff Latency: Latency led to delay in the data the user receives. It will affect the quality of facilities the user can access. It leads to buffering of videos and other real time applications. It becomes very annoying for users to use their applications in such conditions. They are basically delay or variations in packets being received. A good and successful handoff will ensure minimized latency.

• Power Consumption: Energy saving is one of the prime requirements in any network. Due to handoff scenario there is frequent activation and inactivation of the user interface leading to power drain out [9]. There is a lot of battery being consumed. The power saving thus does not take place. Hence there is a need to find ways to save power in LTE networks.

VIII. 5G as a future technology

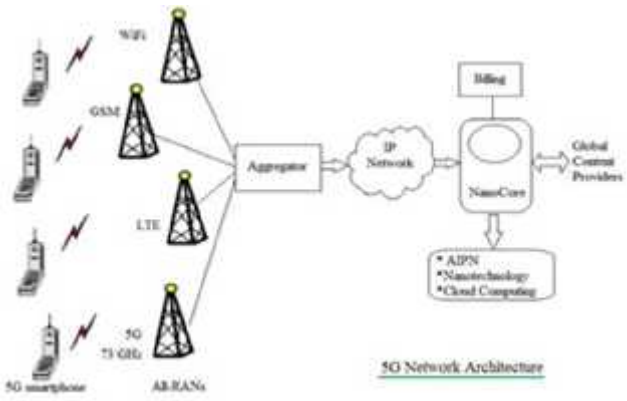

Fig 4 generalized 5G Architecture

The architecture of 5G is a general one .it is based on TCP/IP network which is flat in nature. Thus, it enables the radio network to use the same nanocore for all its usage throughout the network .It will identify the devices operating within its range using certain specified pre-defined symbols. Normal IP addressing which is generally used is avoided which is one of the benefits. The network elements are generally avoided or skipped hence there is a lot of saving of expenditure on infrastructure. It also minimizes latency.

5G aggregator aggregates all the Radio access network traffic. It will then be routed to gateway. The aggregator is generally at base station controller. The system terminal has different radio interfaces so s to support various techniques in the band. The added element in network architecture is that of 5Gnanocore. It uses nanotechnology and cloud computing. The architecture is entirely IP based as in the case of 4G systems. It will include both the internet resources as well as centralized servers at the same time. Thus, subscribers can use their application and their files without any requirement of installation of any other software. This would allow to use access any file at any moment from anywhere It will provide such a large capacity that many users can accommodated at the same time. It is mainly developed for IPv6 as the IP addresses are getting depleted. It was each machine has its own unique IPAddress.5G operations will has more larger capacity due to which more users can be accommodated. The allocation of spectrum bands of the network would be such that it would allow a greater bandwidth so as to accommodate multiple users at the same time. The load on the existing network infrastructure would get reduced to a very larger extent and speed of services would rise to a new level [10].

The network will allow for more efficient use of bandwidth and provide for larger capacity in the system at the same time. The users can pay for their services according to their needs. Generally, the subscribers avoid up front cost and they request for more bandwidth as their

demand goes on increasing with time. The user is guaranteed for the bandwidth he subscriber for. Thus, ensuring a quality of service for users. With the growing need of hour there is a request from user for customized internet services which will ensure they get a concentrated network facility for their personalized usage.

IX. Application areas of 4G

- Cameras for city surveillance: The camera being used for security of the city as well as traffic monitoring are connected to central servers. These servers employ 4G networks. They provide them with real time images which helps in securing city.

- Sensors: The sensors being used in smart objects or devices are based on 4G network. These includes the GPS system or navigation tools all of these use 4G network infrastructure. It provides with them real time processed and analyzed data for their applications.

- Industrial automation: The industrial demands require to provide with real time data for their application. For this purpose, a centralized server based on these networks is used. Smart objects are being used they provide with real time data to control objects. These include pick and place robots and robots for hazardous environment.

- Heath solutions: They are recently developed technique. Through these users can check all their medical history and current medical details. According to the details obtained a medical officer or doctor is suggested.

- Smart farming: They help farmers in providing data for their plantation. They include weather forecast, crop details. According to these details farmers takes decisions for which plantation crop he should opt for.

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X. CONCLUSION

Due to rapid development in communication field the focus and need for devices which are more sustainable in nature is needed. Existing communication networks strive to hard to provide seamlessly connectivity among all the devices which are being used currently. Due to increasing popularity and evolution of network devices security and mobility has been a real change while dealing with networks. One of the features of 5G network system is that it is being to support vertical handoff enabling the subscriber to roam seamlessly without the issue of call drop. The changing trends are such that it is mandatory to connect the mobile nodes with multiple interfaces. These interfaces may include WiMAX, Wi-Fi, Ethernet. The evolution of these wireless technology is much required as it helps for business generation because business houses are now becoming more mobile oriented. There also must be a single tariff rates for all of the subscriber needs and usages.it will help to add to clients as well as develop and deploy network accordingly. The technology will not just people the private sector and subscriber to public sector and in turn to the entire nation as whole Thus, more better systems are required to handle the increasing user traffic load and avoid congestion of the network. The technology used must be such that it is able to provide its users a very high-end experience and the quality of service provided must be meet. Thus, it should be able to manage users' requirements and provide a seamless connectivity and security overall.

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Channel Models for Optical Wireless Communication Systems: A Survey

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***Abstract*—In recent years, Radio Frequency (RF) spectrum band has been congested so a shift to Optical spectrum is required. Optical wireless communication (OWC) system consist of technologies which operate in optical spectrum comprising of infrared (IR), visible light (VL) or ultraviolet (UV) bands. For designing and implementation of optical communication systems, it is crucial that the characteristics of the channel are understood. For performance estimation in optical wireless communication, a precise prediction of link behavior is important. Therefore accurate and efficient channel modelling is of importance for the OWC link design. There are many channel models for wireless IR and VL communication systems. This paper is a brief survey on existing channel models used for link configurations in OWC.**

Key words— Optical wireless communication, Channel model, Deterministic model, stochastic model, line of sight (LOS), non-line of sight (NLOS).

I. INTRODUCTION

Currently, radio frequency is broadly used across various wireless applications which limits the power and bandwidth resources in these modern communication systems. There have been RF crisis, since demand for higher data rates continued to increase while the spectral efficiency is being saturated [1]. With the arrival of high-power light emitting diodes (LEDs) and highly sensitive photodiodes (PDs), optical wireless communication has become a practical medium for transmission of data. Compared to RF, optical wireless offers an unlimited bandwidth, license-free operation, low-cost equipment's and expected high data rates. In OWC systems, due to the nature of the light, a resistance is provided against interference caused by adjacent channels which increases the possibility of frequency reuse which means increase in the capacity [2]. In addition, it is free of any health concerns as long as eye safety regulations are fulfilled. Since there is no interference with RF-based technology, an optical wireless system can also be deployed in an aircraft cabin.

In optical wireless communication, to design and implement a system, firstly the characteristics of the channel must be known. Representation of a communication channel is given by its channel impulse response, which is then used to analyze and fight the effects of channel distortions [3]. There are various channel models that measures the different OWC characteristics for line of sight (LOS) and non-line of sight (NLOS) configurations. The channel models are classified into deterministic and stochastic models. Deterministic models have known set of inputs which will result in a unique set of outputs. Stochastic simulation models have one or more random variables as inputs. Different approaches included in deterministic approach are Recursive, Iterative, Dustin algorithm and Ceiling Bounce model (CBM) and the stochastic model can be further classified into geometry based and non-geometry stochastic models. Monte Carlo algorithm, spherical model, modified ceiling bounce model (MCBM) are types of stochastic model.

Figure: OWC Channel models

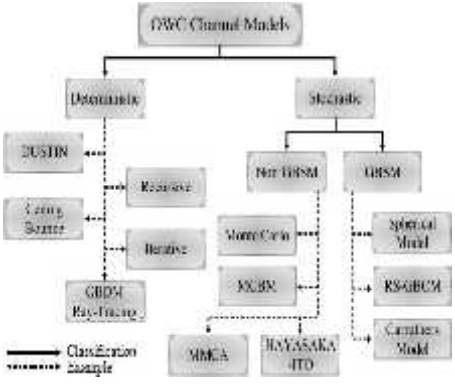

Figure: OWC Channel models

II. CHANNEL MODELS

A. Recursive and Iterative Model

Barry et al. proposed a work on indoor wireless optical channel using the recursive model [4]. Here recursive model approach was used to evaluate the channel impulse response (CIR) of multipath in wireless infrared communication system. This model has been considered as an extension of the cavity model which was proposed by Gfeller and Babst. In [4], an empty rectangular room, of configuration with different dimensions for both line of sight and diffuse scenarios were considered to calculate the multi-bounce impulse response. Up to three order reflections were measured and it was seen that total power decreases for higher order impulse response.

Toshihiko Komine and Masao Nakagawa proposed indoor optical wireless communication system using white LED lighting [5] [6]. This was extended work for Barry's model for non-line of sight visible light communication channel to make use of existing power line network [5]. In [6] up to two reflections were considered and effect of signal to noise ratio along with field on view of the receiver was discussed. For visible light communication, without tracing the data rate achieved is 200Mbps transmission of data is possible and with tracking, data transmission potential is like 10Gbps. In [7], Fang Li et al. proposed a simplified method for impulse response based on recursive algorithm. Here, an empty room with reflection of three bounces are considered which offers a result of 22.7% decrease in impulse response for first reflection, 35.3% in second reflection and third reflection decline closely by 50% in comparison with classical recursive algorithm. Authors in [8] presented an improved recursive model for indoor VLC system which was used to analyze the better inter-symbol-interference in VLC system application.

B. Dustin Algorithm

F.J. Lopez-Hernandez and M.J. Betancor developed an efficient and faster simulation model for calculation of impulse response on infrared wireless indoor channel [10]. Here an empty room is considered with diffuse form of channel scenario. In this algorithm the simulation of is sliced into time steps and not into number of reflections. This approach is not proficient of adapting different environment.

Jeffrey B. Carruthers and Prasanna Kannan proposed a method for estimating channel impulse response of wireless infrared communication [9]. In this method CIR is calculated for multiple reflections in an indoor environment for configurations mentioned in [4]. It has been conveyed that for third reflection, iterative approach is 90 times faster in comparison of recursive method.

C. Ceiling Bounce Model (CBM) and MCBM

Zhongpeng Wang and Shoufa Chen proposed a

Discrete Fourier Transform pre-coding scheme peak average power ratio reduction in visible light orthogonal frequency-division multiplexing using this model [11]. Here ceiling bounce model is used for accurate representation of multipath dispersion in indoor wireless optical channel. Ceiling Bounce model provide a near solution for channel impulse response, path loss and root mean square delay spread for indoor wireless infrared communication. This method is most in use for simulation because of its ease and approximation to the measured data [3].

Smitha et al. developed a model for estimation of impulse response using modified ceiling bounce model for non-directed indoor optical system [12]. Here the existing ceiling bounce model is modified by combining it with DC gain computation and the statistical model. This approach can be used to analyze multipath dispersion and power distribution in indoor environment. In [13], same authors

have developed a model for computing the more accurate impulse response, path loss and delay spread using modified ceiling bounce model.

D. Monte Carlo Algorithm and Ray tracing

Dimitrov et al. proposed a work on infrared optical wireless system for path loss simulation in aircraft cabin [14]. Monte Carlo ray tracing, for both line of sight and non-line of sight, is used to determine the optical shadowing and path loss component. For LOS, path loss and shadowing deviation is estimated to be 1.92 and 0.81dB respectively. Whereas for NLOS path loss and optical shadowing varies. A reflection model based on Lambert Phong using Monte Carlo ray tracing is presented in [15].Miramirkhani et al. developed a realistic mobile channel model for visible light communication [16]. Channel modelling is based on ray tracing feature of

Zemax. Also in [17] a three dimensional indoor environment is created using Zemax software and imported into matlab to obtain the channel impulse response for the particular environment.

E. Spherical Model

Su-il Choi presented a work on visible light communication channel using spherical model for white light LED lighting [18]. Here, signal to noise ratio, optical wireless channel bandwidth and inter-symbol interference is assessed. A room size of 5×5×3 m3 with two types of LED configuration, placed at height of 2.5m and covering about 90% to 92% field of view of the receiver is considered. Illumination includes both line of sight and diffuse, in which the diffuse portion is represented by the integrating sphere model. Type A and B gives a 3dB cutoff at 88.9MHz and 96.7 MHz respectively. Spherical model approach was offered to model wireless infrared communication system channels employing diffused channel scenario. For higher order reflections the reliability of this model was given by stochastic based ray tracing approach [19]. In [20], the authors analyzed the accuracy of the model in comparison to Barry's model for indoor VLC system with distributed array source.

Table 1 presents a summary of indoor optical wireless channel models literature.

III. CONCLUSION

So far, in comparison with the visible communication systems the channel modeling for wireless infrared communication system are more engaged. Channel models for visible light communication system that can adapt wide range of link configuration in VLC spectrum is still absent. In recursive approach the reliability of them system increases with number of reflection but it increases the computational time. Iterative approach of channel modelling provides a fast response for many reflection.

Table 1 Optical Wireless Communication channel models

Sr. No.	Authors	Modelling Approach	Environment	Channel Scenario	Characteristics estimated
1	Barry *et al*	Recursive Method	Empty conference room with different sizes	NLOS and Diffuse	Impulse Response
2	Komine and Nakagawa	Recursive Method	Empty rectangular room	NLOS	DC gain & signal to noise ratio
3	Komine and Nakagawa	Recursive Method	Empty room	NLOS and Diffuse	DC gain & signal to noise ratio
4	Fang Lu *et al.*	Recursive Method	Empty room with ideal reflection	LOS and Diffuse	Impulse Response
5	Ben *et al.*	Recursive Method	Empty rooms	LOS and diffuse	Path loss
6	Carruthers and Khomra *et al.*	Iterative Method	Rectangular room arbitrary number of boxes	Diffuse	Impulse response and path loss
7	Lopez Hernandez and Betancor	DUSTIN	Empty room	Diffuse	Impulse response
8	Wang and Chen	Ceiling Bounce Model	Furnished room	NLOS	Impulse response
9	Smiths *et al*	Modified Ceiling Bounce Model	Two empty rooms of different size	Diffuse	Impulse response, DC gain, RMS delay and path loss
10	Dimitrov *et al*	Modified Monte Carlo	Aircraft cabin	Diffuse and NLOS	Path loss and Optical shadowing
11	Ding and Ke	Modified Monte Carlo	Empty rectangular room and furnished office	NDLOS	Impulse response and RMS delay
12	Miramirkhani *et al.*	Ray tracing using zemax	Empty and furnished rooms of different sizes	NDLOS	Impulse response, DC gain, RMS delay, mean delay and path loss
13	Soltani *et al*	Ray tracing using zemax	Empty/furnished rooms of different shapes and sizes	NDLOS	Impulse response, DC gain and RMS delay
14	Chen	Spherical Model	Empty office room	NDLOS and diffuse	Impulse Response

Table 1: Optical Wireless Communication channel models

Dustin algorithm for channel modelling reduces the computational difficulty but cannot adjust to different environments. Due to simplicity and accurate measurement of data ceiling bounce model can be employed in VLCs.

Ray tracking needs an overall description of the environment for propagation and cannot be used for various channel scenarios. Stochastic approach offers better flexibility, reduced complexity but lower accuracy than deterministic approach. For the optical wireless communication there are various models by which the channel scenario can be designed.

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SDWAN- Evolution of the Networks

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***Abstract*—SDWAN is a Software defined Wide Area Network WAN (Virtual) architecture which allows organizations to take advantage of using any combination of the transport services that includes Internet services, LTE and MPLS to allow users to connect securely to the applications. By using a centralized approach, SDWAN securely and intelligently directs traffic across the WAN. This increases the performance and enhances the user experience which in turn results in increased in business and reduction in costs of organization for IT. This paper presents the review of the SD- WAN as a technology and its features.**

Keywords—SDWAN, Virtual, WAN, LTE, MPLS, Zero Touch Provisioning

I. INTRODUCTION

Traditional WAN architecture is based on conventional routers and are less cloud-friendly. In a typical scenario a traditional WAN architecture would require backhauling all the traffic from a site that is going out for the cloud to a HUB location or the HQ data centers where security inspection services are applied. Backhauling the traffic causes delay and impairs the application performance resulting into poor user experience and reduced productivity.

SDWAN model fully supports applications that are hosted in on premise data centers, private or public clouds and software as a service solutions such as Workday, Office365 as opposed to the traditional router centric WAN architecture, delivering high level of application performance.

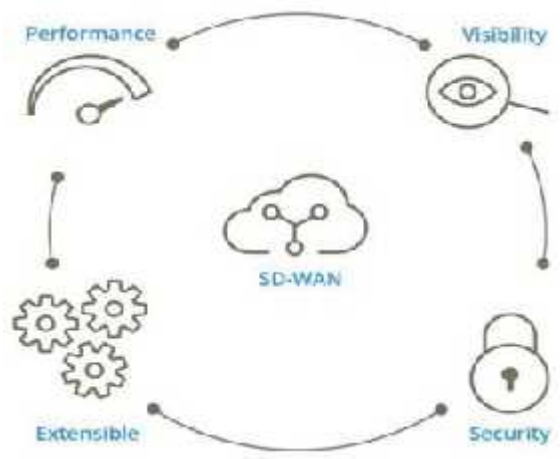

Fig. 1: SDWAN features[1]

II. EASE OF USE

The separation of data forwarding and control planes simplifies the network traffic routing is the foremost benefit of SD-WAN technology. With the introduction of SD-WAN's centralized orchestration feature, it's pretty easier to orchestrate or manage thousands of routers via a single centralized platform. It leads to hassle free and fast updation or modification of SDWAN devices and WAN connection of the organization. [1]

SDWAN separates the data forwarding and control planes which simplifies the traffic routing. Introduction of centralized Orchestrator feature makes it easy to manage thousands of SDWAN edge devices via a single centralized platform. This leads to faster update/modification of every appliance and Wan connection of the enterprise.

III. SDWAN DEPLOYS ZTP – ZERO TOUCH PROVISIONING

ZTP makes use of Orchestrator and the cloud portal (where the edge device registers itself), each edge device at the site knows the URL of its orchestrator. The URL is preconfigured on the edge devices prior to being handed over the organization. [2]

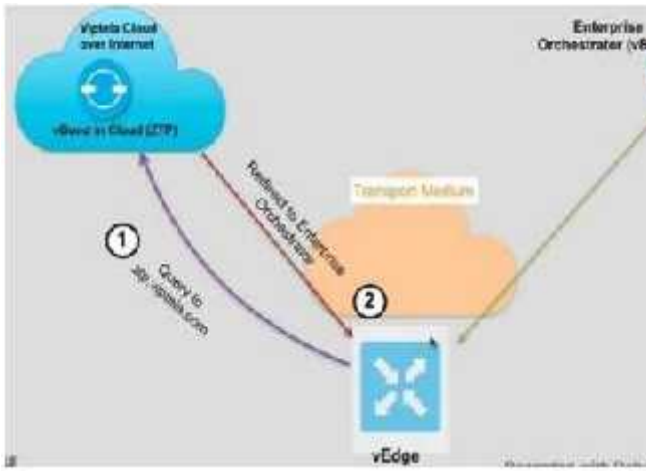

Fig. 2: Zero Touch Provisioning[2]

When the edge device is powered on and connected to a transport (MPLS, Broadband etc.) it attempts to authenticate itself with the orchestrator. The edge device uses one of the forms of authentication parameters: Serial number of the device. After a successful authentication of the edge device an authorization token is generated for any further communication. Orchestrator is already provisioned with the new edge device and the configuration details. For example, which network segment it belongs to policies. ZTP allows organizations to automatically update, pre- configure the device and update scripts hassle free.

A. Terminologies in SDWAN:

Underlay tunnels:

Underlay tunnels are the ipsec tunnels, actual physical path taken by the packet to traverse in a network. Eg MPLS, LTE, Broadband internet.

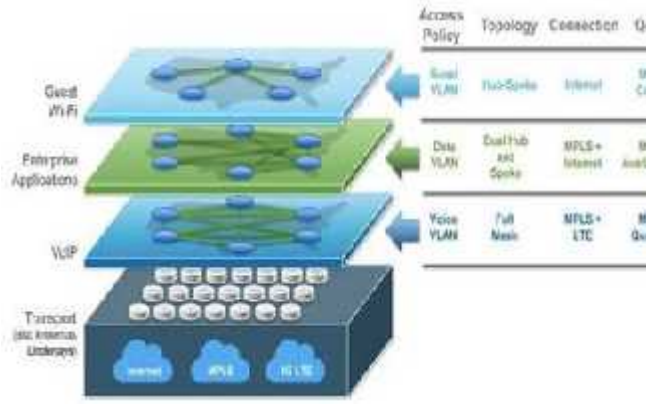

Fig. 3: Overlay tunnel topology[3]

Overlay tunnels:

Overlays are the virtual tunnels which are built over the physical media(underlay tunnels) depending upon the policies and type of traffic(eg VOIP) [3].

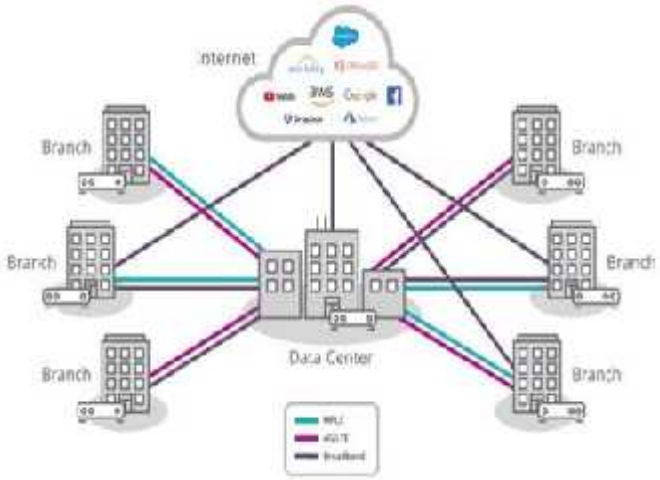

Fig. 4: SD-WAN Architecture[3]

Labels:

Each interface on the edge device are assigned a label to identify the type of transport connected to it. Eg: MPLS label for MPLS transport.

Deployment profile:

SDWAN facilitates ease of configuration with the help of a deployment profile which is standard for all the sites and the system administrator can then assign IP addresses accordingly.

RouteMaps:

Route map defines the policies which are to be applied to all the sites. There are two types of policies that can be created i.e. Global policy and Local policy. As the name suggests Global policy applies to all the sites present in the orchestrator and Local policy is limited to the single site only.

Building of overlay tunnels:

Policies defined use the labels from the deployment profile to define the path of traffic and it's optimization between sites. These overlays helps to define the path that data will take.

HA tunnels:

High availability tunnels means allowing the two different edge devices at a site to act as a single virtual device.

Routes:

It defines what path the traffic should take while traversing the network.

B. Modes of SDWAN deployment

1. In-line deployment: In an in-line deployment mode the edge device is connected in-line between the Router facing the WAN and the Switch on the LAN side of the network.

2. Out of path deployment: In an Out of path deployment mode the edge connect device is OUT OF PATH and the traffic must be redirected to the SDWAN edge device from the client in order to optimize the traffic.

C. Types of Topologies:

In SDWAN solutions, different types of topologies can be build depending upon the applications.

For example, critical traffic like Voice and video, full mesh topology can be selected for securing one hundred percent uptime of services. For insensitive services such as data. Hub and spoke model can be deployed. [4]

D. Security in SDWAN:

SDWAN forms Site to Site IPSEC tunnels for data transmission which is the most secured way of transmission as the data is being encrypted and encapsulated by the IPSEC header. It provides Deep packet inspection feature to analyse the data packet before it enters or leaves the network. Interface hardening is another feature which is provided by the SDWAN vendors which means that for the inbound traffic to the edge device, it accepts traffic only from IPSEC tunnel packets and for outbound traffic from the edge device it allows only IPSEC packets. E. SDWAN GUI dashboard:

SDWAN facilitates GUI based network monitoring dash board on which all the devices can be monitored with ease. All the information such as tunnel status, number of routes learned by the edge device, redundancy status of links etc related to the organization site can be viewed on the dashboard and any required changes can be directly performed. Administrator can assign privilege levels for access of the dashboard like Read-Only, Read-write access.

The GUI Dashboard maintains a log file for any changes that are made on the device.

Alarms are generated on the dashboard when any of the device in the network malfunctions which allows network administrator to take prompt action.

Various features allow to monitor the real time Utilization graph of a link, most used application by the users, amount of bandwidth a single user is utilizing, traffic load balancing, degradation of links. GUI dashboard eases task of performing simultaneous tasks on devices present in the network. For example, Multiple devices in the network can be upgraded to newer operating system version at a single go unlike traditional routers and switches where in user needs to log in individually into the devices for upgrading the operating system.

F. Dynamic Path Selection:

SDWAN enables the end user to prioritize applications based on the business requirements and dynamically routes data according to the network conditions. This helps to increase reliability, reduce the operational expenses and hence use the WAN more effectively. During congestion, the SDWAN orchestrator offloads less critical data onto a secondary path using intelligent path selection techniques. [5]

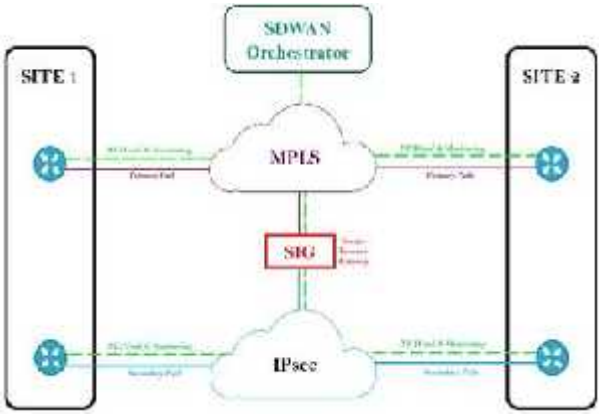

Fig. 5: Dynamic Path Selection in SDWAN[5]

SDWAN dynamically balances the traffic with the help of adaptive routing and dynamic path selection techniques. The network administrator can classify software and services as high priority, medium priority or low priority. The high priority traffic such as audio or https traffic will always flow through the primary path whereas the low priority traffic such as FTP file transfers will always flow through the secondary path. The medium priority traffic such as Video or CIFS will flow through the primary path by default. If the primary network path starts getting congested, then the medium

priority traffic will be shifted on to the secondary path automatically by the orchestrator. The network administrator can specify either a fixed threshold or a dynamic traffic profile based on the network usage with the help of the GUI dashboard for transferring medium priority data onto the secondary path.

IV. CONCLUSION

SDWAN solution allows the traffic to be prioritized depending upon the application thus enhancing the network performance. It is highly scalable and provides an ease of deployment with zero touch provisioning, also it reduces the hardware costs of various other devices required on site for example Load balancers, Firewalls by providing all in one feature in a single edge device.

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Impact of PAPR in Unipolar Communication

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Abstract*— A great thrust for bandwidth intensive applications is driving researchers from bipolar radio frequency conventional Optical wireless communication systems to unipolar communication system. Amplitude modulated RF wireless, Optical communication either with free space or optical fiber, base band digital modulation can be named as few examples for unipolar communication systems. Our paper is focused on Optical wireless communication (OWC) a complementary technology. OWC is an age old technology for low data rate applications using single carrier modulation techniques. It has been become popular in OWC by introducing the concept of multicarrier transmission technique which overcomes the limitation of OWC for low data rate applications. Multicarrier transmission techniques used in RF communications has to be modified to generate a unipolar signal in OWC to perform intensity modulation and direct detection for short range line of sight communications. DC-biased orthogonal frequency division multiplexing (DCO-OFDM), Asymmetrically clipped orthogonal frequency division multiplexing (ACO- OFDM), Flip orthogonal frequency division multiplexing (Flip- OFDM) and Unipolar orthogonal frequency division multiplexing (U-OFDM) techniques are the various forms of techniques available in the literature. Out of these DCO-OFDM and ACO- OFDM are the most popular techniques. DCO-OFDM is spectral efficient whereas ACO-OFDM is power efficient. Though the comparison of these techniques are available in the literature we the authors are focused to extend the comparison in terms of peak to average power ratio(PAPR) which is a crucial factor and one of the limitation of OFDM. It has been noticed that ACO-OFDM has higher PAPR value as compared to DCO-OFDM. Simulations are carried out and CCDF has been plotted for 256 subcarriers , 4QAM

Keywords— CCDF, multicarrier transmission, PAPR, unipoalr signal

I. INTRODUCTION

Though OWC is an age old technology it gained importance as the demand for high data rate applications such as mobile video, video conferencing, multimedia applications is increasing. Available RF spectrum becomes congested to meet the required data rate applications this driven the path to use an alternative visible light spectrum an unlicensed bandwidth and low cost transmission and reception devices. Information is conveyed in the form of optical radiations in free space using intensity modulation and direct detection. Rapid utilization of RF spectrum may lead to congestion of the spectrum to meet the demands of the exponentially growing users. This motivated towards OWC. Either the line of sight (LOS) or diffuse link is used as a Propagation mechanism. In OWC pass band modulation is carried out by intensity modulation (IM) and direct detection (DD) using cost effective devices like light emitting diodes (LED's) and photo diodes. Single carrier modulation (SCM) was used in OWC for low data rate applications. Though SCM is a best option for low data rate it suffers from intersymbol interference for high data rate and in dispersive channel. This gained importance for multitransmission techniques. OFDM is one of the multicarrier transmission system which forms the basis for 4G technologies like LTE and WiMAX. In OFDM entire bandwidth is divided in to number of subbands and each subband has a carrier frequency and data is carried out on carrier frequency parallelly. Though OFDM has been intensively used in RF communication systems for the las few decades its application gained importance in OWC very recently. OFDM RF communication algorithm has to be modified to be used in OWC. Optical signal power is proportional to the information signal generated by OFDM and also quadrature modulation is not possible in IM systems. However, OFDM signal is complex and optical power must be real and positive. To obtain a real and positive signal various approaches for subcarrier assignment and bipolar real signal to unipolar has been proposed in the literature. They are DCO-OFDM, ACO-OFDM, Flip_OFDM, unipolar_OFDM and ADO-OFDM. Out of these techniques ACO-OFDM is the most power efficient technique. But its spectral efficiency is less than DCO-OFDM. ACO-OFDM belong to the group where data is assigned only to odd subcarriers where as in DCO – OFDM information is assigned to all the subcarriers[1-4].

As per our knowledge PAPR comparison related to ACO-OFDM is not carried out. Though it is power efficient its PAPR is very high as compared to DCO-OFDM. In this paper we the authors present a extended comparison of DCO-OFDM and ACO-OFDM in terms of spectral efficiency, power efficiency, data rate, clipping noise and in terms of

PAPR. DCO-OFDM its comparison with ACO-OFDM for PAPR is done by observing the CCDF plot. Section II describes the indoor optical system. Section III Compares the DCO-OFDM and ACO-OFDM. Conclusion is drawn in section IV.

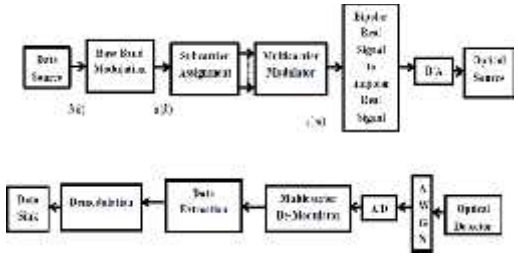

Fig.1 Indoor Optical Wireless Communication

II. System Description

System description is based on the block diagram as shown in Fig.1.Base band modulation is performed on a randomly generated stream of bits. Base band modulation maps bits to M- QAM complex symbols. As the level of M increases number of bits transmitted per symbol also increase.

$i(k)$ { 0,1,1,0,.....}

$q(k)$ $\{x + jy, x_1 - jy_1$ .....}

For OFDM modulation serial to parallel conversion takes place. Subcarrier assignment is done based on the unipolar technique adopted. These QAM symbols are transmitted on different subcarriers. Before the modulation carried out by the OFDM Hermitian symmetry is imposed Aki denotes the complex QAM symbol transmitted in kth OFDM subcarrier of ith OFDM symbol, where k is subcarrier index as given in (1)

$$A_{k,i} = A^{*}_{N-k,i}, \quad where \quad k = 1,2,\ldots,\frac{N}{2}-1 \qquad (1)$$

In (1) denotes complex conjugation is denoted by *, number of subcarriers is indicated buy *N*. In order to avoid the residual complex signal N = 0 and N /2 subcarriers are assigned null values as shown in (2)

$$A_{0,i} = A_{\frac{N}{2},i} = 0 \qquad (2)$$

Now OFDM modulation is performed which results in time domain signal as shown in (3).

$$a_{n,i} = \frac{1}{N}\sum_{k=0}^{N-1} A_{k,i}\exp\left(\frac{j2\pi kn}{N}\right) \qquad (3)$$

for n = 0,1,2, … N − 1, N indicates IFFT size. Time domain signal generated by OFDM modulator is real and bipolar as shown in Fig. 2.

Envelope variations of OFDM signal is based on subcarriers and type of modulation used. Variations in OFDM signal envelope is used to perform intensity modulation so a real positive signal is required and this is obtained by unipolar. techniques We assume ideal intensity modulator where the optical power is a replica of electrical power. Additive white Gaussian noise (AWGN) has been modelled as an optical channel. At the receiver direct detection is performed by photo diode. OFDM demodulation is performed by N point FFT.

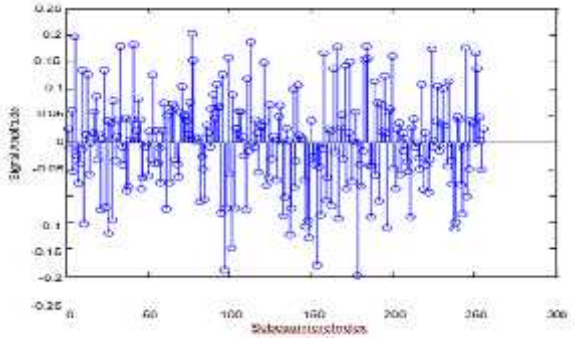

Fig.7 Real Time Domain Signal

III. Comparison of DCO-OFDM and ACO-OFDM

Based on the subcarrier assignment and bipolar to unipolar conversion OW OFDM signals are classified in to DCO-OFDM and ACO-OFDM. These are compared based on their approach to convert bipolar to unipolar, data carrying subcarriers, spectral efficiency, power efficiency and PAPR [4].

A. Subcarrier assignment and bipolar to unipolar conversion

In DCO-OFDM data is assigned to even as well as odd subcarriers. In DCO-OFDM bipolar to unipolar conversion is done by adding a DC bias as shown in (4). 7dB and 13 dB are the most widely used bias level this dc bias helps in shifting negative values to positive value and the residue negative values are clipped to zero. In general for higher values of N the amplitude of signal $a(t)$ can be approximated by Gaussian distribution with mean zero and variance,

$$\sigma^2 = E\{a^2(t)\}$$

$$\beta_{DC} = \mu\sigma \qquad (4)$$

$$\sigma = \sqrt{E\{a^2(t)\}}$$

DCO-OFDM signal generated after adding DC bias is as shown in Fig. 3

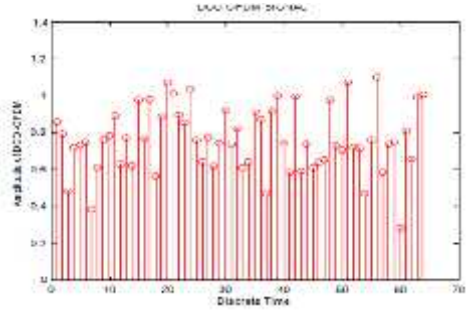

Fig.7 DCO-OFDM Signal

In ACO-OFDM data is assigned to only odd subcarriers and bipolar to unipolar conversion is done by clipping the negative $x(m)$ values to zero as given in the (5) where is the real and bipolar signal .In ACO-OFDM same information in the first N/2 samples is repeated in the next half of the OFDM symbol.

$$x_{ACO} = \begin{cases} x(m) & if \quad x(m) \geq 0 \\ 0 & otherwise \end{cases} \tag{5}$$

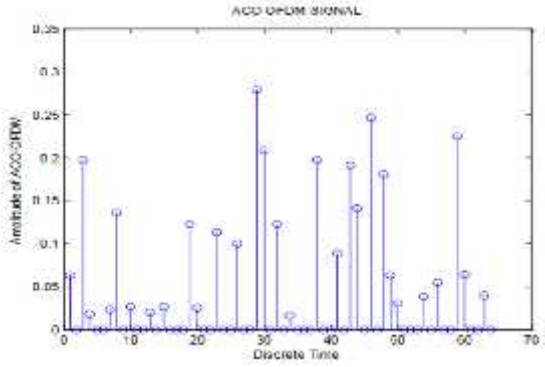

Fig. 4 ACO-OFDM Signal

B. Spectral Efficiency

In DCO-OFDM data carrying subcarriers are N-2/2 where as in ACO-OFDM we have N/4 data carrying subcarriers. Therefore number of symbols transmitted per unit bandwidth is less in ACO-OFDM as compared to DCO-OFDM. But for larger value of N the number of data carrying subcarriers is same.

G. ge Power Ratio (PAPR)

In OWC using OFDM as a multi transmission technique the QAM symbols are loaded in to subcarriers. Since transmitted samples have undergone IFFT operation and subcarriers overlap each other due to spectrum of each subcarrier is in the form of $|\sin(x)/x|^2$ resulting in high PAPR. This in turn needs a linear power amplifier at the front end of the transmitter and thereby increasing the complexity and cost of the system[5]. PAPR is calculated given as shown in (8)

$$PAPR_{dB} = 10 * \log_{10}\left(\frac{\max[(x_{DCO/ACO})^2]}{E[(x_{DCO/ACO})^2]}\right) \tag{8}$$

Complementary cumulative distributive function (CCDF) is used to express the PAPR performance.

C. Data Rate

In DCO-OFDM since the data is assigned to all the subcarriers the data rate given as shown in (6) where as in ACO-OFDM data is assigned to only odd subcarriers and the data rate in ACO-OFDM is given as shown in (7). Therefore the data rate in DCO-OFDM is greater than ACO-OFDM.

$$R_{DCO} = \left(\frac{N/2 \quad 1}{N + N_g}\right)\log_2^M \text{ bits per sec} \tag{6}$$

$$R_{ACO} = \left(\frac{N/4 - 1}{N + N_g}\right)\log_2^M \text{ bits per sec} \tag{7}$$

D. Power Efficiency

ACO-OFDM does not require DC bias to convert bipolar real signal to positive unipolar real signal this itself means that it is a power efficient technique as compared to DCO-OFDM. DCO-OFDM consumes power due to addition of DC-bias and also increase the transmit power.

E. Clipping Noise

In DCO-OFDM after applying the negative bias there can be Some samples may be negative. This results in clipping noise.This results in loss of information. In ACO-OFDM clipping noise is present in even subcarriers. Since the transmitted data is in the odd subcarriers so significant impact may not be there in ACO-OFDM

F. Peak -to-Avera

This is defined as the probability that the PAPR exceeds a certain value PAPR0 and is given in (9).

$$CCDF = 1\text{-}P(PAPR_{DCO/ACO}(dB) <= PAPR_O) \tag{9}$$

Fig. 5 and Fig. 6 shows the PDF plotted for 256 subcarriers and 4 QAM. It has been observed that PAPR of ACO-OFDM is higher than that of DCO-OFDM. The reason may be ACO- OFDM has low average power.

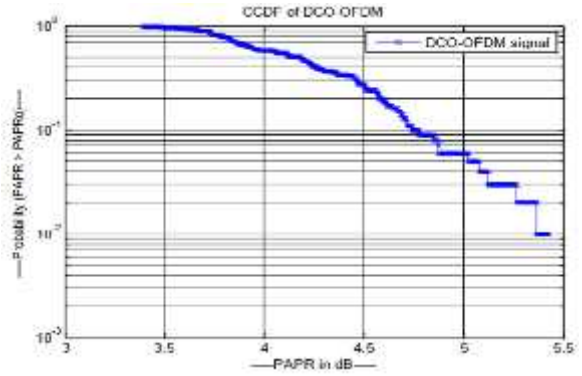

Fig. 5 CCDF for DCO-OFDM

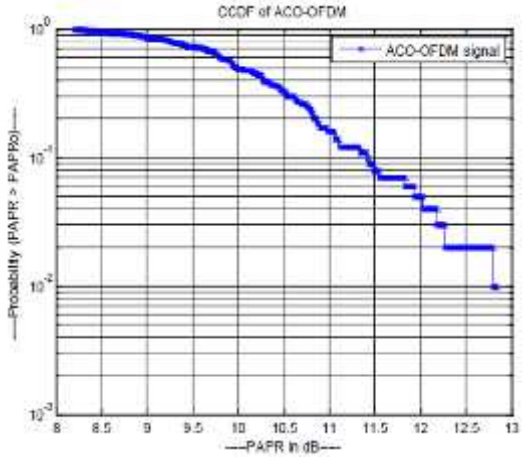

Fig. 6 CCDF for ACO-OFDM

IV. CONCLUSION

Multicarrier modulation techniques using OFDM has been recently gained importance in optical wireless systems due to its capability to overcome intersymbol interference. Comparative study of unipolar communication techniques in terms of spectral efficiency, power efficiency, data rate complexity has been discussed by the researchers and it has been found that ACO-OFDM is power efficient than DCO-OFDM where as DCO-OFDM is spectral efficient. But PAPR has not been investigated up to our knowledge. In our paper PAPR has been investigated and CCDF plot for 256 subcarriers and 4 QAM has been plotted. It has been observed that ACO- OFDM has more PAPR as compared to DCO-OFDM

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Analysis & Handover Decision Making Approach in Wireless Networks

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***Abstract* -This paper presents the cellular networks,hand over is the process that maintains the user's active sessions during mobile terminal changes its connection point to the access network. The decision taken by handover depends upon several (QoS) Quality of Service parameters.There are several methods have been studied for handover decision making and it has been Concluded that's of tcomputing such as fuzzy inference system and optimization algorithm such as firefly algorithm prove the most prominent mechanism for handover decisions. Taking into account, a prominent method for handover decision on the basis of fuzzy inference system with firefly optimization algorithm has proposed. This work aims to develop an adaptive method for parameters evaluations by applying firefly optimization algorithm automatically as the existing method was based on the manual evaluation an was difficult to operate on large scale. Experimental analysis has performed using both traditional and proposed technique. From the acquired results, it has been accomplished that proposed technique achieves less probability of disconnection with respect to traditional technique in view of random and straight terminal movement.**

Keywords - Handoff, Fuzzy Inference system, Firefly Optimization Algorithm, Quality of Service parameters

I. INTRODUCTION

Initially, the concept of handoff was initiated to make an efficient communication between the mobile users without having any kind of interruption. The term handoff defined the process which is used to transfer the ongoing call or a data session from one connected channel to another channel. Whereas, in satellite communication, the

handoff term is used to describe the transferring of satellite control responsibility from one earth station without any loss or interruption to another earth station [1]. This transferring of station has done through the time slot, code word, frequency band or their combination for TDMA i.e. Time division Multiple Access, CDMA i.e. Code-Division Multiple Access, FDMA i.e. Frequency Division Multiple Access or a hybrid of these accesses. Another term used for handoff is handover. The basic form of handover is considered at the time when phone call is in progress and directed to the current cell as a source to a target cell. The source and the target cells in terrestrial networks can be at two different cell sites or

from one cell site or at the same cell site. These two cells are generally referred as two sectors on cell site [4]. In case, where source and target are in different cells then it is considered as inter-cell handover. The main idea of using this handover is to maintain the call while the subcarriermoves out of the covered area by the source cell and entered in the target cell's area. Customer satisfaction regarding the available services is one of the major goals in cellular networks and handling handoff is the domain for providing the customer satisfaction is communication. Efficient handoff handling leads an improvement in receiving rate of calls and hence satisfies the customers [6]. The handoff frequently occurs in mobile communication thus it becomes important to handle it effectively so that the performance of the communication can be enhanced. Handoff is done to manage the resources in cellular network. It is important to consider **that the** handoff should be done in such a way that it should not leads to the interference whether after shortage of available resources, it did not avoided. Thus handoff handling is one of the important tasks in cellular network to satisfy the customers by enhancing the levels of the services and to manage the resources of the network.

II. PROBLEMFORMULATION

Hand over in cellular networks is the process of maintaining the user's activesessions when am obile terminal changesits connection point to the access network. The decision of handover is based upon various QoS (Quality of Service) parameters. Various methods have been studied for handover decision

making and it was reviewed that soft computing such as fuzzy inference system, artificial neural network prove the most prominent mechanism for handover decisions. In[1]aprominent method for handover decision was developed on the basis of fuzzy inference system by using two parameters i.e. coverage and speed. The consideration flesser parameters for hand over can affects the decision capability of the network. Also the evaluation of the input parameters was done manually. Hence there is a requirement to develop such a mechanism which can consider higher number of parameters for handover decision.

1. Proposedwork

As reviewed from the previous section that there are some open research topics in handover that still require enhancements.The lesser number of parameter consideration, manual evaluation of parameters etc are example of such topics. The manual evaluation of the parameters is only suitable for the small systems but when the implementation is done on large scale systems or real time based systems then the manual evaluation of the parameters is quite difficult task and sometimes can also leads to the falls evaluation which directly effects thehandover decisions. Therefore the proposed work aims to develop an adaptive method for parameters evaluations by applying firefly optimization algorithm. Since the firefly optimization algorithm is one of the prominent optimization algorithms. Also the proposed work utilizes the following parameters for handover decision:

a. Coverage
b. Speed
c. Distance
d. Load
e. Received Signal Strength

The methodology of proposed work has mentioned in the following steps which are followed to attain the handover decision

1. Initially generate the population for fireflyrefly

optimization algorithm in fuzzy inference system.

2. Further, design fuzzy inference system where number of input and output variables is defined along with Membership functions. In addition to this, rules are also defined based on which an output is achieved.

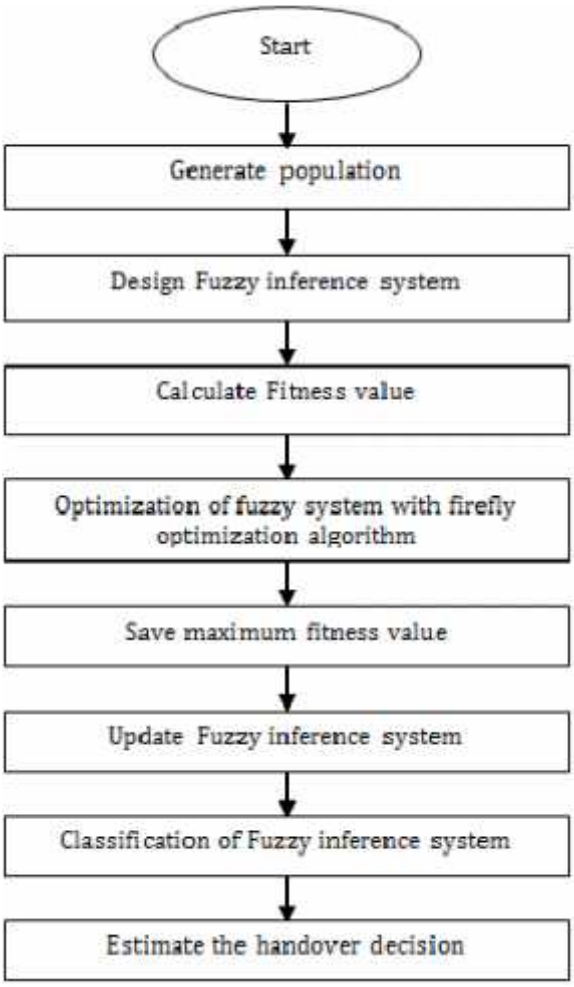


Fig.1.Proposed Methodology

3. Evaluate fitness value based upon which system will update
4.Then, Optimize designed fuzzy inference system with firefly optimization algorithm for effective handover decision
5 Evaluate the fitness value and save maximum value and this maximum fitness value update the fuzzy interference system
6.Finally, classification of fuzzy system has performed and handover decision is taken accordingly.

III. RESULTS AND DISCUSSION

This section represents the graphs of results which are obtained after implementing the proposed method for Handoff decision making.

This work purposes a fuzzy system for increasing the handoff for increasing the handoff decision making capability

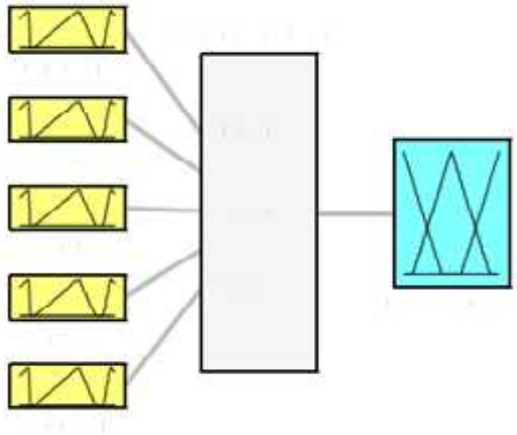


Fig-2: Fuzzy Interface of first layer of the Multilayered

fuzzy interface

This figure explicates that the network takes five inputs and on the basis of 243 rules after the implication of fuzzy interface, it generates the single output regarding the handoff decision. Each input has 3 membership functions based upon which an estimation level has defined. After inputting the parameters to the fuzzy interface it takes some decision on the basis of rules that are predefined. The membership functions which forwards to the fuzzy system are explained in the below figures 3, 4, 5, 6, and 7. Figure 8 is the membership function of the output parameter which is Estimation Level. The range lies from 0 to 1.

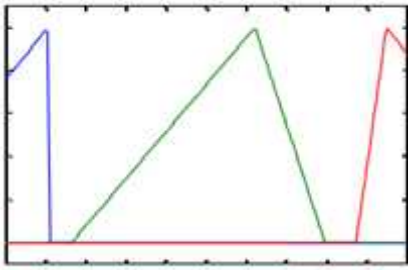


Fig.3 Membership function of Distance

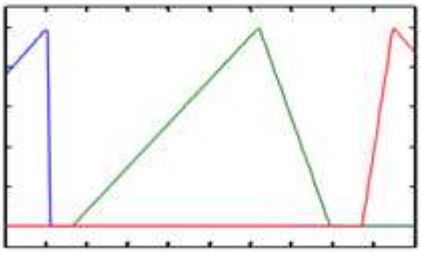
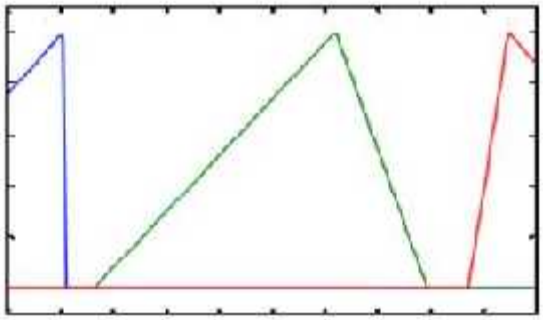


Fig.4.Membership function of RSS



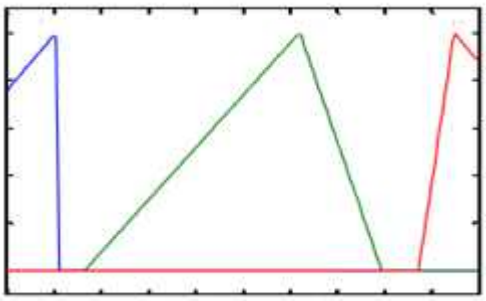


Fig.5 Membership function of load

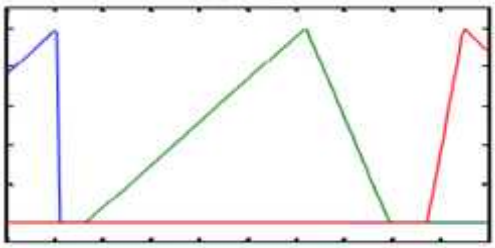


Fig.Membership Function of Speed

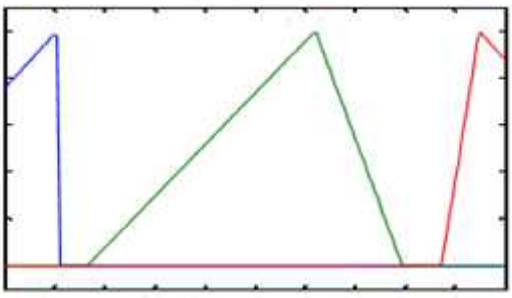


Fig.7.Membership Function of Coverage

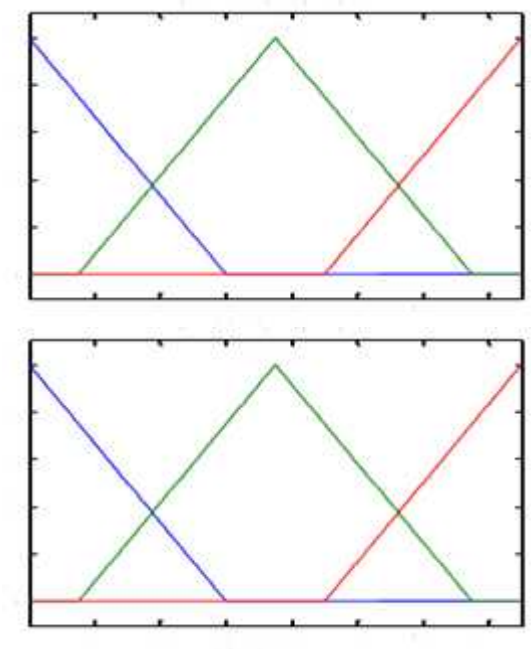


Fig.8 Membership function of Estimation Level

Chart 1 and 2 depicts the comparison of handovers of
the comparison performed, it has been confirmed that fuzzy with firefly optimization algorithm outperforms traditional and fuzzy technique. In traditional technique, estimation level reached at 13.86 in random terminal movement whereas fuzzy acquires 0.84 and fuzzy with firefly achieves0.52256 of estimation level .Therefore fuzzy with firefly optimization algorithm performs efficiently similarly in straight movement method estimation level achieves best

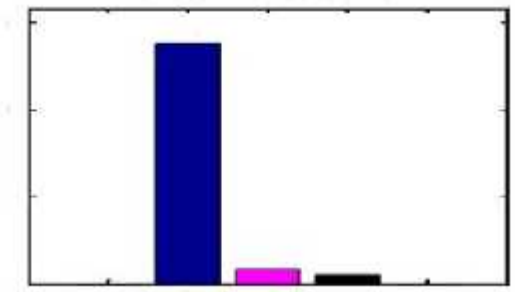


Fig.9.Chart: Handover of random movementMethod

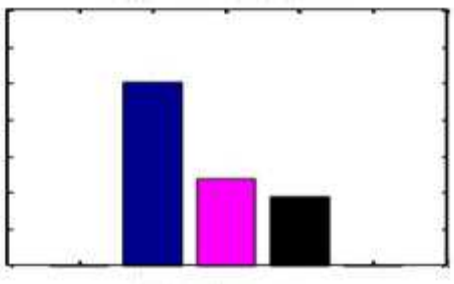


Fig.10.Chart : Handovers of straight movement method

In traditional and fuzzy method, the estimation level was 5.03

FA performed effectively and acquires estimation level of 1.875.

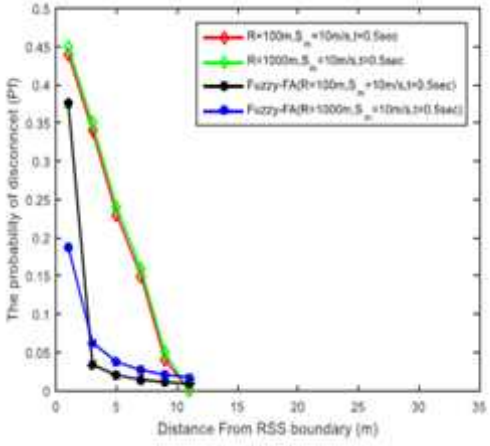


Fig.11ChartProbability of disconnection with respect to distance

Chart3 shows the probability of disconnection with respect to distance .For the simulation analysis ,traditional technique has compared with the proposed fuzzy FA technique .From the results acquired .it is concluded that

proposed technique achieves less probability of disconnection w.r.to other technique As the distance increased the probability of disconnection has been decreased but in proposed technique it decrease efficiently in view of different traditional technique

IV. CONCLUSION &FUTURE SCOPE

In this work, a handover decision method has presented. This method involved distance, coverage, speed, load and RSS, all of which affect the process of communication. These parameters are considered as input variables for fuzzy inference system based on which estimation level has evaluated and decision has taken. Moreover, based on the handover decision parameters, reasoning rules are designed

While considering their logical relationships. The fuzzy inference system is considered to be a suitable system for reason based on nonlinear data i.e. terminal as well asnetwork information. In the proposed work, fuzzyinference handover decision. The collaboration of two techniques such as neural network and fuzzy inferencesystem can perform more efficiently and can make system innovatory.

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A Review paper on EMI/EMC sources and their significant effects on RF circuits

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Abstract: **One of the most important issues for the assessment of performance of radio frequency circuits is EMI/EMC. EMI/EMC is depending upon some factors one important of them is the characterization of fast switching digital devices and Their nonlinear behaviour strongly affects the integrity of signals launched on system interconnects, which in turn affect crosstalk and radiation. The system-level EMC is therefore highly sensitive to the nonlinear behaviour of individual IC ports, which must be accounted for in any realistic numerical model. This paper considers several sources of EMI and approaches for Mitigation of EMI, with the aim of detecting which are the most important effects that must be considered for both signal integrity and radiated emission analyses.**

Keywords—Crosstalk, electromagnetic interference (EMI), modelling, near field, power bus, SOP (system-on-package).

I. INTRODUCTION

Each device radiates some EM waves, which causes problem for another nearby RF/wireless system. This is called EMI. This EMI level radiated by device should be within limit so that nearby systems function properly. Each device generates electric noise which passes through cables/wires and cause problem for another device connected with the same electric system. This conducted emission (transients/ripples) should be within limit for proper functioning of another device/system. This is called as EMC level. Any electronic device which uses electricity will produce the electromagnetic interference (EMI). When interference enters in places where it is not required it may affect the working of that device. EMC is the measure of how good our device in normal functioning in the presence of EMI. Electronic products and equipment's developed by companies should meet EMI and EMC limits finalized by standard bodies before the products are actually launched to the market for the user. If proper guidelines are followed by manufacturers at design stage then the product will pass the EMI/EMC tests at the initial trial itself. Some manufacturers use emi/emc compliant components in the design that helps a lot.

When designing any electrical/electronic devices in terms of EMI/EMC, they must be tested by a spectrum analyzer in order to know their EMI generation behaviour. The generated EMI is mandatorily compared with an EMC standard, such as FCC, EN, CISPR, VDE, and military standards. However, the spectrum analyzer is an expensive measuring apparatus. That is why many companies cannot measure or detect EMI emissions during design phase. The EMI generation is usually measured or determined at the testing center when the device is already completed. Certainly, the cost of the testing is expensive and charge by the time of testing. Some electronic devices do not respect EMC standards; therefore, it is required to add or modify the EMI filter to limit conducted EMI issued from the device at the testing center, and measure electromagnetic noise again. Sometimes, it is only a single tune, and sometimes, it takes several times to adjust EMI filter component values to pass the EMC standard.

Most EMI mitigation and protection techniques primarily rely on shielding the circuit boards and cable bundles. Not only does this approach lead to high cost, but it is also insufficient since it fails to perform as expected due to inadequate understanding of the coupling phenomenon. Therefore, it becomes important to have a better understanding of electronics to combat with EMI at circuit level and to possess well-established theoretical tools to study characteristics of interfering signal and also understand the impacts of enclosures and shielding on EMI/EMC performance.

II. TYPES OF EMI

EMI is divided into two types: 1) conducted emission and 2) radiated emission. The EMI filter is designed to reduce conducted noise emission. Moreover, conducted EMI is separated into two modes; one is differential mode (DM) interference and another is common mode (CM) interference. The DM noise flows in line and returns by neutral whereas the CM noise flows in line and neutral and then, flows into ground. For specification of conducted measurement within the EMC standard, the noise is measured in the frequency range of 9 kHz to 30 MHz or 150 kHz to 30 MHz the main equipment employed in noise measurement is LISN (Line Impedance Stabilization Network), spectrum analyzer and computer. LISN is normally placed between the electrical source and the device under test (DUT). It allows maintaining fixed input impedance in accordance with the EMC standard.

III. SOURCES

EMI sources, both natural and man-made, that compose the EME can be categorized into several primary categories. Some of these classifications of sources are listed below.

(1) Ambient EME that is composed of numerous sources of which the most significant are: Television transmissions both analog and digital Radio AM, FM, and Satellite Solar Magnetic Storms which peak on a eleven year cycle Lightning which occurs as a very high voltage and high current event Utility power grid transmission lines which have high voltage, low current, and low frequency characteristics. In this category is also the new technology of Broadband over Power Lines (BPL) digital signals. Other ambient EME sources include airport port radar, telecom transmissions, electrostatic discharge (ESD), and white noise. Also, in this category is the earth's magnetic field flux which has a value of about 500 milligauss. Some other major product and system's emissions sources include switching mode power supplies, arc welders, motor bushes, and electrical contacts

(2) High Powered Electromagnetic Pulse (HEMP) threats which are intended to disable electrical and electronic equipment. These sources are designed to be utilized by terrorist and military organizations. Currently existing HEMP devices include the following: Intentional Electromagnetic Interference (IEMI) source – a high powered pulse device utilized by combat, sabotage and terrorist organizations High Altitude Nuclear Electromagnetic Pulse (HNEMP) – produced by the detonation of a nuclear device high above the earth's atmosphere High Powered Microwave Weapon (HPM) – a device utilized by the military as a combat weapon E-Bomb – a HEMP weapon employed by the military to disrupt an enemy's intra structure that is delivered by an aircraft. EMP Cannon – a military tactical weapon

(3) Power Quality degradation factors can affect the operation of equipment that is powered by a mains power source. These mains degradation factors include: Voltage surges, sages, dips, spikes, and high and low voltage Brownouts and blackouts Power line faults Electrical Fast Transitions (EFT) Electrical noise superimposed on the mains power line These power quality degradation factors can occur simultaneously or independently, during any time interval.

(4) Railroad and Mass Transit Systems have some unique types of EMI source problems. These include: Propulsion system's high voltage and high current operational mode emissions Train signalling systems and their associated computer operating codes Third rail shoes arcing broadband emissions High voltage contact switching arcing broadband emissions Train control system's emissions Track train control circuits Right away emission sources

(5) Medical equipment utilized in medical facilities has numerous EMI sources. Some of the more prominent of these are listed below: Life support equipment such as ventilators, cardiac defibrillators, infusion pumps, etc. Patient telemetry and assistance equipment which includes electrocardiographs and motorized wheelchairs Electrical surgical units and their associated support equipment Magnetic Resonance Imaging (MRIs) systems X-ray units, both therapeutic and diagnostic Gamma Beam Electron Accelerators and Therapeutic equipment

IV. SOURCES AND THEIR MOST SIGNIFICANT EFFECTS

(1) Ambient (EME) – Can affect sensitive electronic equipment in the vicinity of the EMI sources. The closer the sensitive electronic equipment is to the EMI source, the higher the source's radiated power level, and its in-band frequency the greater is the probability that the EMI will cause an interference problem. In the case of the effects of ESD on sensitive electronic systems it can cause upsets, burn outs, and latch-ups in these units.

(2) High Powered Electromagnetic Pulse effects – High powered electromagnetic sources can totally destroy an electrical and electronic equipment's function. As an example, an HNEMP device detonation above the earth's atmosphere of the United States can totally immobilize the whole of the continental United States infrastructure. IEMI, HPM, E-Bombs, and EMP Cannons can be utilized to disable electronic systems at specific locations.

(3) Power Quality distortions and transits that are present on the power main systems can affect the normal operation of the equipment that it supplies power. Transits such as power surges are capable of destroying interface electronic circuits. EFTs can cause electronic circuit upset conditions.

(4) Railroad and Mass Transit Systems have one primary source of EMI and that is the transit and railroad engine's propulsion systems, which operates with high voltages, currents, and magnetic field levels. They have been known to affect other facilities that contain sensitive electrical equipment that are located near the railroad or mass transit systems right away. These propulsion systems have had EMI associated problems with other elements of their systems. Train control electronics can be affected by EMI sources such as third rail and other broadband frequency arcing sources if they are not adequately designed for EMC.

(5) Medical equipment and facilities sources include patient monitoring systems Those are very susceptible to EMI interactions. The human body signals that they monitor are very weak. They are measured in unites of microvolts and micro-amps. Among other devices that are susceptible to EMI are hearing aids, wireless patient monitoring systems, magnetic resonance imaging systems, implantable cardiovascular devices, drug pumps, and portable diagnostic meters. As new technologies are developed and enter the marketplace at a fast pace the list will grow.

V. CONCLUSIONS

An important step in mitigating EMI involves identifying the sources of radiation on the RF circuits. This paper discusses about different types of sources and their effect on the performance of the system. There is different

solution available to mitigate effect of EMI but each solution having their own limitation. So, it is difficult to find out the source of EMI in the RF circuit and the best method to reduce the effect for the given application.

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Implementation of RFID based Automated Billing with Anti-Theft Mechanism

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***Abstract*—Due to the increasing population, there is a huge commotion around us in each place. Hence, there is an increase in the number of people visiting to the malls, which has given rise to large crowds at shopping malls which lead to long queue and morewaitingtimeforthebillgenerationatthebillingdesk. Also due to human error some of the products get skipped while scanning the product and the customer takes away the product without paying. The traditional procedure is that the cashier needs to first scan each and every product present in the cart, during the scanning each product gets added to the billing record in the software and then final bill is generated. Thus,the existingbillingsystemismoretimeconsuming.Thispaperdeals with creating an exit gateway to solve this problem. The customer once completing the shopping can go to this exit gateway with their trolleys. At this gateway there is a systeminstalledwhichworksonRFIDMechanism.Asthetrolleycomes in the range of RFID Reader, data of each passive tag will be given to the reader and from there using Arduino the final bill will be transferred to the billing desk where the customer can pay the bill either by cash or by using available online payment methods. The main objective of this project is to reduce thetime in generation of the bill and also provide a security system of billing which offers anti-theft mechanism by using UHFRFID.**

***Keywords*—Ultra High Frequency (UHF), Radio Frequency Identification (RFID)**

I. INTRODUCTION

Human beings are always looking to develop technology such that it can fulfil their basic requirements with muchless complications and in a quicker way. The grocery section plays an essential part inside the worldwide economy acquiring a good position with most convenient and various business throughout the globe. Now a day's buying and shoppingathugemallsisturningintoaneverydayactivityin metropolitanarea/citiesespeciallyonholidaysandweekends. Shopping mall is a place where people can get their daily necessities but there are some problems which are currently faced by the customer.

In the present scenario, customers visit the mall to purchase various products. Initially after selecting all the required products, he/she places them into the cart and moves toward the billing counter where he/she may need to stand in a long queue to pay the bill depending upon the rush in the mall, unnecessarily wasting precious time for both the customer and the cashier. The rush is even more during festive season,specialoffersanddiscounts,inthatcasealotofpeoplemight leave the mall without making the payment of the products. As a consequence, some methods are incorporated to solve theseproblems.

This paper gives a solution to the existing problems. The main purpose of this paper is to provide an automatedbilling with an Anti-TheftMechanism.

II. LITERATURESURVEY

This paper provides centralized and automated billing system using RFID technology and ZigBee. Purchased productswillbereadbyRFIDreaderpresentonthesh opping cartandtagdatawillbestoredonEEPROM.Storeddatawill be transferred from EEPROM to the central billing system via ZigBee module[1].

This system provides budget setting and gives information about ongoing offers on products. Products placed in a cart will be detected by RFID technology, it helps to set a budget if purchase cost reaches the budget value the buzzer beeps. When cart reaches billing counter bill will be generated through Rf communication [2].

It provides a system that keeps a track of purchased products and online transaction. This system gives suggestions to buy products based on the user's purchase history from a centralized system [3].

This system transmits scanned tag data to cloud databaseand retrieve it again to display it on an LCD screen, so that the customer can see the purchase product. Purchased product information will be deleted from the product database after

the customer has done with the payment process. So that when a customer exits through the anti-theft gate, microcontroller sends all read data of RFID tag to the server and determines whether they exist in the database or not. Thus, if the product which is not purchased is detected, an alarm will notify the staff about it[4].

This provides a system which transfers the data using GSM module. The purchaser puts the product in the cart. The cart shows the details of the product that is the item name andthe rate of the item. The final information is then transferred to the centralized billing unit via GSM module[5].

Butitstillneedsagreatimprovement.Thereisaneedt obring some advancement and automation in this ongoing practice so everyone can feel easy and comfortable whileshopping even though there is a huge rush. There are still lots of areas in which improvement may be done in terms of providing excellent shopping experience to the customer [6].

III. PROBLEMSTATEMENT

Inthecurrentscenarioalotofvaluabletimeiswastedforthe payment of bills once the shopping is done, mostly in malls/marts. The large crowd at the shopping malls leads to long queues at the billing desk because the accountant needs to scan each and every product and then the bill isgenerated. Due to which prevailing billing process is time consuming. This process makes customers tired and irritated. Also,when there are a lot of products for billing, there are chances of skipping one or two products due to cashiers negligence.

IV. PROPOSEDSYSTEM

This system provides systematic, synchronized and automated billing system with usage of RFID technology. Anti-Theftmechanismisintegratedalongwiththeautomated billing. This paper contributes to the advancement within the present purchasing system which can bring a newinnovation in the field of shopping malls. In a proposed system, there will be a gateway present near the billing counter. As shown in “Fig 1” when a customer is done with his/her shopping, they can place their cart at the gateway for a few seconds. This gateway has an RFID reader installed which will scan each and every tag attached to the product placed in a cart. Information of the tags will be stored in Arduino, where bill will be generated. Generated bills will be transferred to the billingcounterthroughtheWi-Fimodule.Customerscanpay the bill at the billing counter via cash or via online transaction.

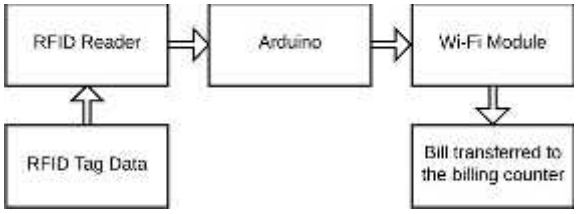

Figure 1. Block Diagram

A. *RFID Tag andReader*

Radio Frequency Identification (RFID) is the wireless non-contact technology that uses the radio waves to transfer the data. Tagging items with RFID tags allows users to automatically and uniquely identify the data present on the tags. There are two categories of RFID system - Active and Passive. Active RFID systems have their own power and transmitter source emitting their own signals to transmit the information stored in microchips. They are operated in ultra- high frequency (UHF) band. They offer a range of 90m - 100m. In Passive RFID system reader antenna sends a radio signal to the tag. This transmitted signal to power on and reflect energy back to the reader. Passive RFID systems can operate in the low frequency (LF), high frequency (HF), or ultra-high frequency (UHF) radio bands. Range of passive tags is typically less than 10m. It is cheaper, smaller and easier to manufacture than active tags. There is no need of line of sight and multiple tags can be read simultaneously withagoodabilitytoread,write,updateandmodifythedata Environmental factors do not affect the tags. They have high security as these tags can’t be replicated. This system uses UHF RFID tags having the reading range up to 2m. UHF reader having read range 0-6m and write range 0-3m working at frequency 865-928 MHz



Figure 2. ALN-9662 Short Inlay RFID Tag

B. *Arduino Mega2560*

TheArduinoisanopensourceprototypingplatfo rmbased on easy to use hardware and software. The Arduino Mega is amicrocontrollerboardbasedontheATmega2560.I thas256 Bofflashmemory,8KBofSRAMand4KBofEEPR OM. In this paper, Arduino is used to generate bills through coding. Using Arduino and Wi-Fi module generated bill will be transferred to the Billing counter



Figure 3. Arduino Mega 2560

C. Wi-FiModule

Thewi-fimoduleusedinthispaperisNodeMCU.Itisused to transmit the generated bill from the gateway to the billing counter. NodeMCU is an open-source firmware and developmentkitthathelpstoeithercreateaprototype orbuild IoT products. The module is mainly based on ESP8266, whichisalow-costWi-Fimicrochipincorporatingbothafull TCP/IP stack and microcontroller capability. It is introduced by manufacturer Espressif Systems. The ESP8266 NodeMCU is a complex device. It tends to combine some featuresoftheordinaryArduinoboardwiththe possibilityof it being connecting to theinternet.



Figure 4.NodeMCU

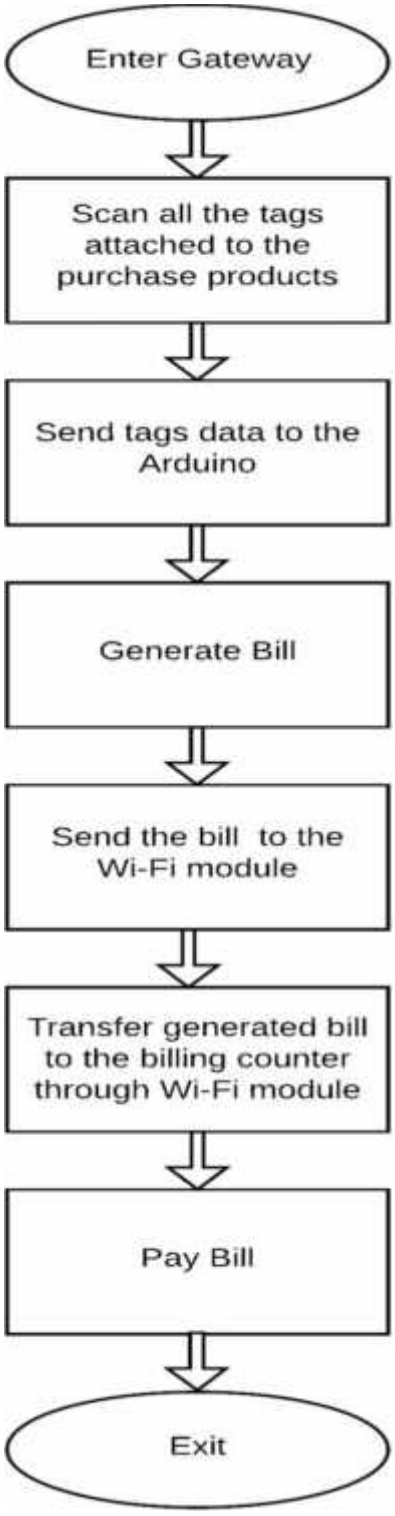

Figure 4. Flow Diagram

V. RESULT

Tagsdatascannedbytherfidreadercanbeseenwiththehelp of rfid reader software. As shown in “Fig 5” all the details like the length of data stored in tag, the received signal strength, amount of tags read by reader are displayed here. Also depending on the memory bank (epc/tid) of the tag the respective banks data can be viewed.

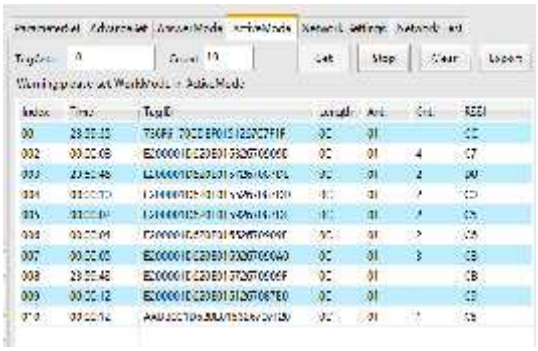

Figure 5. Scanned tags data

VI. CONCLUSION

This system will make the billing process smoother and more systematic than the existing billing system, hence it will consume much less time to generate bill. There wouldn’t be any rush at the counters like in the current scenario. It is a onetime investment of installing the gateway as compared to employing a large number of peopleatthebillingdeskandalsohavingmanyautom atic trolleys. Inconvenience caused to the customers, skipping of products by cashier’s negligence and stealing problem can also be reduced to a great extent.

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Implementation of IoT Enabled Solution to Optimize Bed Management in Hospital

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***Abstract*— The increasing number of casualties has raised the demand of hospitals which are well equipped in providing required treatment with optimum precision. In case of emergencies, every moment becomes highly critical; hence the victims need to be well aware of the current status of the hospitals. Often crucial time is lost due to the inability to find the appropriate hospital for the victims. Over the years, there have been several attempts made in order to optimize the process in the domain of hospital management. This includes applications which provide information about the nearby hospitals but they lack to inform about the bed availability and the facilities available in the hospital. Even if they provide this information the method they use to collect this information is not reliable. In short, there are no such systems available in current times which collectively provide good functionality, reliable information and are user friendly. This paper proposes a system which provides necessary information to the users about the hospitals along with the number of available beds in an easily accessible format. In addition to this, the project also helps the hospitals to minimize the endeavor to manage bed allocation, which will effectively help the hospital to provide treatment to all the patients even at the time of calamities and will also smoothen the process.**

Keywords—casualties, optimum precision, hospital management, bed availability, functionality, bed allocation

I. INTRODUCTION

In times of crisis, it is of important significance to move sufferers as fast as possible to a hospital that has all the human and technical assets required for their treatment. Certainly, timely and suitable treatment can dramatically bring down casualty figures in the course of such conditions. So, it is important that the patient makes the correct choice of hospital.

According to a survey conducted in 2011 beds available per 1000 population in India is just 0.7 [1] which is much lower than the requirement percentage of WHO (World Health Organization). This number incorporates inpatient beds available in public, private, general, and specialized hospitals and rehabilitation Centre's. People die before they reach hospital, this happens many times just because the approach of patient to a particular hospital is wrong.

With the development of communication technology, it is now possible to find out the nearest hospital which is appropriate in terms of resources which will be needed to treat the patient.

The database of hospitals can be constructed by using standard data formats like Emergency Data Exchange Language (EDXL), in conjunction with the resources that each hospital has. This database can be used to provide information to the patients so that they can make correct decision.

This paper discusses the framework we have proposed which gives users vital data about the hospitals and helps them to decide the appropriate hospital for them. The data such as availability of bed in a hospital, facilities available in the hospital, number of patient approaching to the hospital along with other indispensable data such as hospital contact details, address and the time table of the hospital is likewise provided to the users. Along with this, the system also provides an extension to Google maps utilizing which the users can locate the hospital and will also get aware of the traffic, shortest route and favorable means to reach the hospital which are also the significant variables to be known to settle on choice.

Alongside this, the system helps the hospital to allocate respective bed to the users without a lot of hustle and bustle by providing them the data of number of patients approaching the hospital along with the reason of their approach if provided by the user and the data of which bed is allocated to which patient is also maintained.

II. LITERATURE SURVEY

Advancement in technologies used to diminish the overall casualties is a significant field wherein numerous improvement and papers has been proposed till date.

One of such paper is Ambulance Assistance for Emergency service using GPS [2], which proposes a system in which GPS is used to track location of victim. The main intention of this paper is to save the time by using GPS tracker so that the hospital management can track their ambulances

and in case of any emergency it can be sent to patient location.
Gap: the patient first have to verify in hospital of available ambulance. Pre knowledge of available ambulance in a hospital to patient doesn't fulfill in the system.

In the paper, Pre hospital emergency [3], the author proposes an android mobile application that sends the medical severity of road accident to the hospital and a web-based system at hospital end user for viewing received notification and victim information. Rapid Application Development (RAD) is used as a software development process. RAD is a software development methodology which is targeted to produce higher-quality results and faster development than traditional software development. Although there is an ineffective communication between medical team and hospital the current system only focuses on injury during road accident other type of medical cases doesn't fulfill the application form.

In the paper, Bed occupancy monitoring data processing and Clinician user interface design [4], the author proposes presents a bed occupancy monitoring system using a bed pressure mat sensor. Clinician User Interface (CUI) is used to monitor data such as ECG, breathing rate, heart rate which will be displayed in clinics. a pressure sensitive mat S4 Sensors Controls Inc. called Bed Occupancy Sensor (BOSTM) was used. The BOSTM is a waterproof sensor pad that is placed under a patient's mattress. The algorithm used is to derive parameters such as average number of entries, the amount of continuous bed occupancy, etc. The issue of the overall system is that it is much costly and it's difficult to implement this system in a hospital but this system can be installed at home.

In the paper, Design of Hospital Beds Center Management Information System based on HIS [5], HIS software is used that enabled the comprehensive computer-based hospital information management in all aspects. The function of HIS consists of transaction management and information services. Transaction management is used to manage outpatient hospitalization, medicine, financing and integrated information. This project doesn't address the problem in the miscommunication between the nurses and the hospital management. Hence, the delay in allocation of beds is still a problem.

In this paper, AutoHS [6], the author presents a solution that assists a disaster victim or an ambulance paramedic in choosing a destination hospital that is appropriate in terms of availability of required medical infrastructure and distance to travel. We use a system of ranking of hospital for each victim to make an intelligent choice and also ranking on the basis of the nearest hospital. AutoHS is implemented using the NGINX web server, specifically OpenResty [6], a patched version of NGINX that adds support for web application development using the Lua, programming language. The algorithm used for ranking on the basis of volunteering is not too precise and also in this application for urgent emergency the ranking is more preferred on the basis of distance and the quality of hospital is not taken care of.

In the paper, A Smartphone based Application to Improve the Health Care System of Bangladesh [7], the author proposes an application which will be a helping hand for people who find it difficult to select hospital, book cabin, contacting doctor for appointment or seeking help in an emergency situation. To help finding the hospital location, the app provides an option for getting hospital location. Users can easily find the location of hospital with a single tap. The system will open up the Google map application and mark the hospital's location. Miscommunication between patient and hospital management as there is no auto update in the system hospital management has to manually fill the update also patient has to manually search for hospital, in the application there is no pre knowledge for availability of hospital, ambulance, etc.

III. PROBLEM STATEMENT

The major problems which exist in Hospitals are:
1) Delay in changing the status of a bed:
In hospital several times it happens that a patient is discharged but the status of the bed which was allocated to the patient is still occupied for certain that is there is a delay after which the status of the bed is changed. Due to this if a patient reaches the hospital under this time period then wrong information may be given to the patient due to which there may be a delay in his or her treatment.
2) A large number of patients arriving at the hospital in short time:
This problem occurs at the time of crisis when any natural calamities take place or a virus is spread in a region. In such conditions a lot of people approach to the hospital for treatment under such situations a lot of hustle and bustle is being created in the hospital due to which the rate of causality is increased.

For a victim in need of a hospital, a person may be aware about the hospitals around him but he or she may not be surely aware about the facilities of treatment as well as the availability of beds in the hospitals. Due to this lack of information at the time of emergency a person may take wrong decision about visiting a particular hospital.

IV. PROPOSED METHOD

The proposed framework understands the issues which exist in hospitals and furthermore with the patients who are in earnest need of treatment.
Since the task unravels issues of both the side that is the hospital and the user side henceforth the structure of the proposed frameworks is partitioned into two sections.

Section A - User Side:

Out proposed system provides the user various essential data about the hospital in an Application named as 'Hospital Bell'.

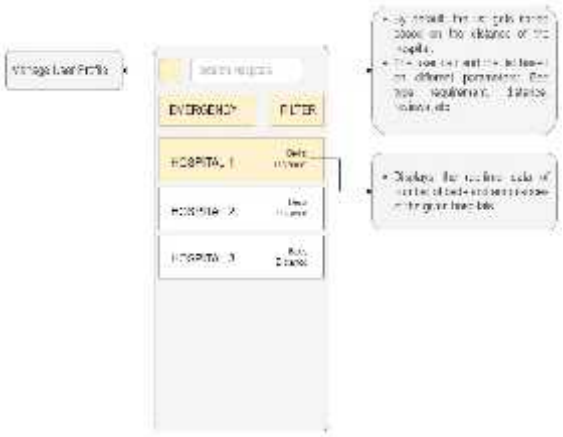

Fig.1: User Application – Hospital List

The User Application provides the optimum list of hospitals as shown in fig. 1. There are multiple parameters which are considered while sorting the list of hospitals. The list can be also be optimized based on the emergency of the patient. The list provided to the user considers parameters such as the category of bed availability. Furthermore, these are classified on the basis of distance which becomes a vital parameter in case of emergency. Also, for an accident affecting multiple victims needs a hospital which has sufficient facilities for all the patients to get treated.

When the user makes a choice of the hospital, the user can inform the hospital about its arrival in a couple of clicks. The layout for the application of the hospital page is shown in fig. 2. This page includes the details of the hospital which is required at the time of browsing. The list which shows the bed availability is classified on the basis of the bed category. This helps the user to know the information of the bed's availability based on his requirements.

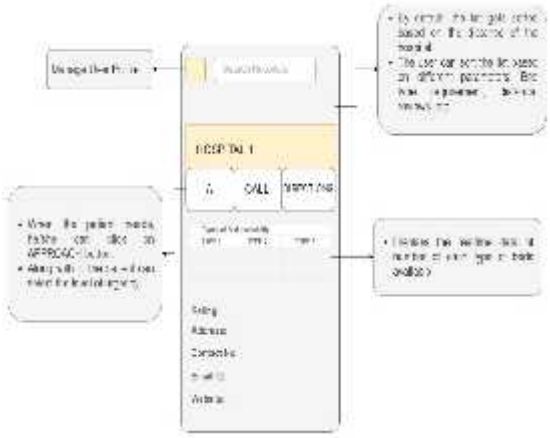

Fig. 2: User application: Hospital page

The layout and working of the application are such that when a person in need will access the application initially, he will be shown list of nearby hospitals along with number of beds available and distance of the hospital from the location on the first page itself. Initially the list will be sorted on the basis of distance in accordance to his present location (the user can also change the current location if required). Although there are other sorting methods based on distance, number of available beds or ratings to the hospital is available along with filter such as - Government Hospital - Private Hospital, etc. are also provided.

As soon as the user decides the hospital he or she wants to visit the user has to select the hospital by click on the name of the hospital which will send the user next page where other information about the selected hospital will be present. At this page, a button named as 'Approach' is present on which the user has to click so that the selected hospital gets notified about the user, the user can also provide other related information to the hospital such as symptoms of the illness or information about any other related issues if he wishes. The user will also get the data about how many other users are approaching to this hospital. Now after the selection of the appropriate hospital the issue is how to reach to the hospital in an efficient way and best means so that it consumes minimum time. To solve this issue the app provides the contact details of the ambulance available nearby, and also has the option which will send the user to the Google maps through which user will get the direction to the hospital along with information about the traffic and different means to visit the hospital.

Part B - Hospital Side:
The proposed system solves both the problems mentioned in the problem statement by informing the management of the hospital about the status of the bed through the app. To sense the status of the bed an IoT based hardware is being developed. The other issue is solved by providing the hospital the data of number of patients approaching to the hospital along with the requirements of the patient which they will provide in the application.

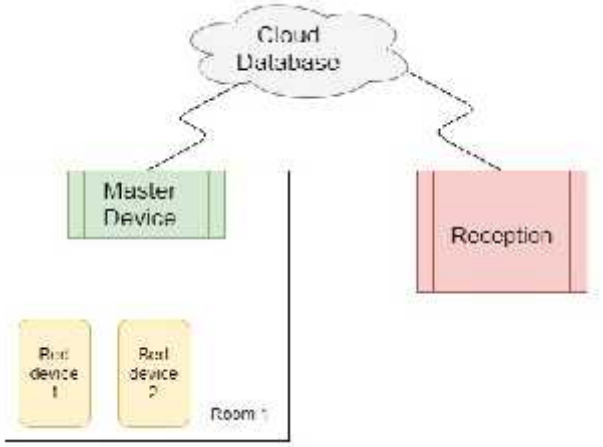

Fig. 3: Hospital Layout

The layout shown in fig. 3 is proposed system for the hospitals to sense the bed availability and uploading the data to the cloud, which further can be accessed by the receptionist as well as the users in need of a hospital. The layout consists of a bed sensor device which senses the bed status and sends this data to the master device which is

unique in every room. Having multiple bed sensors and one master device enables the system to have low cost due to fewer requirements of Wi-Fi Modules and other components. The use of radio transmitters and receivers in multiple bed sensors and the master device drastically decreases the cost requirement of the implementation of the project.



Fig. 4: Bed Sensor Device

For the implementation of the bed sensor device, copper tapes are used for the detection of the bed occupancy. Use of copper tapes enables to detect a human presence, since it works on the principle of capacitances change on skin interaction. The bed sensor device as shown in Fig. 4 consists of an MPR 121 whose task is to detect any change in the capacitance value in the copper tapes. The Microprocessor connected to the MPR 121, receives the data. This data received is transmitted to the master device via the NRF transceivers. This data received by the master device, further uploads the data to cloud server.

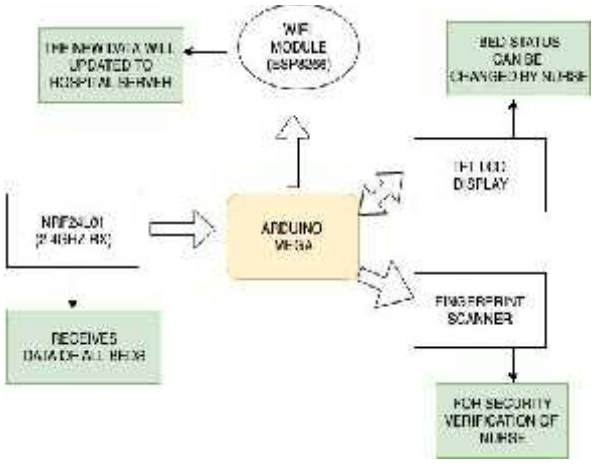

Fig. 5: Master Device for Uploading Data

The device responsible for the uploading of data to cloud is shown in Fig. 5. This device consists of a NRF receiver which receives data from multiple bed sensors consisting the data of the bed status. For every updation of data, there is a need for the authentication process in order to avoid any issues related to sensors. The nurse which is charge of the hospital room has the responsibility to give the approval of uploading the data to the cloud. The authentication is done with the help of fingerprint scanner, which provides a reliable means of authentication. All the data about the beds can be viewed on the touchscreen display attached to the master device. The bed whose status needs to be changed can be viewed on the display. The step of authentication becomes necessary in order to be reassuring the accuracy of the data being uploaded. All the data received and processed is updated in the database by using Wi-Fi Module (ESP8266). Furthermore, the data uploaded is accessed by the receptionist, and hence the receptionist has access to the real time status of the beds. Even though, it might doesn't has an impact in normal daily operation of a hospital, but it surely reduces the latency period between the nurses and the receptionist which can create tremendous impact in case of situation where there is a sudden requirement of multiple beds, And, since the data about the approval of the patient is priory known to the receptionist, accordingly, it can take required decisions such as the preparation for the upcoming patient.

V. METHODOLOGY

This paper describes the use and development of an application which aims to enhance the database management for hospitals. The cloud database - Cloud Firestore, a fast, fully managed, server less, cloud-native NoSQL document database that simplifies storing, syncing, and querying data for your mobile, web, and IoT apps at global scale, supports the back end of the system. Google Cloud Firestore is a collaboration of the Google Cloud platform with Firebase and hence provides a better scalability with real-time database. With scalability, it means the number of users that the database can serve can be varied as per the developer requirements; hence prototyping to actual implementation in real world becomes easier. It also provides features which include live synchronization and offline support. It offers built-in offline support and uses local cache to serve and store data. It enables syncing of data across devices, both online or offline. The updation of data collected from the beds is synced with the database, through which the hospital is able to manage the data as well as the users seeking for medical help is able to get the best option available from large pool of different hospital databases.

This paper targets the development of the application for Android devices currently - which has a market share of 91% nationwide until December 2019. The android application is developed by using the Android Studio - the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. The programming for the project is done using Java, which is regarded as one of highest ranked languages for IoT applications. The software provides support to all android devices supporting different versions. The application enables the users to have access to a user-friendly interface which makes it easier to manage the process of approaching the optimum hospital choice, and also, informing the hospitals about the arrival of a particular user.

In Hospitals to sense the presence of patient on the hospital bed, capacitive sensors are used. A capacitive sensor uses the principle of capacitors that is the capacitance of the conductor is increased when a conductor which is earthen is brought near to it.

Capacitive sensing is a technology used to detect nearby objects which has a permittivity different than air, like human body or hand. It works by sensing the change in electric field around it.

Capacitive sensors consist of two conductors separated by a dielectric. Capacitance of the sensor is directly proportional to the surface area of the sensor and inversely proportional to the distance between the two conductive plates. Capacitance also depends on the dielectric material used.
Hence when a person touches the sensor a pressure is generated due to which the distance between the conductive plates is reduced which changes the field produced in the sensor and the capacitance changes.

VI. RESULTS

The application for the hospital is developed for management of the database as shown in Fig. 6. The given screenshots display the application page for setting up the database of a particular hospital. It includes of a form through which the details of the hospital are filled. This creates a bed object in the database whose details can be seen on the screen of the master device. The layout of the hospital can be saved by filling the details such as the number of floors, number of rooms, number of beds. Each bed can be named different as per the convenience. Also, at the time of saving the bed details, the category of the bed can be specified. The category of the bed is visible by the user at the time of searching for the hospital.



Fig. 6: Hospital Application: Filling details

The home screen as shown in the fig. 7 includes a list of beds which has been saved earlier in the database. The status of the bed can be changed by the user. Every bed can be allocated a patient by clicking on the bed and entering the details about the patient. The list of the beds can be filtered on the basis of the bed category, floor number, etc.



Fig. 7: Hospital application: Home Screen

The screenshot shown in the fig.8 is a snippet of the database which stores the information of the hospital beds as well as hospital details. In Google Firestore, the data saved is in the form of collections and documents, In the figure given below, it shows a collection named as ‘beds’ which has the attributes as the details of the hospital such as city, hospital name, etc. The collection ‘beds’ has multiple documents which is setup at the time of the filling the details. The details of the bed include the name, its status, category, floor number and room number.



Fig. 8: Database Screenshot of a hospital

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Implementation of Automatic Token Generation Machine Using Raspberry Pi

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***Abstract*— As in the hospital with a thousand of patients arriving on the same day if there is no system to provide advanced queue management it can lead to havoc for the patients as well as for the hospital. By using the token generation method in hospitals, it helps the hospital to manage a queue in a very simple manner. As in the hospital, there are cases which tends to someone's life in line by queue management we can remove the time limitation and can reduce the possibilities from which the seriousness of the patients canincrease. So, the importance of this project is the token generation method for queue management in the hospitals in today's busy world.**

Keywords—Automatic Token Generation Machine, Raspberry pi, Python, Tkinter, Queue, Hospital, Patients, Hospital Management System, Thermal Printer, Server,DBMS.

I. INTRODUCTION

The exponential growth in embedded sector has enabled us to have compact and versatile gadgets from static to moveable era .The dimensions of CPU from room size to handy size bagsha seaseourlife; to caterthenee dofIoTand Smart Concept ,the automation have vital role in Raspberry Pi a mini computer which perform similar to mac and window pc with some limitation . Automatic a task help in improving efficiency , reducing time consumption and boosting the capital investment. Management a vital task for organizations , proper managed organization have positive feedback from customer , downgrading error and time consumption proportional to improved performance , lower load on organization to execute itworks.

In this project we have automated the process of token generation using raspberry pi for computational purpose and providing GUI through python programming language. Increase Patient Satisfaction considerably reduces the time taken for processes and procedures at every stage of patient interaction, such as registration, billing and discharge, thus making your customers happy , electronic versions of their papers and appointment. To recreate place where everything is managed in efficient way; where things will be running inparallel and every individual will be attendedinisolatedmanner,thisprojectwillchangethewaytimemanagementis done at crowdy hospitals in India. As per analysis on the hospitals the maximum number of people visit during 10pm to 2pm these is peak hour, based on analysis ,if crowd is managed properly then number of staff , cooling power can be reduced thus result in managed and properly running system with less overload conditions. The main focus is to reduce the time of every patient by allocating specify time slot to each patient through token generation that would be labelled with the time stamp, appointment time, appointment number and concerned department ofenquiry.

II. LITERATURE SURVEY

A queuing Network Model for Analysis of Patient Transitions Within Hospitals written by HyoKyung Lee,Jingshan Li,Albert J. Musa,Philip A. Bain,Christine Baker. This paper introduces a various technique how someone can manage the time which is taken during the transition inside the hospital between different wards. Since there is also a queue during the transfer of patients in different wards. The proposed system aims at reducing the dissatisfaction with services with medium to long waiting times. To this end, the system allows carriers of digital ticket to leave the waiting areas and return in time for their turn to receive service. The proposed system also improves the waiting experience of clients choosing to stay in the waiting area by connecting

them to the audio signal of the often-muted television sets running entertainment programs, advertisement of services, or news. In our system the main focus is done when patient go for hospital for the first time and for regular checkup too.

An IoT Smart Queue Management System with Real-Time Queue Tracking written by "Mohammed Ghazal, RaniaHamouda, Samr Ali". This paper proposes a smart queue management system for delivering real-time service request updates to clients' smartphones in the form of audio and visualfeedback.Thissystemalsofocusesonimprovemen tin the waiting period in the hospital. The system is a web of thingsincludingconnectedunitsforregisteringandverify ing tickets, units for capturing and streaming audio and queue management, and participating client units in the form of smartphone applications. Routings with feedback flows are considered under general arrival and service processes, and the effects of blocking on performance measures are presented for both the mean and variability. It is shown that the iteration procedure is convergent and leads to acceptable accuracy of estimation, for both small-and large-sized hospitals. In addition, the impacts of bed capacity,admission rate, as well as arrival and service time variabilities are discussed. Such a method provides an efficient way to study patient transitions withinhospitals

III. PROBLEM STATEMENT

How did it happen that, as patients, we pretty much expect to have a terrible experience when visitinghospitals?

Even ignoring the overall stress associated with health risks, you have to spend a lot of your time in infamously long hospital queues. According to a 2015 study by Harvard Medical School, people spend 121 minutes for every visit to the doctor. Without further ado, here are 5 reasons why hospital queues are out of control.

1. Too Many Patients, Not Enough Hospitals 2.Traiging the Queue
3. Emergency Situations
4. Visiting a Hospital at the WorstTime
5. Inefficient Queuing atHospitals

IV. PROPOSED SYSTEM

In current working system of token generation ,organization'sareusingtouchpadsensortogeneratetoke n; generated token has only token number printed on it. The proposed system will have a touch screen loaded with GUI developed on python in replacement of touch pad sensor. Token will have information about appointment time , concerned department, current time in structured and decorated format as per organization'sdemand.

In this project, we are using raspberry pi 3 device for automation in Token Machine. Respective token for the respective OPD's are used. Each specific button is assigned to print the token associated with it.

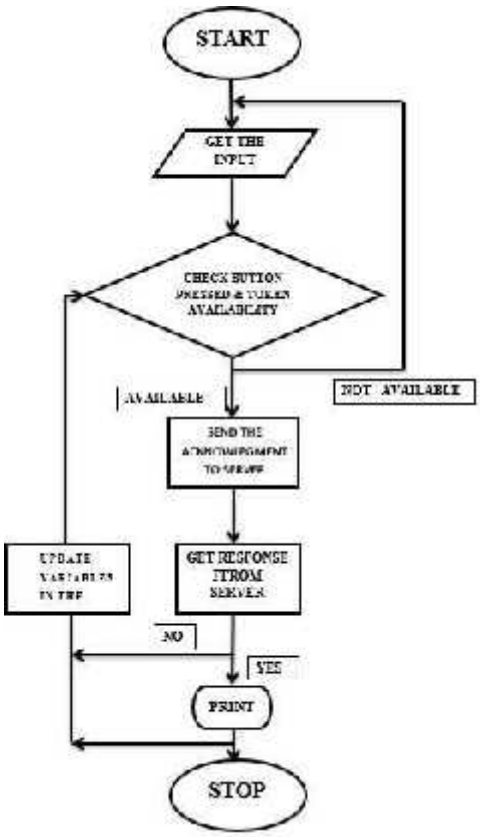
Hardware Requirement:
->Server PC
->Raspberry PI
->Thermal Printer
->GUI



Fig1: Working Of Token Machine Using Raspberry PI 3 V.DATA FLOW

DIAGRAM

STEP1: On pressing the desired button on the display the function associated with it would be matched.



STEP2: The Button Pressed and the availability of that token will be checked.

STEP3: On availability of the type of token an acknowledgement will be sent to the server regarding the token request.

STEP4: If the token is not available a default message regarding insufficient token will be displayed. And further user will be forwarded to the main menu.

STEP5: Upon matching the button with its associated function the server would respond to it.

STEP6: Control of providing the response will be available with staff at the server end.

STEP7: If the staff grants a YES to the request then this will result in printing of the token.

STEP8: The Variables and information of the token will be updated in the server.

STEP9: Thermal printer in connection will print the token along with the token number and time stamp and the time of schedule.

STEP10: If the staff grants a NO then the token won't be printed and no update process at the server will take place.

STEP11: And the process comes to End with main menu popup and waiting for the nextuser.

Number of different tokens to be printed daily can be changed on individually token basis daily.
Everyday a new button creation and deletion along with function associated with them can be done.
Online Appointment and also time prediction of the patient to visit the hospital/clinic can be printed and sent as message with the help of AI.

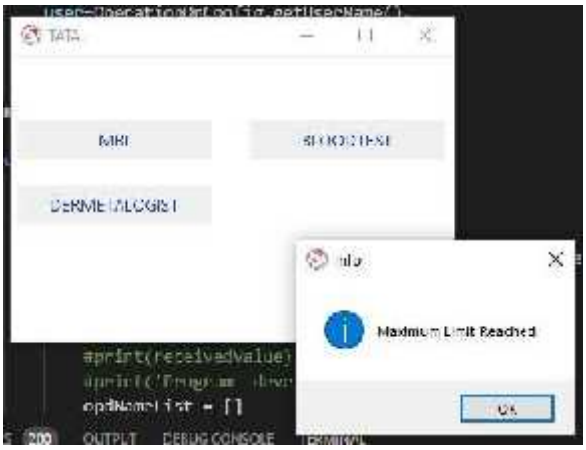
V. RESULTS AND DISCUSSIONS

Python is a dynamic, interpreted (bytecode-compiled) language. There are no type declarations of variables, parameters, functions, or methods in source code. This makes the code short and flexible, and you lose the compile-time type checking of the source code. Python tracks the types of all values at runtime and flags code that does not make sense as it runs.

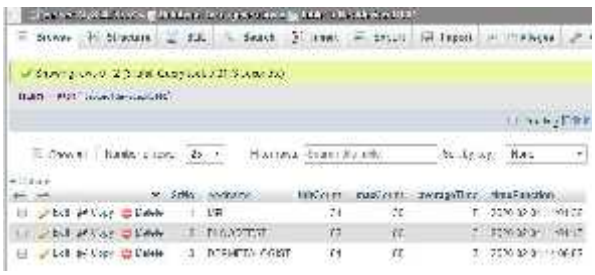
This page is used to register the new device in a existing network on device where the device id are stored in the database via a server side scripting program.



This is GUI page which can contains N number of buttons, on click of the button query is made to database to update current value and print command is initiated for generation of token.



This is case where the maximum limit set for pressed button is reached. The info panel is notification/acknowledgement that no more token can be generated now. The test case is performed by getting data from two column (initCount and maxCount) of Device Table from DB.

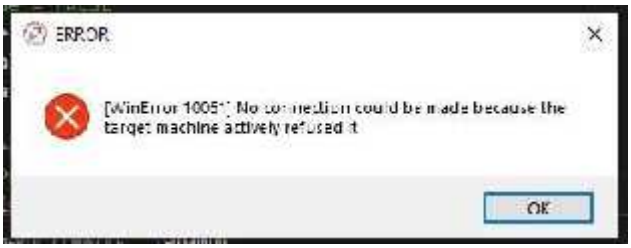


View of device table, it contains six column they are Sr.No. which is auto increment unique key, opd name varchar, initcount, maxCount, Average time and Time Function. TimeFunction is used to get timestamp on token.





This image represent the view of database through GUI of Wamp Server. Register table is used to storage the device id of all the devices. All the devices have their individual tables for performing the specifictask.



This is error handling case,when the device is unable to connect to server.then this error msg is raised by program.

VI. CONCLUSION

1. This project not only proves to be helpful in the queue management but also helps in managing the stress and burden present with the hospital/clinic.
2. Alarge amount of time woul dbesavedatboththeendviz. patient and the hospitalstaff/doctors.
3. This will also help in efficient management of the emenities and services offered by the hospital like the stress on the escalator, lifts, lights, fans, AC's and various equipmentetc.
4. Nowadays the smart database management and AI algorithm's available can be integrated with this project to form a complete suit.
5. This integration will help in easy scheduling of the appointment with least probability of crowd and fast detection of symptoms and suggesting theprescription.

VII. ACKNOWLEDGEMENT

We would like to express our gratitude and indebtedness to our project guide Mr. Vinit Dongre (HOD) and Mr. Niket Amoda, Assistant Professor, Department of Electronics and Telecommunication Engineering for his guidance, constructive criticism, valuable suggestions, support, motivation and encouragement throughout the period and arranging the necessary facilities to carry out the project work. We would also like to give credit to our entire faculty members and staff of the Department of Electronics and Telecommunication Engineering, Thakur College of Engineering and Technology, for their wisdom and expertise whenever it was required and helped us every time.

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Design and Implementation of Multi-purpose and Multi-place Display System for Education Institute

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Abstract **- The notice boards are very important in public places like railway stations, bus stations and airports. This project may be used for advertising or for providing info at various places like retailers, government offices, hospitals, academic institute, railway stations. The data to be displayed is provided from the web server. The ESP8266 module is reliable, secure and provides a long range of communication when comapared to other wireless technologies like RF, Zig-Bee, Bluetooth etc. Along with the ESP8266 Wi-Fi Module the board also uses a web server as they have become abundant and are easy to use. The rolling display consist of LED Matrix which has 8 columns and 8 rows. The message received from web server is displayed on the rolling display. To operate the display board remotely, we can use MQTT protocol. Using IoT it is easy to operate notice board from any remote device.**

Keywords— IoT, MQTT, smart display board, led matrix display board.

I. INTRODUCTION

When it comes to hobbyists or even small - medium sized enterprises (SMEs) who wish to develop their LED display boards, there arise only two options - either to do it themselves or procurement through outsourcing. Both these options don't prove to be much more utilitarian. If they wish to manufacture display boards from outside it is quite costly, as they are small in size and required quantity is high. If we make it by ourselves it will be less costly and size can be adjusted as per our requirement. As we are using wireless technology application of this project can be implemented at various locations such as hospitals, education institute, emporiums, railway stations, etc. By using this technology, we can make this simple display panel into a agile display panel.

Earlier the important notices were pinned on notice board which was a tedious task for everyone to come and check the notice board. Some people may read the notice board and some may not due to which important notices will not be known by the students or faculty members for changing the notices again and again different notices has to be pinned again and again which may be tedious for the one who has to change it again and again. Using paper leads to wastage and is very time consuming, so therefore displaying of notices on display board becomes easy for the one who wants to change the notice and even for the person who will read the notice board

II. CURRENT SCENARIO

A. Pin Up Board

Basically the information that is to be provided to the students, members or faculty or anyone is printed on the paper and is then pinned on the notice board so that everyone can read the important notices provided. This leads to wastage of paper because for every new notice a new print has to be taken and pinned on the board.

B. Smart Notice board using GSM

Here GSM technology can provide us large range i.e. can be operated from a very long distance display. This notice board can be operated by writing the message in a cell phone and send it via SMS which is displayed on the LCD display The main problem in GSM technology was the cost which included the cost of GSM module and per message cost which in total will increase the cost widely.[1],[2]

C. Smart Notice board using Bluetooth

The technology used in such type of application is Bluetooth i.e. HC 05 which is successful and convenient for sending messages to display on the notice board. For sending messages android app is used but the problems encountered are, that display is to be connected to the Bluetooth continuously. The major disadvantage was the Bluetooth range which was just 5-10 meters which was very less and also the display board was LCD which was quiet small and not readable for the people sitting far.[3]

III. PROPOSED TECHNOLOGY SOLUTION.

A. Smart Notice board using WIFI

The technology we are working on is Wi-Fi based multi display notice board. The message can be sent from anywhere at any time that is it is not necessary that we have to be near board every time. Message can be sent to notice board using webpage and MQTT. The topic is created in MQTT and topics are subscribed by the notice board. The problem faced in Bluetooth technology was the range. The other technology used was GSM which had a problem of Cost. The traditional notice board used earlier was tedious for everyone to come and read the notice and for even that person who has to change the notice board every time and leads to wastage of resources such as paper, ink etc this all the problems can be solved using Wi-Fi based technology.[4]

IV. DESIGN

The block diagram provides a visual representation of the various components used the display system and give a brief idea about the signal flow in the system. The project consists of two display board which can be individually controlled from web-server.

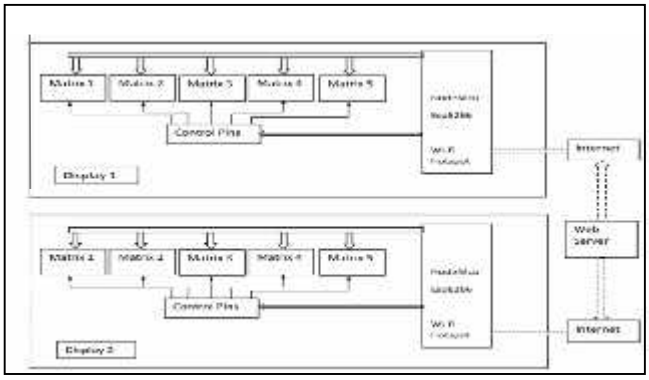

Fig 1. Block diagram

Each board consists of following steps:

A. Designing of LED Matrix

The display board is made up of LEDs connected in a matrix form. The matrix is of size 8x8. There will be 6 such matrix. Therefore, total size of the matrix will be 8x 48. There will be 2 such notice boards.

B. Interfacing shift registers with LEDs

This step involves connecting the columns and rows of led matrix to a shift register. 8 columns are connected to 1 shift register. Hence 48 columns will require 6 shift register. And 8 rows will require 1 shift register.

C. Interfacing shift registers with each other and NodeMcu Esp8266

Shift registers required for columns led terminals are connected with each other in order to shift the data from one register to another. The pins namely, ST_CP, SH_CP, DS of each column shift registers are connected respectively. Common points of this pins are connected to NodeMcu and similar the pins from row registers are connected to NodeMcu

D. Connecting NodeMcu with WIFI

The NodeMcu has in built WIFI which can be connected to WIFI network. It can be done using programs.

E. Interfacing NodeMcu with Webpage and MQTT

MQTT is a publish/subscribe messaging transport protocol that is optimized to connect physical world devices and events with enterprise servers and other consumers. Using Mosquitto/ Cloud MQTT we can easily interface it with NodeMcu

V. EXPECTED OUTCOME.

The system is designed to display a scrolling text message on a electronic noticeboard using pc or mobile to control it..



Fig 2. Expected outcome

The message sent by the admin is displayed on the display matrix.The user can send same messages to the display boards or send unique messages to the individual boards

VI. APPLICATIONS

A. Railway station

The display boards which are being displayed on the railway station helps people to know about train updates such as what time train will arrive or which train will arrive etc.

B. *Hospital*

It can be used in hospital for displaying the rooms such as operation room, pharmacy, room numbers etc. this will help for person to know that where he needs to go for the things he need or to meet someone or any kind of information.

C. Education institute

As it becomes tedious for everyone to go and see the notice board which is placed quiet far because some may read the notice and some may not read the notice and they will miss out important notices. In education institute it can be used for displaying important notices for students or teachers so that they will be informed on urgent basis about the information they should know and this will make work easier for everyone and they will be updates about it every time.

D. *Road diversion*

When some roads have potholes or some work is going on and if the board is not visible enough for the person who is driving there will be car accident or anything as such can take place so therefore placing led display boards will be easier and visible for person who is driving so that the person comes to know that there is road diversion ahead in order to avoid any incidents.

E. *Malls*

Display boards placed in Shops at malls, any general store, clothes shop etc will help people to know about the exciting offers or discount which indeed will help shop owners to pull customers attention to buy these goods which are at cheaper price.

F. *Sports/Score board*

Display boards can be used for viewing score of the match that is being played which will let everyone know about which team is in lead and how many points are required for a particular team to win.

G. *Bank*

The Display Board can be used in banks in order to display token number. It is often observed that bank employees assign token numbers to perform critical tasks like arranging a meeting with the branch manager, granting loans, withdrawal of cash etc. In stock markets/Trading firms like the Bombay stock exchange, NSE, SEBI, etc such technology can be used to display profit/loss of individual companies.

ACKNOWLEDGMENT

This project cannot be entirely created by an individual. The timely completion of the project 'Design and Implementation of Multi-purpose and Multi-place Display System for Education Institute' has been possible because of our teacher and project guide Mrs. Leena Chakraborty who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge.

Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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Development of Textile Industry using IoT for Temperature, Humidity and Cotton Dust Control

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***Abstract*— The purpose of this paper is to present an idea of monitoring and controlling of textile industrial parameters like temperature, humidity and cotton dust which is a major issue. Increase in the any of above parameters than the desired value leads to many health problems. Therefore in this paper the author proposed an IoT based solution through which these parameters can be limited below their threshold value. Depending on the Inputs received by the NodeMcu it performs controlling actions and tries to bring the parameters under normalcy. IoT used here helps to take precautionary action and alerts about the change in parameters to in-charged person.**

Keywords—Internet Of Things(IOT), IIOT, DHT11, Dust Sensor, Monitoring and Controlling

I. INTRODUCTION

Textile industry is the second largest industry in world next to agriculture. Therefore, main focus of the paper will be on monitoring temperature, humidity and cotton dust in the textile industry and also controlling the same. All the monitoring and controlling will be done through IoT. In textile industry it becomes very necessary to have proper temperature, humidity and cotton dust. Cotton dust is defined as dust present in the air during handling or processing of cotton which contains various other substances, and an increase in cotton dust leads to various health diseases.[1]

Looking in the current scenario, many industries have installed devices that measures required parameters and simply sends message on user's phone or uses alarm indication due to which manual controlling of parameters is needed[2]. Existing systems also use microcontroller(uC) like ATMEL 89C51 due to which implementation becomes a tedious task. Another main concern is 8051 system being under production and are slower which causes slower communication between devices**[**3]. Some devices have limited range**[**5**]**. One of the devices also use Zigbee which is a short range technology**[**4].

The following system gives solution to problems existing in current scenario. Here, IoT is used for measuring as well as controlling purpose which reduces the task of user to manually control the parameters. The device is user friendly which means range of the parameter can be changed as per the requirement of the industry. The system is set up on an open source platform Arduino IDE software which makes implementing code in various languages. NodeMCU is used for monitoring and controlling purpose whereas sensors like DHT11 and Sharp GP2Y10AUOP are used for temperature, humidity and dust sensing respectively. A 3rd Party Application BLYNK is used for graphical representation of the parameters[6-8].

II. PROPOSED FRAMEWORK

The following set of Sensors/Actuators which are used in the system design are listed as follows:

1. NodeMCU
2. DHT11 Sensor
3. Sharp GP2Y10AUOF Dust Sensor
4. SD1306 OLED screen
5. 4 Module Relay board

1)NodeMCU: This is the main hardware of the project,which uses 128kB of memory and has 4Mb of storage capacity.



Fig.1. NodeMCU

2)DHT11: As the name says , it is a digital sensor which senses Temperature upto 50*C and Relative Humidity in between 20%-80%

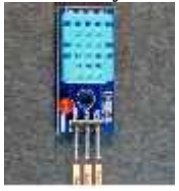

Fig.2. DHT11

3) Sharp GP2Y10AUOF Dust Sensor: It is a sensor based on the principle of IR sensing. It senses dust particulate around it and gives corresponding value.



Fig.3. Dust Sensor

4)SD1306 OLED Screen: This is an display device which is used for showing the user the current values of the parameters



Fig.4.OLEDScreen

5) 4 Module Relay Board : It is an actuator which is being used for taking the controlling actions



Fig.5.Relay Module

III. PROPOSED ARCHITECTURE & METHODOLOGY

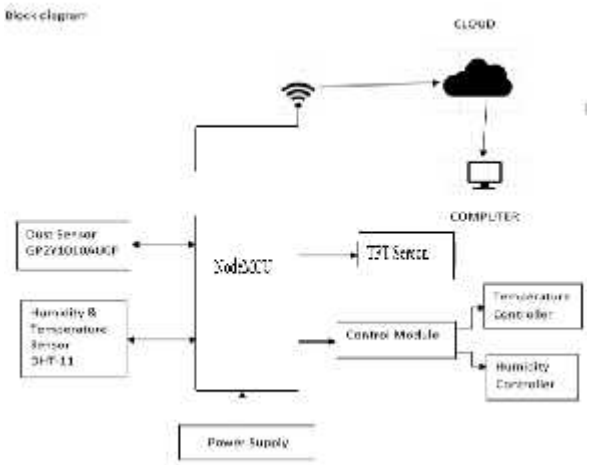

Fig.6. Block Diagram

The above diagram depicts the structure of the system which is used for sensing and controlling of Temperature, Humidity and Cotton Dust.

The System Design consist of 5 sections with the first 4 sections being involved in sensing and displaying part while the final section involved in monitoring the parameters.

The 1st Section is used for sensing i.e it senses the humidity, temperature and dust level by using Temperature and Humidity Sensor(DHT11) and Dust sensor(GP2Y1010AU0F) .The next section performs the task of reading the values from the sensors and sending that value to NodeMCU , which will convert those values into signals which are suitable for transmission over cloud. The 3rd section is the most important part of the system design as this section involves the Usage of IOT i.e in this section with the help of the WiFi module , NodeMCU sends the parameter to the server of an 3rd Party Application(in here BLYNK whose server name is BLYNK Cloud). After sending the data to the cloud , the 4th section comes into picture, this section is a display section as the parameters which were uploaded to the cloud are now being brought back and then are made to be displayed on the OLED screen.

The first 4 sections constitute of the 1st half of the system i.e the sensing part, the next half of the system is based on monitoring these parameters and that is done by the 5th section. This section consist of actuator like relay, buzzer(used for controlling action) which are turned ON once the parameter crosses the threshold.

The working of the IoT System is as follows:

- The DHT11 sensor works on serial communication.
- This module sends a train of pulse signals for a specific time duration.
- Before sending the data it requires some time delay which is of 18uS.
- This delay is to ensure that the DHT11 is properly connected with the NodeMCU.
- After the delay time period is over and DHT11 is successful in establishing a connection with the NodeMCU, the next process begins.
- This process involves conversion of the given input signal coming from the output of 2 sensors and converting it into desired value which can be displayed on the OLED screen.
- For displaying all the 3 parameters simultaneously on the Oled, various parameters of the Oled needs to be restructured, these parameters are TextSize, TextColor and TextPosition.
- A 3rd party application named BLYNK is used to see the graphical representation of the data
- The data which are sensed by the sensors are pushed to the BLYNK server via NodeMCU.
- In order to ensure that there is no damage to the machine, as soon as the parameter of the machine goes beyond its threshold value, a signal is then send to the monitoring device

from NodeMCU through the relay modules so that the parameters are brought down to the value below their respective threshold.

- NodeMCU will keep on sending data which is made available to it via sensors to the cloud at an interval rate which is set/defined by the user.
- The process starting from sensing of parameters upto its controlling is repeated continuously till a fault is detected in the system.

IV. FLOWCHART

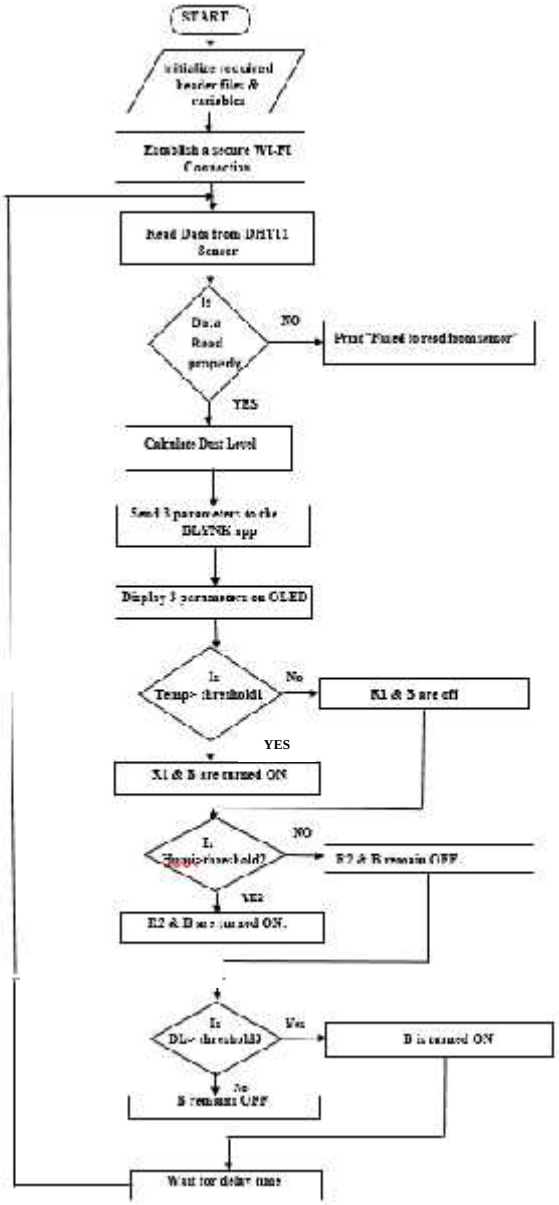

Fig.7 FLOWCHART

V. FIELD SURVEY

On visiting a Textile Industry, we gathered the range of the parameters which will help with our project.

The data gathered is tabulated and shown below:

TABLE I : INDUSTRIAL DATA

Data/Parameter	Range
Relative Humidity	70%-80%
Temperature for Cotton	32*C-39*C
Temperature for Texterize	30*C-35*C
Cotton Dust	100-500 micro meter

VI. RESULT

We have obtained the following set of results when the device was kept online for a period of 24HRS.

1. Display of values of the sensors through Gauges



Fig.8 Display of Sensor Values

2. Graphical Representation of the variation of Cotton Dust

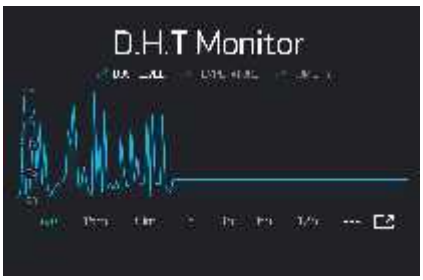

Fig.9 Line Graph of Cotton Dust

3. Graphical Representation of the variation of Temperature and Humidity

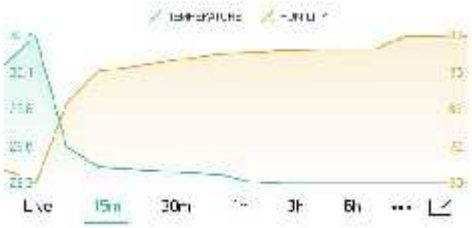

Fig.10. Smooth Line Graph for Temperature & Humidity

VII. Future Scope

According to reports given by Nasscom, the market value of IOT is expected to hit the 9 billion $ mark by the end of 2020 and an approx. of 2 billion $ is expected to come from the Indian market, so there is a lot of scope for IOT in the coming years. With the massive increase in the IoT devices usage, it leads to security and liberty issues getting magnified. While the consumers/end-users won't be the only one's using IoT , this services will also be put to use by various cities in order to be known as a smart-city. As the usage of Iot increases , one must not forget that Artificial Intelligence(AI) will also penetrate into every household which will improve to lifestyle of the people .

VIII. Conclusion

The monitoring of temperature and humidity is done in the textile industry. On addition, we also did the monitoring of cotton dust and the controlling of temperature, humidity and dust control. The monitored values of temperature and humidity is displayed on the screen and then using the IOT the actions related to it is taken. And in the same way the cotton dust is monitored and been controlled. With the use of IOT the human effort is been reduced and it became easy to controlled the temperature, humidity and cotton dust.

Acknowledgment

The following work 'Development of Textile Industry using IOT for Temperature, Humidity and Cotton Dust Control' can't be created by a single person. The timely completion of the work has been possible due to the guidance of our mentor Mrs. Archana Belge who imparted her knowledge regarding the topic on us and with her continual motivation, this work was completed. We are also thankful to the Department HOD Dr. Sandhya Save for allowing us to use the lab equipment's which were required for our project, and to our parents for providing us with all possible resources. We would also like to thanks Mr. Sunil Goenka MD/CEO/Chairman of 'GOENKA MILLS CO'OP LTD.' for giving his valuable time out of his busy schedule and allowing us to visit his Company for our research purpose. We also thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project possible.

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Design and Implementation of FAIR System Using IoT for Public Transport System

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***Abstract*-As we all know that there is cheating & corruption all around. Top to bottom everyone everywhere looks for the place to earn extra money, in better words easy money. Hate to admit this but auto rickshaw meter tampering in India is quite common. The drivers escape with their devious plan due to the fact the modern meter calculates fare based totally at the rotations of the wheel of the automobile this gadget can be effortlessly tampered with eventually the load comes on the shoulder of the center-elegance public. And the big amount they pay extra as fare. Due to an increase in technology, there are several ways to use that technology formal practices. As in Auto/Taxi meter, there is no fare way to cross-check the reading of the meter thus a passenger cannot rectify if any type of tampering is done to the meter & he/she is forced to pay the amount as shown by the meter. So to avoid cheating with the passengers, the proposed system will help them to cross-check the reading of meter with the help of the software which is preinstalled in the system & if there is any error then passengers will be informed about the error & he/she may pay the amount as shown by the system. This will help to reduce the meter tampering done by the drivers. This system will also help to update the meter readings as per government rule in an efficient way.**

Keywords: Communication, Micro-controller, Industrial automation, Astable Multivibrator, embedded technology

I. INTRODUCTION

An automobile-rickshaw/taxi is a car for lease and it is one of the leader modes of transport in India. A large number of people use these vehicles for their daily transportation and every time they pay extra amount as fare because there is no check on the reading of meter available. Hence, it is necessary that we should have something that can cross check the reading of the meter and guide us the right fare amount. This daily problem of the public encouraged us to work in this area and we came up with an idea of FAIR FARE SYSTEM for social benefit of all. In our proposed project the actual calculation which is required to perform in the device is made to work and with the use.

II. LITERAURE SURVEY

The calculation of fare amount is calculated on the basis of no of wheel rotation of the vehicle there's no such gadget available that could test whether the calculation shown through the meter is accurate or not. If the driver has tampered the meter the fare amount shown may be excessive however as no crosschecking is accomplished the passengers are compelled to pay the extra cash. Our proposed system may have a circuit in-built within the existing meter and will ship the rim of wheel rotation on Bluetooth frequency with the help of Bluetooth modem. This data can be received on the mobile of passenger after pairing their mobile with the Bluetooth device of the meter with the help of the meter Id printed on the meter[1]. The software inside the cellular will calculate the fare amount on the idea of the facts acquired via the meter now passenger can go-check the fare amount among cellular analyzing and the meter reading. If there is difference then one can easily point out that there is tampering in meter. The passenger will pay as per mobile reading only.

III. PROPOSED METHODOLOGY

A. *BLOCK DIAGRAM*

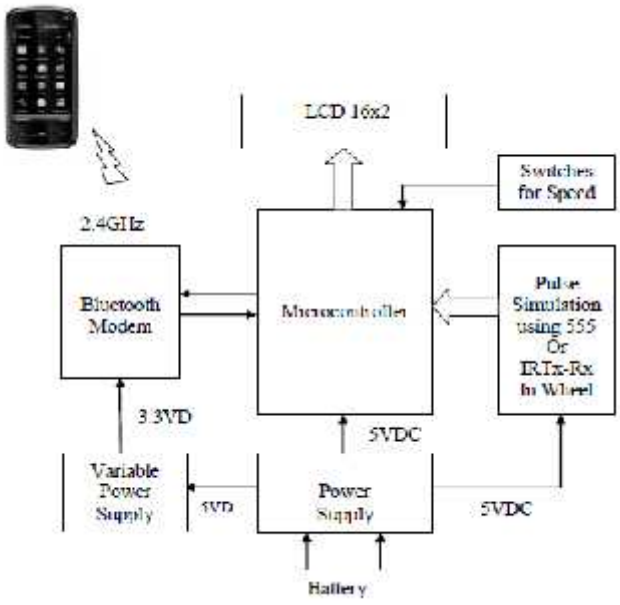

Fig 1: Block Diagram of complete hardware

B. HARDWARE AND SOFTWARE REQUIREMENTS

AS MICROCONTROLLERS ARE THE CORE OF NOWADAYS DIGITAL CIRCUIT LAYOUT WITHIN THE INDUSTRY THIS MACHINE MAKES USE OF IT FOR THE CENTRALIZED OPERATION AND VIRTUAL PROCESSING THE TECHNOLOGY USED HERE IS EMBEDDED GENERATION THAT'S THE FUTURE OF MODERN DAY CUTTING-EDGE ELECTRONICS. THE FOLLOWINGS ARE THE VARIOUS PROGRAMMING LANGUAGES & TECHNOLOGIES THAT ARE GOING TO BE USED IN THE PROPOSED SYSTEM[3].

For Embedded System:

1. Embedded based Technology
2. 8051 Family Based Controller
3. Embedded C - Keil Compiler
4. Eagle Software for the PCB Designing

For Mobile System:

1. Serial Communication Protocol (SPP),
2. J3ME Based Mobile (MIDlet) Programming,
3. Bluetooth Programming-JSR-82

C. EQUIPMENT ARRANGEMENTS

The following are detailed information for the working principle of the numerous essential blocks or sections used inside the system.

1. Power Supply

This unit will supply the various voltage requirements of each unit. This consists of transformer rectifier filter and regulator the rectifier used right here will be bridge rectifier it's going to convert 230V ac into desired 5v/12v dc.

2. Microcontroller

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In quick, we can say that the complete intelligence of the undertaking resides in the software program code embedded inside the Microcontroller.

The controller right here used is of 8051 family. The code is written in Embedded C and will be burned or programmed into the code reminiscence using a programmer. This unit calls for +5VDC for its flawless operation.

.

3. LCD 16x2

It is called liquid crystal show we're going to use 16x2 man or woman LCD this could be related to the microcontroller the activity of LCD can be to display all of the machine-generated messages coming from the controller LCD will provide an interactive person interface.

4. 555 Timer

The 555 monolithic timing circuit is a tremendously solid controller able to producing accurate time delays or oscillation right here we are the usage of it in Astable multivibrator mode for generating clock pulses. The frequency depends upon the external register connected to the IC. The following unit requires +5VDC for its appropriate operation.

5. Bluetooth Modem

Bluetooth modem is a tool that acts as a mediator between any embedded machine and the Bluetooth verbal exchange medium it has constructed-within the protocol for serial conversation i.e. Serial port profile. Thus it provides a perfect answer for builders who want to integrate Bluetooth Wi-Fi generation into their design with restricted understanding of Bluetooth and RF technologies. This unit calls for +3vdc for its proper operation.

6. IR Tx

This is largely infrared transmitter that emits mild in the range of 700nm to 1mm wavelength this light is not seen by using human eye and as a result normally utilized in security systems for proximities this unit requires 5vdc for it right operation.

7. IR Rx

IR Receiver is nothing but a photodiode that break down the diode junction when exposed to IR rays. Thus it can be used for activation & deactivation of particular system.

D. ACTUAL WORKING OF THE METER



Fig 2: Testing of hardware and software

E. Project Development Methodology

The following will be the implementation steps so as to achieve the working Model of the proposed system[2].

- Defining the Problem,

- Understanding the Need & Usability in industry and society (Market Analysis)
- Developing Block Diagram
- Designing Circuits of individual blocks
- Testing circuits in LAB & Finalizing
- Developing PCB .
- Getting the PCB printed from market
- Soldering the components
- Performing various Basic Experiments to test the PCBs
- Developing Flowchart for the entire process
- Writing actual Software Program
- Compilation & Burning
- Testing and Debugging
- Developing Flowchart for Mobile Side Software
- Developing Data Flow Diagram
- Writing actual code
- Finally Running the system
- Documentation

F. WORKING CRITERIA

In our Proposed system the contribution of hardware and software is 50% each. software part does the rectification if the hardware displays the erroneous result, this is the main motive of the proposed system. Interface of various devices to the microcontroller In this 8051 family that is AT89852 which is 8-bit controller and the program is written in embedded C on Keil Platform. Display that is 16X2 is connected with microcontroller and the infrared transmitter and receiver are also connected. The controller's UART is connected with bluetooth model which is HC-05 work in 2.4 gigahertz and the maximum range of the meter is 10 metre[3]. To demonstrate various modes of meter that is low tampering, medium tampering high tampering, and no tampering, switches are present. To stimulate the meter the wheel rotates and IR generates the pulses in the form of 01010101as pulses. This pulses information will be displayed on the LCD and one copy will be transmitted through Bluetooth to the mobile. The user will be equipped with the mobile and the application will be written with ADT toolkit in Java. Bluetooth in built module will be paired with the mobile and it will show the fare value. If the meter and the mobile application show the same fare then the meter works fine. Else if the meter shows higher fare than mobile then meter is considered as tampered. This is how meter tampering status is verified[2].

IV. APPLICATIONS

Only the imagination can limit the applications of the above proposed system. Though the following are some examples.

1. For Auto-Rickshaw meter:

If there is any discrepancy between the fare shown in the meter and the fare calculated by our system, one can easily point it out and prevent themselves from the scam.

2. For Taxi meter:

As mentioned above the same is applicable for taxi meter also.

3. False weight used by Vendors:

With slight modifications, our system can also be used detect whether the measuring instrument used by vendors is correct or not.

4. A Fair Chart can be Implemented:

As the fair is calculated through the number of rotations, the fair chart can be very useful and implemented considering few constraints.

5. Maximum Usage of Public Transport:

The system implemented will have less chances of displaying wrong Fair, Large number of daily of daily commutators will use public Transport. It can be implemented in other Public Transport also.

6. Tracking of the Vehicle:

Using GPS system, it can be used to calculate the distance travelled and proper record of the starting point and destination point can be saved for frequent usage[4].

V. RESULT AND DISCUSSION

This can help concerned authorities to make the culprits hindered from tampering the meter. This project also helps to provide legitimate and actual fare for public transport system. It lessens the burden of overcharging on common people.

TABLE 1: OBSERVATION SHOWING THE DESIRED RESULTS

Sr.no	Distance travelled(Km)	Meter reading(Rs)	Application reading(Rs)	Meter Tampered(Y/N)
1	2	40	40	N
2	4	90	70	Y
3	3	60	75	Y
4	8	150	150	N
5	5	92	78	Y

VI. FUTURE SCOPE

The scope of improvement is always there in the technology field, may it be a device based on wireless communication or embedded based technology or signal processing.. The following improvements can be done.

i. Automatic complain launching for tampered meter can be introduced.
ii. FARE chart can be integrated and connected for side by side references.

VII. CONCLUSION

In a country like India, where maximum population rely on public transport for commuting. It is very much needed to have a reliable source of fare calculation, with least error possible. Our system proposes a step towards efficient and reliable source of fare calculation and diversifies the scope of this technology to various aspects like GPS tracking. It proves itself to be very much useful for society.

ACKNOWLEDGEMENT

This work cannot be entirely created by an individual. The timely completion of the topic named 'Design and Implementation of FAIR System Using IoT for Public Transport System' has been possible because of our faculty and project guide Dr. S. C. Patil who provided us with the guidance and motivation throughout its making. We are obliged that we got an opportunity to implement this work successfully. We are also thankful to Dr. Sandhya Save(Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge. Finally, we would thank our college 'Thakur College Of Engineering and Technology' for providing us with a platform and the necessary facilities.

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Development of Electronic Passport Verification Using Near Field Communication (NFC) Method

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***Abstract* --Enhancement of Passports and other means of identification is possible by using recent advancements in technology. Information about the authorized and unauthorized passport can be obtained by the implementation of this system at the airport. This project is all about international and national security. In order to prevent unauthorized crossing of borders, also to avoid terrorist attack attempts. The purpose of passports verification is to avoid the entry of traveler/passenger whoever has illegal passport/Visa into a specific country and limit the usage of counterfeit documents by enhancing identification of an individual. The main hectic thing that the travelers/passengers face is time consumption that the manual process at the airport. This time consumption can be completely reduced by the implementation of this project. The practical implementation of this project may also make the airport system more centralized and also improves the security by using near field communication (NFC) tags.**

Keywords—NFC, Security and authentication, Passport, Visa, Visa on Arrival, Database, verification.

I. INTRODUCTION

As currently, the verification of passports takes a lot of time at the airport. In the current scenario, travelers /Passengers find this process a bit hectic. The manual checking process is being followed at the airport. Travelers /Passengers need to be present in the queues for long durations. Therefore, the implementation of electronic passports may reduce the time requires for verification. The idea of implementation of electronic passport is mainly to provide improved authentication. Authentication of personal information is also today's need. Finding out whether the travelers /passengers is authenticate or not, in order to provide access only to the authenticate user. People with negative intention may create a duplicate passport. Another person may also use someone's passport. This is nothing but identity theft. Numerous countries are providing e-passport to traveler/passenger, in order to automate the verification process and increase the security of border.

Many Countries are providing electronic passports to travelers /passengers, in order to automate the verification process and increase the security of border. Millions of people travel on regular basis. And therefore it is important to have a way more improvised Identity check. It is necessary to advance/enhance the passports so that it provides more quickly the identity check of the travelers /passengers.

The aim of the project is to enhance the passport verification without consuming more time of the traveler/passenger. This will help to deal with security breaching. Here database also plays a key role. If a person is travelling to another country then they must carry a valid passport and visa this will grant them entry. Here we use NFC Tags which has a unique ID, this tags are embedded on the passport. The database consists of three logins- one for airport and other for passport authority and visa. The on arrival visa is granted only if the traveler/passenger meets the required parameters that the particular country demands for. Then at the check-out, LCD will display whether the VOA is granted or not.

II. LITERATURE SURVEY

1. Shivani Kundra [3] explains the mechanisms which the future generations will use, it also mentioned cryptographic means. This also refers to few technologies used in designing of e-passport.
2. Prashant Shende [4] uses biometric means, such as Face identification, Iris, palmprint and Fingerprint. The data stored in the chip by electronic means is verified by Public Key Infrastructure (PKI).[2]
3. Adrian Atanasiu [7] includes e-passports verification using biometric. They have also defined the attacks which the tags can face such as cloning, spoofing, eavesdropping, tag modification, Impersonation, unauthorized tag reading.
4. Sana Zeba Bakshi [8] deals with secuirty using gsm. This paper uses RFID Reader and Scanner for verifying e-passport.

III. PROPOSED FRAMEWORK

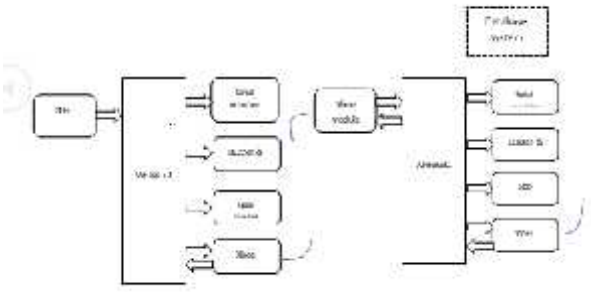

Fig 1: Block Diagram

An electronic passport is passport consisting of a Tag. In this project Near Field Communication (NFC) Tags are used. The read scope of those tags is 4 inches (max) (10 cm) from the reader to chip. The technology is also passive, and therefore any power source is not required. In general electronic passport consist of the NFC tag, which is usually embedded over the passport. An electronic passport, combines the E-passport and paper that contains information that provides identity of authenticate travelers /passengers. [2]

The block diagram designing of the system playing an important role. The system is described by a whole displaying the significant element of the system. The diagram below is figure of the system's block diagram.

1. The smart card technology is used and including a microcontroller and NFC tag (communication for power and chip) embedded on the passport.
2. For scanning the passport user needs to show passport at the entrance, after scanning microcontroller will verify the details. And also at the entrance user needs to enter the country code where he is travelling on serial monitor screen for checking the VISA is valid or not.
3. After verifying the details, whatever the results will be shown on serial monitor screen.
4. If data is accurate then green led will be glow, then the entry of the traveler/passenger will be granted.
5. If data is not accurate or expired then alarm and red led will be glow, then the entry of the traveler/passenger will be denied.
6. WIFI module is used to communication with data stored on the website.
7. Hashing Algorithm is used to encryption for the website while communication.
8. After sending data its wait for response from receiver module and display information on Serial Monitor Screen.
9. If It is a valid passport then it opens the gate else a warning will be given via Buzzer & Red Led.
10. After receiving data it is decrypted and shows original Data on LCD Screen.
11. A database will be created using software named NetBeans.
12. So we can easily verify data from Website and show response of data on Serial Monitor Screen.
13. If data is valid then Green led will turn on else for warning red led will turn ON & buzzer Will beep.

IV. DESIGNING OF MODEL

INFORMATION ON PASSPORT

The information page on the passport gives basic information about the passport. That is bearer's given names, photo, date and birth of place, issuing authority, validity period, place of issue and passport number, and the passport issue and expire dates.

In This System There is 2 part transmitter & receiver Module and website.

1. Transmitter Module**:-**

In this Module NFC reader is use to read the NFC tag no as Passport no which read by Microcontroller and process it which send the data to receiver module to Wirelessly through Zigbee Module.

i. *NFC tags:* A unique passport ID is write in to tags with the help of arduino programming and which is read by NFC reader. The maximum range for working the NFC readers is about 10 cm. It works on radio frequency identification technology, an NFC is operates on one part of wireless link. Whenever it is activated or activating by another chip, data is transferred between the two devices when it is placed in within the range.

ii. *Atmega 32:* The data through NFC reader is received by microcontroller and processes the data and then it is sent to the receiver module wirelessly. The microcontroller is high performance and low power 8 bit microchip AVR and RISC based are combines 32 KB flash memory within read/write capabilities, 32 general purpose registers. It consist of 8-channel and 10-bit A to D converter, watchdog timer that is programmable five software with power saving mode and serial port. The device operate in range from 1.7 -5.6 volts. By executing a powerful instruction in a cycle of a single clock, balanced power consumption and a processing speed is achieved by the device. Data will be send in encryption data as changing ASCII value of sending data which decrypt at receiver module and show the NFC tag ID. This communication is done by zigbee module.[8]

iii. *Zigbee module:* Zigbee is used for the low power applications, flow of data rate and is an open standard. Working of the zigbee is known as two way communication for between a sensor and a control system. Similar to Wi-Fi network and Bluetooth, zigbee also short range communication and offers connectivity up to 100 meters. Zigbee technology supports the transfer of data coming from the sensors at a rate of 250 kbps. After

sending data its wait for respond from receiver module and display information on Serial Monitor Screen. In this process the information is fetches from the website and checks the information for the given passport ID. If the given passport ID is valid then it open the gate at the entrance else it gives warning via Buzzer & Red Led.

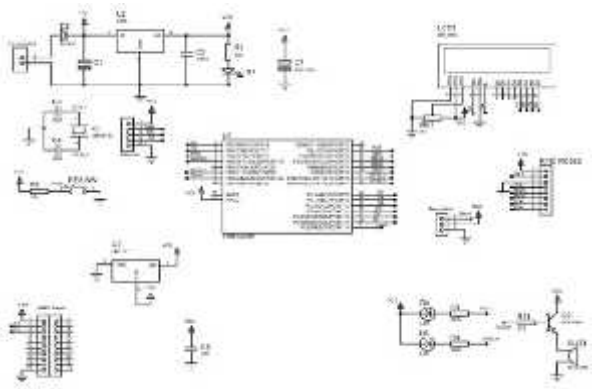

Fig 2: Transmitter Module

2. ReceiverModule:-

In This module after the receiving data is decrypt it and show original data on LCD screen it's also check data from website and show respond of data on serial monitor Screen if data is valid then green led will on else for warning red & buzzer will be beep after received details send again to transmitter module. Process that data and do further process decryption & encryption process is done by using Change in ASCII number pattern. The receiver module fetches the data from the website. The wirelessly communication is done between the module and database system via WIFI module.

To display the details a 16x2 LCD screen will be used, along with this a buzzer and a LED will be placed so that it will be easy to identify authorized passport and the fake ones by the airport authorities/security.

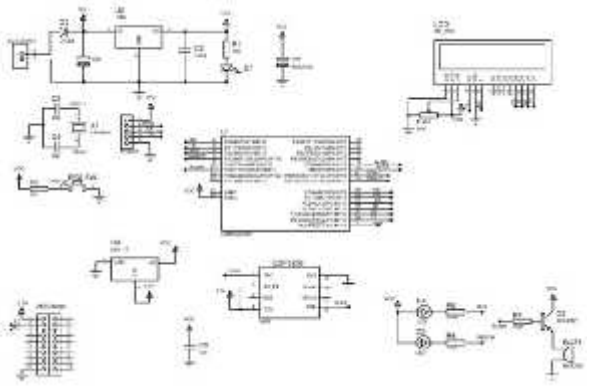

Fig 3: Receiver Module

3. Website encryption:

For website encryption hashing algorithm is used. A mathematical function 'hash' is used for converting an input value into a compressed value that is a hash or hash value. Hashing algorithm depends on the length of the output or the hash .The most popular hashing functions or algorithms have a hash length ranging from 160 to 512bits.

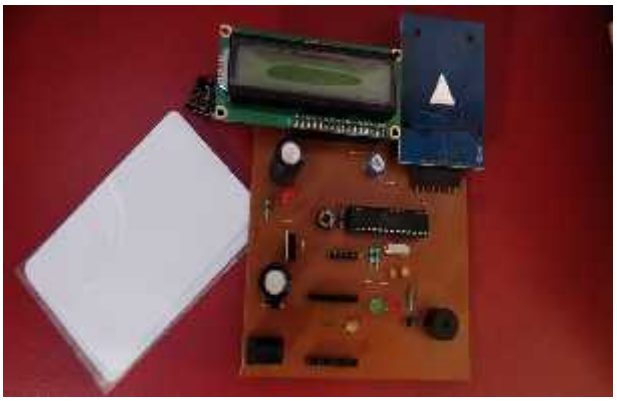

Fig 4: Present Transmitter Module with NFC Tag.

V. RESULTS AND DISCUSSION

TABLE I : CASES FOR ACCESS

Sr. No.	Passport	Visa	Visa On Arrival	Action
1.	Valid	-	Granted	Access Granted
2.	Valid	Yes	-	Access Granted
3.	Invalid	Yes	-	Access Denied
4.	Valid	No	-	Access Denied
5.	Valid	-	Not Granted	Access Denied

In first case, the passport of the traveler/passenger is valid and therefore the Visa on Arrival (VOA) is granted. The access to the traveler/passenger is granted.

In second case, passport of the traveler/passenger is valid and the visa for that particular time period is also valid. Therefore access to a particular traveler/passenger is granted.

In third case, passport of the traveler/passenger is Invalid (passport expired), but visa is valid. But as the passport is invalid, the access is denied.

In fourth case, passport of the traveler/passenger is valid and the visa for that particular time period is also not valid (time period expired), the access is denied. In this particular project, if the person is in other country and the person's visa has expired or not, this process we are going to check manually.

In fifth case, passport of the traveler/passenger is valid, but VOA is not granted, as the passport expires within 2 months. Therefore, the access is denied.

VI. VISA AND VISA ON ARRIVA

TABLE II. COUNTRIES PROVIDING VOA

Asia	Africa	South America	Europe	North America	Oceania
Thailand	Mauritius	Ecudor	All European Countries need a pre-approved Visa	British Virgin Islands	Cook Islands
Bhutan	Seychelles	Dominica		Haiti	El Salvador
Cambodia	Togo	Bolivia		St Lucia	Fiji
Maldives	Kenya	Guyana		Jamaica	Micronesia
Macau	Tanzania			Saint Kitts and Nevis	Vanuatu
Indonesia	Ethiopia			Saint Vincent and Grenadines	Samoa
Iraq	Madagascar			Grenada	Tuvalu
Nepal	Mozambique			Trinidad & Tobago	Niue
Laos	Uganda			Montserrat	Palau
Jordan	Guinea-Bissau			Nicaragua	
Timor Leste	Cape Verde			Turks & Caicos	
	Comoros Islands				

1. If you over stay your visa:

If you are in other country and your visa expires then different countries have different punishment. In numerous cases there is a penalty and some rare cases you will be banned from visiting that country for few years or they will take some strict action against you by verifying your personal details.

Some worst cases:

i. You are in Russia and visa expires, then you will be getting in trouble.

ii. Then border officials and your luck will decide how much you have to pay the fine.

iii. If you are in China and visa expires. In China laws are very strict; there are chances you will be blacklisted for up to 10 years.

iv. If you are in Vietnam and visa expires. Here then the similar situation like Russia. The border officials will take the final call.

v. If you are in India and visa expires then there is a procedure for preparing documents.

a) You have to write explanation for overstaying.

b) There is an exit application form you have to submit.

c) Your passport size photos.

d) You have to mention where you stayed in India.

e) Police clearance certificate. And there will be a fine.

2. VISA ON ARRIVAL

The government of India formally launched the E-passport scheme in September 2009. The e-passport manufacturing facility is installed at India Security Press (Nasik). The biometric passport was first received by President Pratibha Patil, Vice President Hamid Ansari and Prime Minister Manmohan Singh.

Visa on Arrival (For Indians)

Thailand:

1. The passport should be valid for 6 months at least from arrival.
2. Blank Pages for visa stamping are required.
3. Stay Period: 15 days only (Should not exceed)
4. Extension of stay is possible.
5. Fees: 1000 Baht (2290.90 Rs.).
6. Confirmed return tickets within 15 days.
7. Proof of accommodation.
8. Sufficient funds proof (10000 Bat (22909.02 Rs.) per person and 20000 Bat (45818.03 Rs.) per family).

Indonesia:

1. The passport should be legitimate for 6 months at least from arrival. Blank pages for visa stamping are required. Stay period: 1 5 days only (should not exceed). Extension of stay is possible (fees:1000 Baht)
2. 2 Blank Pages for visa stamping are required.
3. Confirmed Return tickets.
4. Fees: 35 USD (2502.46 Rs.)
5. VoA validity is 30 days.
6. VoA can be reached out for an additional 30 days.

Cambodia

1. The passport ought to be legitimate for 6 months at least from arrival.
2. Maximum Stay – 30 days.
3. Fees: 20 USD (1429.98 Rs.)
4. Criteria – Passport should be substantial for at least half year from the date of arrival.
5. Proof that an individual can manage expenses – 500 USD (35749.50 Rs) is required.
6. Proof of accommodation.

Mauritius

1. The passport should be legitimate for 6 months at least from arrival.
2. 2 Blank Pages for visa stamping are required.
3. Confirmed return tickets within 60 days.
4. Proof of accommodation.
5. VOA Validity- 60 days.
6. VOA Fees: 50 USD (3574.95 Rs.) to 100 USD (7149.90 Rs.)

Kenya:

1. The passport should be legitimate for 6 months at least from arrival.
2. Proof of accommodation.
3. Visa Validity: 90 days (multiple entries)
4. Fees: 50 $(3574.95 Rs.)

Bolivia:

1. Does not provide VOA to USA.
2. Fees: 55 USD (3932.44 Rs.)
3. Stay Period: 30 days
4. Extension- can be extended 2 times for 30 days each.

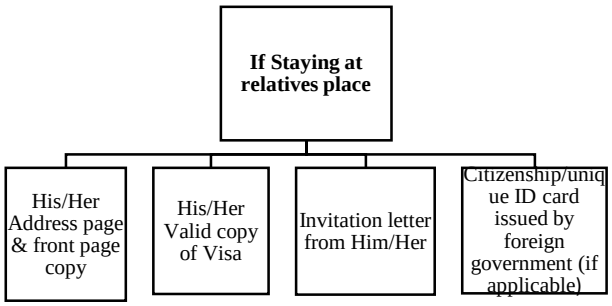

Fig 5: VOA (Mauritius)

VII. FUTURE SCOPE

In this future we can have Crone job on server which will run every day at specific interval of time. This process will sort out passports whose expiry is there on that day.

The International Civil Aviation Organization (ICAO) has norms for "reading" of electronic passports. But it does not prescribe how the chip's "writing" operation and the "Security features" must be the technical committee looks after those operations, which is headed by the NIC Director General. So therefore the Security aspects can be enhanced more and more.

The future of electronic passports may implement some advanced cryptographic means, also called as Extended Access Control. This may also include iris or fingerprint scan and also include two protocols referred as Chip Authentication and terminal authentication that will protect an electronic passport against transferability and cloning attacks.

A cryptographic analysis of the electronic passport will use fingerprint, iris scan and palm print. Biometrics may provide improvised security in protecting the information of the electronic passport. Together, NFC and biometrics may also promise to ease identity checks, reduce fraud and enhance security[3].

VIII. CONCLUSION

The brilliant technology named Smart card technology has many benefits, which eventually upgrades/improves the security and therefore the process. Also decreases the number of forgery and counterfeit documents. As the validation of the passport will be faster and efficient. Therefore this process is much convenient. This system makes the overall project management much easier and flexible. The system provides an online interface where authority concerned with issue of passport can use this system to verify.

ACKNOWLEDGMENT

This project cannot be entirely created by an individual. The timely completion of the project, Passport Verification Using "Near Field Communication" has been possible because of our teachers who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project. We are also thankful tour mentor Electronics Department) for guidance and to our parents for providing all possible resources to gain the best possible knowledge.

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IoT based Generator Management System using GPy Pycom

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***Abstract*—In the era of digital devices many industries still use traditional methods of pen and paper to maintain records. One such industry is the diesel generator industry where these generators are operated without any proper supervision. The need for having a proper database in every sector is highly important. The current management of these generator vans is highly unorganized. This causes a lot of miscommunication between the owners and the customers. The idea focuses on monitoring the different parameters of a diesel generator using internet-connected sensors. Parameter such as fuel consumption, AC power ON time, RPM of the turbine and power consumption are measured. The real-time data collected from the sensors will help the owners in providing better services to the customers. The system will also help the owners to monitor their generators vans through one mobile application rather than depending on the operators. Not only the owners will be able to monitor the generator continuously but also the consumers will be able to see how much power was consumed and how their bill was generated. Rather than using pen and paper to maintain records in the current method, the new system completely transforms the old methods into a high digitalized modern business.**

Keywords—connected sensors, data management, generator van, GPy, Micro-python, Pycom, Internet of Things (IoT).

I. INTRODUCTION

Data is the new gold in the current digital age. For any business to improve and grow, proper data management is essential. The generator van industry is very unorganized and is still years behind when it comes to organized management [1]. Proper data management becomes a very important factor while analysing any business, but currently, the generator van industry is lacking this ability. The system tries to create a better overall experience for the owners as well as the customers with the help of connected sensors and data analysis.

The process of generation of the bill is a headache for both the customers and the owners [2]. Currently, there is no accurate way to decide how much power was generated and exactly how much power was actually consumed. Common problems that are faced by the generator van owners are not having the proper ON and OFF time of the generator, no record of how much fuel was consumed, when and where the generator was turned ON or OFF and many more. From, the consumer's side, they are completely kept in dark about their usage and have no data to review. The consumers have to agree whatever the owner demands as they have no data to verify if the owner is telling the truth or not.

Generators have different parameters that are taken into account while generating the bill or invoice for the consumer. Fuel monitoring, AC power consumption, RPM of the turbine, AC power ON time and temperature are the parameters which help the system to monitor the generator van in real-time [3]. The parameters such as GPS location is also monitored continuously to prevent any kind of misuse by the drivers. When dealing with high-level voltages of the generator, safety becomes one of the most important factors. Continuous monitoring of the temperatures and fuel consumed will help in preventing any damage to the generator and in the longer run, it will reduce the cost of maintenance.

Pollution control is also one of the factors why generator vans need to be monitored continuously. There are almost 40,000 diesel generators in Gurugram alone. The amount of pollution caused by these generators is a concerning issue. The system will also provide a platform for the locals to see how many generators are being operated in their locality and how much pollution is caused by them. Regular maintenance alerts will be provided to the owners regarding the need to maintain the generators, which will indirectly help in reducing the CO2 emissions.

The system is used by both the owners of the generator vans and the consumers. Although the system is used by both owners and consumers, only the owners will have full control over the data which is received. The consumers can only view the data and not edit it. The owners will be able to manage their inventory through a mobile application and simultaneously the customers will be able to see their usage. This will minimize the information gap between the owners and the customers.

II. CURRENT SCENARIO

While many industries have been digitalized in today's modern world there are some industries who still use pen and paper for management. The diesel generator van industry is one of them. The current generator van industry uses the age-old method of documenting on paper rather than having a more robust digital system. Due to this, the chances of mismanagement rises. Also, the lack of proper data leads to inappropriate readings which causes error while generating the bill.

The owners are not able to monitor their vans continuously and have to rely on the staff for continuous updates. Due to this, the customers are also not able to directly contact the

owners.Hence, miscommunications happen. When it comes to using modern technologies, the owners mostly use a spreadsheet application to note down the readings. This method is very inefficient as the data needs to be added manually and there are high chances of redundancy. Fuel theft is one of the major problems in generator vans. Current systems do not have any real-time monitoring sensors, which leads to high chances of fuel theft. The fuel consumption of generator van varies according to the power generating capacity. The table below shows the fuel (diesel) consumption in different types of generator vans.

TABLE I. DIESEL FUEL CONSUMPTION RATINGS

Generator Size	Approxmate Diesel Fuel Consumption			
	25% Load (Litres/hr)	50% Load (Litres/hr)	75% Load (Litres/hr)	Full Load (Litres/hr)
8kW / 10kVA	0.9	1.2	1.7	2.1
10kW / 12kVA	1.0	1.4	2.1	2.6
12kW / 15kVA	1.0	1.8	2.6	3.2
16kW / 20kVA	1.7	2.4	3.5	4.3
20kW / 25kVA	2.1	3.0	4.3	5.4
24kW / 30kVA	2.6	3.6	5.2	6.4
32kW / 40kVA	3.4	4.8	7.0	8.6
40kW / 50kVA	4.3	6.0	8.6	10.7
60kW / 75kVA	6.4	9.0	12.7	16.1
80kW / 100kVA	8.3	11.9	16.1	21.4
120kW / 150kVA	10.9	17.3	24.1	32.1
160kW / 200kVA	14.1	22.9	32.7	42.8
200kW / 250kVA	17.4	28.6	40.8	53.5
280kW / 350kVA	23.7	39.3	56.0	74.9
400kW / 500kVA	33.3	55.6	79.6	107.0

Depending upon the capacity of the generator, fuel consumption varies significantly. 280kW/250kVA is the most commonly used generator [4]. It is suitable for most of the scenarios, but smaller generator vans are also available. The system which is used across all these types is the same. Only minor modifications are required during the installation of the system.

The current method for bill generation takes only fuel consumption into account. Whereas, the new system will be able to take multiple parameters into consideration before generating the final invoice. Currently, there are some systems which are based on IoT but are open source. These systems are depended on the open-source platforms and do not provide complete control over how the data is collected [5]. Since each and every generator has to be depended on these platforms for proper management, it becomes difficult for the consumers to view the same data as the owners of the generators. This leads to miscommunication and lack of transparency between the owners and the consumers. The system tries to organize a very unregulated generator van industry. The project will have both hardware and software components. While the hardware will only be used by the owners, the software will be available for both the customers and the owners. The hardware will be installed on the generator vans. The data from the hardware i.e. the sensors will be sent to a server. Then this data will be further categorized according to the parameters. Finally, all the processed data will be displayed on the mobile application or the website. The process of documenting manually will be replaced by an automated system. This helps in reducing the inefficiencies and makes the overall process more transparent.

III. BLOCK DIAGRAM & DESIGN

The designing of the block diagram plays a very important role as it visually describes the system as a whole by displaying the significant elements of the system. The diagram below is the block diagram of the project.

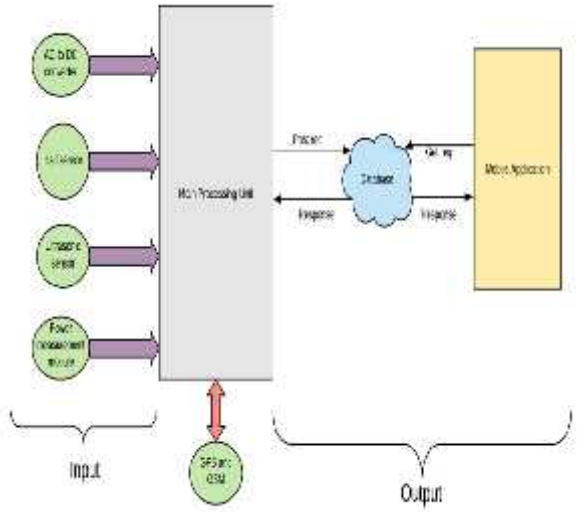

Fig. 1. Block Diagram of the System

The system has an array of sensors to continuously monitor the various parameters of the generator. The fuel in the tank is measured by using an ultrasonic level sensor. This helps in providing accurate fuel levels with a resolution of ± 0.2%. When the generator is turned on it is not necessary that it is generating electric power. A hall sensor module is used to measure the RPM of the turbine. The reading from these sensors helps in determining whether the generator is actually generating any power or not. Also, a micro SMPS is used to check if the AC supply is present and thus providing the actual switching ON and OFF timings to the owners.

A GPS module is also built into the system in order to determine when and where the generator was turned ON.

With the help of the RTC module, accurate timings are provided to the micro-controller. The main brain of the whole system is a micro-python based micro-controller – Pycom's GPy.

GPy comes with Wi-Fi, BLE and cellular LTE CAT M1/NB1 which makes it perfect for enterprise based IoT applications. GPy provides full flexibility during testing, install, deployment and is RCM, IC, CE and FCC certified. What makes GPy such a great micro-controller is the powerful CPU, 1KM Wi-Fi range and ultra-low power usage. The addition of LTE makes the GPy a truly independent IoT micro-controller. The GPy has 2 * UART, 2 * SPI, I2C, I2S as digital channels. It also has analogue channels which include 8-12 bit ADCs and 2-8 bit DAC. For timers, it has a 64 bit with PWM with up to 16 channels. The input voltage required by the GPy is 3.3V to 5.5V and it is also capable of sourcing up to 400mA. At the heart of GPy lies the Espressif ESP32 system-on-chip. This processor has a dual Wi-Fi radio system-on-chip. The network processor handles the Wi-Fi connectivity and IPv6 stack. When the GPy is in sleep mode it only consumes 25uA, which makes it perfect for application with low power consumption.

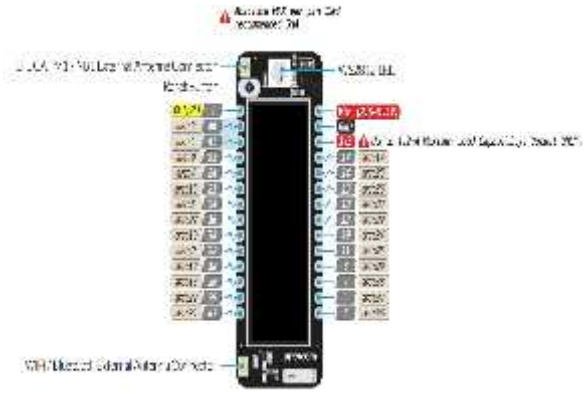

Fig. 2. Pycom GPy pin configuration

When it comes to security & certifications the GPy has SSL/TLS support up to 1.2 and the WPA comes with enterprise-grade security. It also has an AES encryption engine to further enhance security. It comes with built-in RTC so that the clock is always showing the right time when turned ON. The size of the GPy is 55mm * 20mm * 3.5mm. The small form factor helps the GPy to be used in small packages which enhances the ruggedness of the system.

As soon as the generator is turned on, the hall sensor will check the RPM of the turbine. This will indicate if the generator is actually producing any output. If the RPM is greater than the threshold value, and 230V is observed by the AC power sensor then only the generator will be completely ON [6]. In the next stage, the fuel sensor module will come into the picture and start measuring fuel consumption. Simultaneously, the AC power sensor module will check the power consumed at the output. This will give us the efficiency of the engine.

On the software side, all the data from these sensors is processed by the GPy using micro-python. This processed data is sent to the server using API's [7]. The data is then categorized at the backend. This properly sorted data is then fetched by the mobile application. The user will be able to access this data by logging into the website or the mobile application. At the end of every session, the data collected from all the sensors will be processed to generate the invoice. This will help the users to get the invoice on time and also the users will be able to access the data from the sensors for reviewing their invoice.

IV. RESULTS

The current method of storing records is done by manually writing on a register, which becomes very inefficient when data is needed to be shared among multiple parties. Working of generators vary depending upon the manufacturer but, there are some core similarities. The generator van has a total of 3 states. Here they are categorized in different modes. The figure shown below is the screenshot of the mobile application.

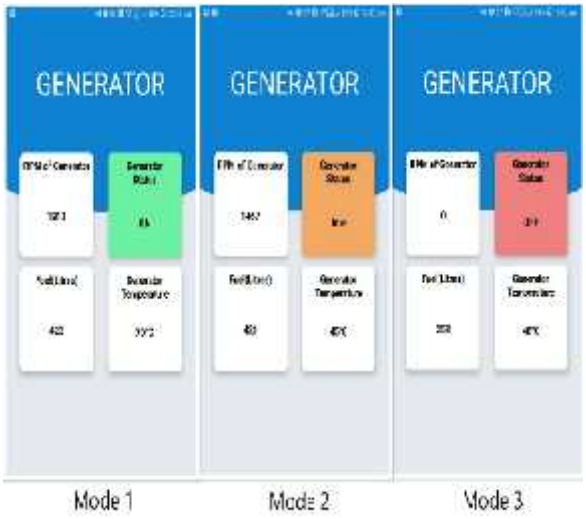

Fig. 3. Screenshots from the mobile application

In mode 1, the generator is in ON state. When the generator is on, all the sensors attached to the system are expected to be working. During this state, the generator is running and generating AC power. This is sensed by the micro-SMPS used in the system. To check whether the generator is working properly the RPM of the fan is also measured. The RPM is measured by the hall sensor module. The sensor is triggered by the magnet attached at the blades of the fan. This method provides gives precise RPM count of the fan. Next, as soon as the generator starts, the ultrasonic level sensor starts detecting the fuel level in the tank. As the range of the load varies, the fuel consumption also varies simultaneously. Finally, the temperature sensor provides the reading of the radiator. The temperature sensor also helps in maintaining the radiator. Regular cooling and replacement of water alerts are provided by using this temperature sensor. The parameters are taken simultaneously without hampering each other's operation.

Next in mode 2, the generator is in idle state. During this state, the generator is not producing any electricity. The idle state is the middle state between the turning ON and OFF of a generator. When the generator is in idle state, the RPM count of the fan is below 1500. This RPM along with the readings from the micro-SMPS helps in determining the actual state of the generator. If the fan is rotating and its RPM is below 1500 and no output is sensed by the micro-SMPS then, the generator is said to be in idle state. This state is also beneficial for properly turning ON and OFF the generator. Many times, just by looking the fan rotating cannot assure the customer that the generator is producing any power. The reading from the sensor helps in solving this misunderstanding for both the customers and the owners. Even when in idle state, the generator is consuming some amount of fuel. This amount is far less when compared to the consumption of fuel in ON state.

The last state is mode 3, in which the generator is in the off state. During this stage, the generator and its engine are expected to be static and not working. As the generator's engine is not working the output which is observed in the form of RPM is zero. Since the fan is not rotating, the RPM count detected by the hall sensor is zero. When the generator is turned off, again with the help of a hall sensor and the micro-SMPS the state of the generator is confirmed. From the turning ON time to the turning OFF time, the one session is considered. The total amount of fuel which was consumed during this session is calculated and processed by the GPy. All the sensors in this state are expected to show zero or off readings. After every session, the SD card in the Gpy is checked for any malfunctioning log reports. If any log file is generated, it is sent to the owner stating the problem which needs to be solved. The fuel consumption of a 250kVA generator was monitored in real-time. The generator was operated for 15 hours continuously without any intervals. On average, the generator consumes 30 litres of diesel. This value is found when a constant load is connected from the start of the session to the end. Similarly, when the load is increased or decreased the fuel consumption of the generator varies to some extent. This value may not be large enough for smaller durations, but when a generator is operated for longer durations without any intervals, the fuel consumption starts to vary significantly.

The data from the hall sensor and the temperature sensor are monitored in real-time. The table given below shows the variation of fuel consumed by a 250kVA capacity generator. Also, the temperature of the radiator is measured simultaneously. The table summarises the readings from a generator which was used for 15 hours without any interval.

TABLE II. FUEL CONSUMPTION AND TEMPERATURE VARIATION OF A 250 KVA GENERATOR

Time (Hours)	Fuel Consumption (Litres)	Temperature (degree Celsius)
0	400	35
1	375	38
2	340	45
3	312	49
4	287	56
5	250	64
6	233	70
7	202	76
8	180	50
9	165	56
10	131	60
11	105	63
12	90	68
13	70	74
14	40	50
15	40	54

The fuel tank or container in a generator varies according to the owner and the requirements. The fuel tank of the generator van was 400 litres on which the system was tested. A threshold was set for the tank which was set to 100 litres. As soon as the generator starts generating power the fuel consumption of the generator is measured in real-time. When the fuel in the tank reduces below the threshold value an alert is sent to the owner of the generator as well as the consumer. As soon as the alert is sent the owners will be able to make the decision whether to stop the generator or continue operating it for some more time.

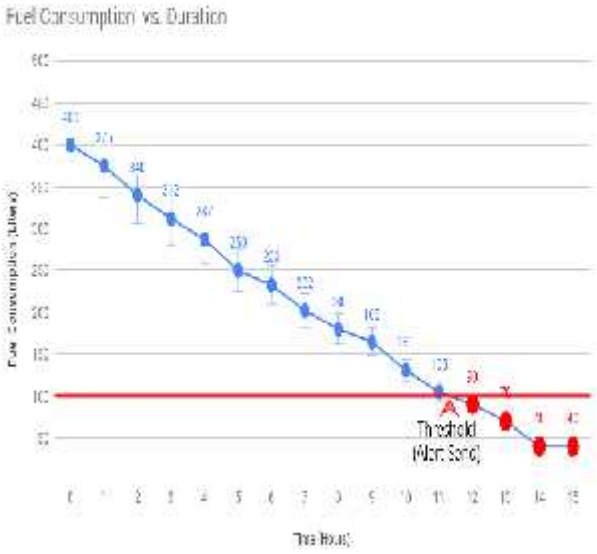

Fig. 4. Graph of fuel consumption of 250kVA generator for 15 hours

When the generator is stopped to refill the tank, the owners, as well as the consumers, will get a detailed graph showing the fuel consumed in the session. If the same generator is used again for a further session then the owners will have the option to add the previous data or to complete start a new session.

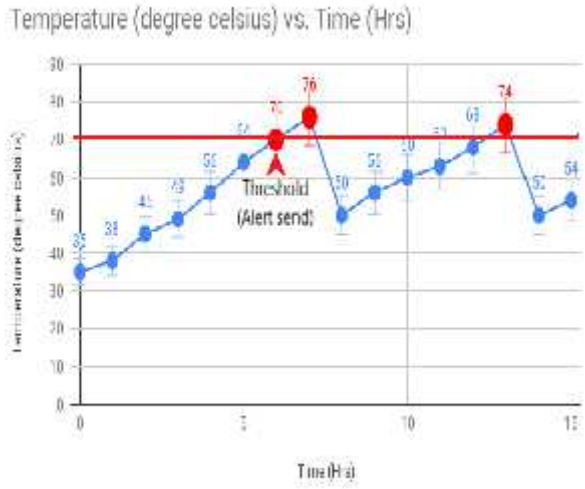

Fig. 5. Graph of the temperature variation of 250kVA generator for 15 hours

Like the fuel consumption is measured and alerts are sent, the temperature of the radiator i.e. the engine is also monitored in real-time. For the engine to function smoothly for longer hours, proper cooling and changing of the water in the engine become necessary. This is done with the help of a temperature sensor. A threshold of 70 degree Celsius is set, after which alerts will be sent to the users. Again, the operators onsite will have to change the water in the radiator, so that the engine will cool down to some extent. This provides the owner with definite readings which helps in generating the invoice later.

V. Application

The main application of this project is to organize an unregulated industry. The system tries to build a proper database which can be used for future operations. The data collected from the sensor will help the owners to optimize their services. The owner of the generator vans will be able to monitor their generators continuously with the help of various onboard sensors. The system will provide the owners with a platform to monitor and maintain their different generators through one single mobile application. Whereas, the customers will be able to see their usage regularly and can contact the owner of the vans if any problem occurs.

The overall transparency of the system is increased. The miscommunication caused between owners of the generator van and the consumers are reduced to a great extent. As all the data is stored on the cloud, whenever an old record is to be analysed, it can be easily done with the help of the application. Managing and generating bills/invoice becomes an automated task which reduces the work of the owners.

VI. Conclusion

While many industries have been digitalized there are some industries who still use pen and paper for management. The current generator van industry uses the age-old method of documenting on paper rather than having a more robust digital system. Due to this, the chances of mismanagement increases. The lack of proper data leads to inappropriate readings which causes error while generating the bill.

With the help of the system, most of the inefficiencies of the previous methods are removed. The use of internet-connected sensors helps not only the owners of the van but also the consumers. The real-time monitoring on the various parameters helps in better services provide to the customers. Overall losses of the owners caused due to mismanagement are reduced to a great extent.

The system developed is better than the current methods in many ways, still, there is always room for improvement. The system is still depended on the operators on the site for turning ON or OFF the generator. This problem needs to be solved where the generator can be remotely turned ON or OFF using the mobile application. The remote triggering will help in many ways. The owners of the generator vans will be able to set the time limit for which the generator can be used. This will prevent over or unwanted usage by the consumers. Also, the generator owners will be able to set various sets of limits like time, fuel consumption, or even the load consumption. The owners will have even more control over the generator operation.

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Li-Fi based Home Automation

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***Abstract*— Home automation systems are among the upcoming applications of IoT which enhance the quality of human life and brings more comfort, convenience and savings. Wi-Fi based Home Automation system gives off Electromagnetic radiation in low frequency range which is considered potentially dangerous to human health. The proposed system uses visible light spectrum to establish communication between the devices. This paper presents a system implementation of Li-Fi based home automation system. Li-Fi is a high-speed bi- directional technology that allows the transmission of data through illumination using LED. The system consists of two main components; the first part is the web server and the second part consist of hardware interface module which provides interface between the devices. The proposed system ensures security of the data, high speed data transmission and low energy consumption.**

***Keywords: Li-Fi, Home Automation system*.**

I. INTRODUCTION

Li-Fi uses visible light instead of radio waves. It is a disruptive technology that is poised to impact a large number of industries. Li-Fi can unlock the IoT, drive Industry 4.0 applications, enable light as a service (LaaS) in the lighting industry, contribute to the 5th generation of cellular systems (5G) and beyond, enable new intelligent transport systems, enhance road safety when there are more and more driverless cars, create new cyber-secure wireless networks, enable new ways of health monitoring of aging societies, and offer new solutions to close the digital divide.

Visible lights are safe to use from health point of view, rather than using RF that can lead to human disorders. Li-Fi is a future technology which will replace the Wi-Fi technology. As Li-Fi overcomes the disadvantages of Wi-Fi, like the rate at which the data is transferred of Li-Fi is more than 1 Gbps while in Wi-Fi it is about 150 Mbps. It uses light as a carrier whereas Wi-Fi uses radio Spectrum for transmission. Frequency spectrum of Li-Fi is ten thousand times greater than that of Wi-Fi. Li-Fi is Cheaper than Wi-Fi as free band does not requires license. This term was developed by Harald Haas, it is a form of visible light communication and is a subset of optical wireless communications (OWC) and could be a complement to RF communication (Wi-Fi or Cellular network). It is so far measured to provide a speed of 224 gigabits per second.

The concept of Li-Fi technology is based on fast flickering of light which cannot be detected by human eye, it is detected by the photo detector which converts the ON and OFF state into binary digital data. The flicker rate of LED represents the stream of data which is transmitted.

Energy consumption can be minimized with the use of LED illumination which are already available in the home, offices and Mall etc. for lighting purpose, which makes it very efficient in terms of costs as well asenergy.

This technology will create major impact on smart homes as security will be improved and by using light as a medium of data there will not be any problems related to human disorder. And any amount of data will be easily transmitted in real time without any delay at the speed of light.

II. LITERATURESURVEY

A. (Li-Fi) in the Field of Internet of Things (IoT) andBig Data: With the advent of Li-Fi and data transfer technology, the IoT and Big Data fields achieve greater benefits as the data stress is minimized and fast data rate is achieved.

B. Prototyping and Measurements for a LiFiSystem: Two Spartan 6 FPGAs have been used on the transmitter and the receiver's side for the communication to take place. The transmitter FPGA receives the Ethernet frames from the computer. At the other end, the receiver FPGA processes the received pulses undoing all the operations made by the transmitter.

C. Home Automation using Li-Fitechnology:

For Home Automation system, a PIC microcontroller can be used for controlling multiple devices and the hardware which controls the devices based on user'sswitching.

D. Transmission of Data, Audio Signal And Text Using Li- Fi: Li-Fi can be used for transmission of audio signals, text, images, and videos. It can also be used for providing internet.

E. LiFi: Conceptions, Misconceptions andOpportunities:

In this paper talk we talk about Li-Fi and its differences to visible light communication. We discuss about the misconceptions and the opportunities of Li-Fi in existing and emerging technologies and industries.

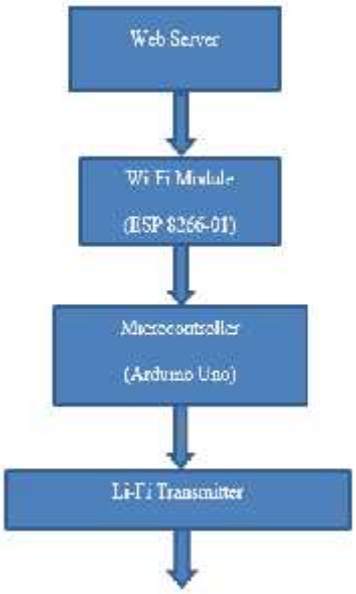
III. PROPOSEDWORK

The proposed system consists of two main components; the first part is the web server, which presents core that controls, manages and monitors user's home. The User and Administrator can locally or remotely manage and control the devices connected to the system. The next part is hardware interface module, which provides interface between the web server and the devices connected to the home automation system. Unlike most of existing home automation systems in the market, this system is scalable, flexible and low of cost than the commercially available systems.

A. Hardware:

- Transmitter:

The below figure is the block diagram of the transmitter section of the proposed system.



begins when the user gives the input to the webserver.

Based on the commands of the user, the web server transmits the signal to the microcontroller (Arduino Uno) through the Wi-Fi module (ESP 8266-01). Li-Fi transmitter receives this signal and generates the signal which will decide the operation of relay. The light signal from the LED varies according to the intensity of transmittedsignal.

- Receiver:

The below figure is the block diagram of the transmitter section of the proposed system.

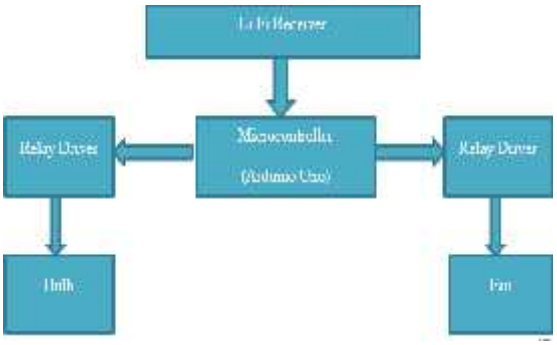




TABLE 1. COMPARISON OF DIFFERENT STANDARDS

Sr. no	Standards	Data Rate	Bandwidth
1	2G	64-144 Kbps	25 MHz
2	3G	2 Mbps	25 MHz
3	4G	100 Mbps	100 MHz
4	Wi-Fi	200 Mbps	20, 40 MHz
5	Li-Fi	10 Gbps	430–770 THz

As shown in fig.1, at the receiver's side, LDR will receive the light signal and generates the electrical signal according to it. In case of data transmission, the output is then fed to the microcontroller and it will activate the corresponding load (Bulb, Fan) via relay for the pressed key. Thus, the connected device will be turned on/off according to the command given by theuser.

B. Software

A web server is created using visual studio version 2013.A database table is created using SQL which displays all the connected devices and indicates their respective states.

IV. COMPARISON BETWEEN LI-FI ANDWI-FI

Li-Fi is the name given to high speed wireless communication, where visible light plays a vital role. The name is derived from similarity to Wi-Fi. Wi-Fi works well within buildings and Li-Fi is unique for high density data coverage areas or rooms and for avoiding radio interference issues. Wi-Fi provides higher data rates, IEEE 802.11 in maximum implementations which provides up to 150 Mbps practically, but the speed is low. [2]

V. RESULT

The main objective of this project is to implement a Li-Fi based home automation system. A website is developed to provide connectivity between the hardware and the web server by using Wi-Fi module (ESP 8266-01).



Fig. 3. Login page

Fig. 4. Homepage



Fig. 5. Status page

I. EXPECTEDOUTCOME

The system will be using Web page, having options to turn ON/OFF our home appliances. In appliances, we will be using a Bulb and a Fan. Li-Fi Transmitter side Controller, at every 30sec will request the web server to send real time status of user input. Based upon the user input, Transmitter side controller will generate a Li-Fi Data sequence. This data sequence will be transmitted with help of Li-Fi transmitter. At Receiver Side, we will use a Li-Fi receiver to collect the data and the collected data will be in Li-Fi Format. At receiver the controller converts this data in to normal TTL logic and proceeds for further processing. Based on information available, controller performs operation like ON or OFF the devices using relay attached to eachdevice.

VII. CONCLUSION

Li-Fi is a new paradigm for optical wireless technology to provide unprecedented connectivity within a localized data- centric environment. The increasing demand for higher bandwidths, faster and more secure data transmission as well as environmental and undoubtedly human friendly technology heralds the start of a major shift in wireless technology, a shift from RF to opticaltechnologies.

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Wireless Sensor Network for Environmental Monitoring

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***Abstract*— Environment monitoring has become an important field of control and protection, providing real-time system and control communication with the physical world. An intelligent and smart Wireless Sensor Network system can gather and process a large amount of data. In this, we discuss about wireless sensor network for environmental monitoring. The proposed system is designed using a single sensor node which senses the parameter such as temperature and humidity. A base station to receive the sensed data from sensor node. The sensor node is attached to an Arduino uno configured as slave and an Arduino uno as basestation acts as the master. Both the sensor node and the basestation communicate via a ZigBee module placed at each end. It is also proven that these approaches can improve the system performance, provide a convenient and efficient method and can also fulfil functional requirements.**

Keywords- Wireless sensor network, environmental monitoring, ZigBee, energy efficiency management.

I. INTRODUCTION

The environmental care has become one of the biggest concerns for almost every country in the last few years. Even though the industrialization level has been increasing without any control in the last decades, the current situation is clearly changing towards more environmentally friendly solutions.[2] Water and air quality are essential to maintain the equilibrium between human development and a healthy environment. It is also important to notice that by means of looking for a more efficient production in factories both pollution and consumption of natural resources can be decreased. Processes, such as boiling, drying, binding, and so forth, are being carried out by almost every kind of the current factories. Those processes are responsible of a great amount of gas emissions and polluted water discharges. Although the majority of the factories have their own sewage plants, it is crucial to measure the quality of the waste water that is being poured into the public sewer. Due to the reasons above, the necessity of monitoring production processes and environmental parameters has become an essential task for the industrial community. The solution proposed in this text is an environmental monitoring system based on a wireless sensor network (WSN hereafter) platform, to measure both gas emissions and waste water quality in an instant coffee factory in Spain. Even though there are myriad other approaches that are now being used, WSNs can offer a cheaper solution while having data acquisition in real time, working in an unattended way. [2]

II. LITERATURE SURVEY

A. Wireless sensor network communication terminal based on embedded Linux and Xbee

The proposed system is a low-cost, low power consuming and highly scalable in both (type & number) of sensors which is well suited for a variety of applications related to environmental monitoring.[1]

B. Wireless Sensor Network Applications: A Study in Environment Monitoring System

In the proposed system, each node consists of microcontrollers, memory and transceiver. The microcontrollers are used to execute task, data processing and assist the functionality of other components in the sensor node. For the memory, it is mainly used for data storage while the transceiver acts from the combination of transmitter and receiver functions. Natural phenomena data such as temperature, light, sound and pressure are collected by sensors and then transmitted to a server. These battery powered nodes are used to monitor and control the physical environment from remote locations. In the past few years, the applications of Wireless Sensor Network have been widely used and applied in medical, military, industrial, agricultural and environmental monitoring.[2]

C. Wireless Sensor Network for Environmental Monitoring: Application in a Coffee Factor

In this paper, a real monitoring application in an instant coffee factory is presented. Here, if a catastrophic discharge occurs at a place such as a chimney & waste water pipes, WSN will help to inform the client about the discharge immediately.[3]

III. PROPOSED SYSTEM

The proposed system uses Arduino module along with Zigbee as a sensor node, which is placed at different places to collect information and send it to the server. Here, an Arduino uno acts as the base station and receives the data from the sensor node through a ZigBee module and the data is processed and made available to the end user.

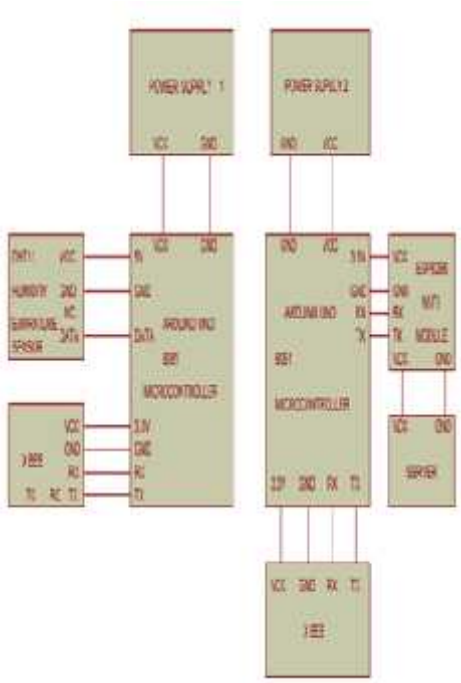

Figure 1: System Architecture

A. *Hardware*

- Transmitter

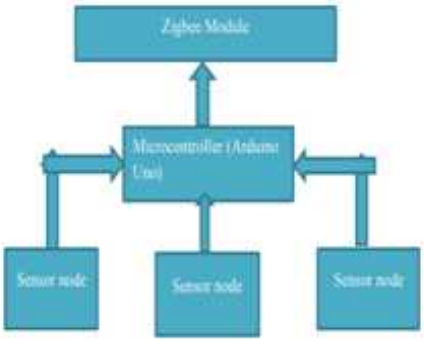

Figure 2: Transmitter End

1) **Arduino Uno:** Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.
2) **ZigBee Module**: ZigBee consist of various XBee RF modules. Each having different specification. Generally, XBee modules operate within ISM 2.4 GHz (Unlicensed) frequency band. XBee modules support ZigBee protocol which is based on IEEE
802.15.4 standard. XBee modules uses DSSS (Direct Sequence Spread Spectrum) modulation technique for communication. XBee has on board features like Digital I/O pins, analog ADC (10-bit) input pins, PWM output etc. It has serial UART pins for communication with PC and Microcontrollers serially. Some XBee modules (e.g. S2C) has support for SPI interface too.
3) **DHT11 Humidity sensor:** The DHT11 is a basic, low cost digital temperature and humidity sensor.DHT11 is a single wire digital humidity and temperature sensor, which provides humidity and temperature values serially with one-wire protocol.DHT11 sensor provides relative humidity value in percentage (20 to 90% RH) and temperature values in degree Celsius (0 to 50 °C).DHT11 sensor uses resistive humidity measurement component, and NTC temperature measurement component.DHT11 is a 4-pin sensor, these pins are VCC, DATA, GND and one pin is not in use.

- *Receiver*

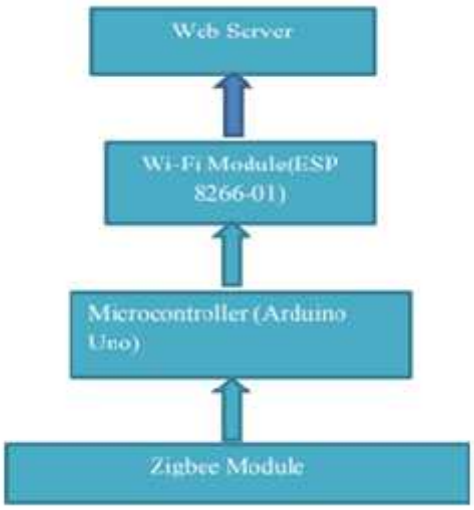

Figure 3: Receiver end

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications. It employs a 32-

bit RISC CPU based on the Tensilica Xtensa L106 running at 80 MHz (or overclocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI.



Figure 4: WiFi module

B. Software

A web server is created using visual studio version 2012.A database table is created using SQL which displays all the connected devices and indicates their respective states.

IV. RESULTS

The main objective of this project is to create a Wireless Sensor Network (WSN) through which we can monitor Environmental conditions of any given place & at any point of time. Sensor nodes are used to collect data from surroundings and provide it to the Arduino configured as a Slave. The Slave then forwards this data to the Master using Zigbee module and a Web Server is created where the clients or users can easily access this data.



Figure 5: Welcome page



Figure 6: Admin Login Page



Figure 7: Sensor Node Output

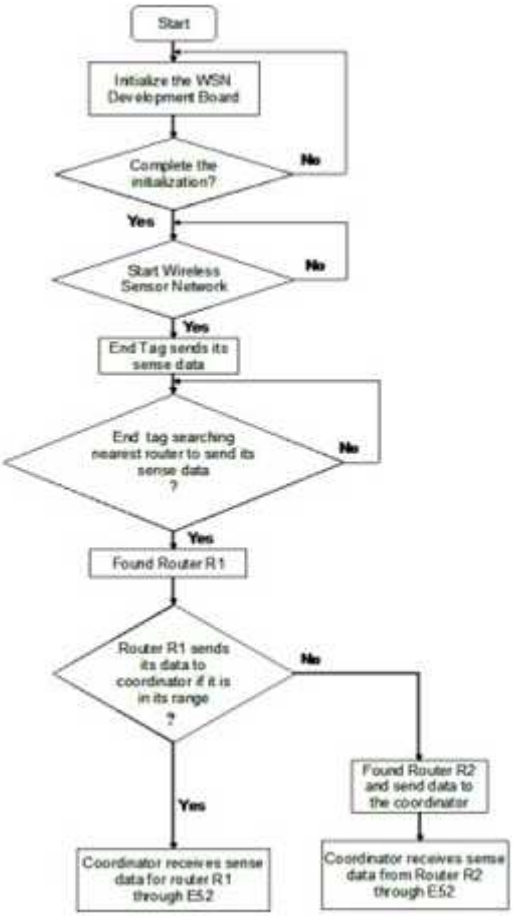

Figure 8: Flow Diagram

V. EXPECTED OUTCOMES

The system will be using a Web Application for clients or users to access the data collected by the sensors. There are 2 Arduino Uno Modules used, one which acts as a Slave which is connected to the sensor nodes (DHT11-Humidity Sensor) and the other one acts as a Master connected to the Server through the Wi-Fi module (ESP8266). The Arduino modules communicate by using Zigbee modules.

VI. CONCLUSION

This paper describes the design of a Wireless sensor network using two Arduino uno modules.One of the Arduino module is configured as slave which is connected with the sensor node and the sensed data is then transmitted to the base station where the microcontroller processes it in suitable form in which it can be transmitted by the WiFi module(ESP8266).The end user can access the data through the web server.

ACKNOWLEDGMENT

The Completion of this project could not have been possible without the guidance and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following We are very grateful to Prof Ms. Kalawati Patil, Prof. Manoj Chavan, HOD Dr. Vinitkumar Dongre, Dean Dr. Lochan Jolly and Principal Dr. B K Mishra for their endless support, kind and understanding spirit during the preparations of this project. To all the Professors, lab assistants, friends and our parents who in a way or other shared their support morally, financially and physically.

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WIFI Based Beach Cleaning Vehicle Using Solar Panel

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***Abstract*—The vehicle has particular development, which leaves it alone increasingly flexible, permitting adjustments for various uses and encourages it get together and its upkeep. The mechanical part of the robot needs to give the ideal strength and solidness, as the robot would be utilized by the two analysts and learning understudies. The hardware needs to permit the ideal activity of a strong mechanical framework and the likelihood to apply systems of procedure control, a colossal part of the Control and Automation Engineering course**

Keywords - mechanical sensors, automation, Internet of Things (IOT).

I. INTRODUCTION

Trash is a significant issue overall consideration. The association reports over 9.5 million volunteers have evacuated 163 million pounds of garbage from in excess of 330,000 miles of coastline and conduits in 153 nations and areas. This issue influences to the obliteration of the excellent landscape and attractions. In addition, it causes the issue about the passing and poisoning of ocean animals. Along these lines, the improvement of the innovation, for example, robot for gathering the trash is the one perspective that is intrigued.

The mechanical technology field has experienced upheavals with some innovative advances and the promotion of improvement sheets, sensors, microcontrollers and other ease available electronic components. Robots are the most well-known enthusiasm among college understudies of Control and Automation Engineering As the present period is moving towards being digitalized and robotized with an extraordinary speed, the adolescent need everything easily and keen. The young as well as the individuals of all age are thinking that its extremely simple to be brilliant exertion what's more, increasingly being sound and are getting pulled in or joined towards most recent innovation of being "brilliant work". Anyplace you go, you get this innovation accessible. So we thought of utilizing this innovation and adding more to it for our last year venture. No one gets a kick out of the chance to languish and hold up over our long holding up hours just to get great encompassing or somewhere in the vicinity. To stay away from this and to spare time of the executives of waste we are making an application called "Keep cleaning ". For that we are utilizing framework by which sea shore cleaner can do his work adroitly utilizing correspondence through application. Savvy Cleaning Framework proposed to defeat the constant issues. With the proceeded with extension of businesses, the issue of sewage water must be critically settled due to the expanding sewage issues from businesses of the general condition. The squanders created from the businesses are extremely destructive to people and to the condition. Second Important thing is squandering the board framework by which specialist can keep up the entirety of his wellbeing and work great through application keep up that announcing laborer don't have to pause and get in to waste.

One all the more extremely helpful and significant favorable position of our framework is that the specialist to supplant the manual work in sea shore cleaning by semi mechanical sea shore cleaner. Furthermore, can get to them effectively

II. CURRENT SCENARIO

India has a coastline of in excess of 7,000 kilometers, yet unfortunately, it's not every immaculate sea shores and staggering precipices. Truth be told, for Mumbai's residents, the shore is progressively similar to a landfill. The sea shores are secured with rubbish - beautiful plastic sacks, jugs and nourishment bundles are all over the place, regularly entrapped in old angling nets or decaying textures.

The vast majority are insulted by the circumstance, irate at the regional government for not tidying it up or at the individuals who toss their rubbish in the lanes or even straight onto the sea shore.

All around, 8,000,000 tons of plastic enter the sea every year, for the most part through bundling material, bottles, cigar butts. "The worldwide plastic creation has multiplied in the course of recent years, adding up to in excess of 300 million tons for each year, "A huge portion of this plastic isn't reused yet is dumped into nature."

An around one waste vehicle of plastic advances into the sea consistently.

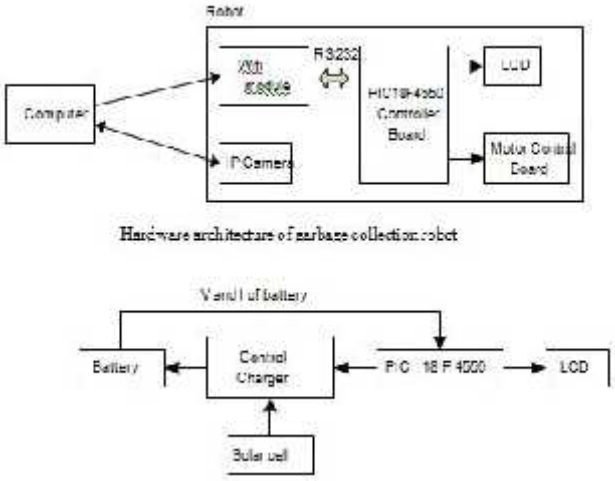
The issue with plastic is that it doesn't leave, and any creature, ashore, ocean or winged animal, will eat it on the off chance that they can fit it in their mouth, in the event that it has the smell of nourishment or green growth on it," "This doesn't mean they will all bite the dust, yet it

means that poisons can without much of a stretch advance into our evolved way of life, especially when the littlest creatures and channel feeders are likewise eating it."

Tidying up sea shores from plastic litter absolutely is initial an approach to make the sea shores increasingly alluring again for amusement, yet more significantly it produces attention to not dispose of plastics in the earth and to not litter. Squander made by people which is released in beach front or marine condition - Paper, materials, glass, elastic, wood, metal, earthenware production, plastics · 60-90% of marine litter is comprised of plastic polymers · Most normal plastic polymers plastic sacks, angling rigging, nourishment and drink compartments.

III. BLOCK DIAGRAM & DESIGN

The designing of the block diagram plays a very important role as it visually describes the system as a whole displaying the significant elements of the system. The diagram below is the block diagram of the project.



Hardware architecture of garbage collection robot

Fig.1 Block Diagram of Garbage Collection Robot

2. Microcontroller

A microcontroller (PIC18F4550) is used as the brain of the robot. It is a 40-pin dip, consumes low power and high speed FLASH/EEPROM technology. It consists of 256 bytes EEPROM memory, 35 Input/output, two external clock modes (up to 48MHz), 13 channels of 10-bit analog to digital converter, a capture/compare/PWM functions. The 16x2LCD is used for displaying the user output command and status of the charging battery on the robot.

3. Wireless communication module

Bluetooth device class-2 USB dongles with a range of 10m and maximum output power as 25mW/4dBm is used to communicate between microcontroller and computer. Bluestrick on the robot is a Bluetooth Serial Port Profile device for , sharp shells, glass, rock, and over the top kelp from the wireless serial data communications via the Bluetooth radio system. It is a low cost, compact and easy to use this module. It can connect to the microcontroller via RS232 serial port.

4. IP wireless camera

The FosCam WPA Wireless IP Dual Audio Camera (FI8908W) is used as an IP wireless camera at Wireless Standard IEEE 802.11b/g. This camera allows people to get into IP cameras without a huge investment. The dimension of this camera is 110x100x108millimeters and the net weight is 418gram. It can pan or tilt at the angle 300° horizontal & 120° Vertical. The IP camera is installed on the robot. It will send the image in front of the robot to the computer via Ad-hoc mode by Connectively program. The image is displayed on the computer by IP Camera Tool software.

IV. RESULTS

Sunlight based Powered Beach Cleaning Robot Vehicle is utilized to diminish water contamination in sea shores and waterways. The model is likewise material for open zones like shopping centers, sanctuaries, transport stops and railroad stations. Tidiness is imperative and instinctive with regards to open spots in light of the fact that gigantic number of individuals uses sea shores and stops for recreational reason each day.

This incorporates kids and senior residents as well, which further builds the danger of spreading of infections because of grimy condition and spoiled trash. Trash Cleaners can be a major help for this undertaking of cleaning trash from the spots like sea shore.

Likewise bringing down the harm to condition and keeping its excellence intact.

V. APPLICATION

Sea shore cleaners are machines that expel undesirable materials from sea shores and make them agreeable and outwardly satisfying for sea shore goers. Different sea shore cleaners can be utilized to successfully expel litter sea shores. Sea shore cleaners come in all shapes and sizes. The most mainstream sorts are tractor-towed and controlled by a tractor's water driven PTO shaft. Littler stroll behind models are additionally made for private sea shores and sandy areas. Beach cleaners can likewise be utilized in gardens, open spots and simple and easy to use to utilize and deal with. The plan of Garbage authority model was structured and the plan was dissected hypothetically and afterward created with standard materials. By presenting the sun-based force, the expense of the force creation has gotten zero, and since it is sunlight based, upkeep cost likewise decreased. It very well may be made further proficient by overhauling.

VI. CONCLUSION

This framework help to clean sea shores so it keep the sand clean what's more, spare the sea life from trash contamination This framework needn't bother with progressively human work for the waste water cleaning and this can diminish the immediate contact of the human work with the waste water so there is no risk for the human work. Likewise, this technique is programmed so the working time is less when contrasted with the regular

technique. In view of this task as there is no immediate contact of the specialist with trash so the soundness of laborer will be acceptable and he will have the option to work for a more extended span. This framework is created with accentuation on the utilization of neighborhood materials and nearby creation.

ACKNOWLEDGEMENT

This project cannot be entirely created by an individual. The timely completion of the project 'Development of Wi-Fi Based Beach Cleaning Vehicle using solar panel has been possible because of our teacher and project guide Dr. Sanjay Patil who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

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Online Customer Review Analytics Using Data Mining & Sentiment Analysis

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***Abstract*— Individuals request several items from amazon's, Flipkart and Ebay online web-based business sites. Wherever there are changed cases, the on-line product shown was genuine, however, if it was dressed to be fake. In the last few years this drawback has grown and we've drawn attention to it. Simultaneously, the innumerable online customer surveys submitted as complete and provide many illuminated, accessible overviews for an object cannot be dismantled by any proper system. This inconvenience, which customers had considered a long time ago, motivated America to take up this task. The aim of this project is to use the feeling of mining to see how a person who used this item communicates an object. Starting from there, examine the feelings derived from these assumptions with a so-called estimate study. This specifically distinguishes the platform surveys.**

Keywords—opinion, emotion, sentiment analysis, opinion mining, customer review, product, e-commerce, analytics, ratings, algorithm

I. INTRODUCTION

In nearly everyone's everyday life online life takes on important jobs. It gives people the opportunity to share what they accept and feel about the item on the website. This may be referred to as an evaluation or an investigation. He expects the temperament of the creator or the speaker's point of view to be positive or negative towards the product. The unit of the population conveyed these positive or negative feelings as an assumption. A closing examination abstracts the enthusiastic impression of customer surveys on general language and sub domain choices. By watching clients' frames of mind and sentiments, it uncovers torment purposes of item usage and features zones to help.

This sense the torture intentions of the use of objects and has zones to support by looking at customers ' frames and feelings. On web-based business websites it has been resolved that different customers compose mixed surveys of the item that they are commercial on-line, making it intensive for companies to deal with adding it. Finally, it is necessary and important for businesses to mine such data in order to understand that market information has been duplicated. Organizations try to open up the covered costs to help their customers understand their thoughts and wishes and to make more business choices that are extra-learned. Organizations relying verifiably on inspections, workshops and centre groups to recognize knowledge regarding their customers ' feelings and emotions, and we are still tendering to the territorial unit with the trend of innovation that is able to handle the capacities of IA and software engineering to distinguish between content and assessment and see them outside the generally controlled area.

This paper focuses on the Mining of Amazon Items following the free audit. The customer's survey will not be limited.

OPINION MINING & SENTIMENT ANALYSIS

The investigation of assessment, also known as opinion mining, is the investigation of concepts which decide on assessment of the assumptions, opinions, assessments and feelings of individuals, comparable to substances such as objects, administrations, associations, subjects and their various characteristics. Opinion cannot generally structure the problem, but can be subjective and should it be summarized from many people. The fundamental components of an opinion are:

Opinion holder: the person who gives a particular view about a particular object.

Object: is referred to as the object for which the consumer expresses an opinion.

Opinion: it is a view, sentiment, or assessment of an object done by user.

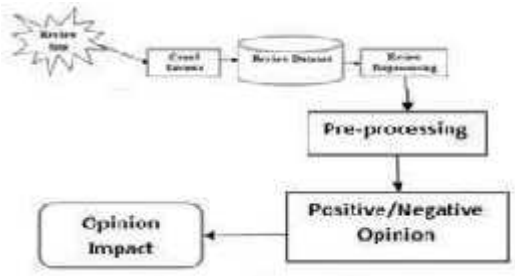


Fig.1. Opinion Mining Work Flow

Positive, negative and neutral connotations are also known as opinion mining analysis, which means identifying the sentiments of the user. Opinion mining can be divided into three levels: document level, sentence and sentence level.

II. RELATEDWORK

Opinion mining is also known as the analysis of the product review, a technique that enables users to detect their feelings about a product through reviews. The opinion mining task is broken down into three levels, namely the level of documents, the sentence and the sentence level as stated by bingLiu[1].

Additional information can be used in the viewed reviews to detect an feeling about a product. The review from flipkart.com is used by Venkata Rajeev P et al [2] to combine the four parameters: the review pole, product star ratings, age of review and the score of helpfulness to determine a product opinion.

The mining features are one of the main tasks and many methods are recommended for them. The analysis of the opinion is divided by Weishu Hu et al. [3] into three steps: the identification and polarity of opinion sentences, customers ' commentary and the removal of incorrect features.

Shoiaab Ahmed et al. [4] suggests that seven possible categories of words of opinion should be classified: positive, weak, neutral, weak, negative, strong negative.This score counts for the analysis of feelings.

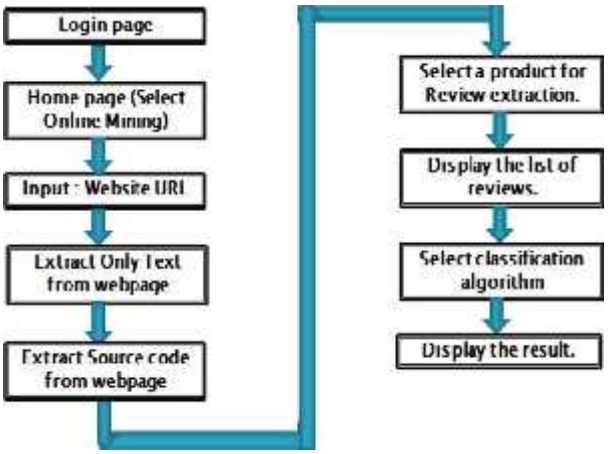
The primary goal of the customer review program is to locate and define the feeling behind the adjective word in a sentence. The final feeling score of the study, according to Yan Luo et al[5], is the average feeling score for all the adjectives in the review.

The supervised classification approach, known as the support vector machine, is used by Andrea Esuli, Fabrizio Sebastiani[8]. This paper claims that the classifier proposed is one of the best. It also describes various problems in the study of emotions such as sarcasm and conditional sentences. Classification of sentence levels is done on inputs which are further classified by subjectivity. SentiWordNet is used for additional feature extraction. It is established by feeding to SVM that the overall opinion.

Fig. 2 Data flow of the proposed system

III. FRAMEWORK

This paper focuses on mining reviews from websites like amazon.com, allowing the user to write the view freely. It extracts the opinions from the website automatically. The review is also classified as positive



and negative using algorithms such as the Classification of Naïve Bayes, Logistic Regression, and SentiWordNet algorithm. The data flow of the system is indicated in Fig.1. The system's different computing elements are as follows:

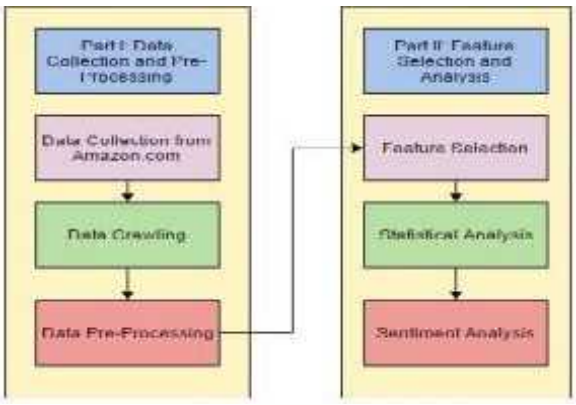


Fig.3. Methodologies Used

A. Text Extraction

This module takes the universal resource locator from amazon.com after the login credentials because it enters and removes the entire text from the website.

B. ASCII text file Extractor

This module extracts the HTML ASCII text file from the webpage.

C. List of Product

This module will display a list of products from which we must choose a product from our revision option.

D. Show Review List

The dynamic link generates and all the product reviews are displayed in this module.

E. Stop Word lexicon

This output includes the stop glossary that can be used in the reviews to delete stop terms.

F. Algorithmic rule choice

This module allows the user to evaluate every algorithm of Naïve Thomas Bayes, SentiWordNet and Regression.

G. Calculate Performance

The coaching information is then loaded once the algorithmic rule is chosen. In terms of recall, accuracy and F-measure the performance of the algorithmic rule is measured.

H. Show the Classification Result

This module contains 2 lists separately of positive and negative feedback.

I. Positive and Negative Opinion lexicon

This output includes the positive and negative glossary, and it can be used for symbolic interpretation in the 2 separate texts.

IV. THE OPINIONCLASSIFICATION METHODOLOGIES

A. .Naïve Bayes Text Classification

The Bayesian scheme is used similarly as a probabilistic method (Naive Classification of Mathematician Content)[7]. The centre of these should be recognized by the use of suitable samples which replicate good, terrible or impartial feelings. The fundamental feeling combines a classification with a high-performance model based on statistics. In addition, these credible classifiers of mathematicians use single terms in terms of illustration features. It assigns the entry below nice or awful. The categories+ 1,-1 are unbiased, which is quite a lot null separately. This numerical performance drives a fundamental space of the first order, the state of which is the mimic-like, emotional state of the experiment.

B. Logistic Regression

Logistic regression requires a position with an exponential or log-linear cluster of clusters[6]. It works like an innocent mathematician by removing some weighted pieces from the data, taking logs, and link them linearly (implying that each piece is enhanced by weight and included thereafter). Indeed, logistic regression is a classification that characterizes a perception in one category in all 2 and multinomial logistic regression is used once the transcription has been transcribed into two different categories.

While logistic regression varies in the way it calculates the odds, in being a linear classifier it is still the same as naive mathematicians. The logistic regression estimates P(y|x) by dividing certain components from the input, consolidating them linearly (by adding weight to each part) and then mixing the components.

C. SentiWordNet

For Word web SentiWordNet 3.0[9] the updated version for SentiWordNet 1.0 is also open for exploration freely and uninhibited with a Web interface. SentiWordNet can provide satisfactory progress on Word web. This improvement sets each cost in the range of zero and one for each arrangement. For each partner grade each set may cost non null on these lines, so that a number of synsets make a positive, negative or objective depending on how the aid is set. The web interface enables these shoppers to scan, regardless of which area WordNets should have for their connected SentiWordNet scores.

In addition to the customer, the representation of the individual is limited. Each grouping is interfaced with shading that may be red, blue, objective and green and positive.

V. FUTURE SCOPE & CONCLUSION

Fast changes to the unconnected market and "verbal" custom of informing customers about the toughness of web- based business development products produced online surveys and the source of trust-building networks. Through this undertaking, we intend to concentrate on understanding the link between different points of interest and carry out a sharp investigation into the information index for online business audits that is both valuable for customers and for the trendy. With objective study, it is generally concluded that Amazon, flipkart and myntra are the top three marks on the market at present. The Amazon brand has the best feedback. Therefore, thorough evaluations were not really analysed and more expensive items were not met with surveys. Nonetheless, the expensive items displaying significant levels of customer loyalty and favoured quality of items over low-valued items were a superior ranking. In addition, high positive assessments of euphoria, confidence, expectations, and shock were shown to combine the final direction of the three best brands, Amazon and flipkart and myntra. The information characterization is highly effective since the accuracy of SVM after cross-approval is 84.87%. It can be extended to the needs of my customer, in keeping with the interests of the planner. In this context, it can be agreed to provide audit support with the most valuable information to allow the architect to extemporize or roll another product on the market by meeting the most severe customer needs. This expansion of this enterprise will be of exceptional

benefit to the company and will make the assembly much less tedious, reducing the costs of use studies.

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Design of Vending Machine(Packed Food) with Online Payment System(Google Pay/Paytm)

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***Abstract*—This project is intended to construct an FSM (vending machine) that will vend packed food with a facility of online payment. This will save labor as well as time. This machine can be implemented easily and can be used in cafeterias and canteens. The idea is to build a machine that will overcome the problems of usage of artificial coins and replace it with online payment. Often, in our daily lives, we come across many small shops where there is massive crowd. The proprietors probably won't have the option to deal with such a group which prompts delay in their administrations. Along these lines, the presentation of vending machines will lessen their work and also, it will spare time. Generally, coins and notes are used as payment options in FSM where there are chances of receiving artificial coins and fake notes. If we could replace this online payment method then the transaction will be white and hassle-free.**

Keywords—vending machine, online payment, online transaction, FSM.

I. INTRODUCTION

A Vending Machine is an electronic machine used to administer an item to a purchaser after a specific measure of cash has been placed into the machine. Vending machines are ordinarily used to disperse drinks and snack items. Usually, in vending machine notes and coins are used for the exchange of desired products. But there are chances of usage of artificial coins and unavailability of exact change. In our project, we want to integrate an online payment system with the vending machines so as to make it more convenient, safe, secure and hazel free. The Project is centred on the notion that the experience of using the vending machine should be convenient and feasible for users.

This willingness to improve the ongoing technology that prevails at a particular time has always existed in the human race by bringing a more sophisticated and advanced product than is currently available today. This act leads to the introduction of new technologies, improvement in every aspect of life for a better livelihood. Because we know that creation is a continuous process and there is always scope for its changes until it reaches a state of absolute perfection, and our task is to support this idea.

With the tremendous growth in technology, India is advancing at a pace like never before. Everything has become cashless and digital. A major part of the population is using online wallet systems for their local transactions. Apps likePaytm, Google Pay have replaced traditional methods with their convenience and security. Still, if we observe, not many vending machines in India have an option of online payment. Issues like the use of fake coins, need for exact change, and robbery from machines could be resolved with an online payment system. This method of online transactions in a vending machine has already been implemented in foreign countries like China, USA etc. This motivated us to pick up the idea of integrating an online payment system in a vending machine. It will be convenient, secure and fast.

Given the diverse fields, which this project encompasses; there is a huge scope of innovation both in terms of improving the hardware and software aspects. Also, the software system which would be used can be made more intuitive by adding in options of online payment system.

II. CURRENT SCENARIO

The vending business in India has far to cover to enlist ideal benefits and income; it is assessed that solitary when the quantity of vending machines across India is duplicated exponentially year after year, will the distributing business give some consistency in development followed by further improvements later on. Towards this end, the Airports Authority of India has upheld the establishment of vending machines in India to offer accommodation to customers.

In addition, the Indian government has additionally helped by supporting the establishment and upkeep of candy machines in metropolitan urban areas, for example, including Delhi, Mumbai and Bangalore. The Indian nourishment and refreshment distributing market is still at an early stage. In any case, the development right now be driven by the development in sorted out retailing in shopping centers and multiplexes, BPOs, IT and ITES areas.

Nourishment candy machines accessible in India are cold refreshments candy machines, snacks candy machines, consolidated candy machines, and others Approximately 88% of the market is involved by the snack and beverage candy machines. The biggest portion of nourishment and beverage candy machines originates from the corporate division, while the human services segment is probably going to develop

quickly at a CAGR of 15% during the estimate time frame. Continuous investment in public infrastructure and growth in organized retail are likely to drive the demand of vending machines in the end-user segments

III. Block Diagram & Design

The designing of the block diagram plays a very important role as it visually describes the system as a whole by displaying the significant elements of the system. The diagram below is the block diagram of the project.

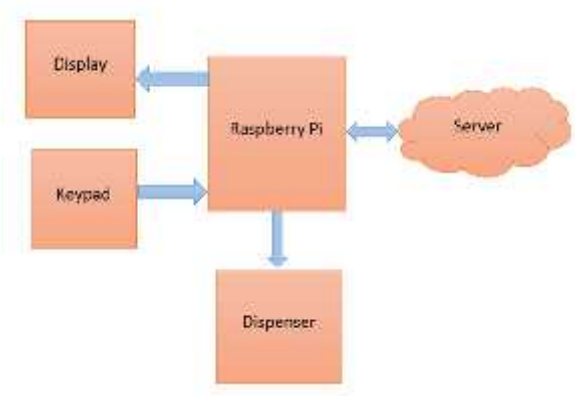

Fig. 1. Block Diagram of the System

IV. Results

The FSM system that will be built would be vending out the desired products with a facility of online payment system. The final product would be time-saving convenient and the transaction would be secure. The biggest advantage this system will offer is that the transaction will be hazel free and the problem of artificial coins can be removed..

A hall sensor will be used to count the RPM of the turbine in the generators whereas a fuel sensor module is used to measure the fuel consumed by the generator. A temperature sensor will continuously monitor the temperatures of the generator so that the water can be replaced as soon as the generator's temperature increases.

Beside these sensors a power measurement module will also be installed to know how much power is being generated and how much power is actually consumed. All the backend data will be handled using SQL and the users will be able to see their power consumption on the mobile application as well as on the website.

V. Application

Snack candy machines disperse candy bars, chips and other food items in break medication. They can be uniquely assembled and loaded to the earth whether it is washing items at a laundromat, MP3 players and earphones at a shopping center or pain relievers and indigestion prescription at a rest stop. They fill the need of 24-hour comfort at any area. rooms, emergency clinics and rest stops the world over. They can be in any area with an electric hookup. These machines can incorporate cold stockpiling machines that can convey refrigerated things.

Cutting edge candy machines that contain PC processors can administer frozen yogurt, milk shakes and even warmed nourishment food items upon demand Consumer merchandise candy machines apportion an assortment of merchandise including electronic products, family unit items.

Buyers can lease a motion picture by basically visiting a film rental candy machine. Independent candy machines in or outside markets, drug stores and corner stores hold several motion pictures. Also, buyers can save a motion picture online to guarantee the film will be accessible when they visit the machine

VI. Conclusion

While many industries have been digitalized there are some industries that still use coins and notes for using the vending machine. The vending machine with online payment system can be used to reduce the problem of having exact change for the product, it reduces the use of labor, it will encounter the problem of artificial coins and the transaction would be secure and hazel free.

Acknowledgement

This project cannot be entirely created by an individual. The timely completion of the project 'Design of Vending Machine (Packed Food) With Online Payment System (Google Pay/ Paytm)' has been possible because of our teacher and project guide Mrs. Roohi Mehta who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

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Structural Health Monitoring System Using Fiber Bragg Grating

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***Abstract*—Optical fibers are well known for their importance as transporter of information. However, much has been said and proved that optical fibers are essential and play their role as producers of information that is as sensors. Recent research has proved that fiber optic sensors can be integrated in structure such as multi-story buildings, dams and bridges with the capability to monitor their strength and integrity.The evaluation and use of fiber sensors in civil structures have increased in recent years. Fiber Bragg grating sensors have proved to be very well suited for applications such as structural health and performance monitoring. In this paper we are showing the relevance of Fiber Bragg Grating in Structural Health monitoring via simulation.**

I. INTRODUCTION

The evaluation of structural integrity is essential to public safety and to prolong the life of the building. There is no need for an Automatic Sophisticated Monitoring System (ASMS) when the systems are small enough for human inspection. However, manual inspection of structures is not always possible when structures are massive or inaccessible. Picture a natural gas pipeline running through rough terrain extending from one country to another. How quick is checking this pipeline manually for gas leakages or other faults? How about supervising a sky scraper's walls for cracks? What about testing a space-orbiting autonomous vehicle?

Fiber Bragg Gratings (FBG's) are well known for measuring pressure, temperature and a wide range of other parameters as critical sensing components. This is attributed in part to the fact that the sensing signals from such FBG are encoded in wavelength, making them well suited for multiplexing, allowing measurements at multiple sensor points across a single network, in addition to showing benefits over their counterparts due to the intensity-independence of the measuring signal. In addition, FBG showed immunity to electromagnetic interference (EMI), which was electrically passive, low, and lightweight. However, because of their cross-sensitivity to several parameters, particularly strain and temperature, FBG sensors can suffer significant limitations in real engineering applications. A new network of household to industry infrastructure is currently being developed by Structural Health Monitoring (SHM). While FBG is more expensive than strain gauges, the reliability of FBG results in a good sensor option technique to detect the wavelength shift which is an important task in our project, as the wavelength shift is proportional to the constant temperature deformation applied.

II. LITERATUREREVIEW

Historical photo sensitivity origins and FBG technology are recounted. This explains the basic techniques for the fabrication of fiber grating, their characteristics and the fundamental properties of fiber gratings. Tabulates many applications of fiber grating technology, and briefly explain some of the selected applications. [1]

The application of FBG sensors and the interrogation method to track the complex strain and temperature on the Tsing Ming Bridge landmark in Hong Kong was demonstrated in this paper. The FBG package technique has been proposed to apply for application for structural monitoring. The interrogation system's measurement result was in excellent agreement with that obtained by calculation of electrical strain gauge. The FBG 8 sensor system provides numerous benefits over the electrical strain gauge. These include remote sensing, ease of installation, low maintenance costs and non-corrosive. This shows that FBG sensor technology is a good alternative for the monitoring of civil and structural dynamic stresses.[2]

This paper proposes a new Autonomous Structural Supervision System (ASMS). The strain gauge sensor for the system is a modified version of a newly developed strain gauge sensor. A theoretical analysis was discussed for the sensor and the device. This device can be used for the identification and transmission of cracks in structures such as houses, bridges, pipes, ships... etc. The system can be used for various crack sizes, depending on the types of springs and the FBG frequency. They checked the device for cracks between 1 and 10 mm. The sensitivity of a

device can be tuned according to the specification you want. The system's major components, which are based on fiber optics, can be made in one piece. Components of the system are relatively cheap and therefore the system can be manufactured cheaply. The onlymechanical part of the system is the spring that could eventually lose its sensitivity. The device is not as temperature sensitive as is the conventional resistive stress gauge described in the introduction section.[3]

The experimental device incorporated an external-cavity tunable laser diode and an unbalanced Michelson interferometer to obtain the reflected spectrum of an FBG. The reflected wavelength values measured using this experimental method were approximately the same as those obtained with a commercial wavelength monitor. Different FBG reflection spectra of the same reflected wavelength can be determined by adjusting the difference in optical fiber lengths of an unequal optical path interferometer, opening up the prospect of different point measurement ofstrain.[4]

III. PROPOSED WORK

Problem definition:

Civil Engineering infrastructure is generally any country's most expensive national investment and asset. The industrial application of optical fibers is taking it to new level of experience. Considering disasters caused by the failure of infrastructure, monitoring of structures is important. Conventional strain gauges are cheap, available with easily used monitoring system but drastically attenuate the signal for long distance. FBGs provide reliability, low data loss, multiple sensors in a single fiber, resistant to EM interference Problem Solution: SHM only requires a fraction of the cost used to build the bridges. Given the availability of resources we are simulating the FBGs at wavelength of 1550 nm later on we will switch to wavelength of 850 nm. FEM Analysis have to do to obtain values for strain in Real Time. When simulation is completed, we will switch from Mach-Zhender interferometer and homodyne detection to hardware setup for wavelength detection. In this project, if stress is applied to Optical sensor, we detect changes in Bragg wavelength.

I. BLOCKDIAGRAM

Block diagram (Fig. 1) shows proposed method to detect Peak Reflectivity .

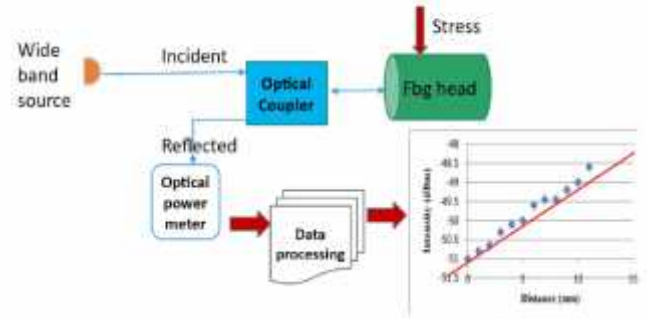

Figure 1: Block diagram of wavelength detection

From theoretical calculation we found that when the strain is increased, the Bragg wavelength shifts away from the designed Wavelength. Hence, power received by Optical power meter at designed Wavelength decreases. It gives rough idea about relationship between the Bragg Wavelength and the Strain.

As shown in Fig. 2 the we are implementing the project in four stages . Stage 1 contains study of Literature Survey. Stage 2 contains Simulation of FBG sensor and Finite Element Analysis.

Stage 3 Deals with study of losses and other important parameters in the fibre using Optical Time Domain Reflectometer (OTDR). Stage 4 is the Hardware

as the wavelength shift is proportional to the constant temperature deformation applied.

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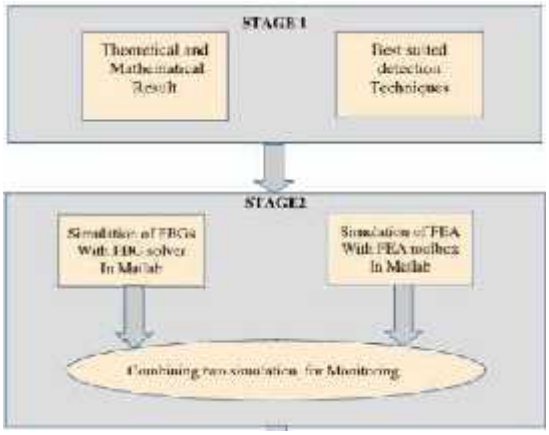
The experimental device incorporated an external-cavity tunable laser diode and an unbalanced Michelson interferometer to obtain the reflected spectrum of an FBG. The reflected wavelength values measured using this experimental method were approximately the same as those obtained with a commercial wavelength monitor. Different implementation of Block diagram to verify theoretical results.



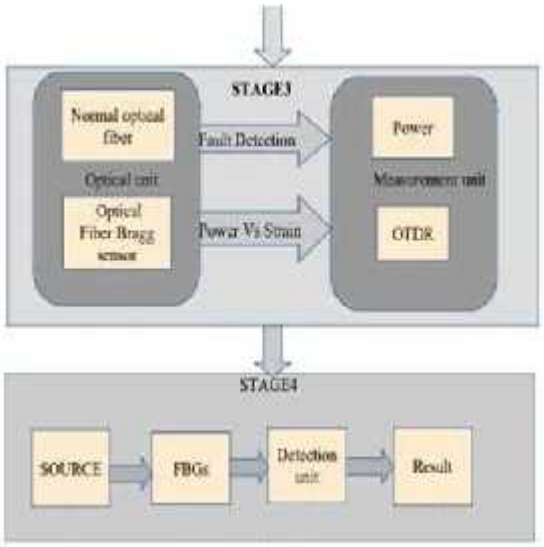


Figure 2: Data flow diagram

V. WORKING

Fiber Bragg Grating sensor (FBG's): It is a type of Bragg distributed reflector built in a short optical fiber segment that reflects a particular wavelength of light and transmits all others (Fig. 3). This is accomplished by producing a periodic change in the fiber core refractive index, thereby generating a wavelength-specific dielectric mirror A fiber Bragg grating can be used as an optical inline filter to block other wavelengths or as a wavelength-specific reflector. Because of the high sensitivity of FBGs tomultiple environmental parameters, including physical, chemical, biomedical and electrical parameters, they are used for structural health monitoring in civil infrastructure, aerospace, electricity and maritime areas, where the measurement-related information is typically encoded by the FBG's Bragg wavelengthchange

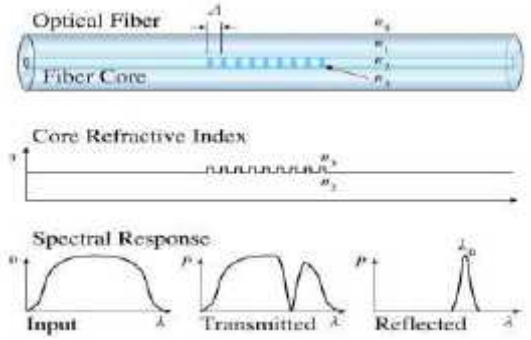


Figure 3: Optical fiber geometry and spectrum

Principle of Operation of FBG's

The fundamental principle behind an FBG's operation is Fresnel reflection, where light traveling between media of different refractive indices at the interface can both reflect and refract. Usually, the refractive index alternates over a given length. The

reflected wavelength, called the Bragg wavelength, is determined by the Equation (1)

λ=2neffΛ (1) λ=2neffΛ (1) where neffis the fiber's effective refractive index of the grating calculatedfromEquation(2).Λistheperiodofgratingor The wavelength spacing between the first minima .The effective refractive index quantifies the speed at which light propagates relative to its vacuum velocity.neffdoes not only on the wavelength but also on the mode in which the light propagates (for multimode waveguides).

$$n_{eff} = \frac{n^2 - n^2_{clad}}{n^2_{core} - n_{eff}} \left(\frac{n_{core} - n_{clad}}{n_{clad}}\right)$$

ncorerefractiveindexofcorencladrefractiveindexofcladding.UsingCoupledModeTheory(CMT)for uniformly perturbed ,step index ,single mode fibre. We obtained the Reflectivity(R) as inEquation(3). k2sinh2(γL)

R=|r|= (3)

δ2sinh 2(γ L)+γ2cosh2(γ L)

ris reflection coefficient , L length of Grating ,δ detuning parameter as shown in Equation (4) δ=2π n

$$\delta = 2\pi n_{eff}\left(\frac{}{\lambda} - \frac{}{\lambda_B}\right) \quad (4)$$

and $\gamma = \sqrt{\kappa^2 - \delta^2}$ (5)

κis coupling coefficient calculated as in Equation (6)

$$\kappa = \frac{2\pi}{\lambda} v \delta 1 n_{eff} \quad (6)$$

for $\delta > \kappa$,γbecomes imaginary , Now Let

How is FBGs related to stress: A general overview of the FBG strain sensors, interrogation techniques, performance, and their fields of application is presented in this paper. The inquiry begins with the measurand analysis (i.e., strain). Strain is a standardized measure of the deformation, which describes the movement between objects in the



Figure 4: OTDR Setup ,Benchmark setup

matter with respect to the reference length. The strain is related to the movements of a rigid body, such as transformations and rotations, and the variation of the shape / size of the matter. The usual component takes into account the stretch or strain along the elements or fibers of the material base, while the shear component has to do with the slipping of the layers that form the body over each other. If the length of the body increases, the usual strain is called the tensile strain, if it reduces, the strain is called the compressive strain.to the slipping ofthebodylayers. If thelengthofthe body increases,thenormal strainis called thetensilestrain,ifit decreases, the strain is called the compressive strain The engineering strain is defined as the ratio between the total deformation and the initial state.

$$\epsilon = \frac{l - L}{L} = \frac{\Delta L}{L}$$

The strain is tensile if the total deformation is positive, while it is given by ϵ - engineering normal strain , l- final length, L- initial length. Strain is the change of the angle between two material line elements which are perpendicular into the unperturbed state , while engineering shear strain in the tangent of that angle. For conventional single modefibre

$$\frac{\Delta\lambda}{\lambda} = 0.79\epsilon \quad (12)$$

Optical Time Domain Reflectometer (OTDR) :

The main function of an OTDR is to track, locate and measure all events (splices, connections, bending, etc.), an accurate measurement of the position of each event ranges from 4 cm to 40 meters. Using the tiny signals that pass

back to the fiber, it can even produce a nice report of what events are on a fiber connection by back scattering or comparing their power levels and arrival time with their sent signals. It sends pulses of light at one end into the fiber and measures the reflections at the same end back from the fiber. An OTDR's main advantage is , it tests the time taken to reflect back for

the dummy end . The OTDR can provide the details about various loss occurring in the fibre cable.
OTDR setup (Fig 5.1) shows the connection of various units of OTDR. It consist of 850nm ,1550nm laser source (FOTX- 650), pulse generator ,coupler module ,Avalanche Photodiode(APD) Module (FODM-200) for detection ,Power meter (FOPM-101),pools of fibre cable ,Digital Oscilloscope and Powersupply.

RESULT & DISCUSSION

OptsSimSimulations:

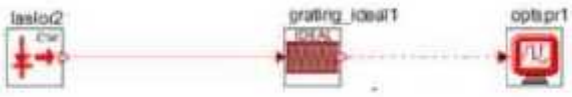


Figure 5: Block diagram in OptSim

For spectral response of a 1550nm FBG , we connected the CW laser,FBG sensor and Optical Spectrum Analyzer as shown in Fig. 5. Output of spectral response is given in Fig. 6 . Which clearly shows that the reflectivity is maximum at 1550nm wavelength or bragg wavelength.

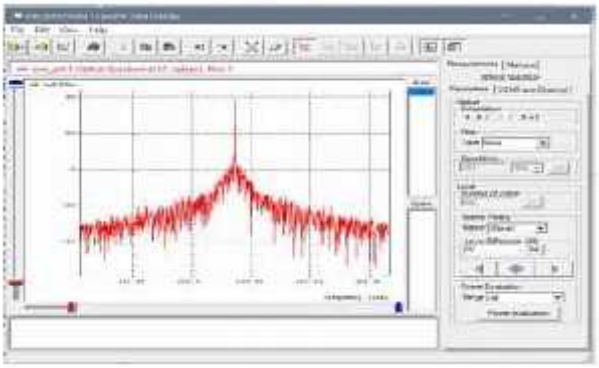


Figure 6: Output Spectral response in OptSim , 1550nm FBG sensor

OTDR output:

The Peaks in the top signal shown in Fig. 7 is input pulse train of 850nm . Below response is the Output of OTDR ,

which clearly shows that the first peak occurs after some time i.e. when the Optical signal reaches to dummy connector or strongly reflected. Measurement of time difference between input pulse and output can give where fault is located.

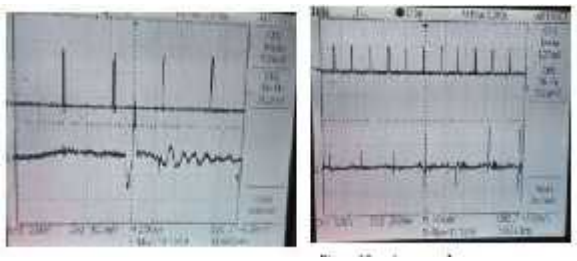


Figure 7: Digital Oscilloscope Output for OTDR

Matlab Simulation: As MATLAB simulation is the main part of our project. We assumed parameters as follows. neff =1.45,L=1mm,νδ1ne
=8×10-4 and λB=1559nm or 1550nm. Using Equation (1) to
(10) we plotted Wavelength vs Reflectivity as shown in Fig. 8 and 9

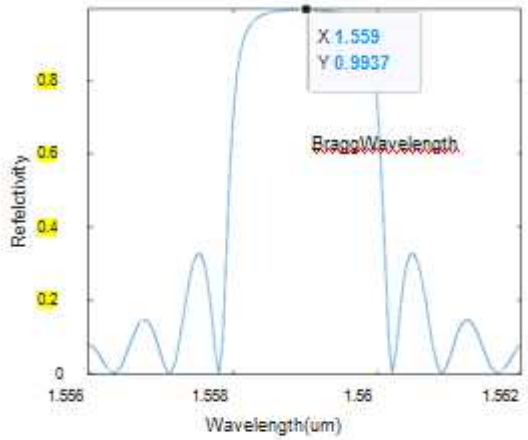


Figure 8: λ_B=1559nm, n_{eff}=1.45

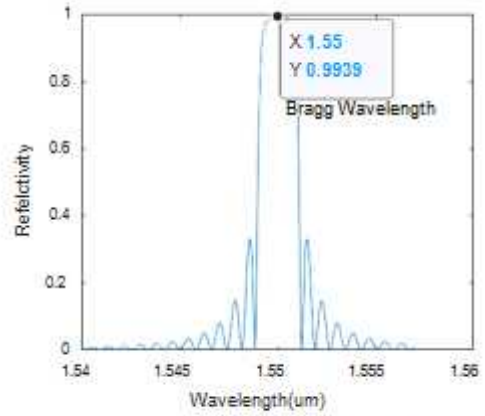


Figure 9: λ_B=1559nm, n_{eff}=1.45

We have performed the fault detection of Fiber cable using OTDR and digital oscilloscope output denotes that there is only one loss that occurred due to reflection at the end where dummy connector was

connected. Power or intensity is reduced when there is huge loss or bending in thefiber.

Simulation shows different responses for the Wavelength 1550nm and 1559 nm. FBGs has definite working range in which it gives response.Bandwidth of the FBG depends on length and coupling coefficients .Reflectivity is maximum at λB Bragg wavelength. When the stress is applied grating period changes, causing shift in λB. This shift in Wavelength is linear with the strain in the sensor or specimen to which sensor is attached to. This project can be extended to simulate SHM usingMatlab for various design parameters of FBG sensor.

VII. ACKNOWLEDGEMENT

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Implementation of Healthcare Model for Industrial Gearboxes

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***Abstract* - With the weather breaking its monotony, it has not only affected the ecological system but also the mechanical systems. Gearboxes are the rudimentary structure of any machine used in the industry. Thus, a direct relation is formed with the efficiency of this mechanical innovation and the revenue generated by a manufacturing company. Often these structures are heavily affected by multiple environmental as well as non-environmental factors. Temperature variation has been a major concern to the industry which has led to disparate inventions and ideas that promote the well-being of this machine. With the advent of IoT and advance processing computers, it is possible to detect temperature accurately and apply machine learning algorithms for characterizing behaviours as well as predict them. Here we introduce the ARIMA MODEL which is a popular statistical model and comes under Time Series Forecasting. These models are used abundantly in the stock market for analyzing and predicting future values. Based on the current and previous statistics, future temperature conditions are forecasted and the report is generated in the database.**

Keywords – ARIMA MODEL, IoT, Time series forecasting, AWS, Raspberry Pie, Dynamo DB, AWS IOT-Core,

I. INTRODUCTION

Conveyers are set to accelerate; heavier burdens are applied to the yields and crisis stops, as well as cool beginnings, can add stun burdens to the gearbox past their structure appraisals. When a basic point of confinement is come to, failure can happen rapidly. At the point when a gearbox begins to warmth up, it attracts more capacity to run, has an increase in noise and vibration levels and time for a rebuild becomes critical. It might take a very long time for the principal indications of harm or segment inability to show up, however, once that underlying harm happens, the movement of harm is quickened and will eventually prompt a catastrophic failure. The project monitors and predicts the temperature parameter of Industrial Gearbox to achieve maximum production for industries. Numerous organizations in the paper, sugar, concrete, chemical, and rubber ventures depend on the intensity of modern gearboxes to finish their procedures. Gearbox manufacturers have clear aims to limit vitality expenses and empower organizations to satisfy their procedures viably. Gearboxes are brilliant machines that can be utilized to improve an organization's operational yield but improper maintenance can lead to heavy losses. The entire production line is dependent on the gearbox since it's used to multiply torque, match inertia, and reduce speeds. Industrial Gearboxes are rigid and tough machines which can deal with extreme temperatures, pressures, etc. Gearboxes are often taken for granted because of their durability which can lead to catastrophic situations. Symptoms for identifying gearbox problems are odd noise, temperature problems or performance drop. Misalignment is a common issue encountered which is probably caused because of thermal expansions, installation issues, improper mountings, etc. Gearboxes depend on correct lubrication to perform efficiently. Lubrication and contamination problems point towards 80% gearbox failures. Thermal instability refers to a significant variation in temperature between the housing and the automotive gearbox shaft. High temperature is a red flag that something doesn't function as planned inside your system. This could mean the lubrication doesn't do its cooling job, or it could lead to the discovery of overstretched bearings. Temperature monitoring is recommended for pro-activation. Therefore, the project is bonded with Auto-Regressive Integrated Moving Average helps in predicting fluctuation. ARIMA MODEL depends on past data and is a subset of TIME SERIES FORECASTING. This will help the organizations to delay with catastrophic failures of gearboxes before time. A detailed analysis of past data and present data will be available with organizations database which will define the efficiency and life of the gearbox.

II. LITERATURE SURVEY

The literature survey has been done in such a way so that the 4 modules i.e. Sensors, Processor, Cloud & Database and Predictive Algorithm are covered. Many kinds of research have focused on how the exchange qualities of every sensor can be set up utilizing promptly accessible temperature measures. While some of them have proposed

that the working guideline depends on the variety of electrical or attractive properties with temperature. By a primer report, brought out through finite component demonstrating, various successful arrangements have been identified and a couple of them have then been chosen for testing in the lab. Some have focused on the importance of sensors' sizes which has made them an indispensable unit in the world of IoT.

The survey on processors highlighted the consistently changing universe of worldwide information correspondence, economical Internet association, and quick-paced programming improvement. Security has turned out to be increasingly more of an issue. Robotization is increasingly gaining more recognition because of its various points of interest. This can be accomplished by nearby systems administration or by remote control. The Raspberry Pi is an easy single-board PC that has as of late turned out to be well known. Raspberry Pi makes organize security financially savvy and simple to execute. One of the papers puts light on these adjectives by implementing a system for a home that can be checked and controlled remotely from any place on the planet employing the Internet. An "associated" home like this can make life progressively advantageous and more secure.

Research papers on cloud and database shed light on the ongoing patterns in the database management system and the conceivable outcomes of making it as one of the administrations offered in the cloud. The research papers discuss DynamoDB as an adaptable, versatile, auto sharding and replicative database and how it is utilized in big data and real-time web applications since it is a leading database innovation. Due to tremendous information stockpiling and scaling requests, a developing number of designers and clients have started going to NoSQL databases. Some papers depict information about demonstrating and inquiry execution in the DynamoDB Document database.

Multiple papers claim that Prediction will continue to be an interesting area of research making researchers in the domain field always desiring to improve existing predictive models. Researchers speak about Autoregressive integrated moving average (ARIMA) as one of the most popular linear models in time series forecasting. But due to its linear nature, many researchers have got mixed conclusions in terms of superiority of forecasting when compared with ANNs. Some Literature studies have shown that machine learning techniques achieved better performance than traditional statistical methods. Since the project only focuses on linear data, ARIMA becomes a superior predictive model as compared to others.

III. METHODOLOGY

This system has been divided into 4 modules to simplify the task of implementation as well as planning. The first module comprises sensors which act as the sensory organ for the system. C015 sensors are considered for this system mainly due to two reason: It's ability to sustain harsh temperatures range of 250 or 500 and secondly, due sensor is a non-contact type thermocouple for surface temperature measurement and has a built-in automatic compensation circuit for difference of close air temperature and true temperature makes it ideal to be placed between the parts of gearbox. The data acquired is received by the second module.

The second module comprises of a Raspberry Pi Model 3B+ due to it's processing speed and simplified configuration with the cloud and the sensory unit as well. There are many alternatives to this Model 3B+ amongst Raspberry Pi itself but newer models are loaded with bugs and the older models do not provide you with enough data storage as well as processing speed as mentioned before.

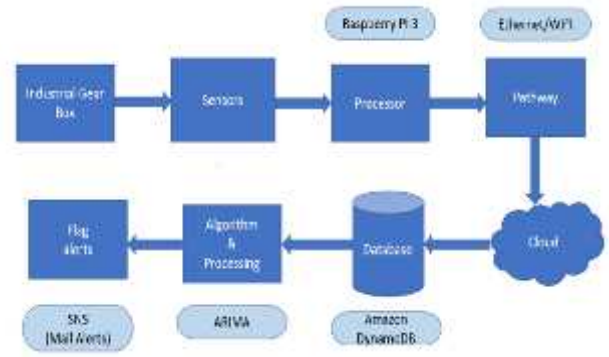

Fig. (a) Block Diagram.

The module consists of the cloud storage and database management which come under the 3rd module of the system. There are multiple accumulation devices or servers' cloud is one of the best options when it comes to accessing data from any location and keeping cost in mind as a factor. Since renting storage on the Amazon Web Services (AWS) cloud has been simplified in the past decade where the policy of "Pay as much you use" is used, it has become one of the booming companies on which multiple corporations rely on for cheap database storage. The database needs to be managed in which Data Cleaning and Redundancy needs to be done so that missing values or any discrepancies can be given attention. There are multiple databases used but in recent trends, DynamoDB has picked up pace due to its flexibility and scalability advantages over the monotonous databases.

The 4th module comprises one of the unique features of this system i.e. the predictive model. There are multiple predictive models used by statisticians and data scientist but we particularly focusing on ARIMA (Auto-Regressive Integrated Moving Average) Model. This model has been extensively used in predicting stock markets but here we are going to predict the temperature fluctuations. ARIMA has a variety of extensions that makes it one of the most flexible statistics models. Here we are going to focus on Seasonal ARIMA (SARIMA) and a fusion of ARIMA and ANN keeping in mind linearity and non-linearity of data which makes it suitable models for predicting temperature.

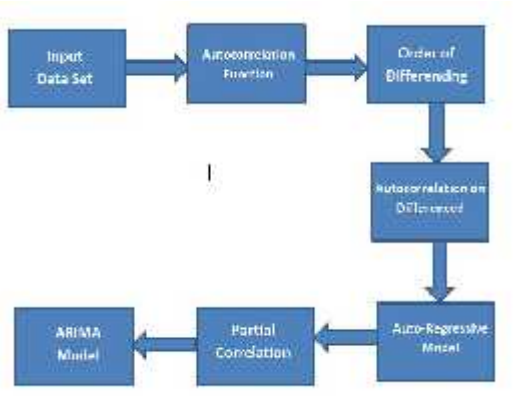

Fig. (b) Flow chart for ARIMA.

IV. COMPONENTS REQUIRED

The Healthcare Model utilizes Hardware components and software applications to display data:

A. Hardware components:

Raspberry Pi: A Raspberry Pi is a Mastercard measured PC, at first planned for preparing, propelled by the 1981 BBC Micro. Maker Eben Upton's goal was to put forth an insignificant attempt contraption that would improve programming capacities and hardware understanding at the pre-school level. In any case, because of its little size and open value, it was quickly grasped by tinkerers, makers, and hardware lovers for adventures that require more than a key microcontroller.

B. Software and Tools

1. Raspbian OS: Raspbian is a free working system improved for the Raspberry Pi hardware. Raspbian goes with more than 35,000 packs, pre-described limits which helps in a straightforward foundation on a Raspberry Pi Computer.

2. Python: Python is easy to adjust, incredible programming language. It has profitable raised level data structures and an essential anyway reasonable approach to managing object-arranged programming. Python's flawless etymological structure makes it an ideal language for scripting and fast application improvement in various zones on most stages.

3. DynamoDB: Amazon DynamoDB is a completely overseen exclusive NoSQL database administration that supports key-worth and report information structures and is offered by Amazon.com as a feature of the Amazon Web Services portfolio. DynamoDB uncovered a comparable information model to and gets its name from Dynamo, yet has an alternate hidden usage. Dynamo had a multi-ace plan requiring the customer to determine variant clashes and DynamoDB utilizes synchronous replication over numerous server farms for high strength and availability.DynamoDB contrasts from other Amazon benefits by permitting designers to buy help dependent on throughput, instead of capacity. If Auto Scaling is empowered, at that point, the database will scale naturally. Also, chairmen can demand throughput changes and DynamoDB will spread the information and traffic over various servers utilizing strong state drives, permitting unsurprising execution.

4. AWS IOT-Core: AWS IoT gives secure, bi-directional correspondence between Internet-associated gadgets, for example, sensors, actuators, inserted smaller scale controllers, or brilliant apparatuses and the AWS Cloud. This empowers you to gather telemetry information from different gadgets, and store and examine the information. You can likewise make applications that empower your clients to control these gadgets from their telephones or tablets.
Message broker Gives a safe system to gadgets and AWS IoT applications to distribute and get messages from one another. You can utilize either the MQTT convention straightforwardly or MQTT over WebSocket to distribute and buy-in. You can utilize the HTTP REST interface to distribute. For more data, see Message Broker for AWS IoT.
Registry Sorts out the assets related to every gadget in the AWS Cloud. You register your gadgets and partner up to three custom characteristics with everyone. You can likewise relate testaments and MQTT customer IDs with every gadget to improve your capacity to oversee and investigate them. For more data, see Managing Devices with AWS IoT.
Security and Identity service Gives a shared obligation to security in the AWS Cloud. Your gadgets must protect their certifications to safely send information to the message specialist. The messaging agent and rules motor use AWS security highlights to send information safely to gadgets or different AWS administrations. For more data, see Authentication.

5. Time Series: A period arrangement is a movement of data focuses documented (or recorded) in time request. By and large, a period arrangement is a mix taken at

dynamic, comparatively isolated focuses in time. In like manner, it is a blend of discrete-time data. Time arrangement is repetitively plotted through line outlines. Time arrangement is used in measurements, signal handling, design acknowledgement, econometrics, atmosphere envisioning, tremor desire, electroencephalography, control building, cosmology, correspondences building, and, as it were, in any territory of applied sciences and structuring which incorporates transient estimations. Time arrangement assessment includes techniques for analyzing time-arrangement data to isolate noteworthy estimations and various characteristics of the data. Time arrangement estimating is the use of a model to envision future characteristics subject to late experiential characteristics. While relapse investigation is often used to test speculations that the present estimations of in any event one self-governing time arrangement impact the present estimation of later arrangement, this sort of assessment of time arrangement isn't assigned "time arrangement examination", which revolves around differentiating estimations of alone time arrangement or different dependent time arrangement at different focuses in time. Models for time arrangement can have various structures and connote different stochastic systems. While exhibiting assortments in the level of a method, three wide classes criticalness are the Autoregressive (AR) models, the Integrated (I) shows, and the Moving Average (MA) models. These three classes depend straightforwardly upon past data focuses. The blend of these models created Autoregressive Moving Average (ARMA) And Autoregressive Integrated Moving Average (ARIMA) Models.

6. ARIMA: In estimations and econometrics, and explicitly in time arrangement assessment, an autoregressive coordinated moving normal (ARIMA) model is a wide perspective on an autoregressive Moving Average (ARMA) model. Both of these models are fitted to time arrangement data either to all the more promptly fathom the data or to envision future focuses in the arrangement. ARIMA models are applied now and then where data show evidence of non-stationarity, where a hidden differencing step can be applied at any rate single or on different occasions to abstain from the non-stationarity. The AR part of ARIMA exhibits that the creating variable of interest is relapsed without the loosened (i.e., prior) values. The MA part shows that the relapse mistake is a straight blend of blunder terms whose characteristics happened contemporaneously and on various events already. The I (for "coordinated") shows that the data has been superseded with the complexity between their characteristics and the past characteristics (and this differencing technique may have been performed more than once). The explanation behind all of these features is to make the model fit the data similarly as possible. An ARIMA model is portrayed by 3 terms: p, d, q where,

p is the request for the AR expression

q is the request for the MA expression

d is the number of contrasts required to make the time arrangement stationary

7. Stationarity and Differencing: Auto-Regressive' in ARIMA infers it is a straight relapse model that utilizes its pants as a forecaster. Direct relapse models, as you likely know, work best when the markers are not related and are self-sufficient of each other. A stationary time arrangement is one whose properties don't depend upon the time at which the arrangement is watched. In this way, time arrangement with designs, or with normality, are not stationary the example and consistency will impact the estimation of the time arrangement on different events. Of course, background noise stationary — it doesn't have any kind of effect when you watch it, it ought to have all the earmarks of being indistinguishable whenever. Changes, for instance, logarithms can help with settling the variance of a period arrangement. Differencing can assist offset with excursion the mean of a period arrangement by ousting changes in the level of a period arrangement, and thusly destroying (or decreasing) example and consistency. The differenced arrangement is the change between successive recognitions in the main arrangement, and can be formed as,

$$y_t^{'} = y_t - y_{t-1}$$

Occasionally the differenced data will not appear to be stationary and it may be necessary to difference the data a second time to obtain a stationary series:

$$y_t^{''} = y_t^{'} - y_{t-1}^{'} = (y_t - y_{t-1}) - (y_{t-1} - y_{t-2}) \\ = y_t - 2y_{t-1} + y_{t-2}$$

8. Autocorrelation: Autocorrelation, in any case, called consecutive relationship, is the association of a sign with a deferred copy of itself as a component of postponement. Coolly, it is the consistency between recognitions as a component of the time slack between them. The assessment of autocorrelation is a numerical gadget for finding rehashing structures, for instance, the proximity of an irregular sign obfuscated by clamour, or recognizing the missing focal repeat in a sign proposed by its symphonious frequencies. Different fields of concentrate out of the blue describe autocorrelation, and every one of these definitions is unique. In specific fields, the term is used on the other hand with autocovariance. Unit root forms, design stationary procedures, autoregressive procedures, and moving

normal procedures are express sorts of procedures with autocorrelation.

9. Halfway Correlation: In time arrangement examination, the incomplete autocorrelation work (PACF) gives the fractional relationship of a stationary time arrangement with its own loosened qualities, relapsed the estimations of the time arrangement at all shorter pants. It shows up diversely concerning autocorrelation work, which doesn't control for various pants. This capacity pieces a critical activity in data assessment made arrangements for perceiving the level of the leeway in an autoregressive model. The use of this limit was introduced as a segment of the Box–Jenkins approach to managing time arrangement displaying, whereby plotting the fractional autocorrelative capacity one could choose the appropriate pants p in an AR (p) model or a comprehensive ARIMA (p, d, q) model.

10. AR Model: In an alternate relapse model, we gauge the variable of enthusiasm by using a direct blend of pointers. In an autoregression model, we measure the variable of enthusiasm by using a direct blend of past estimations of the variable. The term autoregression exhibits that it is a relapse of the variable against itself. Thusly, an autoregressive model of solicitation p can be formed as

$$y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + \varepsilon_t$$

where ε_t is white noise

This resembles a different regression however with slacked estimations of yt as indicators. We denote this as an AR(p) model, an autoregressive model of order p.

9. Moving Average Model: Instead of utilizing past estimations of the forecast variable in a regression, a moving average model uses past conjecture errors in a regression-like model.

$$y_t = c + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_2 \varepsilon_{t-2} + \cdots + \theta_q \varepsilon_{t-q}$$

where ε_t is white noise

We denote this as an MA(q) model, a moving average model of order q. We don't watch the estimations of εt, so it isn't generally a regression in the typical sense.

11. Estimation And Order Criteria: Akaike's Information Criterion (AIC), which helped choose indicators for regression, is additionally valuable for deciding the order for an ARIMA model. It can be very well composed as

$$A = -2 l(L) + 2(p + q + k + 1)$$

where L is the probability of the information,

k=1 if c≠0

For ARIMA models, the amended AIC can be composed as

$$AIC_C = AIC + \frac{2(p + q + k + 1)(p + q + 2)}{T - p - q - k - 2}$$

also, the Bayesian Information Criterion can be composed as

$$BIC = AIC + [\ln(T) - 2](p + q + k + 1)$$

We are inclined to utilize the AICc.

V. RESULT

ARIMA represents Autoregressive Integrated Moving Average and it relies upon three key factors p, d, q to be effective. Those are quick as follows:

p = number of lags/orders of AR terms

d = order of differencing

q = number of lagged forecast errors/order of MA terms

Our target here is to reveal how to get ARIMA quickly completely operational in Python. It was seen that the p-regard is more unmistakable than the ideal level 0.05 so it isn't stationary and differencing is in like manner required, for example, d > 0.

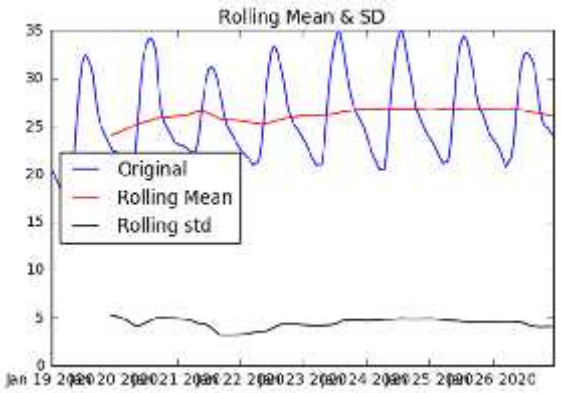

Fig. (c) Rolling Mean and Standard Deviation of initial dataset.

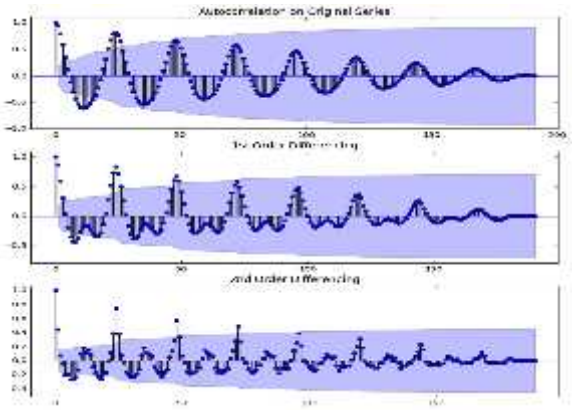

Fig. (d) Autocorrelation on a non-differenced and differenced dataset

We start by discovering the request for differencing, d, utilizing autocorrelation. The time-arrangement is stationary at d = 1 where just the principal slack is over the importance level. If your arrangement is marginally under differenced, have a go at including an extra AR term and if it is somewhat over-differenced, possibly include an extra MA term. Realizing we should distinction once, we proceed to discover the request for AR, p. We get it by checking the number of slacks over the degree of noteworthiness in fractional autocorrelation:

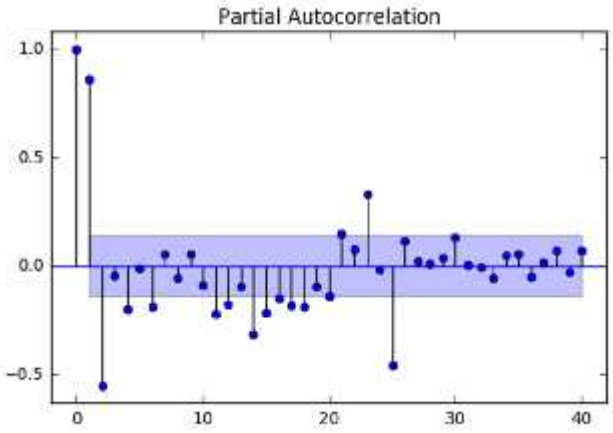

Fig. (e) Partial Correlation of Differenced dataset.

After differencing and logging the dataset, rolling mean and rolling standard deviation was calculated again. It was observed that the rolling standard deviation changed and showed signs of stationarity.

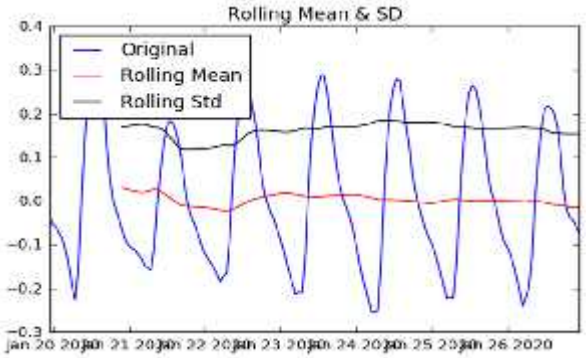

Fig. (f) Rolling Mean and Standard Deviation after differencing.

ARIMA model was implemented using the stationary dataset. The 95 per cent confidence interval shows the range of values in which the temperature will vary and the forecast shows the trend of future data.

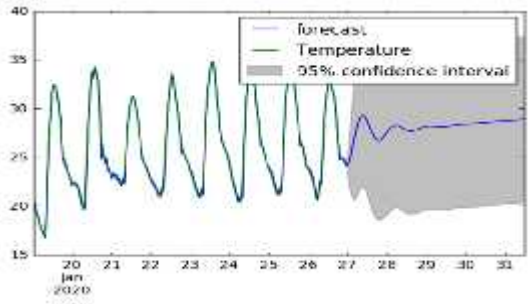

Fig. (g) ARIMA trend.

VI. CONCLUSION

A fundamental ARIMA Model was actualized utilizing the hourly temperature of Mumbai city. ARIMA is as often as possible utilized in anticipating the patterns in Stock Market. The comparability between the plots of stock varieties and temperature vacillations caused us to think about this model. The gauge interim for ARIMA model relies upon presumptions that the residuals are uncorrelated and normally circled. In the event that both of these theories don't hold, by then the figure intervals may be wrong. At the point when everything is stated, desire interims from ARIMA models increase as the guess horizon increases. In like manner, with most figure interims estimations, ARIMA-based interims will, by and large, be exorbitantly tight. This happens on the grounds that solitary the assortment in the botches has been spoken to. There is in like manner assortment in the parameter checks, and in the model solicitation, that has not been associated with the calculation.

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MEDICAL EMERGENCY ALERT SYSTEM FOR PATIENT

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Abstract **-This paper illustrates and defines the use, applications and the need of medical emergency alert system. This system is not specifically for people of any age group but it includes everyone who is suffering with health related problem and shall need medical assistance at any instance. Here with the use of simple components along with a simple application we can engineer this system. The components include Fingerprint Sensor, Raspberry Pi and USB Converter. The basic working methodology is to interface the Fingerprint sensor along with the Raspberry Pi and send an alert message to the nearby hospital. Alert message would be in the form of a short message. Along with the message the live location of the patient would also be shared with the hospital. The location is shared using the google location which will be interfaced with the system. This is simply a wide awake system running 24x7 for sending an alert message.**

Keywords –Medical assistance, live location, alert message

I. INTRODUCTION

The project primarily focuses on the user and patient side. The raspberry pi board will be interfaced with the fingerprint sensor module. The software support for the processing board will be Raspbian OS and database will be created to store the history of the patient using their unique identity (fingerprint). XAMPP platform is used for local web server for testing and deployment purposes. It has an inbuilt MySQL, PHP and Apache. Database of a patient will be created using MySQL which will be stored in the server/application itself. Interfacing XAMPP server/ application with Raspberry Pi using the command line. Interfacing GSM module to the Raspbian OS using Python programming with PyCharm editor. Interfacing the google location with Raspbian OS using python programming.

II. PROPOSED METHODOLOGY

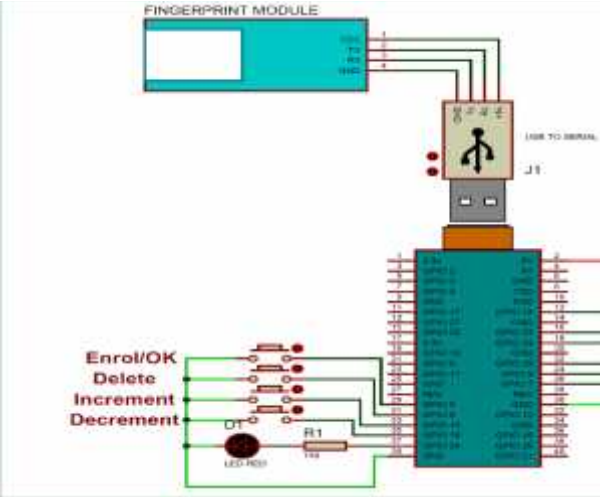


Fig. 2 Raspberry Pi interfaced with finger print module.

In Raspberry Pi interfacing with fingerprint sensor there are 4 push buttons which are connected to GPIO pins which are used to enroll, delete, increment or decrement the finger. These GPIO pins can be used as input/output pins. Interfacing of Raspberry Pi with fingerprint sensor is done with the help of USB to serial Converter.

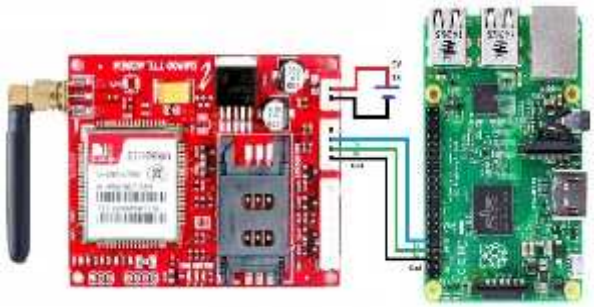


Fig. 3 Raspberry pi interfaced with GSM Module.

By using a 5V USB port we can supply power to the Raspberry Pi. Now just mount the antenna and add a

lock free SIM card, insert the module on the GPIO header and plug a USB cable from a 5V/2A supply. When the power switch is pressed for a while, the systemstarts and connects automatically to your GSM net.

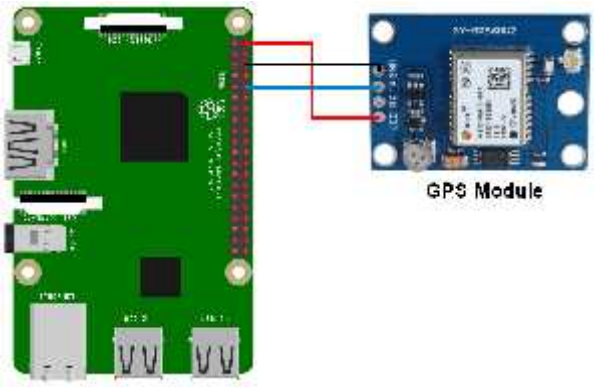


Fig. 4 Raspberry Pi interfaced with GPS module

Global Positioning System, used to detect the Latitude and Longitude of any location on the Earth, with exact UTC time (Universal Time Coordinated). GPS module is the main component in our vehicle tracking system project. This device receives the coordinates from the satellite for each and every second, with time and date.

GPS module sends the data related to tracking position in real time, and it sends so many data in NMEA format (see the screenshot below). NMEA format consist several sentences, in which we only need one sentence. This sentence starts from $GPGGA and contains the coordinates, time and other useful information. This GPGGA is referred to Global Positioning System Fix Data.

The Medical Emergency Alert system make use of hardware components and software applications to display information: Hardware Components.

1. Raspberry Pi: A Raspberry Pi is a credit card-sized computer originally designed for education, inspired by the 1981 BBC Micro. Creator Eben Upton's goal was to create a low-cost device that would improve programming skills and hardware understanding at the pre-university level. But thanks to its small size and accessible price, it was quickly adopted by tinkerers, makers, and electronics enthusiasts for projects that require more than a basic microcontroller.



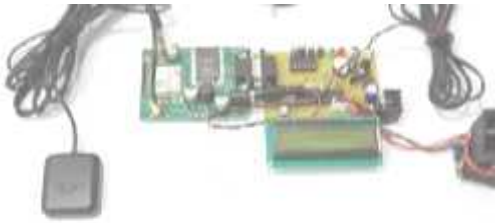
Fig. 5 Raspberry pi

2. Fingerprint Sensor: (R307optical sensor)-This is the R307 Optical Fingerprint Reader Sensor Module. R307 fingerprint module is a fingerprint sensor with a TTL UART interface for direct connections to processing board through MAX232 / USB-Serial adapter. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person.

Software and Tools-

1. Raspbian OS- Raspbian is a free operating system optimized for the Raspberry Pi hardware. Raspbian comes with over 35,000 packages, pre-defined functions which help in easy installation on a Raspberry Pi computer.

2. Python- Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax makes it an ideal language for scripting and rapid application development in many areas on most platforms.



III. RESULT

Fig. 4 Raspberry Pi interfaced with GPS module

This project focuses on the patient facing any health problems and is used to send an alert message to the hospital for emergency.

IV. CONCLUSION

This project primarily focuses on patients who are suffering from any health issues. The patient can send an alert message through the fingerprint sensor via GSM module or Internet connectivity. With the help of GPS module the live location of the patient can also be shared. Hence with the use of circuits like GSM module, GPS Module and Fingerprint Sensor interfaced with Raspberry Pi using the Python language we can send an alert message to the hospital.

ACKNOWLEDGEMENT

This project cannot be entirely created by an individual. The timely completion of the project 'Implementation of Medical Emergency Alert System for Patient' has been possible because of our teacher and project guide Mrs. Poorva Waingankar who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

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Implementation of RFID based system for banking sector

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***Abstract*— Banking sector is the one of the most important sector for any country as it effects are directly proportional to economy of the country. Most of banks are getting closed or getting merge nowadays due to lack of man power, their services and facilities. As our country has large number of Their services and facilities. As our country has large number of working population, so there are more number of people who are earning. Besides this industries and corporate companies also have bank accounts. To handle such a large number of clients and provide each client with same standardized information is a hectic task which could lead to human error or miscommunication might be involved in this process. Also people are too busy nowadays so they don't have time to visit banks for same work again and again. Nowadays there is voice assistance in ATM machines, passbook printing machines and in many other applications, but there is no such module yet developed to provide assistance for various queries of clients. This can be achieved by Implementation of RFID based system for banking sector. This would be helpful for clients and banks both.**

I. INTRODUCTION

Banking sector is growing very rapidly nowadays. So it's important to upgrade traditional methods with modern technologies to justify the needs. The people are too busy and need to do time management for personal tasks. Besides our daily day to day chores there is a lot of time consumed in solving same queries of different individuals. Also client have to wait in long queues for a simple task which hardly needs few seconds of attention. Handling large number of crowd at a time can be difficult for employees too. The goal of this system is to provide correct and easy information to the clients and reduce the work load on the employees working in corresponding banks. The RFID (Radio Frequency Identification Device) technology is very lucid yet useful in various fields.

As the technology is getting advanced and we are marching towards a digital era the banking sector nowadays is upgraded from traditional services and facilities to modern services and facilities which includes app and web pages that provides e-passbook, DD, money transfer. ATMs for

24x7 money withdrawal, digital passbook printing machines etc.

So a machine can be designed by using Implementation of

RFID technology which can provide information to clients for various queries like how to open joint account, how to apply for debit and credit card, how to change branch, how to block lost debit or credit card, how to close account etc.

[1] A Proposal for Enhancing Museum Visiting Experience Implementing Active RFID Technology. Author, Souvik Sen & Subhashis Roy

Research work:-

1-Visitor must select the language where it stores the choice of language in variable and interrupt tags.

2-The tags sends packets to the reader. The reader receives this packet which contains TAG ID and selected language and signal strength.

3- The second packet is generated at reader which contains signal strength and reader ID which sends to the tag at handheld devices.

4- The reader ID is compared with database and corresponding matched audio file is played.

Gap Identification

Tag collision: When 2 or more tags need to communicate with same reader simultaneously.

Active tags automatically broadcast their data at a fixed interval of time it is possible that if tags are not located in a reading range than it may interfere with each other.

[2] An RFID Based Navigation and Object Recognition

Assistant for Visually Impaired People. Author,

Mohsin Murad & Abdullah Rehman, Arif Ali Shah.

Research work:-

1- It consists of low power hand mounted RFID reader for fetching tag information.

2- To zigbee transreceiver are interfaced with reader circuit and PC for data transmission.

3- At data base site the received TAG ID is searched in database and the audio file against that particular tag is retrieved and played.

Gap Identification

When the audio file is send using GPRS network there is a voice delay and system becomes complex. [3] Simulation of Attendance Application on Campus based on RFID.Author,Dania Eridani & Eko Didik WidiantoResearch work:-

1- The proposed system consist of 3 main parts a)RFID

system as attendance device

b) attendance database c) attendance information system. RFID system is connected to computer interface to display result of attendance process.

Attendance database is the collection of information of various tags id and studentsname.

Gap Identification

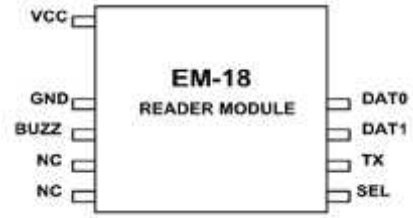
The tags are only useful for short range of distances.

II. TECHNICAL WORK

RFID technology automates data collection and vastly reduces human effort and error. RFID supports tag reading with no line-of-sight or item-by-item scans required. RFID readers can read multiple RFID tags simultaneously, offering increases in efficiency. All RFID tags within range can be detected instantly and matched with information in your database [1] [2]. Assets can be cross-referenced against assigned locations and recorded as present, missing, or relocated. RFID can be integrated with active scanning and fixed readers for a totally automated tracking solution. Assets and employees can be tracked and located automatically for everything from supply chain and asset management to facility security and emergency planning. Available scanners support both RFID and barcoding so you can upgrade at your own pace

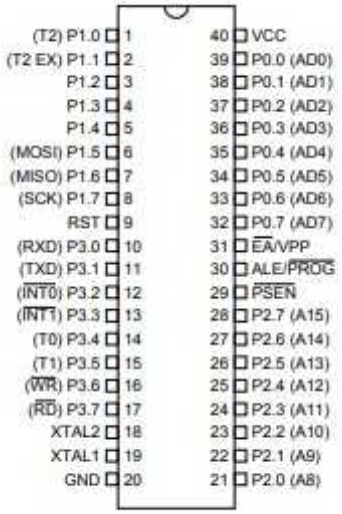
FID reader EM 18:

The EM-18 RFID Reader module operating at 125 kHz is an inexpensive solution for your RFID based application. The Reader module comes with an on-chip antenna and can be powered up with a 5V power supply. Power-up the module and connect the transmit pin of the module to receive pin of your microcontroller. Show your card within the reading distance and the card number is thrown at the output.



Microcontroller AT89S52:

The AT89S52 is a low-power, high-performance CMOS 8- bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.



KEIL uV3 Compiler - microcontroller programming software :-

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The industry-standard Keil C Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all 8051 derivatives and help you get your projects completed on schedule.

EAGLE – PCB designing software:-

EAGLE, an acronym for Easily Applicable Graphical Layout Editor, is a design software by Cadsoft Computers. It is widely used by educationalists,

students, hobbyists and professionals because of its rich yet simple interface with large component library cross-platform support on Windows, Mac and Linux tool

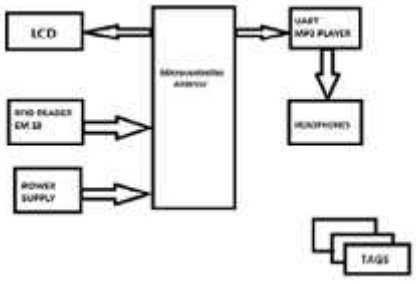
III. TECHNICAL WORK

Description of the overall block diagram:-

This technology consisting of following key elements:

- RFID Tags
- RFID Reader
- Microcontroller AT89S52
- UART based Mp3 player.

The figure shows the system architecture of Implementation of RFID based system for banking sector. Microcontroller acts as a main control block for the proposed system. Microcontroller AT89S52 is use as it can be serially connected to UART based Mp3 player.RFID reader EM 18 is used to read the passive RFID tags. When the reader is in close range with the tag it powers the tag with electromagnetic field. The passive RFID tag receives the power and transmits the unique 12 digit hexadecimal code as a character string to the Microcontroller using UART protocol at 9600bps. As the code is received microcontroller enters into serial interrupt mode where it compares with the pre-stored database and if match found necessary action is taken. Microcontroller plays a particular audio track stored in memory card via MP3 player, and simultaneously displaying the file name on LCDetc. The database will have corresponding audio files which are to be obtained as output. When a particular RFID TAG is selected a hexadecimal number that is identification number corresponding to that tag should match with the file stored in database using microSD card and that particular file should only be played and name of that audio file with corresponding instructions should be displayed on the LCD.



IV RESULT AND DISCUSSION

Expected result: There would be various passive tags that will cover different area of backing sector like how to open joint account, how to apply for debit and credit card, how to change branch, how to block lost debit or credit card, how to close account etc. The database will have corresponding audio files which are to be obtained as output. When a particular RFID TAG is selected a hexadecimal number that is identification number corresponding to that tag should match with the file stored in database using microSD card and that particular file should only be played and name of that audio file with corresponding instructions should be displayed on the LCD.

V CONCLUSION

The system should be able to cover different departments of banking sector effectively by providing complete information to users (clients) at a single visit, so it will be timing saving. The system should be able to update database as per needs of banks. It will reduce the work load of employees and help in better handling of clients.

VI ACKNOWLEDGMENT

We are very grateful to our principal Dr. B K Mishra, Dean Dr. Lochan Jolly HOD Dr. Vinit Dongre, Asst Prof. Archana Deshpandea for their endless support, kind and understanding spirit during the presentation of this project. To all the professors and lab assistants who in a way or other shared their support morally, financially and physically.

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[3] Simulation of Attendance Application on Campus based on RFID. Author, Dania Eridani & Eko Didik Widianto

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Implementation of Departmental Time Table Generator

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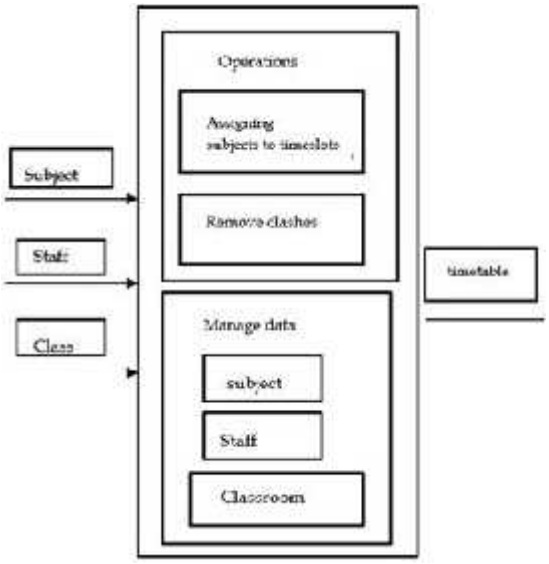
***Abstract*— Timetabling has been of interest for decades, and it always has been relevant in practice. Indeed, it has been implemented in education, health, manufacturing, etc. Producing a conflict-free timetables for schools and in education generally is a tedious process due to the complexity of factors to be considered and the size of search spaces. Over the years, various approaches have been adopted, but none of them is standard. That is because every timetabling or scheduling problem is unique. Nevertheless, OR problem formulations are still applicable, but major modifications deem necessary. Algorithms have been developed and became more complex. Consequently, it is harder to decide over different approaches and appropriately write a linear programming model for it. However, challenges arise when simplifying and structuring a problem on a spreadsheet.**

This project introduces a practical approach completely functional timetabling algorithm capable of taking care of both strong constraints and weak constraints effectively in an automated timetabling system rather than manual approach. So that each teacher and student can see their timetable once they are build and finalized for a given semester and all the editing process can only be done by admin and none of the teachers and students without administration permission.

I. INTRODUCTION

Many colleges have computerized all their works but lecture timetable generating is still done manually due to the difficulties caused by it's constrains. The manual way of creating lecture-timetable demands considerable and precious time and efforts. The course- timetable manual scheduling is a constraint variable problem in which we have found a solution that satisfies the given set of all constraints.



The college lecture manual creating timetabling problem asks us to find some time slots, teacher loads and classrooms which satisfy the constraints given on offered courses, lecturers, classrooms and so on.

Since the problem is a combinational optimization problem, the computation and logical thinking time for timetabling tends to grow exponentially as the number of constrains increase.

Various number of approaches made for fast solution of time table generation in the past decades to the problem of constructing timetables for colleges and schools. Timetabling problems may be solved by different methods inherited from operations research such as graph coloring and mathematical programming, from local search procedures such as tabular search and simulated annealing, from genetic algorithms or from backtracking- based constraint satisfaction manipulation In our project, manual timetabling problem is viewed as a constraint related problem and we proposed a practical timetabling algorithm which is capable of taking care of both strong constraints and weak constraints and finding variables' instantiation, which is based on the forward search method. Some of these similarities is that certain entities have to be scheduled. e.g., the college time tabling problem has

several entities such as students, lecturers, courses, practical labs classes and labs. All these entities have properties e.g. classes are linked to the subject of the course and the students of this class are taught. Constraints Assignments usually cannot be done randomly, but many constraints have to be considered. We distinguish two different types, namely hard and soft constraints. A solution is acceptable if no hard constraints are changed. A satisfactory answer is in which, if fewer soft restraints are changed. A timetabling algorithm can use different strategies to get a solution without defilements of hard constraints. Defilements can either be avoided from the outset or penalized to lead the algorithm towards better solutions and introduce repair mechanisms.

II. EASE OF USE

Departmental timetable generator will automatically generate feasible time table without human efforts. This will decrease the amount of time invested. It is user friendly and even a person with no computer knowledge can generate a time table with a click of a button by just inputting a few parameters such as number of subject ,name of subject
,number of hours allotted to each subject , availability of faculty etc. Its main advantage is declaratively a direct statement of the restraints serves as part of the program. This makes the program easy to modify, which is crucial and hectic in timetabling problems. The constraints are handled through a dedicated system of constraint variable propagation, which reduces domains of variables, joined with backtracking search. In modern CP languages, both features do not need to be programmed differently. The main disadvantages of this approach are :

l. The difficulties with expressing soft constraints

2. The possible problems with improving the initial feasible
solution, which as a rule may be determined without difficulties

The ability to express complex constraints variable in a simple, understandable way is crucial for introducing the requirements of the colleges and university timetabling problem into the program and is tough for their successful solution, - a custom-tailored distribution strategy is able to introduce soft constraints during a search, leading quickly to a ”Good” timetable, - incorporation of local search into CP gives the ability to optimize effectively the timetable.

III. METHODOLOGY

Our Timetabling Algorithm is main component of our project which produces the HTML based timetable even / odd semester sheet as the output. Our project takes various inputs from the user such as Teacher List, Course List, Semester List, Room List, Day List and Timeslot as well as various rules, facts and constraints using web based forms, which are stored in XML based knowledge base. This knowledge base serves as input to our Timetable Generator Algorithm residing on server machine.Our knowledgebase is in the middle, because it is between our time tabling algorithm and GUI front end which is designed in the last. After the representation of KB is standardized, we designed the timetabling algorithm. The design of timetabling algorithm took most of our total time. During design of algorithm, first problem was, from where to start? Second problem was, does it really going to work? But after all due to our superior design of knowledgebase, flowcharts and enough thinking on time tabling data structure representation helped us to really boosted building our fine working algorithm .

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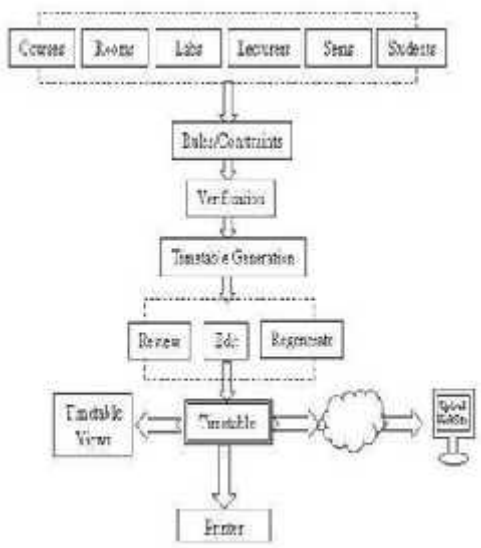
IV. RESULTS AND DISCUSSION

There are many methodologies which has been proposed for the development of the timetable system, depending on various parameters and requirements. Most of the researcher used AI techniques for optimization. However, each proposal is for the specific academic institution and addresses different problems with diverse constraints. Furthermore, industry base solutions are expensive and charge huge licensing cost yearly.

Therefore, in this paper, we have used the web base

platform to develop an efficient timetable system with an attractive Graphical User Interface (GUI) which reflect and solve our institution problems and issues. Our solution was developed using multiple open source frameworks and libraries to simplify and boost the development process.

	Mon	Tue	Wed	Thurs	Fri
TS1	Mr. A/ W.N	Mr. A/ R.F.D	Mr. B/ N.M.T	Ms. C/ Satcomp	Ms. D/ Pracs
TS2	Mr. A/ R.F.D	Ms. D/ Pracs	Mr. A/ R.F.D	Ms. D/ Pracs	Mr. B/ N.M. T
TS3	Ms. C/ Satcomp	Ms. D/ Pracs	Mr. A/ R.F.D	Mr. A/ R.F.D	Mr. A/ W.N
TS4	Ms. D/ Pracs	Mr. A/ W.N	Mr. B/ N.M.T	Mr. B/ N.M.T	Mr. A/ R.F. D
TS5	Mr. A/ R.F.D	Mr. B/ W.N	Mr. A/ R.F.D	Mr. A/ W.N	Mr. B/ N.M. T



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Implementation of Web Marksheet Module in ERP

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***Abstract*— Looking at the existing mark sheet management system, it is found that many educational institutions, mainly engineering colleges, have incorporated "Grading System" in their educational stream. But, the problem here is that they are still using manual methods for calculating grades and entering in them in the marksheet. This is a very time consuming and uneconomical process. Using Web marksheet module basic information of the student such as courses taken, subjects, semester, etc. need to be provided, and then the grades are calculated automatically and the final result is shown.**

***Keywords*— ERP; Web Marksheet CAS; Organization;, Student; Professor; and Examination**

I. INTRODUCTION

Web marksheet module is a technological opportunity for the Academic Institutions searching for a secure, simple and alternative solution to the conventional paper-based exam results evaluation, reporting and distribution. Web marksheet module is an effective solution for result management system with unique templates by providing the administration a secure database system for storing, evaluating and publishing the test scores and grades of candidates online. The database likewise allows the students to observe and gander at the exam results on the web at whatever point necessary. The module exhibits effortlessness and ease in solving, adjusting and eradicating the problems in traditional result and examination management with automation system. One of the principal purposes of the system is to give the test results to the students in the as fundamental and exact way as possible.

While looking for the advantage and disadvantage of the student result management system and the ways on how to create an effective exam result system and database, it is essential to note that it is possible to design the software in HTML or by using PHP & Bootstrap. Web marksheet module incorporates a reliable result management module. By implementing it, educational institutions can eliminate errors and dependency and, improve exam and result management. The application manages the information about various students along with the course they opted in different years, the marks secured by the distinctive students in various subjects in different semesters.

II. SYSTEM ARCHITECTURE

College Administrative System or CAS is an ERP package which will include the respective modules: Organization, Student, Employee, Biometric and Leaves, Time Table, Account, Fees, Salary, Library, Stores, Mark sheet and Examination. Implementation services include installation services, end-user training, database management service, data migration and conversion services



Fig.1: Web Marksheet module integration with ERP System

A. Organization Module

Major fields in Organization module include important parameters like Session which is used to plan the Current Active Session, Education Type, University, College, Department, Course, Branch, Syllabus, Subject, Subject Hours Allocation, Room, Building and Holiday details. This module is used to plan current session.

B. Students Module session
Major fields in Student module include Student Admission, Personal Information, Parent, Back Student Admission, Branch Change, First Year Branch Promotion

C. Employee Module

Major fields in Employee module include Title, Grade, Designation, Experience, Shift, Pay Commission, Pay Scale, Exceptional Pay Scale, Paper presentation, Consultancy, Teaching Approvals, Prizes, Grant/Financial Assistance, Special Lectures Delivered, Patent, PhD Guide, Sports, Physical Detail, Membership, Fellowship, Achievements, Book Published and Award details.

D. Biometric and Leaves Module

Major fields in Biometric and Leaves module include Leave Span, Late Mark Rule, Exempted Employees, Discrepancy Notification, Leaves Type, Leaves Rule, Post Leave, Carry Forward and Leave Cancellation.

E. Time Table Module

Major fields in Time Table module include Teaching Subjects, Time Table Manager and Time Table Report

F. Accounts Module

Major fields in Accounts module include Accounts Category, Accounts Group, Cheque Book, Cheque Cancellation, Voucher Add, Voucher Update, Opening Balance and Balance Carry Forward.

G. Fees Module

Major fields in Fees module include Receipt stock, Fees Criteria, Fees Basic Criteria Setting and Fees Structure.

H. Salary Module

Major fields in Salary module include Pay Commission, Pay Scale, Earning, Deduction, Slab and Loan Deduction.

I. Library Module

Major fields in Library module include Library Incharge, Books, Subject Detail, Books Purchase Order, Books Purchase Order Approval and Books Issued.

J. Store Module

Major fields in Store module include Store Incharge, Store Members, Unit, Unit Conversion, Nature of Item, Item Group, Supplier Details, Supplier Item Detail, Purchase Order, Purchase Order Approval, Goods Receipt, Stock Issue Register and Stock Transfer.

K. Web Marksheet Module

Major fields in Marksheet module include Exam Name, Student Type, Student, Roll Number, Semester Wise Pass Status and University Rank.

L. Examination Module

Major fields in Examination module include Exams, College Assessment, Assessment Rule, Center, Exam, Exam Name, Exam Pattern, Roll Number, Exam Type and Grade.

III. IMPLEMENTATION

The user is has to login through the main window of CAS.



Fig.2: Main Login window CAS

If the user is authorized to access the web Marksheet portal it is visible in the Dashboard of the user. After selecting the Web Marksheet Module the following options are visible.



Fig.3: Web Marksheet Module in CAS

The Internal Marksheet has following sub options:

1. Internal Exam Mark Entry
2. Marksheet List Export To Exce
3. Internal Exam Marksheet Export In Excel
4. Internal Marksheet List Export To Excel (Without SMS) Internal Marksheet List Export To Excel (Without SMS)

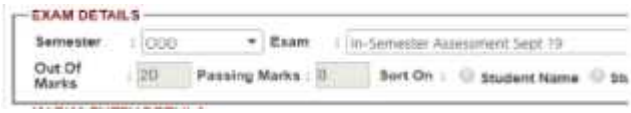

Fig.4: Exam Detail form

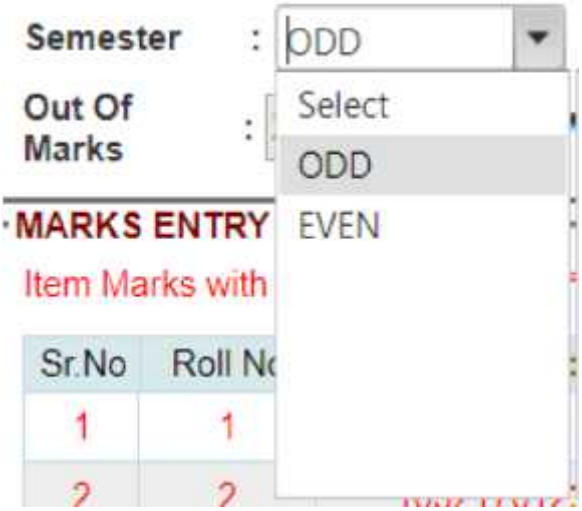

Fig.5: Semester

2. Exam

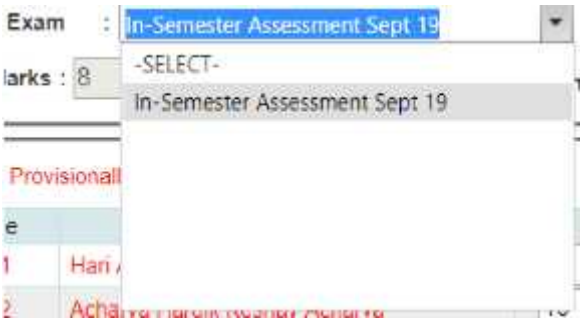

Fig.6: Exam

3. Course Year

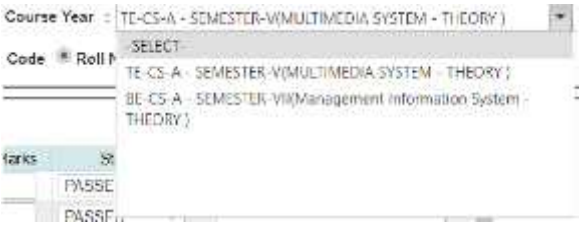

Fig.7: Course Year

4. Out Of Marks
5. Passing Marks



Fig.8: Out of Marks & Passing Marks

6. Sort On
a. Student Name
b. Student Code
c. Roll No



Fig.8: Sort on Function

While entering the marks of the students various status types can be applied.

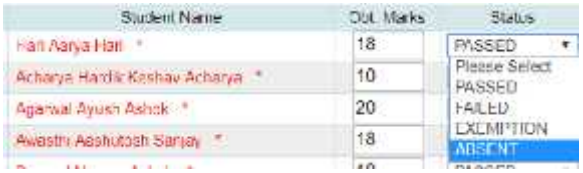

Fig.9: Status Types

It is possible to generate the report the report of any classes any time once the marks are entered. For this the user has to fill “Internal Exam Marksheet Export In Excel” form which has the following inputs:

Semester Type

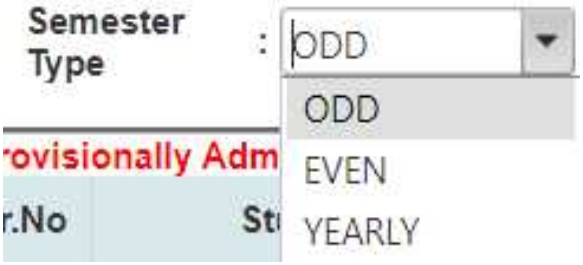

Fig.10: Semester Type

Exam Name

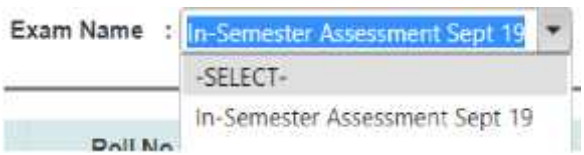

Fig.11: Exam Name

Course Year

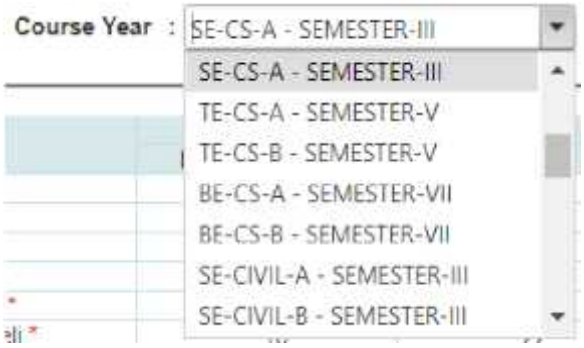

Fig.12: Course Year

On submitting the the above form the report is generated.



Fig.13: Detail Marksheet report

The facility to export the report to excel is also available.

IV. CONCLUSION

Web Marksheet Module effectively manages the information about various students along with the course they opted in different years, the marks secured by the distinctive students in various subjects in different semesters

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Performance of Dipole and Bow-Tie Antennas in Free Space and Water

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***Abstract*— This paper aims to design antennas that can be used for many applications in our case it is underwater environment. The study show results based on the simulation of the designed antenna characteristics using FEKO software. Here the performance of antennas, dipole and bow tie antenna is analysed through simulation for different frequencies in terms of return loss and radiation pattern and results are studied.**

Keywords*— *Dipole, RF communication, radiation pattern, return loss, underwater

I. INTRODUCTION

Wireless technology is one of the main areas of research in the world of communication and it is an essential part of modern society. The transmission of power or information between multiple systems that are not connected by an electrical conductor is known as wireless communication. The most common wireless technology used in the air is radio frequency (RF) waves due to high data rates over long distances and low signal attenuation. It has various types of fixed, mobile, and portable applications, such as telephones, Bluetooth, GPS, satellite television. The rare methods used to accomplish wireless communication in the air include light or sound.

The use of wireless communication in the underwater environment is not a new idea or concept as a wide of wireless sensors already exist in the oceans to collect different data that are useful for recording climate, predicting natural disturbances, search and survey missions, and marine existence study [1]. The widely used wireless communication in an underwater environment are acoustics and optical communication. These technologies are not affected by the salinity of water and acoustic wave travels five times faster in water than air [2].

For underwater communications, these technologies has advantages and disadvantages that radio frequency (RF) systems do not have. Acoustic systems are unfit for real-time as they have low data rates, high latency, poor noise immunity and poor performance due to turbidity. In contrast, optical communications have high data rates at short distances and have lower latency which are major advantages over acoustic technologies. However, both the technologies are affected by turbidity of water and require line of sight [3].

Radio Frequency (RF) wave have some advantages over acoustic and optical communications. The advantage of Radio Frequency wave is that it is not affected by turbidity of water, can be operated in non-line-of-sight. Additionally, they allow high bandwidth. However, radio frequency (RF) is susceptible to electromagnetic interference (EMI) [4], and also signals are attenuated due to the conductivity of the water.

The majority of work-related to underwater antennas is done in seawater, in the related literature; we can find proposals where authors used frequency below 1GHz to design the antenna for underwater applications. For very short distances EM waves can attain data transfer rates up to 10 Mbps [6]. In water, the EM waves are barely affected by the effects of reflection and refraction [7]. The speed of as compared to acoustics communication there is not much research done about underwater communications based on EM waves. In [8] it was seen that antennas with the same electrical length behave differently in fresh and seawater. In addition, [5] concluded that it is possible to predict the operation of the antennas and improve their design with software like FEKO.

Konstantinos N. Alvares conducted experiments with and without insulating antenna and the author concluded that antennas with insulation had better performance in water whereas antenna without insulation had a good performance in the air [9]. In all cases, the authors used the frequency below 1GHz.

II. PROPERTIES OF WATER AND OVERVIEW OF ANTENNAS

In water, there are many important properties to be taken into account. A change in these properties may indicate a change in the quality of the water. These properties include temperature, conductivity, turbidity, and suspended solids. The capability to conduct an electrical current is known as conductivity. The conductivity of water is affected by salinity and temperature of the water, thus seawater has higher conductivity as compared to fresh water. The value of conductivity of fresh water is 0.05 S/m whereas of sea water it is 4S/m at 25°C. The relative permittivity (sr) for water is 81 and relative permeability (μr) is 1 whereas for air sr =1. As water is a lossy media, attenuation increases with the increase in frequency and with the conductivity of medium [3].

In this paper, Dipole and Bow-Tie antennas are designed. These antennas can be made out of a wire or can also be printed on a substrate which is very simple.

A. Dipole Antenna

A dipole antenna which is composed of two symmetrical conductive elements or rods, which is fed with a balanced transmission line at the centre [10]. Dipole antenna has many applications for many years because it is simple to design, and has wide range for communication which includes underwater applications [3]. There are many different types of Dipole antennas such as short dipole, half-wave dipole, folded dipole, bow tie, v-shaped [11].

B. Bow-Tie Antenna

A bow-tie antenna is sometimes known as a butterfly antenna because it looks like butterfly wings. The antenna uses triangular elements instead of straight rods in order to increase the bandwidth. In [9] the insulated and non-insulated Bow tie antennas were designed and fabricated at 2.4GHz. The antenna which was not insulated had a very good performance in the air whereas the insulated bow-tie antenna had a very good performance for distance up to 38 cm in water.

III. SIMULATION OF ANTENNAS

In this section, we assess the performance of a dipole and Bow-tie antenna for air and water, in terms of the radiation pattern, gain, and reflection coefficient through simulation. The simulation of antennas is done using the FEKO 3D electromagnetic simulator. These type of antennas are selected since it is simple and easy to build. The antennas are designed to work at the frequency of 900MHz and 2.4GHz.

A. Dipole Antenna

The FEKO model for the dipole antenna analysis is shown in the fig. 1. The antenna was designed for frequencies 900 MHz and 2.4 GHz using 10 mm thick copper wire. The reflection coefficient of dipole antenna is presented in the fig. 2 as a function of frequency. It is seen from fig.2 (A), that the resonance frequency of antenna in the air is 2.3 GHz and in water, it is 1.483 GHz whereas, in fig.2 (B) that the resonance frequency of the antenna is 905 MHz in air and 795 MHz in water. Fig.3. shows maximum gain in polar coordinates for both frequencies in air and water.

Fig. 4 and Fig. 5 shows the 3D radiation pattern at frequencies 2.4 GHz and 900 MHz, with the dipole antenna placed in the same orientation for both the mediums. It is seen that the medium influences the performance of the antenna. In the air, the radiation pattern is maximum in x-y direction and in water the radiation pattern is shifted by 90°.

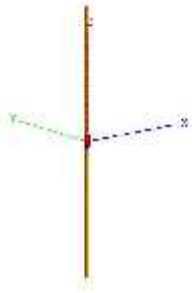
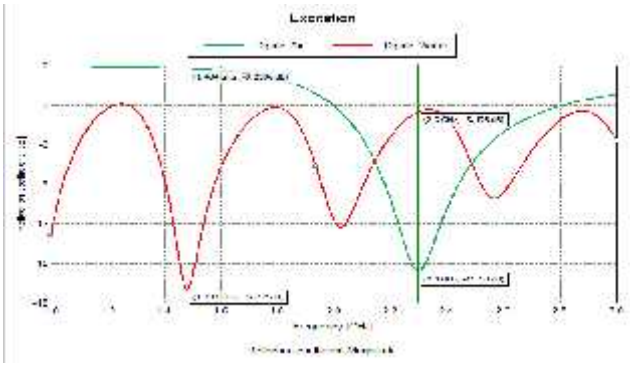
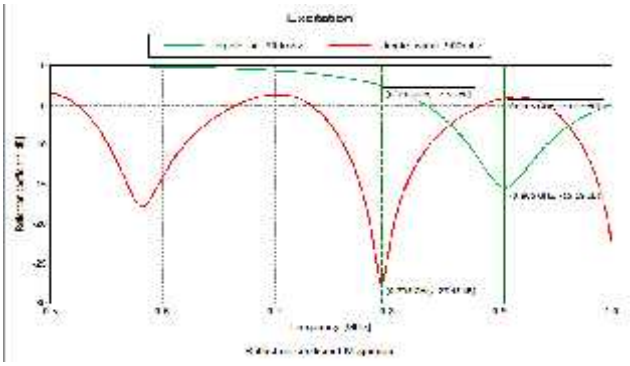


Fig 1: Model for dipole antenna

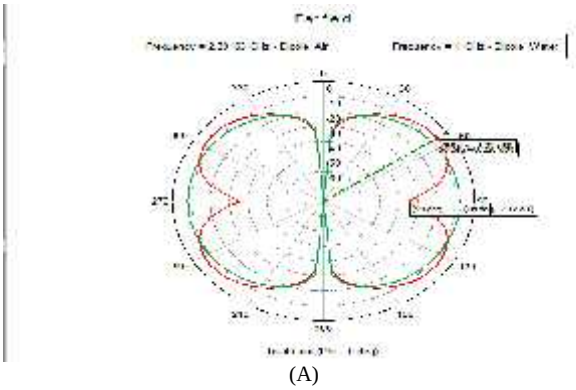


(A)

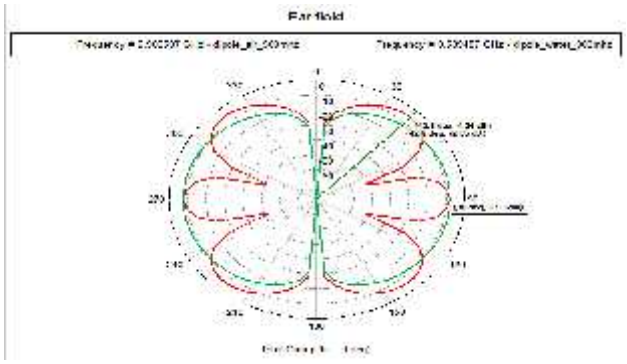


(B)

Fig 2: Reflection coefficient for air and water at frequencies (A) 2.4GHz
and (B) 900MHz

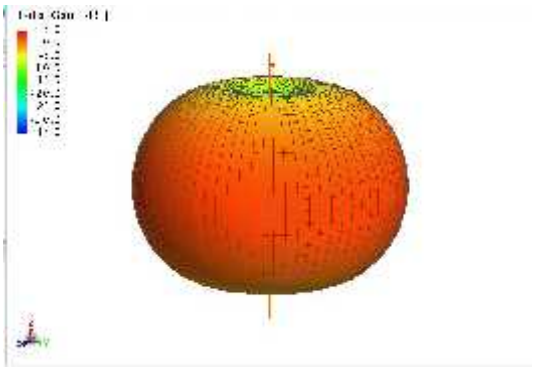


(A)

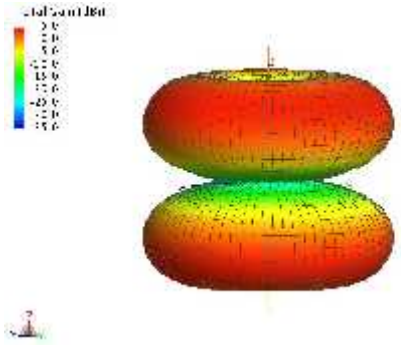


(B)

Fig. 3. E-plane Radiation pattern for air and water at frequencies (A) 2.4GHz (B) 900MHz

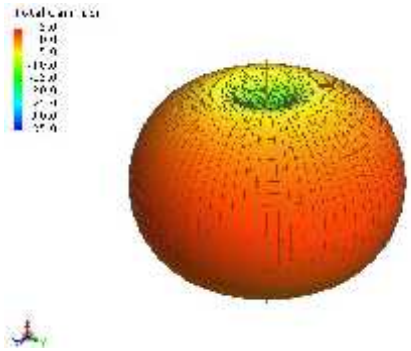


(A)

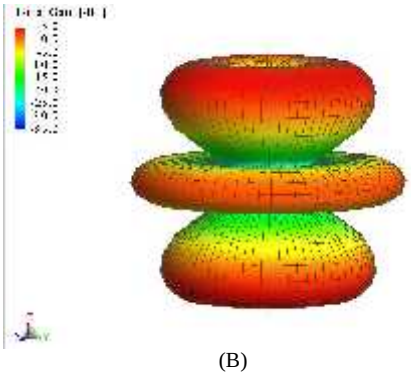


(B)

Fig. 4: 3D Radiation pattern of dipole antenna at 2.4GHz in (A) air (B) water



(A)



(B)

Fig. 5. 3D radiation pattern of dipole antenna at 900 MHz in (A) air (B) water

B. Bow-Tie Antenna

The FEKO model for the Bow-tie antenna analysis is as shown in the fig. 6. The antenna was designed for frequencies 900 MHz and 2.4 GHz using 10mm thick copper wire. The reflection coefficient of the Bow-tie antenna is presented in the fig. 7 as a function of frequency. It is seen from fig.7 (A), that the resonance frequency of antenna in the air is 1.655 GHz and in water, it is 1.256 GHz whereas, in fig.7 (B) that the resonance frequency of the antenna is 981 MHz in air and 817 MHz in water.

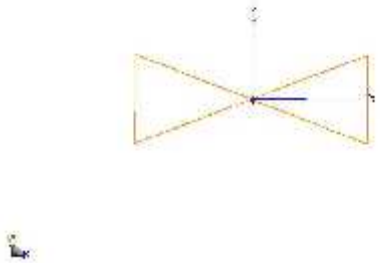
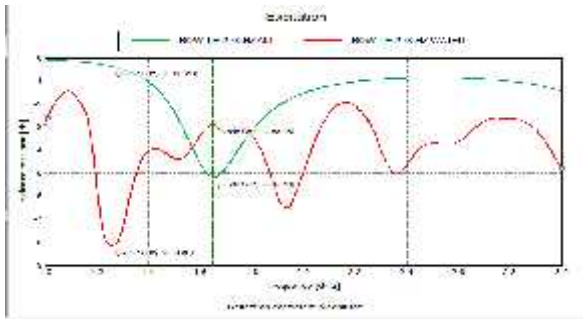
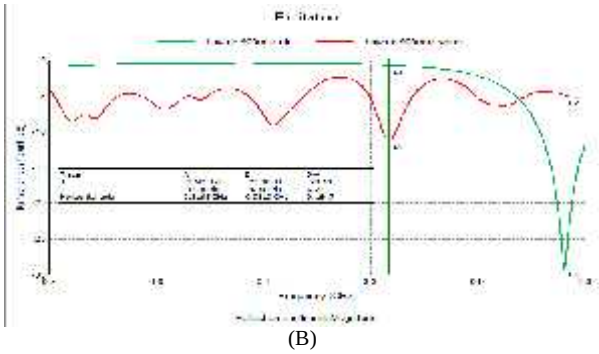


Fig. 6. FEKO model for bow-tie antenna



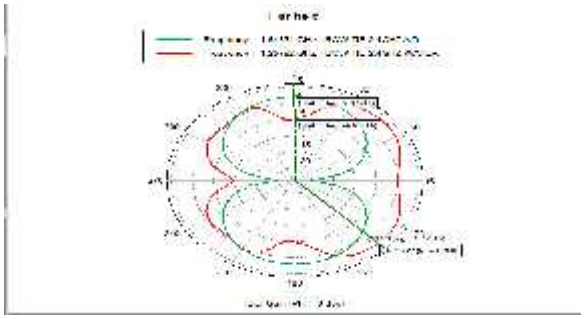
(A)



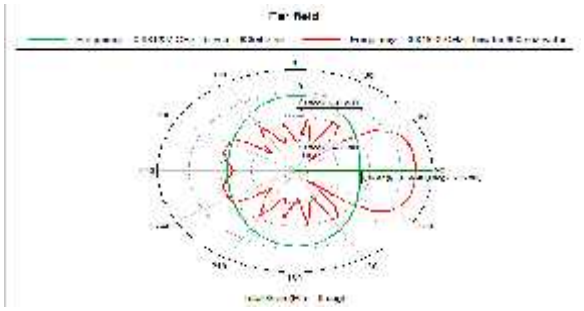
(B)

Fig. 7. Reflection coefficient for air and water at frequencies (A) 2.4GHz
and (B) 900MHz

Fig.9 and Fig.10 shows the 3D radiation pattern at frequencies 2.4 GHz and 900 MHz, with the Bow-tie antenna placed in the same orientation for both the mediums. It is seen that the medium influences the performance of the antenna. In the air, the radiation pattern is maximum in the z-direction whereas in water the radiation pattern is directional towards x-direction.

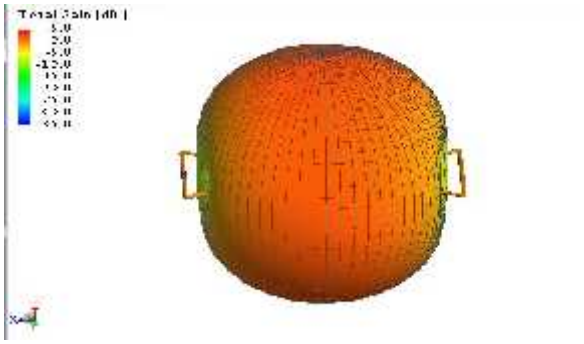


(A)

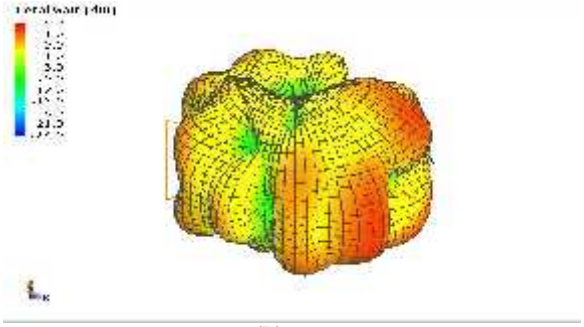


(B)

Fig. 8. E-plane Radiation pattern for air and water at frequencies (A)2.4GHz (B) 900MHz

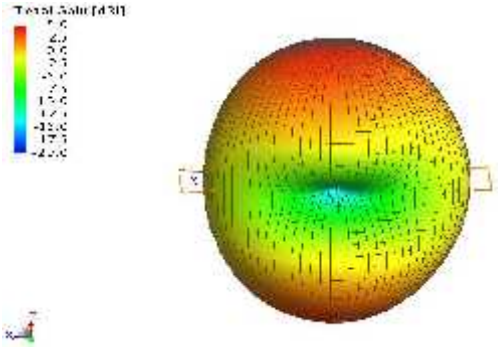


(A)

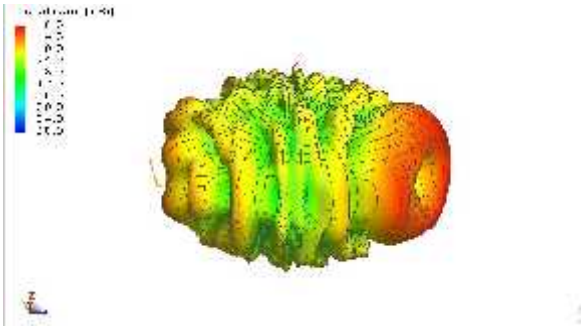


(B)

Fig. 9. 3D Radiation pattern of Bow-tie antenna at 2.4GHz in (A) air (B)Water



(A)



(B)

Fig. 10. 3D Radiation pattern of Bow-tie antenna at 900MHz in (A) air (B) water

IV. CONCLUSION

The performance of the two antennas was analysed using FEKO software. From the simulations, it was concluded that the orientation of radiation pattern changes with respect to the medium. Also, the same physical antennas cannot be used in different mediums as their resonance frequency changes with respect to the medium. Hence medium plays a very important role in the designing of the antennas.

V. REFERENCES

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The Design of Dual Band Antenna for Bluetooth and Wi-Fi Applications

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Abstract*—The antenna with small size, large bandwidth and high gain are having more demand in modern communication systems. Also the antenna with multiple frequency bands is the major concern nowadays. Considering this increasing demand a dual band microstrip antenna for Bluetooth and Wi-Fi is designed. Dual band operation is achieved by cutting a rectangular slot on the patch surface. Also it enhances the bandwidth of MSA. For the proposed antenna design the coaxial feeding technique is used. The antenna is designed on FR-4 epoxy substrate with dielectric constant 4.4. On simulating the design the realized operating frequency for proposed antenna is 2.4 GHz and 3.6 GHz respectively.

Keywords*— MSA, Dual Band, RMSA,Bluetooth, Wi-Fi, wireless communication.

I. INTRODUCTION

The communication system refers to the exchange of information from one place to another [1]. The microstrip patch antenna is the most appropriate means for the transfer of electromagnetic waves in modern wireless communication systems. The microstrip patch antenna is having several shapes like rectangular, square, triangular, semicircular, etc. so it is preferable in wireless communication. Also the MSA has several advantages such as light weight, low profile, ease to fabricate on printed circuits. MSA not only supports linear polarization but also the circular polarization. The dual, triple and multiband operation is easily achieved by MSA [2-3].

The dual band operation is obtained by combination of rectangular and circular patch with microstrip line feed [7]. Another technique to obtain dual frequency operation is using varactor diode for tunable MSA [8]. Also by cutting V slot inside the patch a dual band triangular MSA is realized [10]. The popular approach to increase the operating bands in single MSA is cutting slots of different shapes such as U shape, V shape, E shape, rectangular to

the patch [4-6]. As the slots are incorporated in the MSA itself, there is not increase in the size of MSA. Also the radiation characteristics of MSA are not affected significantly. Usually the length of the slot is taken to be either half wavelength or quarter wavelength depending upon the position of slot [9].

The proposed design is a simple rectangular microstrip patch antenna [RMSA], with rectangular slot at the centerof patch in order to get dual band operation, without affecting the physical size of antenna and to enhance the performance of antenna. This design gives the dual band operation for the frequencies 2.4 GHz and 3.6 GHz respectively.

II. ANTENNA DESIGN

The geometry of the proposed MSA is shown in Fig. 1. The proposed design of the RMSA is having a simple rectangular slot at the center of patch.

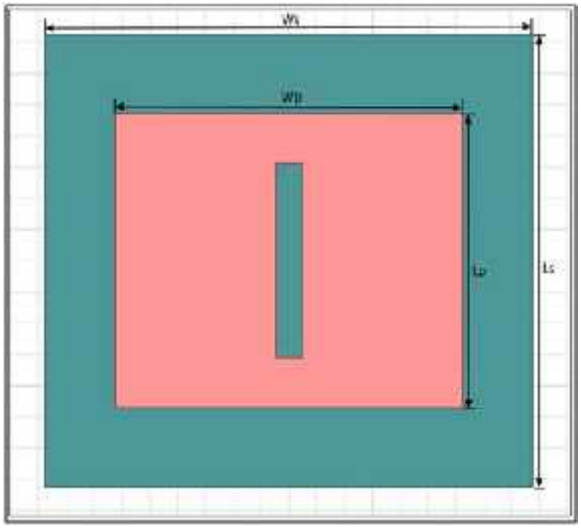

Fig. 1.Proposed antenna design.

The RMSA is simulated on FR4 epoxy substrate of thickness 1.6mm. The width and length of RMSA is calculated by using the following equations [2-3]: W= C/(2f_0 √((εr+1)/2))

ε_(reff =) (εr+1)/2 + (εr-1)/2 [1+12 h/w]^(- 1/2)

Leff = C/(2f_0 √єreff)

L = Leff - 2ΔL

Where,

f0= center frequency
εreff= effective dielectric constant
C= velocity of light in vacuum
h= thickness of the substrate
Leff = Effective length

A rectangular patch of size 18.8mm×25mm which is having a ground plane of 29mm×35mm is calculated by using the above equations and by optimizing the calculated results we get the RMSA dimensions. A rectangular slot which is having length equals to quarter wavelength is cut at the center of RMSA. An effective dual band operation is realized in this design.

TABLE I. ANTENNA DIMENSIONS

Parameters	Values	
	Calculated	Optimized
Ws	34.94mm	35mm
Ls	29mm	29mm
Wg	34.94mm	35mm
Lg	29mm	29mm
Wp	25.34mm	25mm
Lp	19.40mm	18.8mm

III. RESULTS AND DISCUSSION

A. SIMULATED RESULTS

The proposed antenna is designed using the HFSS software. The simulated results such as return loss, VSWR, gain are discussed here.

The simulated S11, VSWR and Gain is shown in Fig. 2, Fig. 3 and Fig. 4 respectively. The bandwidth of 120 MHz and gain equal to 1.0243 dB is obtained for 3.6 GHz.

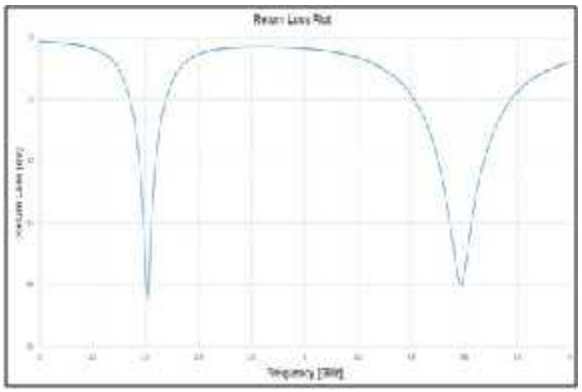

Fig. 2.Simulated S11 plot of the proposed antenna.

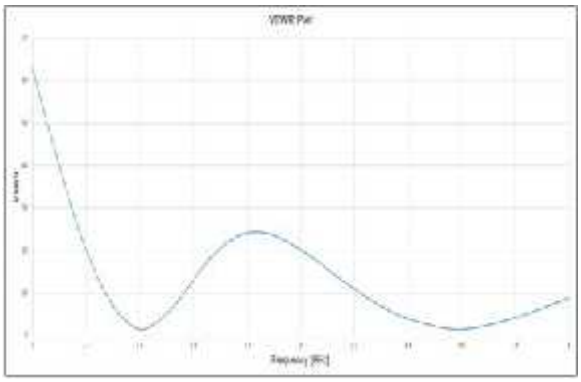

Fig. 3.Simulated VSWR plot of the proposed antenna.

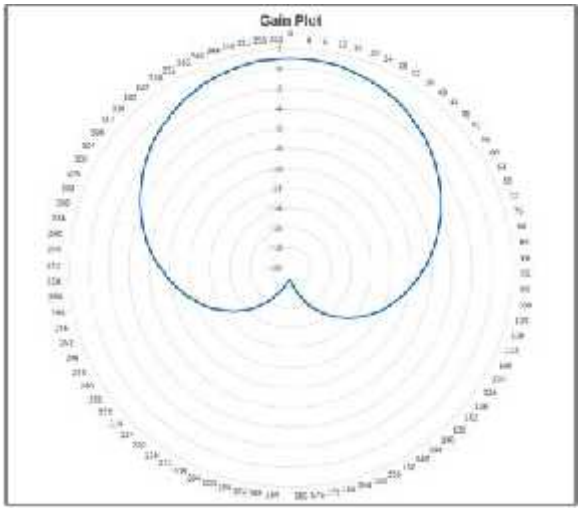

Fig. 4.Simulated Gain plot of the proposed antenna [f0= 3.6 GHz].

TABLE II. SIMULATED RESULTS

Parameters	Simulated Values	
	2.4 GHz	3.6 GHz
Return Loss	-18.8922 dB	-19.2865 dB
VSWR	1.2563	1.2436
Bandwidth	60 MHz	120 MHz
Gain	-3.40 dB	1.0243 dB

The Table II gives the complete summary of simulated results of Dual Band antenna.

IV. CONCLUSION

The design of a rectangular microstrip patch antenna for dual band operation [Bluetooth and Wi-Fi]i.e. for the frequencies 2.4GHz and the 3.6 GHz is simulated in this paper. The dual band operation is achieved by making a simple slot at the center of

patch. The design is simulated on easily available FR4 substrate which is having low cost. Here we have avoided the design complexity.The excellent value of simulated results is obtained. Also, the gain of about 1.0243 dB at 3.6GHz is obtained.

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Automatizing Train Signalling Technology for Smoother Operations

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Abstract:- Train signaling technology has undergone many advancements in the last few decades. Lots of European and Chinese signaling technologies have been installed in their transportation systems benefits of which they are continuously reaping with improved transport capacity. Automated Train Signaling & Operations is a paper to explore the capability to move key operational decision-making tasks from the human to a computer-based system where, work being done by a motorman is moved to a computerized system. The current fixed block system uses larger fixed blocks make it difficult to run trains closer together, hence introducing delay between the two trains. This paper will delve into technological solutions to increase the frequency of trains by decreasing the time gap between the two trains. This paper is a showcase of an adaptation of the family of Communications Based Train Signaling (Broad framework) to Mumbai's broad-gauge system which brings its own challenges and nuances to the system primarily designed for the standard gauge operations.

Keywords: Automated Train Signaling and Operations

1. INTRODUCTION

Mumbai Suburban Railway currently uses an old, antiquated system for signaling that itself has been operating with minor incremental changes in signaling technology since decade. Current system uses a fixed block system to locate the trains. The signaling itself is done using conventional red, yellow, double yellow & green. Where each color signifies a vague understanding of the required speed to the motorman, which allows for inefficiencies in the system. More inefficiencies in the system include transmission time for data from head office to the signals. Such a structure makes recovering from unexpected delays almost impossible.

Automated Train Signaling & Operations represents the general concept of adaptation of the family of Communications Based Train Signaling to Mumbai's broad-gauge system. Mumbai's Suburban railway has been slow in adopting a complete overhaul which has restricted it from achieving its maximum potential. ATSO brings a overhauled structure for the signaling system to function on which is automated.

2. HARDWARE

2.1 Microprocessor

The 8051 microcontrollers were originally designed in the 1980s by Intel. It is a member of the MCS-51 family. A microcontroller is largely used in most of the embedded systems. The 8051 microcontroller contains several on-chip peripherals, like timers and counters, also it has 128 bytes of on-chip data memory and up to 4K bytes of on-chip program memory.



Fig 2.1: Microprocessor 8051

control applications are optimized by 8-bit CPU. 64k bytes of external ROM and RAM & 4, 8 bit wide I/O ports also two 16-bit timer or counters.

2.2 IR LED

IR LEDs are nothing but infrared light-emitting diode, which is widely known for its cheap & efficient production of infrared light. It has electromagnetic radiation in the 700 nm to 1mm range. They are commonly used in various signal transfer systems, like in remote controls for televisions, night-vision cameras, and other devices. An IR LEDs beams light with data signals to control the device. Here IR LEDs are used as Axle Counters to replicate real-life working principle of axle counters



Fig 2.2 : IR LED & RECEIVER

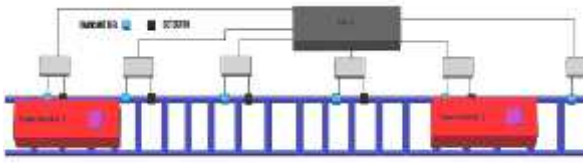

Fig 2.2.1 3D Representation of the System Topology

2.3 Zigbee Module

Zigbee is a communication protocol using small & low power radios based on an IEEE 802.15. 4-2003 standard. ZigBee is basically used for personal area networks.it is designed for devices that require simple networking & don't need a high data transfer rate.

It requires minimal power and provides reliable delivery of data between devices. The interfaces provided with the module help to directly fit into many industrial applications. The modules operate within the ISM 2.4-2.4835 GHz frequency band with IEEE802.15.4 baseband.

2.4 2x16 LCD Display

The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7-pixel matrix.16X2 LCD has two registers command and data. The register select is used to switch from one register to others. The data is the ASCII value of the character to be displayed on the LCD. This component will be useful in displaying ongoing processes in the Microprocessor and help troubleshooting.



Fig 2.4: 16x2 LCD Module

3. METHODOLOGY

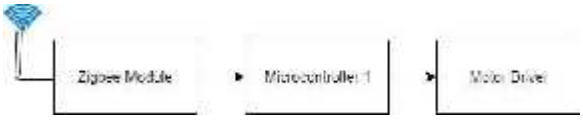

Fig 3.1: Block Diagram: MCU+CC

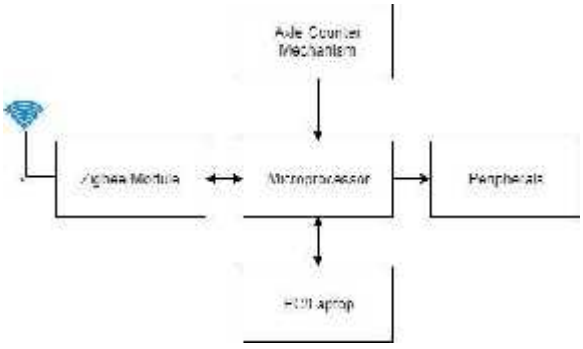

Fig 3.2: Block Diagram: CCU + ACS

The paper proposes to simulate the working of the current train signaling system by using everyday electronics components mentioned above and improving it.The brain of the system is formed by the combination of theCentralized Control Unit (CCU) & Axle Counter System (ACS)

Fig 6. The centralized control unit is formed by an 8051 based microcontroller chipset which is to be continuously fed with information from the Axle Counter system formed using the IR based block system. This is proposed to work on the axle counting mechanism by counting the number of axles passed under a pair of sensors and hence deducing whether the given train is positioned above the block or not. This when done on a pair of track blocks can tell us the exact blocks which are occupied. Calculating the no of block between the two will yield us the distance between the trains. Since this arrangement replicates the real Axle counter system in railways. It helps us better simulate the system. The CCU does the distance and speed calculation part and then feeds the data to the Mobile Control Unit (MCU) for further process, via the Train-To- Wayside Communications Block Fig. 2.21. which is simulated using a ZigBee communication module.

The MCU is a computer-based controller, which is located in the train emulated robotic vehicles, which is proposed to be responsible for:

1) Calculating speed curve based on the status of the block occupancy data from CCU, It provides the actionable command to each CC with a Maximum Permissible Limit (MPL) is calculated with the help of an algorithm, up to which the train is authorized for safe travel. This allows the train to reach maximum speed

concerning the distance between both trains. The train will maintain a safe distance from an earlier train within the least possible interval of time.

b) Relay information to CC for acting on speed MPL calculations.

3.1 Zigbee Functionality

All the calculations are transmitted through a Zigbee module. It transmit & receives the communications between train & CCU Which works as the communication medium for the system5. Algorithm The above flow chart provides us with guidelines for the design of the software part of the program code required for the system. Which gives us to operate the system by proper procedure & order.

First, the location of the trains is monitored then it will calculate the distance & maximum permissible speed. This information is relayed to the trains via ZigBee module communication. then it will check for any block restrictions for further movement. If there are any restrictions then the train will not move forward until the restriction is cleared. If there are no restrictions the train will move till the calculated safe distance with maximum permissible speed then again this it will check the location of the train Again calculate the distance between them. This cycle continues.

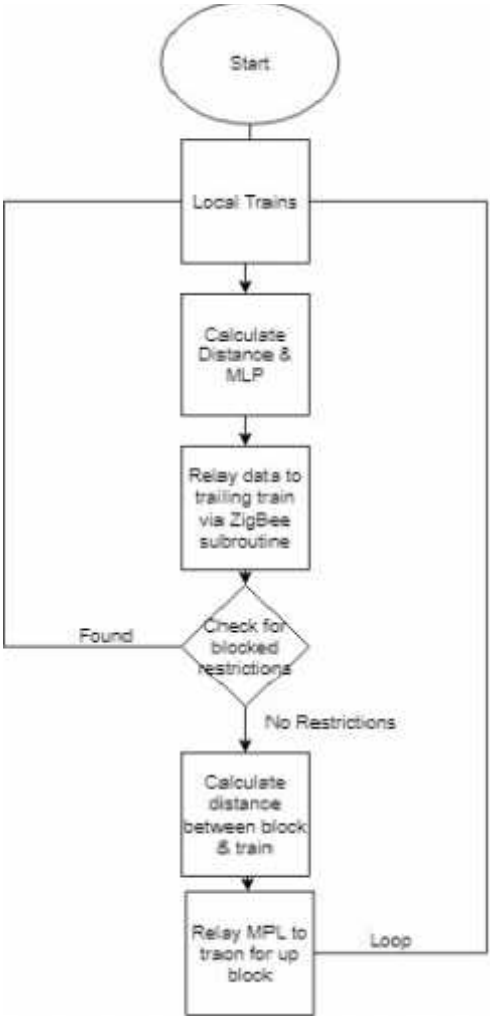

Fig 5.1: Algorithm

6. RESULT

The above project is certain to achieve its goals of improving the capacity of any transportation system by optimizing the frequency of the system. This will also certainly positively improve the aforementioned social aspects of the system because of the reduction in human intervention and decision making. In real life implementation high speed low latency 5G framework is proposed for maximum safety.

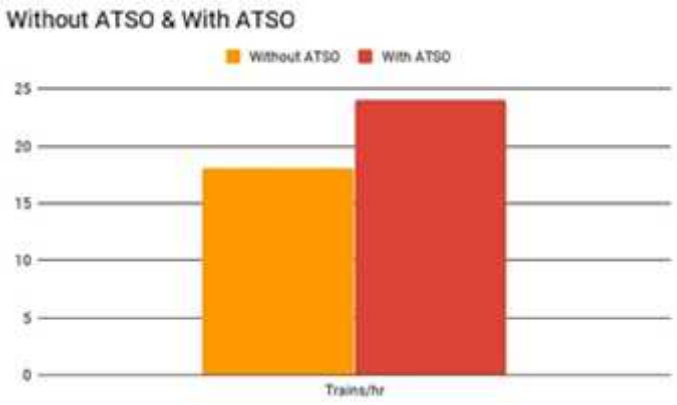

Fig 6.1: Projected Efficiency Comparison

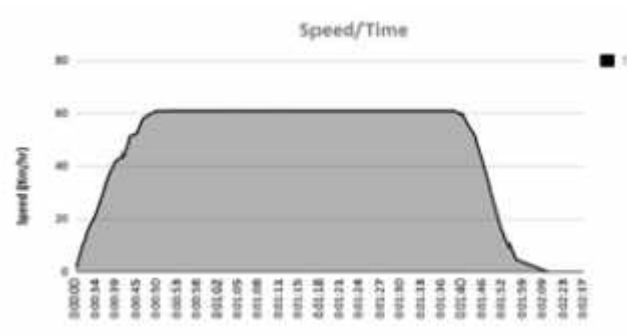

Fig 6.2: Speed Curve with ATSO

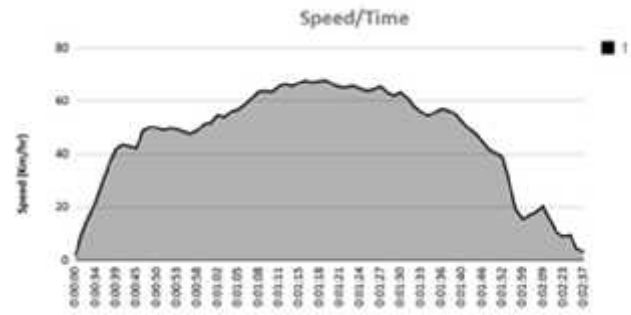

Fig 6.3: Speed curve without ATSO (Actual Recording)

TABLE 6.1

Duration	Speed(km/h)
0:00:00	1.512
0:00:32	16.703999
0:00:38	36.252
0:00:43	51.191998
0:00:47	58
0:00:50	61
0:00:52	61.1
0:01:01	61.1
0:01:05	61.1
0:01:15	61.1
0:01:27	61.1
0:01:34	43
0:01:38	16
0:01:40	5
0:01:44	3
0:01:46	2
0:01:48	1
0:01:50	0
0:02:37	0

TABLE 6.2

Duration	Speed(km/h)
0:00:00	1.512
0:00:32	16.703999
0:00:38	36.252
0:00:43	42.947998
0:00:47	48.815998
0:00:50	50.003998
0:00:52	49.859997
0:01:01	51.876
0:01:05	56.735996
0:01:15	66.815994
0:01:27	65.484
0:01:34	54.503998
0:01:38	56.519997
0:01:40	52.271996
0:01:44	47.771996
0:01:46	45.215996
0:01:48	41.724
0:01:50	40.535995

7. FEASIBILITY

The US Department of Transportation has concluded and stated in the independent study [9] conducted by it that "CBTC and FBTC, reveals significant user benefits in reduced wait times" CBTC is the generalized form of our proposed ATSO system. It also found that "The change from fixed-block signaling to CBTC provided much finer control over the speed and distance between trains in the subway." Several unaccounted aspects which could have a significant impact on the simulation will have a change in the output of the study. These will need extra attention while physically implementing the project, but generally on an overall basis the system promises significant improvement in the current transportation scenario.

8. CONCLUSIONS

Automated Train Signaling & Operations is thoroughly worked on and appropriate implementation methodology is singled out.

1. The design makes it possible to keep it technologically adapted for localized adaptation in the Mumbai Suburban Railway.

2. The system promises to be effective in increasing the capacity of passenger transportation on a per hour basis.

3. Fig.6.1 Implementing this system will reduce the time between two trains which in turn increases the frequency of trains.

4. Table 6.1,6.2 As per the results we found, the ATSO system requires less time to cover the distance between two stations, that is because the ATSO system has a fully computerized drivetrain eliminating any unnecessary speed reductions because of manual lapse in judgement.

5. Fig.6.1 Projections of Speed/Time shows a improvement of31% roughly in a ATSO enabled system over conventional system.

6. Reduction in hardware wear and tear is certain considering fewer breaking cycles caused by non-fluctuating and friction.

7. Fig.6.2,6.3 Table6.1,6.2 By surveying the speed control of trains & comparing with the ATSO & Without ATSO by observation tables it clearly shows that the speed is quite balanced than without ATSO. Hence trains will reach the target distance faster.

8. Fig. 6.1 ATSO also increases the number of trains per hour. That gives the efficiency a greater boost.

9. Communication systems need to be fast enough to maintain a failsafe record. Real life implementation must include newer and fast wireless communication infrastructure.

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Detection of Credit Card Based Fraud on Machine Learning Algorithm

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***Abstract*- Online transactions have now become an important and necessary part of our lives for a days. When transaction frequency increases, so too is the number of fraudulent transactions growing rapidly. To minimize fraudulent transactions, this paper addresses machine learning algorithms such as Naïve Bayes, Logistic regression, J48, and AdaBoost etc. They implement and test the same set of algorithms using an online dataset. Through comparative analysis it can be inferred that in fraud detection Logistic regression and AdaBoost algorithms are performing better..**

Keywords- Credit card, Fraud detection, Machine learning, supervised learning, Naïve Bayes, Logistic regression, J48, AdaBoost

1. INTRODUCTION

Because of the rise and acceleration of E-Commerce, there has been a tremendous use of online shopping credit cards that has led to a high amount of credit card fraud. The need to recognise credit card frauds is important in the digitisation era. Detection of fraud requires tracking and evaluating the actions of various users in order to predict inappropriate activity or to prevent it. In order to accurately detect credit card fraud we need to consider the various technologies, algorithms and forms involved for detecting credit card fraud. Algorithm may discern transactions which may or may not be fraudulent .We need to detect fraud, passed data set and knowledge of fraudulent transactions. They evaluate the dataset and all transactions are categorized.

2. LITERATURE REVIEW

This paper describes the random forest algorithm used to detect fraud. There are two types of random forest, i.e. random tree based random forest and random forest based on the CART. We describe 91.96 per cent and 96.77 per cent in detail and their precision respectively. This paper summarizes type two is better than type one. EOLBREAK Suman Arora[3] Many supervised machine learning algorithms apply in this paper to 70 percent training and 30 percent test dataset. Random forest, stacking classifier, XGB classifier, SVM, decision tree, naïve Bayes and KNN algorithms compare one another, i.e. 94.59%, 95.27%, 94.59%, 93.24%, 90.87%, 90.54% and 94.25% respectively3.

3.WORK DONE

Finding fraud detection involves transaction data set and some algorithms are required for finding or classifying. There are plenty of algorithms to detect fraudulent transactions, so choose some better algorithms from the review of the literature first. And Implement better algorithms to classify fraudulent and non-fraudulent transactions in Spark..

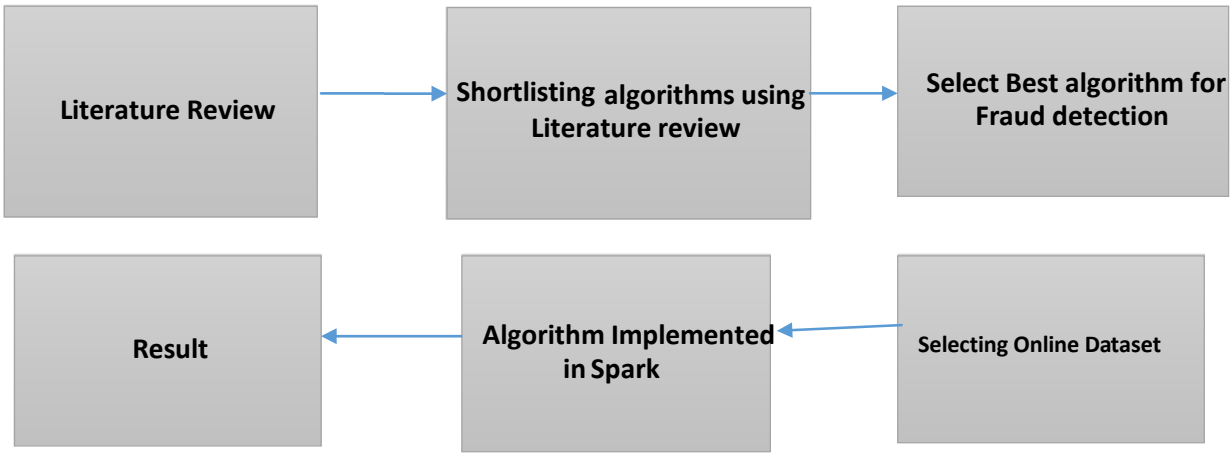


Fig. 1 Flow of finding fraud detection

4. SHORTLISTED ALGORITHMS :

Powerful in this fraud detections. So, compare all the There are many algorithms which can be used in credit card Table 1. Shortlisted algorithms in detail algorithms with their advantages and disadvantage fraud detection.

Algorithm	Accuracy	Advantages	Disadvantages	Related to Database
K – nearest neighbor	97.69%	• No use of predictive model before classification. • Compare algorithms and their power methods KNN is best	• In KNN algorithm accuracy depends upon neighbours distance • It cannot detect the fraud at the time of transaction.	• KNN works well with a small number of input variables • Better if all data has same scale
Naïve Bayes	97.92% / 70.13	• High processing and detection speed/high accuracy	• Excessive training need / expensive	• It good if dataset has plenty of input but small number of records
Random Tree	94.32%	• It can handle thousands of input variables without variable deletion	• It is over fit for classification /regression tasks with noisy dataset	• Easily work on large databases
Logistic Regression	54.86%	• This algorithm gives simple formula for classification. • Work better on linear dataset.	• Not preferable on non-linear data • It is not capable of handling fraud detection at the time of transaction	• This algorithm wants dependent and independent attributes • This algorithm return values between 0 end 1

Outlier		• Using less memory • Computation is required • Works fast and well on online large datasets	• It can handle thousands of input variables without variable deletion	• Good in large datasets
AdaBoost	57.73%	• It is a powerful classifier that works well on both basic and more complex recognition problems	• It can be sensitive to noisy data and outliers.	• This algorithm use weighted dataset
J48	93.50%	• This algorithm use weighted dataset	• This algorithm can be payoff but there is chances to get different decision	• Give decision tree as a result

5. SELECT ONLINE DATASET

Choose a sample dataset to find the fraud detection.

In the dataset, given use of the credit card, intention, Current credit card balance, Average credit balance, credit card holder, Holder status, CC age, Holder's property, Home, Career, Employment, Position, Own phone, Foreign worker etc. Credit card, and the name of the issuer. There are a total of 1000 records in this dataset and this hasbeen preprocessed.

6. SELECTED ALGORITHM FOR IMPLEMENTING

1) Naïve Bayes

• Naïve Bayes, Logistic regression, J48, and AdaBoost are better on the survey bases than other fraud detection algorithms. EOLBREAK 1) Classification algorithm is Naïve Bayes Naïve Bayes. This algorithm relies on the theorem by Bayes. This algorithm is simple, and very powerful. EOLBREAK· Bayes theorem: Bayes theorem finds likelihood of event occurring given the likelihood of another event that has occurred already. EOLBREAK P (A / B)= (P(B / A) P(A))/P(B)

Where, P(A)– Priority of A P(B)– Priority of B P(A / B) – Posteriori is easy and fast. This algorithm needs fewer data on preparation.

2) Logistic Regression

This related methodology to the linear regression algorithm. Yet linear regression is used for forecasting / estimating values and for classification tasks, logistic regression is used. Linear regression defined as Binomial – 2 Possible types (i.e. 0 or 1) only Multinomial – 3 or more Possible types and not ordered Ordinal – Ordered in groups (i.e. very poor, poor, good, very good.

3) J48

J48 algorithms are used to generate a decision tree and are used to classify. J48 is an ID3 extension (Iterative Dichotomyeser 3). This algorithm has some special features such as derivation of rules, continuing value set, pruning of decision tree, etc. J48 algorithm is most extensively studied in machine learning field. They evaluate on the basis of the decision tree generated, and understandable rules. Such algorithms operate on variables that are constant and categorical.

4) AdaBoost

AdaBoost is an algorithm for machine learning. Developed specifically for the binary classification. This algorithm serves to improve decision tree performance. EOLBREAK For AdaBoost, every instance is weighted in the Training

dataset. Initial weight is set to: weight (xi) = (1/n)where, xi – ith training instance n – number of training instance This algorithm is primarily for classification instead of regression. So the AdaBoost

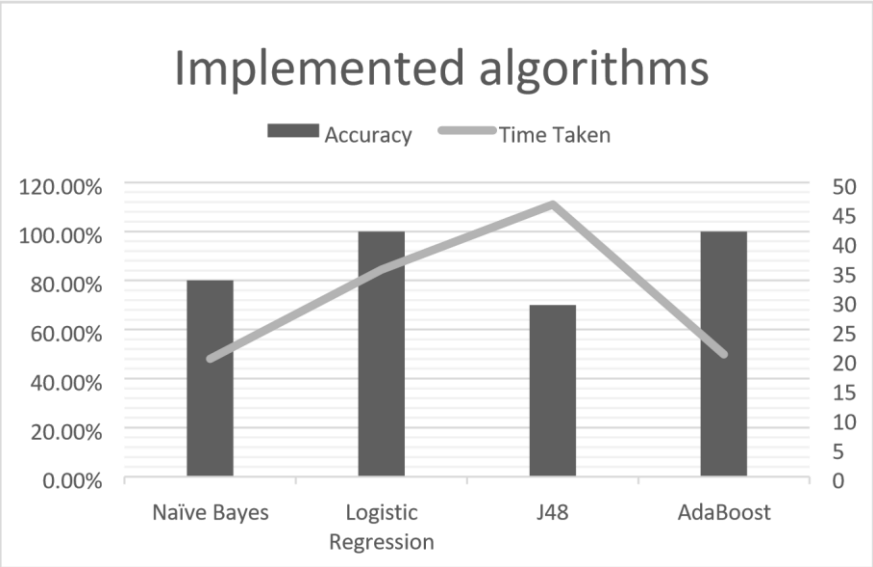
algorithm is used in fraud detection, as this classifies the transaction as fraudulent and non-fraudulent transactions.Using their library and packages these four algorithms are implemented in Spark. Both algorithms need a certain amount of data for the preparation. Implemented algorithms resulted in accuracy, length of time and fraud transactions being reported.

7. IMPLEMENTED ALGORITHMS IN SPARK

This four algorithms are implemented in Spark using their library and packages. All algorithms need some amount of training dataset. Implemented algorithms gave result as an accuracy, Time duration and classify fraud transactions

Name	Naïve Bayes	Logistic Regression	J48	AdaBoost
Accuracy	83.00%	100.00%	69.93%	100.00%
Time Duration	10.0	38.1	46.24	2.80
Method	Classification method	Machine Learning	Supervised Learning	Machine Learning
Training : Testing	70 : 30	70 : 30	70 : 30	70 : 30
Inbuilt Packages	Gaussian NB	Logistic Regression	Decision Tree Classifier	AdaBoost Classifier

Fig. 2 Analysis chart on Implemented algorithm



8.CONCLUSION

Highest accuracy after implementation of the algorithm gave Logistic Regression and AdaBoost 100 percent and 100 percent respectively. And AdaBoost takes very low time. So, in conclusion the AdaBoost algorithm is better than other algorithms for fraud detection

This four algorithms are implemented in Spark using their library and packages. All algorithms need some amount of training dataset. Implemented algorithms gave result as an accuracy, Time duration and classify fraud transactions

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Design and Implementing Automatic follower bag

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***Abstract*—Luggage bag used in today's travelling is manually driven which consumes considerable human energy and does not have safety features. Automatic bag follower will reduce Manuel work of passenger and provide safety features. Aim is to develop a luggage bag i.e. robot capable of navigating through obstacles and successfully following its user. For human detection ultrasonic sensor is used which also help in distance measurement. For safety features GSM and GPS are used which help to locate the automatic bag in case its lost. Raspberry pi is used to integrate all the electronic components used in the project. Automatic luggage bag can also support mobile charging and it can derive its power using solar e**nergy.

Keywords—Automatic luggage bag, Obstacle detection, GSM, GPS, Dry Batteries, PIC, Raspberry pi.

I. INTRODUCTION

The luggage bag which is used in today's world is hand driven posing problems like exhausting human energy and not equipped with state-of-the-art safety features by means of automatic passenger intervention will be reduced to a minimum result of which will reduce the delay time and human efforts in luggage management system. In today's time everybody carries a luggage bag for travel especially to airport and almost all of them are dragging out heavy luggage bag. Every Passenger has to carry its luggage on its own which most of the time is very slow and tiring process because of heavy nature of luggage and journey becomes unpleasant. Automatic luggage follower bag is solution to this problem. It can also be called as smart luggage because of its automation. Ultrasonic sensor is used for passenger detection and distance measurement. The movement of the luggage is controlled using wheels which in turn are controlled by raspberry pi. GSM and GPS are used for security purpose to help track the luggage bag in case its lost. A message will be sent which will activate GPS and location of luggage bag will be sent using GSM. Minimum distance between the luggage bag and passenger has to be maintained, it is done with help of raspberry pi.

II. IMPORTANCE OF THE PROJECT

- Luggage bag is part and parcel of travelling, while travelling luggage bag has to be carried which is most of the time heavy to carry. Luggage can sometimes become problem if not taken take care properly. This project helps overcome this problem.

- The luggage can derive power using solar energy instead of battery and can support mobile charging.

- GSM and GPS will provide anti-theft security.

III. METHODOLOGIES USED

Human detection will be done with help of ultrasonic sensor. Ultrasonic sensor also helps in distance measurement. Security of automatic luggage bag is secured by using GPS and GSM. All components used are controlled and integrated using microcontroller.

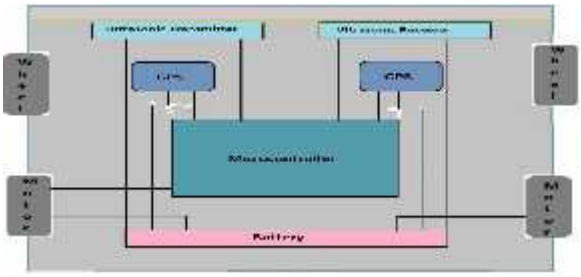

Fig 1. Block Diagram

IV. TECHNICAL TERMINOLOGIES USED

[0] Target Detection:

Detection is the method of finding each user position. The inaudible sensing device is the key element in target detection. Ultrasound detector measures live distance by transmitting ultrasound waves. It' supports the properties of acoustic waves with frequency on top of human perceptible range. There are 2 main components within the sensor, a transmitter to transmit the sound waves and receiver to receive echo. Transmitter converts voltage to sound energy and receiver half receives the echo and switch the received echo and received sound waves into voltage and also, the mechanism can move forward, right or left in accordance with the detected human presence. The fundamental principle behind the operation is that the inaudible transmitter emitted the inaudible waves in one direction and began temporal arrangement once it launched inaudible unfold within the air and would come straightaway once it encountered obstacle on the approach. At last, the inaudible receiver would stop temporal arrangement once it received the mirrored waves. because the inaudible unfold rate is 340m/s within the air supported the timer record t. we are able to calculate the gap between the obstacle and transmitter particularly,

$s = 340t/2$

This is known as because the time distinction distance measuring principle This is called as the time difference distance

measurement principle.

[1] Raspberry Pi :

Raspberry Pi serves as the project's microcontroller and will be wired to all other sensors. It is a low-cost, credit-card- sized device that attaches to a computer monitor or TV and uses a regular mouse and keyboard. It is a small capable device that allows people of all ages to explore programming, and learn how to program in languages such as Scratch and Python. An SD card inserted into the board's slot acts as the Raspberry Pi hard drive. It is operated by USB, and you can hook the video output up to a conventional RCA TV set, a more modern monitor, or even a TV using the HDMI port. The Raspberry Pi has found its way into the hobbyist computing market, but it is also very powerful for other business as well as personal use. An extremely low power draw, low form factor, no noise, solid state storage and other features make it an attractive solution for a thin, lightweight server

1. C.GPS:

The Global Positioning system is one in every of the systems that square measure space-based radio navigation system created from a minimum of twenty-four satellites. it's nothing however a world navigation satellite system that has geo-location and also the time info to a GPS receiver anyplace on or close to the world wherever there's AN unobstructed line of sight to four or additional GPS satellite. If we would like to calculate 2-D position (latitude and longitude) and track movement, a GPS receiver should be fastened on to the signal of a minimum of three satellites. The GPS system doesn't need the user to transmit any of the

information, and it operates severally of any telecom or web reception, though' these technologies will enhance the quality of the GPS positioning info.

I. D. DC Motor:

A DC motor is any of a category of rotating electrical machines that converts electrical energy voltage into energy. the foremost common sorts place confidence in the forces created by magnetic fields. The speed DC motor are often controlled by varied the availability voltage or by dynamic this in its coil The circuit use a one hundred rate twelve V DC motors with gear case, 6mm shaft diameter with internal hole, a hundred twenty five weight unit weight, Stall force = one.5 Kg/cm force, No load current = sixty mA (max), and cargo current = three hundred mA(max). This was the difficult portion for America to implement AN formula which ends up the rigid automaton body to trace the associated transmitter holder moreover because the user. because the correct usage of ultrasound sensing element is just ready to offer with the space of the situation of the user however not the precise position of the user.

II. E.GSM Module:

GSM or Global System for Mobile Communication is a Wireless Communication standard for mobile telephone systems. A sim card is put on GSM module which will help in tracking the luggage bag. A message is sent which activates GPS module and location can be tracked. It is a TDMA (Time division multiple access) based network technology. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. One key feature of GSM is the subscriber identity module commonly known as a SIM card. It operates at 850 MHz, 900 MHz, 1800 MHz and 1900 MHz frequency bands.

F. Bluetooth Module:

Bluetooth helps in collecting all the data and always maintain connectivity with the automatic luggage bag. Bluetooth requires a system of electronic components to receive, process, transmit and present collected data on user interface.

G. Proposed Diagram

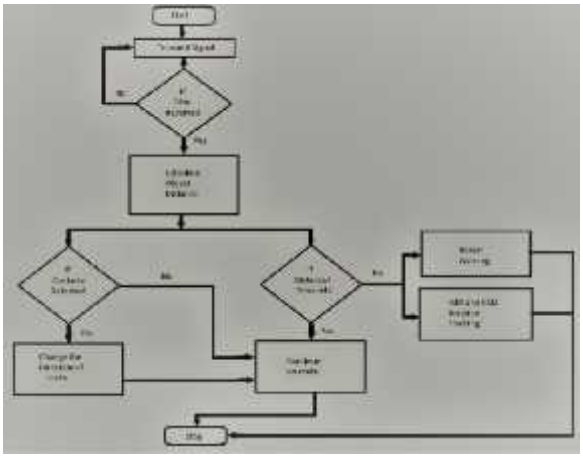

Fig 2. Procedure flow diagram

V. EXPECTED OUTCOME

Luggage carrying smart bag will be capable of following its user automatically after its connection is successful using technologies like ultrasonic sensor, GSM, GPS, Bluetooth, raspberry pi.

VI. RESULT

In day to day life when we are traveling and luggage carrier can become big problem. Using automatic following bag, we can overcome this problem. A security system that the user can be free of worries of its luggage being stolen or left behind. In future features like headphone points, USB point, Wi-Fi technology, fingerprint system for security purpose can be added and focus on to make less expensive and easy to handle.

VII. CONCLUSION

The limitations of the traditional luggage will overcome with Smart Luggage. The market is still new and has potential to accept the new face of luggage. Know the weight of your Luggage at any time and pack accordingly. Move the luggage easily using autonomous and manual modes. The smart luggage will ensure its safety and builds security for its user. From built-in scales to GPS tracking and mobile apps, these bags won't make hauling stuff any lighter, but they could make the experience less harrowing.

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GRIEVANCE CELL AND COMPLAINT TRACKING SYSTEM

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***Abstract*— A public complaint is a direct voice of the population against the government for conveying their opinions and their respective difficulties and problems encountered by them. Using complaint boxes or suggestion boxes isn't very effective and efficient for that matter ,not to forget that this process will be very slow and going through various personnel to resolve the respective issue. A very common issue is that the government doesn't allocate resources properly nor do they solve issues. Especially, in a city having a vast amount of population it can be difficult to deal with their needs and allocating the needful resources properly. Many problems are relatively on a small scale and include various problems such as bad condition or broken street lights ,park benches, potholes, non-functional traffic signal. For example issue of a traffic light's functioning would be more of a major concern of the Muncipalty than these potholes, benches, etc. Thus most often these minor issues are ignored and sidelined, hence causing problems for us in the long run.**

I. INTRODUCTION

Complaints are important way for managing of an organization to be held accountable to the public , as well as providing prompts to reviewing performance and the conduct of the people that work within or for it.This web portal primarily aims at providing a platform to register any complaints regarding the governance, on the go. It consists of a web portal to register the complaints online, from anywhere, at any time. This will minimize time as well as money to visit to an office for complaint registration. One problem resolved pertains to the replacement of personal visit to the office and registering and lodging complaints on paper, next important point is that this web portal surrounds the process of taking actions by the government bodies against the complaints registered by the citizens, as it ,the complaint, will have a certain validation period and if this complaint isn't solved within that time then this complaint will be directly forwarded to the higher or Superior authorities.

II. MOTIVATION

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis.Nowadays, all kinds of work, construction, metro work ,parking issues & many other things have come up.And people have been facing issues and problems.
For example, METRO work is going on all over Mumbai ,and there have been cases of stones ,debris falling and creating a bad environment around that specific area, so regarding this itself people have complainted to the BMC and MMRDA but there have not been successful results and outcomes .
Our system uses such an algorithm that complaints are 100% acknowledged and in most of the cases resolved, leading to full user satisfaction. Not just this but inside instituitions and colleges where there are several departments having different Head of Departments ,so here too we can implement this system and have achieve great outputs.
Since there are more of problems everywhere around and less of solutions anywhere ,we thought of inculting such a system where each problem gets acknowledged and each complaint gets resolved within a certain period of time. Hence creating this Complaing Tracking and Grievance Cell System.

A. Scope of the Project

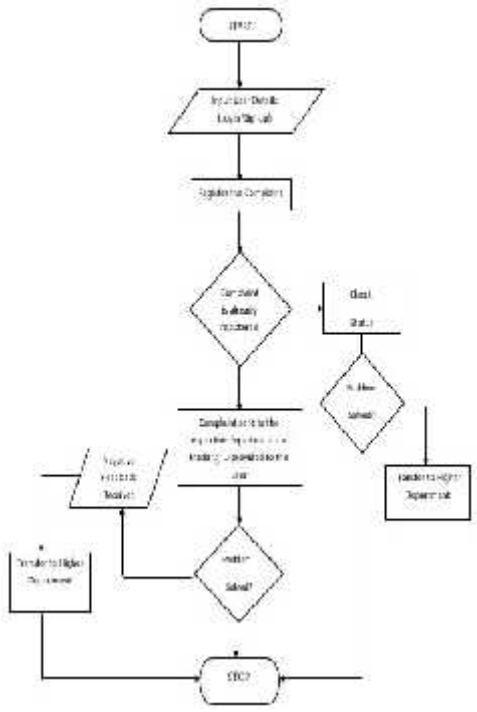
This Grievance Cell and Complaint Tracking System focuses on the things and abilities that other complaint systems couldn't do. This system is comprised of projects, we've inculcated both complaint management system and complaint tracking system.
This project has made complaints an effortless task without any long routes to government offices , avoiding long queues and most importantly avoiding the paper work and not having to be afraid of your complaint not reaching the respective person or the complaint itself getting lost in the paperwork.
This project provides the user with complaint monitoring and complaint tracking which severely helps people to have a timely update on their complaints. This project

is obviously a better platform for the masses and also gives the masses ease of using the website ,this portal is very much user-friendly.

III. PROJECT PLANNING

- Initially, we will research about the topic by going through all the various technical papers available on this topic.
- We will see the drawbacks of all the papers and how we can improve it. (gap identification)
- We will study about Java, MySQL and PHP as our whole project is based on these two languages.
- We will write the algorithm of the program and prepare and flow chart according to that.
- We will segregate the project into two parts, the first one is Html coding and second one is for Java coding.
- We will write the code, Java will be used for background coding and Html is used for building the page.
- We will coalesce the two program: Java and Html.
- We will run the code and debug if required.

A. Data Flow Diagram



B. Objective

The main objective of our project is to give the citizen a user friendly web portal where they launch their complain regarding any issue which can be solved by municipal cooperation and other government bodies primarily.

In this system all the power is in the user hand as user can track the progress of the complain or if the complain is not resolved in a specific amount of time the complaint will directly go to the higher authority.

So, basically our main objective to build this system is to give the user which is the local citizen a user friendly web portal where they can post their complain regarding any government related issue and track the whole process.

IV. LITERATURE SURVEY

Ankita Kotangale, Sneha More, Pinal Sakharka, Dimple Deshkar [1] “Complaint Tracking System for citizen” The project focused primarily on sanitation and a municipal corporation development. In order to make it possible, the citizens belonging to the municipal corporation were provided with a chance to raise grievance over any problem that happens in their portion. The concerns include waste management, water supply management and their related issues occur at any time, energy management, transportation and sewage system management and other important law & order issues, various social issues such as child labour. Digital dispute management could be a great method for evaluating, reviewing and reacting to feedback from clients. Code was used for recording, resolving and responding to client complaints, asking for further feedback.

Ms. Sneha Alve , Ms. Vishakha Babardesai , Ms. Sneha Bhosale , Ms. Siddhi Kapadi [2] “Web Application for complaint tracking and resolving”

The goal of this program was to promote the collaboration, reporting, recording and resolution of complaints and to provide an effective tool for organizations to keep records of complaint data, to use data to identify problem areas and to improve service. The system helps to identify the organisation's problem areas. It puts less effort into manual work. This is an effective tool for resolving complaints in particular time constraints. Complaint Management System is useful for monitoring grievances. Using internet this system works. This system works in three modules where the user can post their complaint as well as upload the photo and the responsible authority will fix it. Users can see the status of previous complaints and give feedback to the system according to the quality of the service user. If the password has been forgotten by the user then the password can be retrieved by email. Where that authority is unable to resolve complaint in a specific time period then he / she gives the administrator the explanation why the complaint is not resolved.

Dr. Swapna Borde, Gavrai Erkar, Jyoti Kaushik, Raminderkaur Gabrhi, [3] ‘’Real Time Grievance Registration and Tracking System Application”

The program proposed offers solution to the existing system by expanding its facilities as follows:• Citizens may post their complaints on the People's Corner android application. She / he is given complaint ID so that the officer can quickly solve the problems.

• Once registered, the complaint will be redirected to specific Municipal Corporation department.
• Includes a camera module to help you select the image of any problem people face and upload their image along with the complaint.
• Global Positioning System (GPS) unit
tracks the place of complaint.
• People can monitor the grievance status
using their complaint ID number.
Alizera Faed DEBII, CBS, Curtin University of Technology, Perth, Australia [4] “Handling e-complaints in customer complaint management system using FMEA as a qualitative system.”

Negative perception of customers often manifests as formal enterprises; while unknown percentages do not become so visible. Within a customer complaint management system, it is possible to identify the flaws in the service standards, in the complaint handling procedure itself, and the finer points that help to formulate resolution methods through careful analysis. Where major issues remain, grievances will spread across a variety of business activities, from organizational employee performance to managerial management of both policy and practice. A poorly managed and/or constructed complaint system can eventually affect the profit and loss status of the company through unnecessary spending, business reputation damage and through sales. As a company's ultimate goal is to attract consumers, achieve an effective profit margin and have a long-lasting relationship with customers and increase market shares. We will address disputes within the complaint management system and this system alone must be under the control of the management system for customer relations.

PanindaLiawsoboom,NarutPhongeon,Siripen,Pattammapo rn

,Faculty of Information and Communication Technology, Mahidol University Nakhon Pathom, [5] “smart complaint management system.”

Customers are the organisation's key element. The business has to support the customers ' preferences and demands to create the customer loyalty that still makes the customer buywith the particular company. The customer may feelunhappy with the service when he or she receives service delay and they do not know the mechanism for filing the complaint, and there are still problems with the current complaint handling in the organisations. We, developers of this project, have therefore implemented the Smart Complaint Management System (SCMS), which consists of the mobile application, chatbot and web application, to solve the dissatisfaction issue of the customerIn addition, the SCMS has the service to identify the complaint, then automatically direct it to the appropriate agency, and the service to locate the similar complaint in order to avoid the duplicate complaint being lodged. The test results show that this program will minimize complaint handling time and procedures, increase the channel for filing the complaint and increase the channel for recording progress and monitoring the complaint status.

P.Ramakanthkumar G.Prabhushankara S.llavarasu [6] “Analysis and Design of GPS based Target tracking system.”

The proposed system, entitled "Study and Development of GPS-based Target Tracking System and Radar Target Information," will assist the pilot, test engineer and radar evaluation team in real time and offline by evaluating the path of the target aircraft and HACK aircraft on the required map and will provide navigation-specific parameters such as latitude, longitude, altitude, distance, range. Throughout flight the device will save the destination information. The system will work on-line as well as offline. The data is received from two independent systems in this system (i) GTTS: Wireless modem target information is provided, and (ii) RADAR: RADAR target information available on MIL- STD-1553Bus. The flight location of the targets is determined using GTTS and RADAR data, and the flight path is shown on the map. This program also includes numerous zoom-in and zoom-out functionality for choosing different maps.

V. CONCLUSION

EXPECTED OUTCOMES

• We have introduced a citizen’s charter in this Complaints and Grievances Tracking systems.
• We are implementing a feature that would allow the users to get a call from the administrator if their complaint is not acknowledged or failed to be worked upon.
• An interim reply would be sent (through Call/Sms/Email) to citizens regarding the delay of complaints ,mentioning additional days to resolve.
• The complaint Receiver’s profile and Department would be sent to the respective person who has filed a complaint.
• Step by step tracking of the complaint.

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Integrated Hospital Reviewing and Management System (IHRMS)

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***Abstract*—Integrated hospital reviewing and management systems is a process of implementing all the activities of a hospital on a website which consist of webpage giving information about the specialization in the hospitals, accreditations received by the hospitals, public reviews, information about the doctors and also with the help of data analytics the website provides a chance to hospitals to improve their facilities in fields where hospital receives negative feedbacks. Many hospitals are good at keeping their patients safe, some hospitals aren't. As many as 440,000 die every year from preventable errors in hospitals. It's up to everyone to make sure that patient safety and satisfaction is the number one priority in India. Health care costs are a concern for everyone one in every country. People are willing to spend their hard earned money on their health but hospitals need to justify their costs, so this is why a proper reviewing system is necessary for the patients so that they can have the best choice in terms of facilities, costs, medicines, doctor availability and etc. Our website will form an interface between the hospital systems and patients where a patient or user will be provided with a user id and password for the site registration .A hyperlink of hospital actual websites will be available on the desk so that a user can find suitable hospital near by him and book an appointment with the doctors.**

I.INTRODUCTION

Nowadays many systems have been developed to make hospital management system easier. The system will include databases that will record all the data of patients in terms of registration, services, review, billing, appointment. Usually it uses digital system to record the patient and other information that is related hospital .There are many system for (HMS), but it does not meet the local user requirements in terms of reviewing as a proper system is required so that it would be easier for a user or a patient to choose the best hospital services near him at suitable prices.

The official statistics show that there is an increasing number of mistreatments due to improper identification of the patient or the drug given to patients. RFID technology was introduced in 1973 by micro w. Cardullo but was not used in industries till now. RFIDIs believed to be the next generation technology for tracking and data collection. FDA have estimated that half of the medical errors caused by misidentification can be prevented by using integrated IT.

System (IHRMS) is developed to improve the HMS and automate the work flow that happens in the hospital. This System is considering all the activities happening in the hospital plus webpage will provides a reference and a proper reviewing of hospitals for a user.

First user will make registration. If the user has never registered before, user information is collected and stored in the databases. After login with the help of GPS the site will reflect list of hospitals near him with specified information about the specialization of the hospitals , accreditation achieved, review and public rating given to the hospital. Once the user is done with fetching the best hospital near him he/she can view the hospital website with the help of hyperlink provided and then he or she is directed to the website of the main page of the hospital website where they can book their appointment and check doctors availability

II. LITERATURE SURVEY

It employs an automated system that is used to manage patient information and its administration .It is done with a view to eliminate the problem of inappropriate data keeping, inaccurate reports, time wastage in storing, processing and retrieving information encountered by traditional hospital system in order to reduce the long queue in hospitals and also help in improving overall efficiency of the organization. Tools used to implement the system are HTML, CSS, PHP and MySQL. A relational database (RDBMS) design was used to design the database. RDBMS organizes large amount of data and defines the relationship between the datasets in a understandable way. The main drawback of the system was that there was no reviewing system for the patients where they can put their meaning full feedbacks.

RFID system use radio waves to capture and transfer data without any human intervention. It consists three components 1)An RFID tag that are attached to an object for identification 2)An RFID

reader that requests the data from the tag 3)The Middleware that process and sore the information from the readers. RFID can also be integrated with an information system to provide intelligence services

This paper reviews the HIS (Hospital Information Systems) which are widely used in many hospitals in China to provide easier and faster way for daily medical activities. His aims at improving quality of health care services but do not have way of evaluating the various health care services.

So this paper proposes HSMS (hospital service management systems) which aim at improving quality of services identifying cost reduction areas, analyses and evaluate health care services.

Due to this ability of evaluating the services facilities hospital achieve higher customer satisfaction scores and get a competitive edge against those hospitals which scoreless or use HRS and do not have ways of promoting the quality of their services.

III. METHODOLOGY

In section 1, a prologue to the venture including the significance of the task, writing overview, foundation and inspiration, extent of the undertaking has been talked about. It gives a significance of the writing review and different papers alluded for this work. It talks about the work completed in related fields of music sort characterization and recovery.

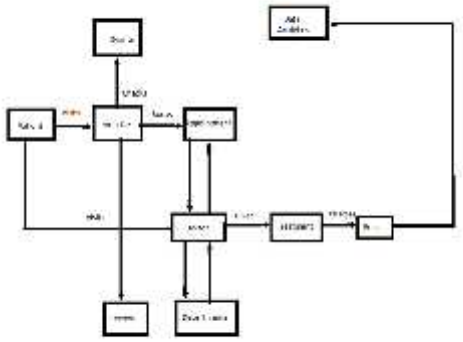
The residuum of this exposition is additionally isolated into various parts, the substance of which are condensed as pursues.

Section 2 gives the related hypothesis about component extraction strategy and different element descriptors, include vector measurement decrease method and also classifiers utilized in music recovery system. It will give the issue definition, Information stream chart and the proposed arrangement of the undertaking.

Part 3 will essentially give the insights about the booking of our task. It depicts the total usage technique in steps and course of events diagram of the work done in semester VII. Part 4 portrays and examines the test results got while playing out the feature extraction method.

The report finishes up with section 5 expressing the end dependent on results achieved. It likewise gives a thought regarding the future work that will be done in the following semester.

Nowadays many systems have been developed to make hospital management system easier. The system will include databases that will record all the data of patients in terms of registration, service, review, billing, appointment. Usually they are using digital system to record the patient and other information that is related hospital .There are many system for (HMS), but it does not meet the local user requirements in terms of reviewing as a proper system is required so that it would be easier for a user or a patient to choose the best hospital services near him at suitable prices.



Integrated Hospital Reviewing and Management System (IHRMS) is developed to improve the HMS and automate the work flow that happens in the hospital. This System is considering all the activities happening in the hospital plus web pages will provides a reference and a proper reviewing of hospitals for a user.

IV. CONCLUSION

1) Automation is the main benefit here.
2) The hospital database includes all the necessary patient data.
3) Hospitals authorities are able to manage their available resources, analyze staff work.
4) The system generates review on the basis of performances received from various departments.

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IMPLEMENTATION OF SMART AMBULANCE USING GSM AND IOT

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Abstract*— Care of critically ill patient, requires spontaneous & accurate decisions so that life-protecting & lifesaving therapy can be properly applied. Statistics reveal that every minute a human is losing his/her life across the globe. More close in India, everyday many lives are affected by Heart attacks and more importantly because the patients did not get timely and proper help .This project is based on monitoring of patients. We have designed and developed a reliable, energy efficient patient monitoring system. It is able to send parameters of patient in real time. It enables the doctors to monitor patient's health parameters (temp, heartbeat, ECG, blood pressure) in real time. Here the parameters of patient are measured continuously (temp, heartbeat, ECG) and wirelessly transmitted using GSM and Iot.This project provides a solution for enhancing the reliability and flexibility by improving the performance and power management of the patient monitoring system. In the current proposed system the patient health is continuously monitored and the acquired data is analyzed at a centralized microcontroller. If a particular patient's health parameter falls below the threshold value, an automated SMS is sent to the pre-configured Doctors mobile number using a standard GSM module interfaced to the microcontroller. Here, we are using Iot for wireless transmission, because it provides continuous transmission of data at particular interval of time. Here all the body parameters of a patient is calculated in the ambulance when the ambulance is on the way to hospital, so that a necessary arrangements can be done before patient reaches hospital. The Doctor can get record of a particular patient's information by just accessing the database of the patient on his PC which is continuously updated through Wi-Fi module.

I. INTRODUCTION

For the last three decades or more, information and communication technology has been a dominant force behind the development of every aspect of human civilization. Its major contribution has been towards consumer electronics, communication systems, production and distribution automation, monitoring systems, and navigation systems. Remote healthcare is a broad technological domain where patient(s) can be monitored and treated from a remote location [1] Rapid advancement in healthcare services and low cost wireless communication greatly assisted in coping with the problem of fewer medical facilities.

Tele-health and telemedicine are now becoming more engrained in the delivery of everyday healthcare, distance education and also healthcare administration. Lots of patients in underserved areas are receiving services that may not have otherwise received without travelling great distance or overcoming other transportation barriers. Tele-healthcare may be defined as the use of information technology to provide healthcare services at a distance. It includes anything like medical services at the inpatient or at the outpatient stage. What the doctors actually would like to see is constant monitoring of the vital parameters so they always know what the history is and how large the change is on day to day basis. When these findings and data points are available, then a much earlier intervention can happen for a patient.Tele-health has various platforms which connect patients to doctors 24x7 interactively using internet, video conferences, smart mobiles, database cloud computing etc. It gives great room for improvement in health administration in the 21st century and forms an umbrella that includes services, which are listed below:

Telemedicine: The integration of mobile communications with wearable sensors has facilitated the shift of healthcare services from clinic-centric to patient-centric and is termed as "Telemedicine" [2]. It can be extremely advantageous for people living in isolated communities and remote regions. It is currently being applied in almost all medical domains.

Tele-monitoring: It is acquiring of patients' health parameters like temperature, Heart rate, peripheral capillary oxygen saturation (SpO2) etc. and sending the collected data to hospitals for remote analysis and treatment. Tele-monitoring service also facilitates alert system that sends information of patient's body parameters to relevant doctor/nurse, if fluctuation of any parameters goes beyond threshold.

Patient Tele-monitoring Using GSM: Patient Tele-monitoring framework utilizing the GSM wireless technology with the help of Arduino uno. Global system for mobile communication is globally accepted standard for digital cellular communication. GSM is the name of standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a European mobile cellular radio system operating at 900 MHz. The GSM

standard is intended to address the problems of compatibility, especially with the development of digital radio technology.With the development of highly sophisticated and fast communication tools, the real-time monitoring became accessible and the developed countries found a way, by using telemedicine, to reduce the huge bills patients must pay for the health sector. However, such system is still not popular in underdeveloped country as the required infrastructure is not ready to handle it.

II. LITERATURE SURVEY

This chapter describes the drawbacks of existing healthcare system and related work done. A detailed literature review on patient monitoring systems is carried out. Also, a comparison of wireless technologies used in the systems like Wi-Fi, GSM, is presented. A brief introduction of the vital parameters is provided. ECG signals that forms a vital parameter for detection of heart conditions are discussed along with some other vital parameters are calculated and recorded in the database.

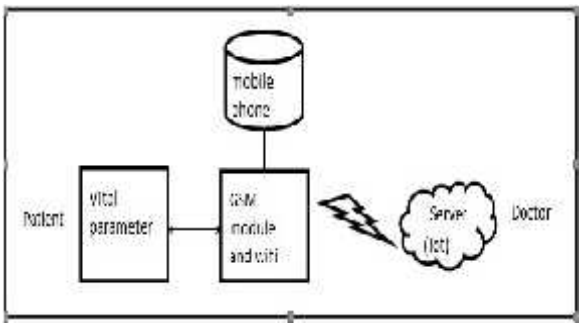
Existing system and its drawbacks

Currently the system used for patient monitoring is the fixed monitoring system which can be used only when the patient is on bed. These systems are huge in size and only available in the hospitals in ICU and difficult on the patient's side. Now-a-days many systems for continuous monitoring of the patient are available. But they have following drawbacks [3].

1. in existing system patient needs to be hospitalized
2.Regular monitoring of patient is not possible once he/she is discharged from hospitals.
3. These systems cannot be used at individual level.
4.Existing systems are bulky in size and their maintenance and cost pose a hurdle.
5.Most of the existing systems use wired communication which is too tedious for long distance communications.
6.They are not successfully implemented when patient is moving.

III. METHODOLOGY

The proposed system is a wireless system which could be implemented in Ambulances for the welfare of the patients. The basic idea of the system working is demonstrated in the figure below:



The System makes use of the microcontroller Arduino uno and interfaces the data to the wireless gsm module for the transmission. Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. The

Why Arduino?

Inexpensive: Arduino boards are relatively inexpensive compared to other microcontroller platforms



Cross-platform: The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.

Simple, clear programming environment: The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.

Open source and extensible software: The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add

AVR-C code directly into your Arduino programs if you want to.

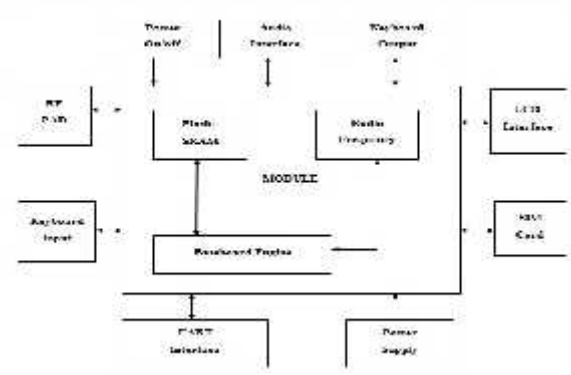
Open source and extensible hardware: The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

It makes use of a LCD 2×16 display. LCD is a type of display used in digital watches and many portable computers. LCD displays utilize to sheets of polarizing material with a liquid crystal solution between them.



SIM (Subscriber Identity Module) Card Slot:

This onboard SIM card slot provide User functionality of insert a SIM (GSM only) card of any service provider. Process of inserting and locking SIM card into SIM card slot is given in this manual. While inserting in and removing out SIM card from SIM card slot, User needs to take precaution that power supply should be OFF so that after making power supply ON, it will be easy to reinitialize with SIM for this module**.**



Arduino IDE 1.6.0 Software: The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

IV. RESULTS AND DISCUSSION

Our Smart ambulance aims to build a medical device used for carrying of patients who require medical care identification which can determine and display certain important parameters of patient such as body temperature, eye blinking, blood oxygen level, heartrate and body motion. It can display all the mentioned Parameters wirelessly. This can however save time and could prove more beneficial for patients who need to be hospitalized immediately. The main use is that at the time of emergency it automatically fetches the important parameter of the patient body on the departure towards hospital rather than calculating it after reaching the hospital which will reduce the time and human efforts.

As far as medical field is concern, the communication should be very much fast as well accurate for safety medical treatment, to prevent malpractice and improve the quality of medical care. Reason behind using GSM module is initially it provides good transmission rate. Since GSM provides better transmission rate but power consumption in case of Zigbee is low as compared to GSM. The reason why other modules are not used is because of the range issue.

V. CONCLUSIONS

This technique presents a system to upgrade existing health monitoring systems in the hospitals by providing monitoring capability and a thus a better cure. This system is based upon wireless technology i.e. GSM providing low cost-effective solution. As it is wireless device, the cost of cables is reduced here. It provides continuous monitoring of the vital signs of the patient over long periods of time until an abnormal condition is captured and hence Critical situations can be overcome. This intelligent monitoring system provides long term monitoring capability useful for the staff in the hospitals and reduces their workload. Future work may include a greater number of sensors in a single system to provide flexibility. Hence the main goal of this paper is to develop a patient health monitoring system to alert the staff in the hospitals so that immediate care is provided to patients.

The proposed technique has the following advantages:• Easy and Reliable for Doctors: In a hospital, either the nurse or the doctor has to move physically from one person to another for health check, which may not be possible to monitor their conditions continuously. Thus, any critical situations cannot be found easily unless the nurse or doctor checks the person's health at that moment. This may be a strain for the doctors who have to take care of a lot number of people in the hospital.

• Increase efficiency: The number of nurses required for keeping a
check on patients in ICU can be reduced to a large extent.
• More Accurate: Chances of human error in checking different health parameters is also reduced, also the database can be updated time to time.

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Formulation of Non-Uniform Loop Antenna

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Abstract— ***There are many unbalanced antenna printed on UWB but very few balanced antenna on UWB.The balanced antennas UWB are a dipole bow-tie and a spiral antenna. There are very few literatures devoted to large or UWB loop antenna architecture. This dissertation is about how such a UWB antenna is designed. To obtain a parametric equation for the configuration of a non-uniform printed loop antenna, different radii of the inner loop and outer loop are taken and compared to the wavelength of the antenna's lower cut-off frequency***

Keywords— ***thin loop antenna; thick loop antenna; ultra-wide band; nonuniform loop antenna***

I. INTRODUCTION

As the need for more data is increasing, UWB needs present and future communication systems. High- speed data transmission requires greater band availability. Broadband antennas are used as transmitting and/or receiving components to meet the need for a greater bandwidth. Certain UWB technologies include position and ground penetration radar monitoring. So far monopoly antennas have emerged as strong candidates to fulfill UWB applications requirements. Metamaterials or EBG structures were applied to the monopole antennas to increase the gain and other electrical and radiation characteristics. Coplanar stripline (CPS)-fed dipole printed antennas span a spectrum from 3.1GHz to 11.4GHz. In antenna architecture this structure has too many dimensional parameters[1]. A closed loop system gives the researchers greater scope to participate. A square printed loop with L-shaped portion to its arm provides excellent output on the lower band of the UWB network, from 3.1GHz to 5.1GH

II LITERATURE SURVEY

Girish Kumar, Narayan Prasad Agrawall and K. In 1998 P. Ray proposed to have a planar monopoly. The circular monopole antenna is transformed into an elliptical one with a ground plane associated with the disk axis. It is evaluated that the elliptical antenna bandwidth is function of the ellipticity ratio and the average obtained bandwidth is 1:10.7 for the ellipticity ratio of 1:1.

RongLin Lin et al suggested a circularly polarized loop antenna with broadband cable. The antenna consists of two loops, one within.

II. FRAMEWORK

A broad non-uniform loop antenna band occupies a spectrum between 3.4 GHz and 9.4 GHz. The creation of the non-uniform printed loop has opened up the following possibilities:

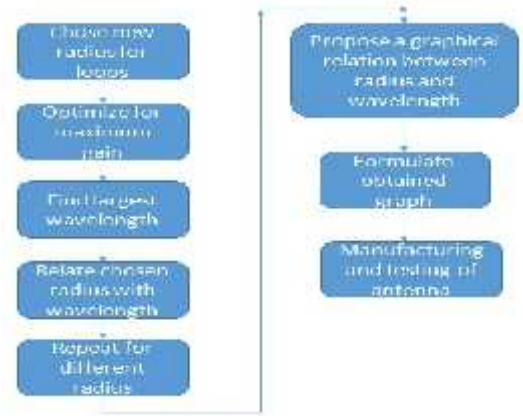
1) Multiband reconfigurable printed antenna architecture using metamaterials.
2) Low-size or lightweight UWB-printed loop antenna style.
3) Formulation of current antenna in written loop.
4) Reduced scale



III. Related work

In order to obtain parametric equation or concept graph, the proposed loop is evaluated as follows:

- Choose different loop radii.
- Optimize Bandwidth and overall cost.
- Consider wavelengths greater than this.
- Finding the relationship between the radius and the greatest wavelength • Repeat.
- Consider the relationship between the radius and the largest wavelength.
- Fabrication and testing;



IV. Analysis of UWB Loop

In order to get a distinct relation between antenna dimensions and antenna wavelength antenna is simulated for different dimensions of loop.

1) Outer radius 35 mm and inner radius 26 mm:

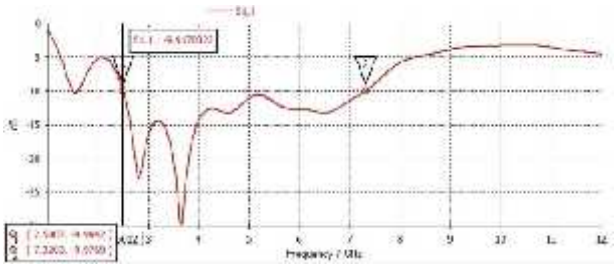


Figure 3.1: Reflection Coefficient (S11) V/S frequency.

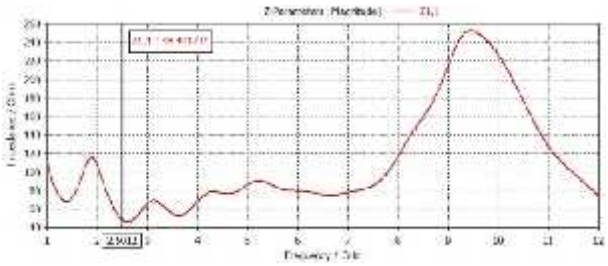
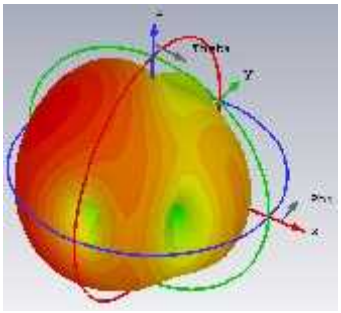
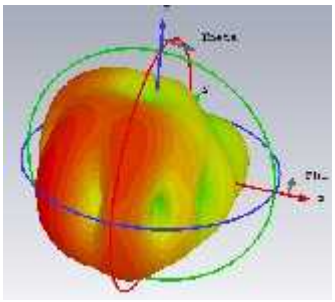


Figure 3.2 : Impedance V/S frequency.



(a) Gain 6.3 dB @ 3.9 GHz



(b) Gain 7.6 dB @ 6.5 GHz

Figure 3.3 : Radiation pattern of non-uniform Loop

2) Outer radius 35 mm and inner radius 26 mm with thin width:

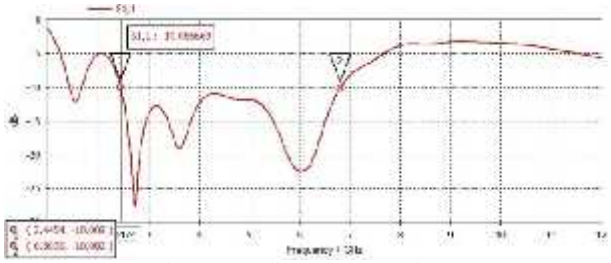


Figure 3.4: Reflection Coefficient (S11)V/S frequency

3) Outer radius 40 mm and inner radius 26 mm with thin width:

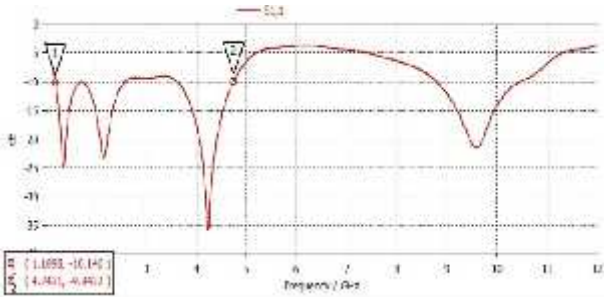


Figure 3.5: Reflection Coefficient (S11)V/S frequency.

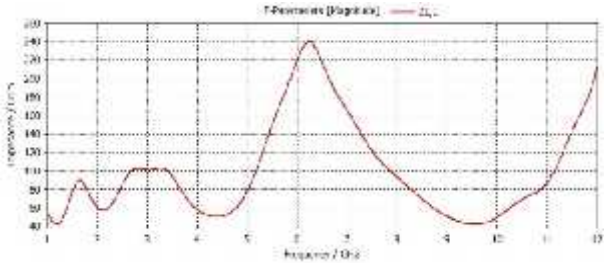
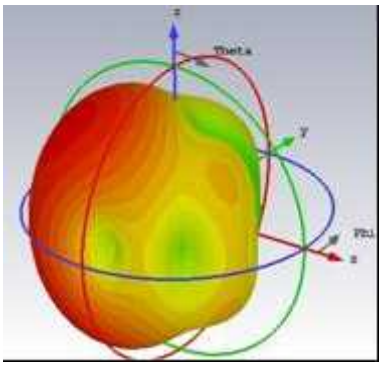
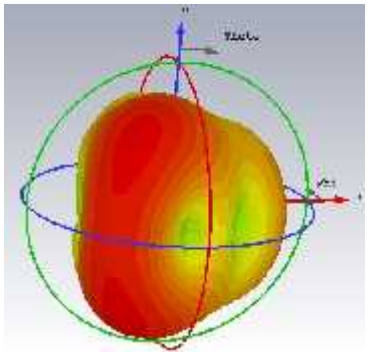


Figure 3.6 : Impedance V/S frequency.



(a) 7.22 db Gain @ 3.9 GHz.



(b) 7.5 db Gain @ 4.4 GHz.

Table3.1 Antenna dimension and its radius

Outer Radius (1)	Inner Radius (2)	Average Radius (3)	Largest wavelength λ	% Bandwidth
24	17.75	20.875	880mm	92
35	26	30.5	88.23 mm	97.96

It can be observed that the loop produces a bandwidth of 92% while the other loop with larger radius gives band width of 97.96%

V. FUTURE SCOPE & CONCLUSION

This technique can be used to build an antenna for applications in the Ka band or higher than the Ka band, where the antenna size becomes so low that it requires a special laboratory to produce it. If this method is used to build antennas at such a high frequency, the loop measurements will be larger enough, and the basic pcb design technique can be used to manufacture the antenna at a low cost. The proposed antenna displays greater bandwidth percentage than any other written wideband loop antenna. The loop's simulated and calculated bandwidth is 91.4 per cent with a pattern of unidirectional radiation directed opposite to the stream.

Since the pattern is accessible in the opposite side of the feed, multiple feed points can be achieved for the proposed antenna, and pattern reconfigurability can be achieved. The proposed non-uniform loop antenna has the unique property of being able to feed the antenna continuously. The antenna offers various electrical properties for the various feed positions. This property is not provided in the traditional loop antenna structure.

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Website Protection and Analysis Using Dedicated Security Tool.

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***Abstract*—The number of users using the World Wide Web has crossed 3.8 billion and the number is increasing day by day. Today Internet touches all aspects of our life, education and economy. There has been a significant increase in hacking of websites on daily basis due to the vulnerabilities present in the websites. According to White Hat security's "2018 Website Security Statistics Report" more than 60 percent of websites had at least one serious and exploitable vulnerability open throughout the year – meaning the doors to easy exploits were wide open. It has become highly essential that each website should have a security measure in place. The main research goal of this paper is to overcome this challenge by presenting an tool which can present an online anomaly behavior analysis of websites and protection of websites from hackers.**

Keywords—Website Security, SQLi Injection Attack Mass Request Attack

I. INTRODUCTION

Websites have the power to interact with their customers and thus most businesses depend on websites to sell their products. Internet currently hosts more than a billion websites and a wide range of heterogenous devices are used to access them. Due to this rapid advancement there has been a significant increase in the vulnerabilities of websites that are being hacked. Thus The remaining sections of the paper are organized as follows. In Section 2, we highlight the related work in web security. Section 3 presents an overview of our anomaly behavior analysis for websites and security. In Section 4, wepresent our experimental results and evaluation. In Section 5, we present conclusions and future research direction.

there are opportunities for individuals, groups or governments to perform cybercrimes and malicious activities due to this web vulnerabilities. According to White Hat security's "2018 Website Security Statistics Report" more than 60 percent of websites had at least one serious and exploitable vulnerability open throughout the year – meaning the doors to easy exploits were wide open.

The bad news is that there are number of people out there that are testing your website with a different attempt. They check your web server for vulnerabilities and unpatched flaws. The attacks range from using webpages to deliver malwares, phishing to more complex attacks like SQLi attack ,Cross site scripting ,Mass Request or Flood attack etc. With no effective website security tools in place one can expect the website security to be even morecritical.

The main research goal of this paper is to overcome this challenge by presenting an tool which can present an online anomaly behaviour analysis of websites and protection of websites from hackers.

II. UNDERSTAND HOW WEB APPLICATION WORK

Any program that runs in a web browser and can be accessed over the web is a web application. They provide functionality to user without having to download and install the application software. The web applications can be easily updated as the updates need not be sent to individual computers. There are three layers in a web application. The first layer is the user-side and consist of web browser that displays the content of the web pages. Second layer is the server side, that generates dynamic content pages. Third layer is the backend database where the data is stored.

III. EASE OF USE

The system consist of a simple software Web Interface and thus it would be easier for the user to analyze his/her website for any threats according to his/her convenience. The owner will just have to upload the necessary files to the server using an FTP and install our security application for his/her website. Once the system is started, the user can monitor his website and get the necessary notifications if there is any threat posing to his/her site.

IV. LITERATURE SURVEY

Anomaly behaviour analysis of website vulnerability and security By:- Pratik Satam, Douglas Kelly , Salim Hariri According to White Hat security's "2015 Website Security Statistics Report" more than 86% of all websites have one or more critical vulnerability and the likelihood of information leakage is 56%. With no effective website security measures in place, one can expect the website security to be even more critically The main research goal of this paper is to overcome this challenge by presenting an online anomaly behavior analysis of websites (e.g., HTML files) to detect any malicious codes or pages that have been injected by web attacks. Our anomaly analysis approach utilizes feature selection, data mining, data analytics and statistical techniques to identify accurately the webpage content that have been compromised or can be exploited by attacks such as phishing attacks, cross site scripting attacks, html injection attacks, malware insertion attacks, just to name a few. We have validated our approach on more than 10,000 files and showed that our approach can detect malicious HTML files with a true positive rate of 99% and a false positive rate of 0.8% for abnormal files.

Web application security tool analysis By;- Abdulrahman Alzahrani, Ali Alqazzaz, Huirong Fu, Nabil Almashf Strong security in web applications is critical to the success or your online presence Security importance has grown massively, especially among web applications. Dealing with web application or website security issues requires deep insight and planning, not only because of the many tools that are available but also because of the industry immaturity, Thus, finding the proper tools requires deep understanding and several steps, including analyzing the development environment, business needs and the web applications' complexity. In this paper we demonstrate the architecture of web applications then list and evaluate the widespread security vulnerabilities. Those vulnerabilities are: Insufficient Transport Layer Protection, Information Leakage, Cross- Site Scripting, and SQL Injection. In addition, this paper analyzes the tools that are used to scan for these widespread vulnerabilities in web applications. Finally, it evaluates tools due to security vulnerabilities and gives recommendations to the web applications' users and administrators aiming to educate them.

PROBLEM DEFINITION Problem with current scenario

The world wide web has grown exponentially over the previous decade in terms of its size that is currently over a billion sites, as well as the number of users. In fact, web usage has become pervasive to touch all aspects of our life, economy and education. These rapid advances have also significantly increase the vulnerabilities of websites that are being hacked on a daily basis.

Drawbacks of existing system There is a possibility for getting inaccurate results.

- User privacy is very less. It may consume the data on client's site for their own monetary benefits
- Less personalization.

So to achieve this we have to Protect your website from QLi Attacks (SQL Injection), Mass Requests (Flood), XSS Vulnerabilities, Proxy Visitors, Spammers, Malicious Files (Shells) and many other types of threats

SCOPE OF THE PROJECT

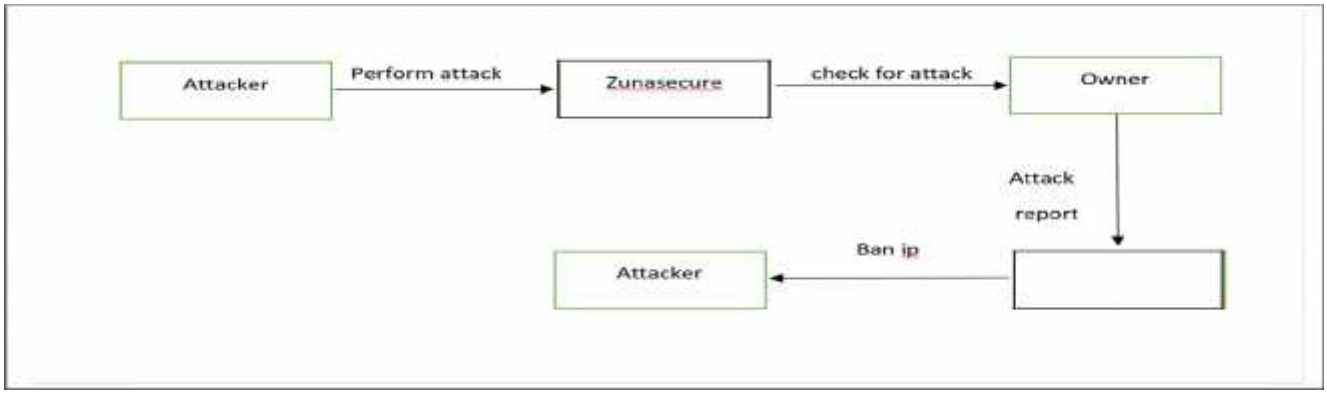
To provide security to websites like E-commerce, Blogging sites and sites which store huge amount of data which can be hacked by an attacker. The world wide web (www) does not have solve the privacy problems. Virtual Private Networks (VPNS) solve a lot of privacy problems. Since a VPN usually encrypts your traffic between your computer and the VPN provider, it makes it very difficult for an observer to or traffic to see what you're up to. There are literally millions of VPN users on anxious web pages worldwide. It may be possible to develop an application to which could Track all the important information about the person using a VPN to access your webcontent content Your website. This will help in securing the important content on user's websites.

V. NECESSITY TO USE

Sophisticated application are being developed on the web which is a complex application platforms. Hackers increasingly are targeting the web apps since software developers these days are writing secure code and developing and distributing patches to counter traditional forms of attack, such as mass requests. Also, secure protection is being provided at host and network levels using the current security technologies like antivirus and network firewalls but not at application level. The main targets for attacker are the public interfaces to web applications.

It is very difficult to remove the vulnerabilities in the web application mainly because of two reasons. First the web applications are developed in-house by some Management Information System engineers(MIS), most of whom have less training and experience in secure software development if compared to engineers at large software firms such as Accenture , Cognizaant , TCS , Facebook. Second, most applications go through rapid application development phases with extremely short turnaround time .

VI. SYSTEM DESIGN



A.Block Diagram

Fig 3.1 has the following:

1) Attacker: A person who makes any attempt to expose, alter, disable, destroy, steal or gain unauthorized access.

2) ZunaSure: Software used to provides Website Security

3) Owner: A person who owes a Website and wants to secure it.

SQLi Injection detection

Fig 3.2 below, explains the detailed steps of implementation of the system, which are as follows –

I. The attacker tries to perform an SQLi attack by inserting javascript, html tags , css tags , multiline comments, or

PHP function preg_replace($search, '', $input) which helps in replacing the elements in the array with a blank field. Thus data is sanitized as ZunaSecure also has patterns, used to detect Malicous Request.

III. ZunaSecure notifies the owner of the site by sending an email which by sending an email notification by using an userdefined function which will

malicious request (example: "+select+", "union+", "+or+")

II. ZunaSecure sanitizes all fields,inputs,forms by using php function

filter_input_array(INPUT_GET, FILTER_SANITIZE_STRING) for both GET and POST types of submission.

ZunaSecure also performs a advanced sanitization of all fields, inputs, forms by using userdefined function cleanInput($input) which has an array of html ,javascript, css tags which need to be striped. The cleanInput($input) makes use of predefined

Example: $patterns = array("+select+", "+union+", "+or+",);

make use of PHP predefined function mail($to, $subject,

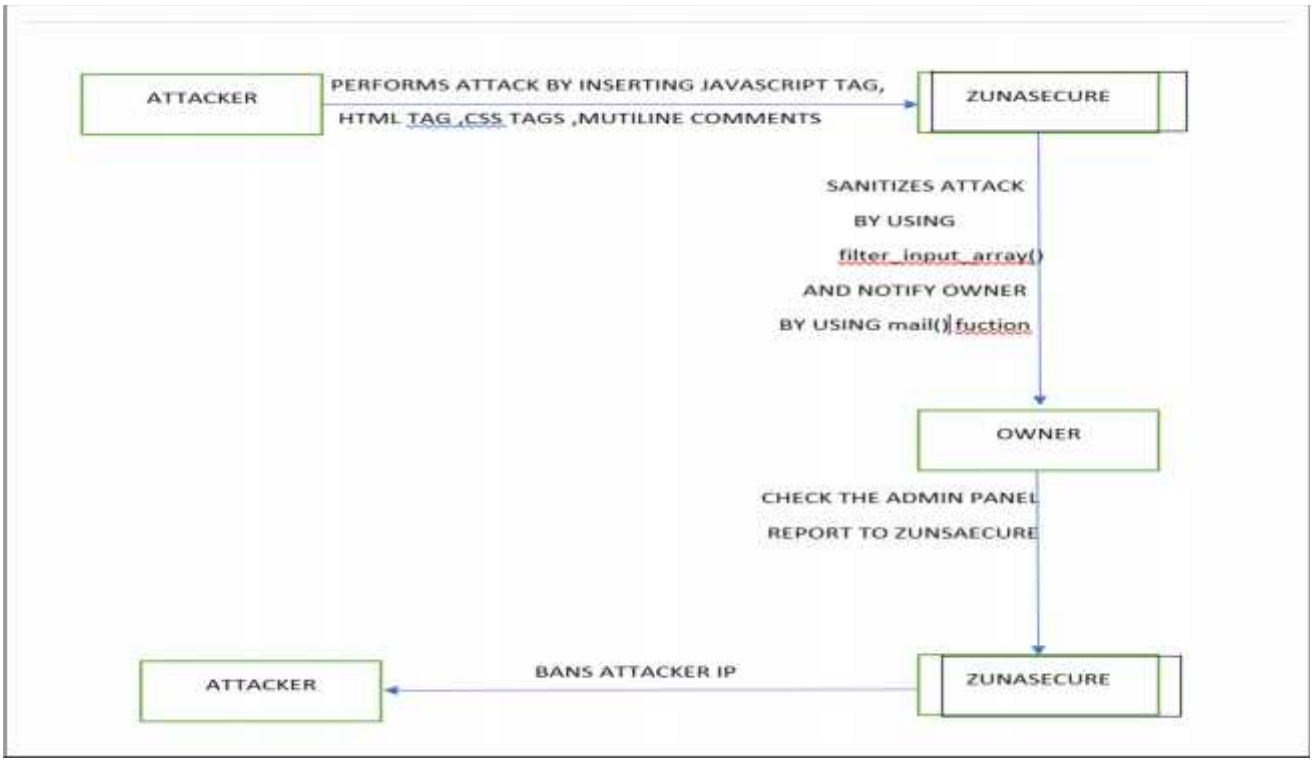
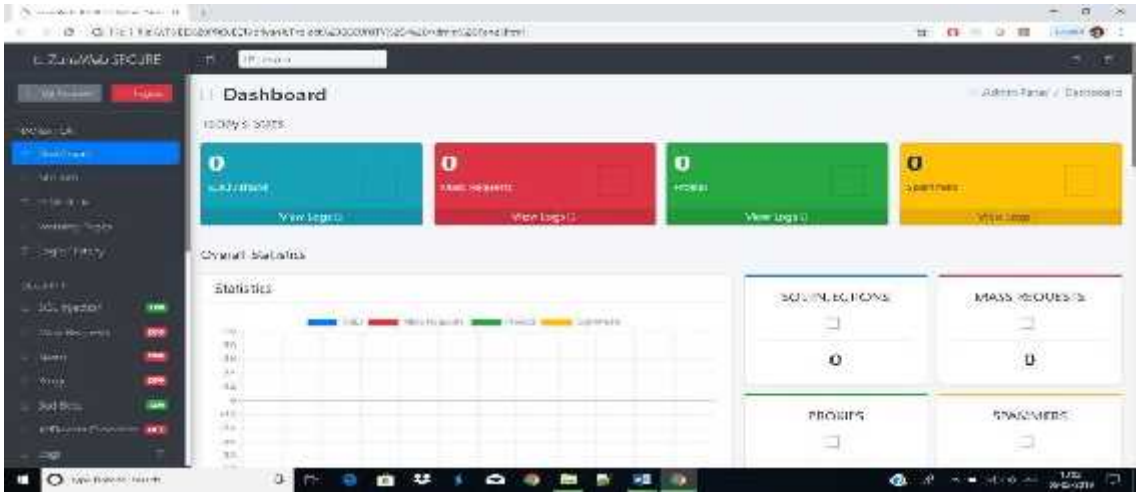


FIGURE 3.2: System Block Diagram

VII. EXPECTED RESULTS



VIII. CONCLUSION

Website Security Using Web Application is a powerful website application that protects websites of clients from hackers, attacks and other threats. It gives protection to website from SQLi Attack(SQL Injection),Mass Requests(Flood), Spammers. The admin panel provides with online anomaly behavior analysis of websites (e.g., HTML files) to detect any malicious codes or pages that have been injected by web attacks. Thus ZunaSecure personalises the website data and increases the website security.

XI. ACKNOWLEDGEMENT

I express my thankfulness to our Project guide Ms. Archana Deshpande, Department of Electronic and Telecommunication Engineering for her persistent direction. She has always urged me to be engaged. Her perception and remarks helped me to build up the general heading of the work and to push ahead with examination top to bottom. I am obliged to her for her ethical help through every one of the phases amid this work. Our most profound feeling of appreciation goes to Mr. Vinitkumar Dongre for his consistent help and direction all through the scholastic year. Likewise, the generosity of our vital Dr. B.K. Mishra can't be overshadowed. He broadened his help at whatever point required.

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Evaluation of Drought Preventing System Using Big Data Analysis

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***Abstract*— In today's world drought prediction and prevention is most needed system to be applied. The prediction of occurrence of droughts has been a challenging task. However, it is necessary to predict about the drought conditions to avoid great effects that are caused because of the drought statics that has been seen previously. This evaluation is done with utmost accuracy to prevent loss of life and property. Based on the previous year's statistics done on rainfall, temperature and transpiration data, drought has vigorously affected climatic, economic, agriculture, lifestyle. Due to climate changes and the uncertainties in future weather conditions, research on drought monitoring has become one of the most important research and working on this has become one of the essential tasks. The output of this new concept can be developed to a full system and is helpful for great measurements needed for preventing severe drought. Droughts are the most frequent natural disasters in the world. In order to improve the condition occurring due to drought we are designing a tool which will give the information and will allow taking preventive measures. The results present that these methods will successfully identify the droughts and will prevent the negative effects. These data can be used to extract more data information and increase predicting accuracy for drought and flood.**

Keywords*— Bigdata, Hadoop, Water level analysis, Drought prediction, Chennai water crisi

I. INTRODUCTION

With all the severe droughts happening in the world there is shortage of supply of fresh water. Drought is lack of sufficient water resources to meet the need of fresh water usage within a region which can last for weeks, months and even for years. It also has impact on the ecosystem and agriculture of the region which vigorously harms the economy the region. There is large number of migrations from one region to another. Drought has a negative effect on the health of people, increases in pollution level, increase in food cost and many more negative effects on the society. Farmers are more likely to get affected by the drought, most of the migrate during drought because they don't have any other resources of food or water. There are many cases of suicide of farmers in drought region because of loss in agriculture.

In order to prevent this, we have proposed a drought prediction system which will help to plan preventive measures in advance

II. LITERATURE SURVEY

The system proposed in the paper is to develop an intelligent system concept for drought information extraction and prediction from satellite images. For this 11 attributes that characterized drought were used, models were developed, a system with GUI was designed and experiments were conducted for time lag predictions.[1]

It provides a system that makes Drought and Floods predicting system more mature with the help of extended empirical orthogonal function technique combined the spatial characteristics and temporal characteristics.[2]

In this paper, a system for drought predicting and resource allocation system has been proposed. Comparison between various drought indices and predicting models has been done by stating their advantage and disadvantages.[3]

III. IMPORTANCE OF THE PROJECT

Drought situations management should be approached differently. It requires more immediate and accuracy because of rapid changes in climate situations and also due to many limitations of detecting the risk of drought because of increase in population so the analysis should be done deeply and with minute details on ground level. This project will help us to understand the increase in drought regions and also help us to find the reasons for drought. It helps to take preventive measures to deal with water crisis. Institutional, satellite and other available

methods often make drought predicting with less accuracy. One of the most important things is about the lack of understanding about the drought conditions by politicians, citizens. Thinking and working on the difference and difficulties faced by public these statics will lead to the solutions of many problems faced by people due to drought. A proper drought preventive system requires anticipating the possible effects. The processing this data analysis is intended to flexibility and is more effective to the previously method proposed. This project will lead us to predict future conditions because of drought and help to increase climatic, economical and will help to increase the condition and lifestyle of farmers.

IV. METHODOLOGIES USED

The analysis is done on parameters such as rainfall in the reservoir region, water level of reservoirs, population growth per five years, daily household consumption of water, ground water level because drought is a result of linear decrease of the water level in the water resources and this data provides the daily variation in the water level.

Data collection:

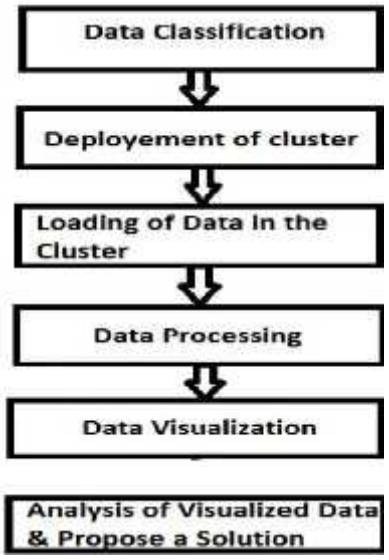
There are four reservoirs in Chennai that are Red Hills, Cholavaram, Poondi and Chembarambakkam with combine capacity of 11,057 million cubic feet. These reservoirs are the major sources of fresh water for the city. The dataset has details about the water availability in the four main reservoirs over the last 15 years. The data is available on a daily basis. apart from the reservoirs, the other sources of fresh water are desalination plants at Nemeli and Minjur and aquifers in Neyveli, Minjur and Panchetty.

The rainfall in these reservoir areas is also taken into consideration. The rainfall data set has details about the rainfall in the reservoir region in last 15 year. All these data are collected from the metrological department of Tamil Nadu. The population of Chennai in 2020 is estimated at 10,971,108. The population in 1950 was 1,491,293. The population of Chennai is grown by 1,294,036 since 2015, which represents a 2.54% annual change. These population estimates and projections come from the latest revision of the UN World Urbanization Prospects.

Data visualization:

Using the data collected from the various source the data will be visualized using tableau software integrated with Hadoop. The data visualization will help understand the dataset more easily and will help in understand the patterns and trends in the group of data. Further the data will be analyzed and appropriate prediction will be made accordingly.

V. FLOWCHART



VI. EXPECTED OUTCOME

The system will be able to predict the drought in the region of which the data is provided. According to the statistical output appropriate measurements can be taken to prevent the drought and water level crisis in the region. Real time monitoring can be done using this system. Including the other parameters such as day to day temperature variation, humidity, moisture content in soil will make the system more accurate to predict the Drought in the region.

VII. RESULT

During the course of this project we did a thorough study of Big data and its algorithm through various E-Learning platforms. We are learning Hadoop through E-Learning platforms to create cluster. We have created a basic cluster on which we can add the various tools and algorithm next semester to improve on accuracy. The basic cluster is created using AWS cloud, virtual machines are launched in EC2. For storage of data AWS S3 is used. The data is collected from Chennai Metropolitan Water Supply & Sewage Board. The data is about the rainfall in reservoir region, water level in reservoir, water used by the different household heads, households having their own source of water such as well.

VIII. CONCLUSION

This project presents the real time implementation of drought prediction which is invariant to illumination and performs well under various conditions. The proposed system achieves good accuracy which supports its algorithm and is satisfactory keeping its algorithm in mind. A structure dataset and more data on various points like migration of population from one state to another can increase the accuracy of the prediction. The idea of using Hadoop as the framework is to distribute the data on numbers of nodes to increase the efficiency. The datasets are stored and kept in DBMS were not analyse to get the information from it till now, so basically the purpose is to make use of the dead data stored. By taking proper measures and the solution provided by the analysis the drought can be prevented. This analysis can be done by using python or any another software tool made for data visualisation, but the data is going to increase day by day and to do real time prediction it is important to that the real time data is loaded on the machine for processing which can be easily done using Hadoop framework.

ACKNOWLEDGMENT

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UWB LOOP ANTENNA AS RECONFIGURABLE MULTIBAND ANTENNA

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***Abstract*— There are distinct and regular approaches to convert a wide band antenna into a multiband antenna. These techniques include current reconfiguration, structure reconfiguration and metamaterial. But these techniques are mainly applied to printed MS antenna, and dipole antenna. Such techniques are not available in case of loop antenna. This work is dedicated to the application of metamaterial to UWB printed loop antenna.**

Keywords*— *coplanar strip line; thin loop antenna; thick loop antenna; wire antenna; ultra-wide band; nonuniform loop antenna

I. INTRODUCTION

As the need for more data is increasing, UWB needs present and future communication systems. High-speed data transmission requires greater band availability. Broadband antennas are used as transmitting and/or receiving components to meet the need for a greater bandwidth. Many UWB technologies include position and ground penetration radar monitoring. So far monopoly antennas have appeared as strong candidates to meet UWB applications requirements. Metamaterials or EBG structures were applied to the monopole antennas to increase the gain and other electrical and radiation characteristics. Dipole printed antennas fed with coplanar strip line (CPS) span the 3.1GHz to 11.4GHz bandwidth. In antenna architecture this structure has too many dimensional parameters[1]. A closed loop structure offers the researchers greater scope to contribute. A square printed loop with a portion of L shape to its arm provides excellent performance at the lower UWB system band, ranging from 3.1GHz to 5.1GHz[2]. The antenna shows a bandwidth of return loss of-10dB over the whole frequency band. The lower band is found to depend on the L portion of the loop antenna, however the taper transmission line determines the upper frequency limit. The level of antenna bandwidth is 48.78%. A printed loop antenna fed with coplanar waveguide will produce a 1GHz and 1.14GHz bandwidth. This antenna is suited to PCS and IMT 2000 devices applications. The antenna has a great gain with pattern of omnidirectional radiation[3]. A small loop antenna fed with a CPW line provides a bandwidth of 70 per cent. The low antenna size makes this useful for array applications[4]. There is a narrow circular polarized bandwidth in a single loop antenne. If this antenna is added as a passive element with another loop antenna, then a second band is created and the antenna combination produces a greater bandwidth with circular polarization[5]. The technique of band enhancement[2] was extended to a circular loop, and 88.6 percent bandwidth was achieved. The proposed work did not provide any justification for bandwidth enhancement and no consideration was paid to the effect of the proposed shape on the pattern of antenna radiation. Ease of Use A metamaterial is a substance designed to have a property not present in natural materials. These are made of multi-element structures, constructed from composite materials such as metals and plastics. Usually, the materials are arranged in repeating patterns, at scales smaller than the wavelengths of the phenomena they influence. Metamaterials derive their properties from their newly designed structures and not from the properties of the base materials**.**

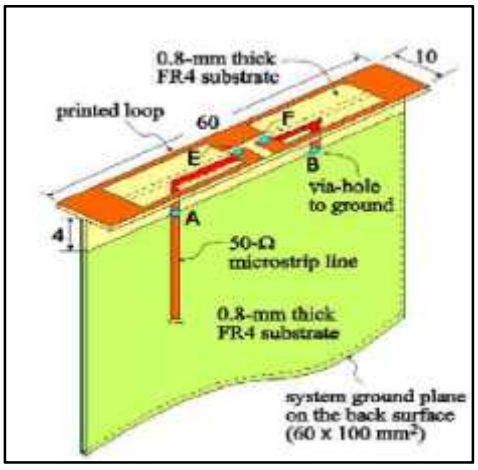

Figure 1: Penta-band printed loop antenna.

Chien-Wen Chiu and Yu-Jen Chi proposed a hepta-band printed loop antenna. A U-shaped tuning element printed on the back side of the circuit board is used to adjusts the resonant modes to cover GSM850/GSM900/DCS/PCS/UMTS/WLAN and Wi-MAX bands.

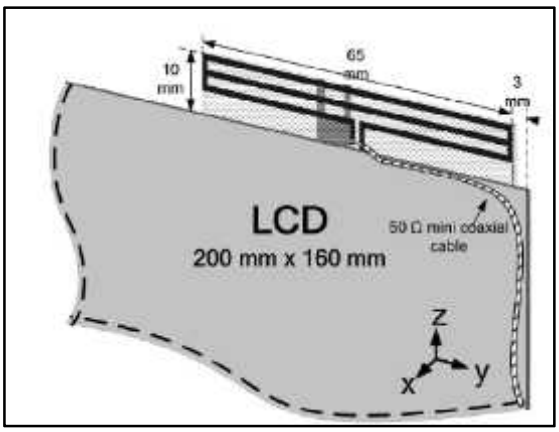

Figure 2: Hepta-band printed loop antenna.

II. METHODOLOGY

A wide band loop antenna is added with a SRR to obtain multibands. Therefore

1) a SRR will be designed to reject a particular band.

2) There is no particular method to place SRR to obtain multiband operations therefore location of SRR will be experimented.

3) Performance of the multiband will be improved by adding reconfigurable SRR.

4) Loop with optimum performance will be manufactured and tested. Abbreviations and Acronyms



Figure .3: Methodology to obtain multiband loop antenna.

Need of Multiband**:** An UWB antenna covers 3.1 GHz to 10.6 GHz frequency range which includes already existing bands such as 5.2 GHz and 5.8 GHz. In order to avoid interference with the existing band, these bands must be rejected by antenna. The rejection can be obtained with the help of filter at the input of the antenna but it occupies larger area on board and is not recommended. A reconfigurable metamaterial is better alternate and can be added to antenna without occupying any additional area on the board.

III. UWB LOOP ANTENNA

A wide band nonuniform loop antenna covers a band from 3.4 GHz to 9.4 GHz. The development of the nonuniform printed loop has opened following opportunities:

1) Design of multiband reconfigurable printed antenna using metamaterials.

2) Design of reduced size or compact size UWB printed loop antenna.

3) Formulation of existing printed loop antenna.

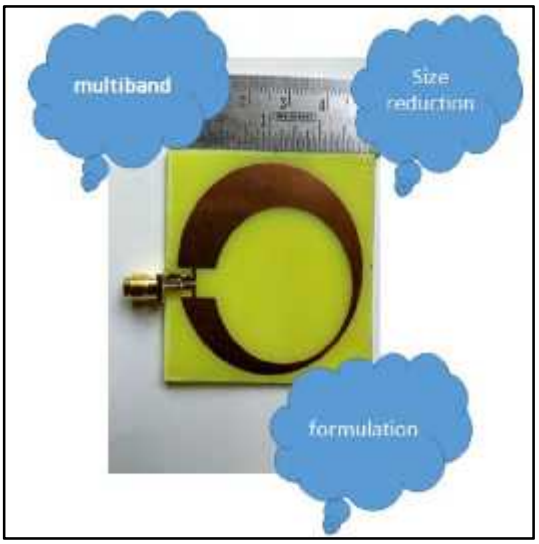

Figure 4: UWB loop antenna and scope

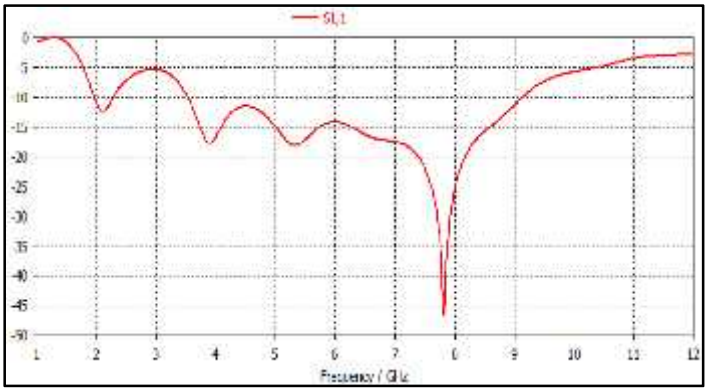

Figure 2.2: Frequency V/S reflection coefficient

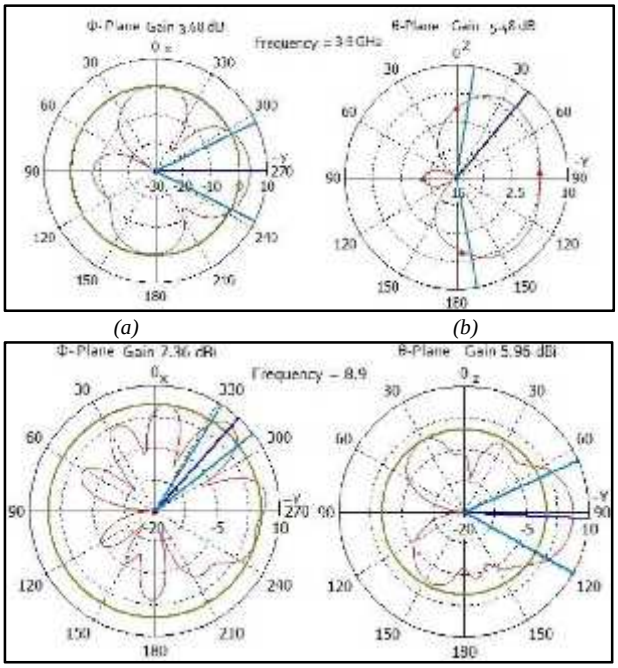

Figure 2.3: Radiation pattern of UWB printed loop antenna at 3.9 GHz and 8.9 GHz.

IV. METAMATERIAL

It is a common practice to design multiband reconfigurable antenna by introducing reconfigurable metamaterials to wideband antennas such as wideband printed microstrip antenna or printed monopole antenna. Multiband operation is achieved by introducing metamaterial in ground plane of antenna or in the plane of antenna or both. It is also observed that such combination to achieve multiband operation is not common in loop antenna. Metamaterials are used for size reduction and bandwidth enhancement in loop antenna. The following work demonstrates application of reconfigurable metamaterial for the development of multiband loop antenna. Figure 3.1 shows the structure of split ring resonator (SRR) with the variables used to control the resonant frequency of the resonator.

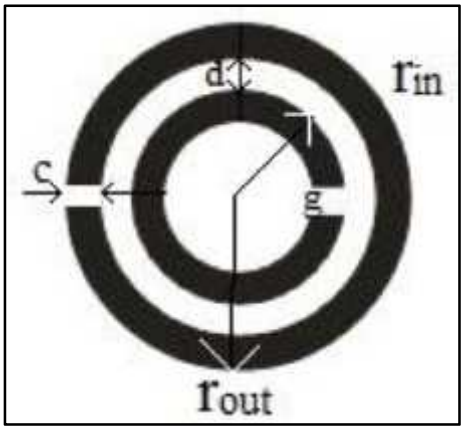

Figure 3.1. Circular split ring resonator (SRR).

Following is the mathematical relations to find out resonant frequency of the SRR.

$$f_0 = \frac{1}{2\pi}\sqrt{\frac{1}{L_T C_{eq}}}$$

fo is resonant frequency, LT is total equivalence inductor and Ceq is total equivalence capacitance.L_T and Ceq are given as

$$L_T = 0.0002L\,(2.303 \log_{10} \frac{4l}{C} - \gamma)$$

$$Ceq = \frac{(\pi r r_{av} - g)C_{pul}}{2} + \frac{\varepsilon_0 ct}{2g}$$

$$l = 2\pi r_{av} - g$$

$$C_{pul} = \frac{\varepsilon_0}{Co\,Zo}$$

l is the length of the of the SRR, γ is 2.451 for circular SRR and c is ring width and t is thickness of metallic rings. Cpul is defined as capacitance per unit length, Co is speed of light in free space, Zo is characteristic impedance of total length. All the dimensions are in mm.

$$\varepsilon_{reff} = 1 + \frac{\varepsilon_r - 1}{2}\frac{K(k')K(k_1)}{K(k)K(k_1')}$$

$$k = \frac{c/2}{c/2 + d}$$

$$k_1 = \frac{\sin\frac{\pi a}{2}}{\sin\frac{\pi b}{2}}$$

For $0 \le k \le 0.7$,

$$\frac{K(k)}{K(k')} = \left[\frac{1}{\pi}\ln\left(2\,\frac{1+\sqrt{k'}}{1-\sqrt{k'}}\right)\right]^{-1}$$

For $0.7 \le k \le 1$

$$\frac{K(k)}{K(k')} = \left[\frac{1}{\pi}\ln\left(2\,\frac{1+\sqrt{k}}{1-\sqrt{k}}\right)\right]$$

Characteristic impedance Z0 is given by:

$$Z_0 = \frac{120\pi}{\sqrt{\varepsilon_{reff}}}\frac{K(k)}{K(k')}$$

Table 1 shows the resonant frequencies for different dimensions of SRR. Larger dimension of SRR resonator resonates at smaller frequencies.

ring-gap, D	C gap-G	Ring width, C	outer-radius-outer-circle	outer-radius-inner-circle	F (GHz)
0.3	0.3	0.4	2.6	2	5
0.3	0.3	0.4	3	2.3	4.14
0.3	0.5	0.4	3	2.3	4.22
0.25	0.5	0.4	3	2.3	4.09
All dimensions of SRR are in mm					

Table 1: SRR showing change in frequency due to change in physical dimensions of SRR.

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Cyber Security in Communication Industries

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***Abstract* – Effective cyber-security must be a universal approach to protect systems against illegal access or attack. With billions of Internet-of-Things (IoT) devices connected worldwide, cyber-security plays a crucial role in the success of the digital economy. Cyber-attacks and threats have worsened and become more sophisticated with the union of Information Technology (IT) and Operational Technology (OT). Automation and data-driven operations require a strong cyber-security system to protect assets, equipment, and intellectual property while reducing interruption.**

Keywords- cyber security, cyber-attacks, power utilities, threat detection

I. INTRODUCTION

Struggling cyber-attacks in Industrial Control System:

The Industrial Internet of Things (IIOT), Intelligent Electronic Devices (IEDs), and Remote access: The convergence of Information Technology (IT) and Operational Technology (OT) continues to drive connectivity and Big Data, demanding the collaboration of these two environments to successfully deliver both security and real benefits to industries worldwide. No longer considered a "nice to have", effective digitalization initiatives are quickly dividing thriving companies from those who might soon be left behind.

But how do operators of Industrial Control Systems (ICSs) stay safe in a world where the line between IT and OT networks is rapidly disappearing? Where employees can easily jump on an ICS network with the tap of a cell phone or a click in an internet browser? Where productivity, share prices, and trade secrets can be wiped out by a single network breach?

For critical infrastructure companies, however, even these significant concerns are overshadowed by the risks malicious attacks pose to public well-being, national security, and the lives of citizens worldwide. Power generation, utilities, transportation—the effects hackers can have on these industrial networks are far reaching and sobering. The good news is that as the breadth and depth of cyber-security vulnerabilities grow for critical infrastructure companies, so too does industry's response to combatting such threats.

Intrusion Detection Systems (IDSs) monitor network traffic and activity, analysing patterns and data to find potential intrusions. This paper will look at anomaly-based detection, exploring the pivotal role it plays in keeping critical infrastructure safe, efficient, and ready to handle future security challenges.

A. A first for power utilities

A quick look at how cyber-attacks play out in real life: early 2019 saw a "denial-of service" attack on a western US power grid – the first reported cyber-attack on the US grid in the country's history. Luckily for the utility and its customers, the hack didn't cause any power outages or effects on power generation. But for operators faced with a sudden loss of visibility to their Supervisory Control and Data Acquisition (SCADA) system, the attack itself was serious enough.

Four years earlier, energy distribution utilities in Ukraine weren't quite as fortunate. In late December 2015, nearly a quarter million customers in western Ukraine lost power for several hours as hackers took over the SCADA network, hijacking the grid and flooding the company's phone networks in order to slow restoration work. This was the first time a cyber-attack is known to have caused a blackout anywhere in the world.

While both of these cyber security "firsts" stand out because they aren't yet commonplace, experts warn that attacks to critical infrastructure aren't a matter of if, but when [1].

B. The how of network vulnerabilities

Whether it's a malware-loaded USB stick knowingly (or unknowingly) plugged into a computer or stolen credentials gained from phishing emails, humans play a massive role in cyber security. Other potential areas for introducing vulnerabilities include – but are not limited to:

- The rise in popularity of vendor-neutral, less expensive Ethernet/IP-based communication rather than proprietary industrial protocols;
- Remote maintenance and access when not set up or enforced in a secure manner; and
- An overall decrease (or near disappearance, in some industries) of the "air-gap" between IT and OT networks.

And for a great number of network breaches, those humans involved in introducing a threat may not even realize their error until it's too late.

In fact, without a robust IDS, nothing detectible might happen for days, weeks, or months. Once the malware reaches a certain number of devices or hits a set date, it can trigger a crash, wreaking untold havoc on systems and processes.

Termed Advanced Persistent Threats (APTs), or "low-and-slow" attacks, these are especially difficult to detect before they are fully executed, as they operate under the radar of most conventional IT cyber-security tools.

In fact, one source puts the average time it takes companies to identify a data breach at 196 days. Imagine the damage an intruder could cause in more than six months on a user's system! [2]

C. Holistic threat detection to the rescue

The concept of "Defence in Depth," based on IEC 62443: Industrial network and system security, is an industry best practice involving multiple layers of protection that detect, prevent and/or mitigate human error or malicious intrusions.

Defence in depth is commonly compared to a medieval castle: each layered defence – from the moat, to the outer walls, to the hard-to-navigate passageways of the castle interior – combines to form a holistic defence strategy.

Figure 1 illustrates the layers of the defence in depth approach. Each piece is as important as the next: plant security focuses on elements like key cards, security cameras and safety processes; network security uses firewalls and virtual private networks (VPNs) to protect the network layer; and system integrity employs system hardening, regular patch management, and attack detection strategies.

Individual pieces of this defence in depth approach cannot alone tackle today's cyber-security threats. But the entire approach is strengthened by an intelligent Intrusion Detection System [3].



Fig 1: Defence in Depth: Comprehensive Protection on Three Levels [4]

II. INTRUSION DETECTION SYSTEM

There are two types of IDSs:

1. Anomaly based detection
2. Signature-based detection

Anomaly-based detection takes information about normal and expected patterns of network activity – traffic types, activity levels as they fluctuate during the day, and origin and destination of traffic – and builds profiles. The detection system uses these profiles or rules to detect network activity that doesn't conform, alerting operators of a potential attack against their systems.

Signature-based detection, on the other hand, identifies attacks by their signatures, or their known attack and infection patterns. This type of IDS is reliable at detecting known troubles but has some difficulty in discovering new attack vectors. If one of these novel methods is being used against a company's systems, signature-based detection may not be up to the task.

But what do these differences mean out in the field?

The answer lies in their origins: signature based systems were born from the ground up in IT environments – where having to update signature files on a periodic basis worked quite well. OT environments, though, are a different beast altogether.

While the two share some best practices like network segmentation and firewalls, solely signature-based approach in a mission-critical OT environment will not work at all.

For example, patching and maintaining IT systems typically means taking down networks for minutes or hours while improvements and updates to signatures are processed. Because they rely on a catalogue of signatures, this type of system must be refreshed or rebooted to add new rules or signatures.

But when natural gas is being continuously piped into a power utility, or a complex transportation grid needs to move millions of people around a city both day and night, extended downtime isn't an option.

Compared to IT systems, OT environments need to function with high availability and strict timing constraints. ICS software controls sophisticated process automation devices and systems requiring accuracy and execution in milliseconds, not hours.

Designed specifically for the real-time operational requirements of ICS and OT networks, anomaly-based systems do not add any operational loads or sluggishness to a company's network [3].

Anomaly-based Intrusion Detection Systems: designed for Industrial Control System Networks
Anomaly-based IDSs work behind the scenes, using software to collect deep, low-level information that, analysed over time, can identify irregular behaviour patterns in the network or its devices.

For example, if a device on a network suddenly begins trying to connect to another device or a server in a country that it has never connected to before, an anomaly-based IDS would flag this and warn the operators of this activity.

In a signature-based system, signature files would need to set rules to flag interactions between a network device and certain countries on a case-by-case basis. For every attack or vulnerability, a corresponding signature or rule must be created. If there is no signature or rule for a particular activity in the database, there will be no detection by the IDS.

Developing these rules can seem burdensome to many network technicians: consider the sheer number of process instruments, analytical devices, controllers, and network infrastructure in a single plant – not to mention throughout an entire utility system!

Using an anomaly-based IDS, on the other hand, helps to reduce these operating expenses because the operator doesn't need to update signature files on every single system across their entire network on a monthly basis.

The time requirements alone for staff performing signature updates have a huge impact when looked at across multiple systems and remote locations in their OT network over the course of the IDS's lifespan. What other critical security concerns could operators be tending to rather than spending time updating signature files?

What's more, an anomaly-based approach is the only type of IDS that can help to identify a zero-day vulnerability. Such threats use previously undisclosed or undiscovered vulnerabilities – they don't have an existing pattern. Since signature-based systems rely on data from previous attacks or known vulnerabilities, an attack that has never been catalogued by an IDS before, will render signature-based systems helpless.

In contrast, anomaly-based systems use a variety of approaches and tools, including profiles of network activity, heuristic learning, and real-time data analysis to uncover suspicious activity and alert staff.

A. The need for a robust IDS

With today's mission-critical ICS under constant cyber threats, it is essential for operators to have IDS systems as part of their cyber defense strategy in order to safeguard the integrity of the data on their network. Because not all ICS networks are the same, having a robust IDS system that can address the uniqueness of the numerous requirements of each of these networks is paramount.

With estimates of global ransom ware costs at more than $4 billion in 2017, industries simply cannot afford to downplay (or ignore!) the importance of cyber security [3].

But despite these cyber security threats present in industries around the globe, in today's increasingly digitalized marketplace, disconnecting simply isn't an option.

Operational technology – from process instruments and sensors to large drives and machinery – has been delivering insights and efficiencies to manufacturing and infrastructure companies for decades. Partners like Siemens are helping bring the best of information technology into these industries – while ensuring this is done safely and responsibly.

Anomaly-based Intrusion Detection Systems offer the best chance to prevent damage to critical operation technologies: a real-time IDS solution acts on network traffic data as it happens. Reacting as quickly as possible thanks to robust intrusion detection could be the difference between stopping an attack before time and money are lost and paying to clean up the mess when the attack is discovered weeks or even months later [3].

For many organizations like manufacturing plants, utilities, and other critical infrastructure companies, anomaly-based solutions or those that combine both anomaly and signature-based approaches are the only answer [4].

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Working Model of Self Driving Car using Machine Learning

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***Abstract*— The evolution of image processing and neural networks has led to innovations which were not possible earlier. One of the upcoming and developing innovations is self-driving car. The very idea of self-driving car has come up due to problems faced by the people who have physical disability, people who want to utilize their leisure time to do some constructive work, people who do not want to drive and also the people who want to be stress free while travelling. We have designed a working model of a self-driving which can detect lanes, lane ends, stop sign, traffic signal, object and act accordingly. To implement these features, we have used image processing, computer vision libraries and machine learning algorithms.**

Keywords— Self-driving car, machine learning, Deep learning, computer vision, image processing.

I. INTRODUCTION

The major facts that tell us that humans are not to be considered as safe drivers are as follows: globally around 1.25 million people die in road accidents in each year. Around 20-25 million are injured or disabled. Road accidents cost USD $518 billion globally, costing individual countries from 1-2% of their annual GDP. Until and unless action is taken, road traffic injuries are predicted to become the fifth leading cause of death by 2030. Creating awareness about the traffic rules and safety is not reducing the number of accidents. Therefore, there is an urgent need to bring self-driving cars. Especially in the countries like Libya, Thailand, which are low- and middle-income countries where there is high rate of fatalities due to car crashes. The definition of Self-driving cars is a car which takes the traveler to their destination with minimal human intervention while taking safety as its first priority. From before when there used to be radar based collision detection to the present, where we use machine learning and image processing extensively to improve the results of the detection, technology has evolved drastically from the past.

To make this dream a reality, several companies and research organizations have developed working autonomous vehicles including Mercedes-Benz, General Motors, Continental Automotive Systems, Autoliv Inc., Bosch, Nissan, Toyota, Audi, Volvo, Vislab from University of Parma, Oxford University and Google. These companies are working since 1980s in this field. To make a small contribution in this field, we have designed a working model to give people an idea about how an actual self-driving car would look like [5],[6].

II. RELATED WORK

In [2] G. Deng and Y. Wu, aims to improve the lane line detection by using the Hough transform based on the polar angle and polar radius constraints, it is used to obtain the double edges of the lane lines. For the curved lane, the lane is divided into two parts one is straight and the other is curved. The curved path is fitted by a parabola. For further enhancing lane line detection, [3] K. Manoharan and P. Daniel, aims to detect and reduce the shadow and other illumination effects on the road which impose a crucial problem while detecting the lane lines. They have used mean shift algorithm for the same. For the purpose of object detection in computationally slow devices, [4] S. Kanimozhi, G. Gayathri and T. Mala, proposed a method of discarding the feature resampling stage and combined all calculated results as a single component and used a depth-wise separable convolution called Mobile Net which increases the accuracy level in identifying the real time household objects.

The above-mentioned solutions are very innovative and accurate, but they are very much computationally intensive. As we are making a small and cost-effective model, the above-mentioned solutions would just block the whole processing.

III. PROPOSED FRAMEWORK

The working of the model starts with capturing real time footage of the camera, and then some basic image processing starts with creating a region of interest in the frame of the camera. A perspective transform (bird eye view) is taken of the region of interest so that we can work on vertical lane lines. Since image processing is easier to implement in grey scale, therefore the image is converted into grey scale. To differentiate lane lines with the road and surroundings, we implement thresholding operation in which all the pixel values are converted into either 255(pure white) or 0(pure black). To detect the edges of the lane, canny edge detection is used. It smooths the image with the help of Gaussian filter and removes unwanted textures and details. Now to find actual position of the lane lines we have created a dynamic array in which pixel intensities are stored. To determine the distances of the right lane and left lane position from the left hand side of the frame, a region of interest is created. The library used for image processing is open cv. Open cv cannot process the entire image at once, so the region of interest is divided into strips with width as 1 pixel. So the strips which have high intensity values will be considered as lane lines and then the distances can be calculated respectively.

To calculate the lane center, we have used a basic formula that is

Lane center= (right lane position – left lane position)/2 + left lane position

Then we will create a variable 'X' which will calculate the difference between the lane center and the frame center. So, when this variable will generate a positive value, a right signal will be given to the Arduino and if the variable generates a negative value then a left signal will be given to the Arduino. For the stop sign detection, traffic light detection and object detection we have used cascade image classifier, in which we have taken positive samples of the required image and negative samples of the unwanted surroundings and then used the Haar feature classifier to train the model. We faced a number of problems while making the model such as the power supply issue. The power was supplied by the dual output 10000 mAh power bank. The power was distributed among Raspberry pi, Arduino uno and L298N motor driver which caused sometimes fluctuation in power and low output voltage. The distribution of power from the power bank to the motors attached on the wheels through the motor driver caused the wheels to be overpowered by the grip on the ground which in turn caused inadequacy in taking a right or a left turn.We also faced processor lag problem due to low processing power.

IV. FLOWCHART

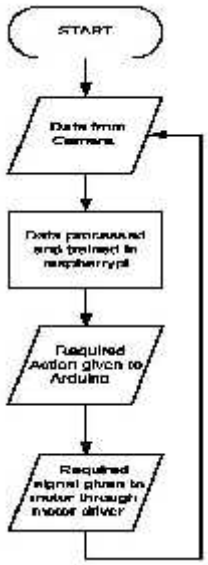

Fig.1 Flow Diagram

V. HARDWARE AND SOFTWARE REQUIREMENTS

The hardware required in this project are Raspberry pi, Arduino, l298N motor driver, Car chassis, Raspberry Pi 8MP camera, power bank with dual output, traffic light signal circuit. Let's discuss each one of them briefly.

A. Raspberry Pi

The Raspberry Pi 3 Model B uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache. The Raspberry Pi 3 has 1 GB of RAM in the B and B+ models. The Raspberry Pi 3 and Pi Zero W (wireless) are equipped with 2.4 GHz WiFi 802.11n (150 Mbit/s) and Bluetooth 4.1 (24 Mbit/s) based on the Broadcom BCM43438 Full MAC chip with no official support for monitor mode but implemented through unofficial firmware patching[55] and the Pi 3 also has a 10/100 Mbit/s Ethernet port. The Pi 3 can boot from USB, such as from a flash drive. The GPU in the Raspberry Pi 3 runs at higher clock frequencies of 300 MHz or 400 MHz, compared to previous versions which ran at 250 MHz[8].



Fig.2. Raspberry Pi

B. Pi Camera

The Raspberry Pi Camera Module v2 replaced the original Camera Module in April 2016. The v2 Camera Module has a Sony IMX219 8-megapixel sensor. It supports 1080p30, 720p60 and VGA90 video modes, as well as still capture. It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi.The camera works with all models of Raspberry Pi 1, 2, 3 and 4 [9].



Fig.3 Pi Camera

C. Arduino Microcontroller

This microcontroller is based on ATmega329P.There are 14 digital input/output pins available out of which 6 can be used a PWM outputs. It also supports 6 analog inputs. It has 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It has 32 kb of flash memory and 2 kb of SRAM and weighs around 25g [10]. Apart from all these features Arduino IDE is very user friendly and uses basic c as its programming language.



Fig.4 Arduino Microcontroller

D. L298N Based Motor Driver Module

This L298N Based Motor Driver Module is a high power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L298 motor driver IC and has the onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control.

This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc. An H-Bridge is a circuit that can drive a current in either polarity and be controlled by Pulse Width Modulation (PWM). Pulse Width Modulation is a means of controlling the duration of an electronic pulse [11].



Fig. 5 Motor driver

E. OPEN CV Lbrary

OpenCV is an open source computer vision library which is capable of handling images/videos from fairly basic tasks to utter complex tasks like facial recognition. It supports C++, C, Python and Java programming languages and supports Windows, Linux, Mac OS, iOS and Android. Written in optimized C/C++, the library can take advantage of multi-core processing. Enabled with OpenCL, it can take advantage of

the hardware acceleration of the underlying heterogeneous compute platform [12]. In this project it is used for perspective transformation, threshold operations and canny edge detection.

VI. RESULT

The first part of the project was lane detection in which the car was tested approximately 100 times where appropriate signals where generated when the car was not aligned in the right direction.

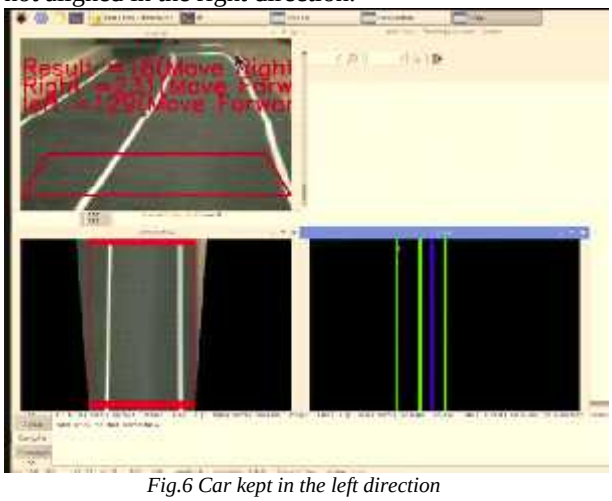

Fig.6 Car kept in the left direction

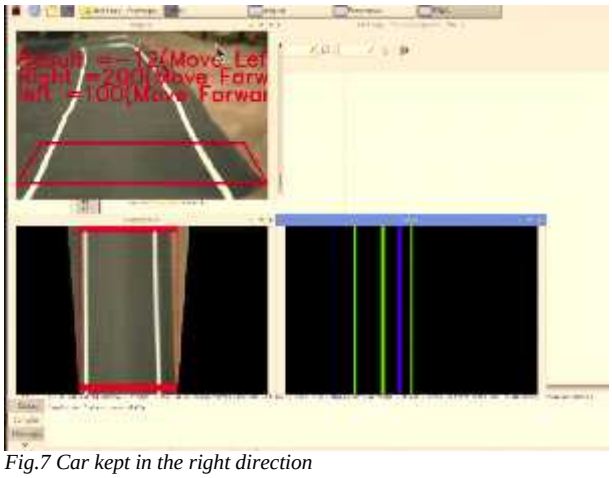

Fig.7 Car kept in the right direction

The second phase of the project consisted of lane end detection and stop sign detection. Both of these features were implemented using cascade classifier and the final testing was done and the testing was successful .

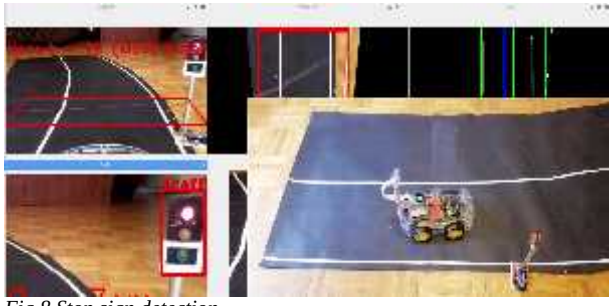

Fig.8 Stop sign detection

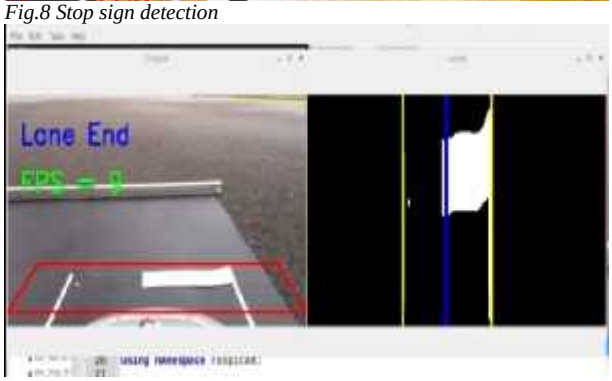

Fig.9 Lane end detection

VII. CONCLUSION

In this paper, we have implemented and tested the working model of a mini self-driving car. We have successfully used image processing and machine learning for making this model. The testing of the model was successful.

VIII. FUTURE WORK

We would like to implement the rotation of the camera when the car is initially kept on the ground so as to identify the lanes, if they were missing earlier. We would also like to use a better and a faster processor so as to add features in the existing model like multiple object detection, inclusion of a GPS system for better navigation and also use of different hardware such as the IR sensor for better object detection.

IX. ACKNOWLEDGEMENT

We would like to acknowledge our parents for always supporting us for making this project a success. Without their financial and emotional support we could not have done this project and also special thanks to our college that is Thakur College of engineering and technology for giving us the required space for testing the project and also helping us financially. We would also like to Mr. Sanjeev Ghosh, our professor in the college who helped us in programming.

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Text Classification using Python

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***Abstract*— Sentiment Analysis is an ongoing field of research in text mining field. Sentiment Analysis is the computational treatment of opinions, sentiments and subjectivity of text. This survey paper gives a comprehensive overview of the various models that can be used for text classification for user reviews and comments on Amazon, Yelp and IMDb.**

Keywords—Text Classification, Sentimental analysis, Baseline model, bag-of-words, Neural network, Sequential Neural Network, Convolutional Neural Network

I. INTRODUCTION

We live in a world that is flooding with data. To handle this enormous amount of data we need to learn more about data science and its advances in technology. Data science is a very large field to start with. It ranges from mathematics to statistics and from artificial intelligence to machine learning. Everything in data science is interconnected like a web. If machine learning is a growing field it because artificial intelligence, mathematics and statistics have supported it in the backend. Machine learning delivers structures the skill to automatically acquire and advance from experience without being explicitly programmed. Machine learning emphasizes on the development of computer codes that can access information and use it study for themselves. The course of learning starts with observations or extraction of data, followed by searching for patterns in data and making predictions in the future based on the instances that we provide. The main objective is to let the machines learn automatically without humanoid interference or aid and fine-tune predictions consequently. One of the broadly used machine learning task is "Text Classification". The aim of text classification is to automatically categorize the text/word into one or more defined groups.

II. SENTIMENT ANALYSIS

Sentiment analysis involves extraction of text which recognizes and pulls out subjective data from the source text. It helps a business in comprehending the social sentiment of their make, merchandise or service by monitoring online reviews and dialogs. With the advance in data science we have come up with more and more efficient algorithms that give us accurate results. Text classification can be done using these codes and sentiment analysis.

III. NATURAL LANGUAGE PROCESSING

Natural language processing (NLP) is the capability of a computer system to comprehend human language as it is expressed. NLP also is an element of artificial intelligence. Syntax and semantic evaluation are the two main aspects of natural language processing. Syntax is the arrangement of phrases in a sentence to make grammatical sense. NLP uses syntax to evaluate meaning from a language based on grammatical rules. Semantics comprises of the usage and meaning behind words. NLP applies algorithms to recognize the sense and structure of sentences.

IV. ANALYSIS

In this project we are working on the labelled datasets of three e-commerce websites namely Amazon, IMDb and Yelp. We have three text files, one for each dataset. Each text file has labelled reviews, 0 denoting a bas review and

1 denoting a good review. We train the machine for future predictions by feeding in this data. We have used several models to implement the process as listed below:

A. Baseline Model

The baseline model is a simple model wherein we give training data to a learning algorithm. The learning procedure then produces a new set of instructions, based on conclusions from the data. This generates a new algorithm. This model is a very basic model which is later used for comparison with advanced models. In the baseline model we have used different models including Logistic Regression, SVM, Decision Tree, Random Forest and K-Means Clustering to find and compare their accuracy scores. The Bag of Words model simply creates a feature vector of each sentence and gives the occurrence of word.

TABLE 1: ACCURACY OF BASELINE MODEL FUNCTIONS

Algorithm	Accuracy		
	Training	Test	Real Time
Logistic Regression	0.819	0.979	0.888
K-Nearest Neighbor	0.672	0.788	1.000
Random Forest	0.335	0.905	0.356
Decision Tree-Gini Index	0.585	0.607	0.555
Decision Tree-Entropy	0.583	0.607	0.555
Support Vector Machine	0.815	0.994	0.888

B. Keras Library

Keras is one of the top high-level neural networks APIs. It is inscribed in Python and provisions numerous back-end neural network computation engines. Keras is a user friendly, modular, easy to extend, and work library available with Python. the Sequential model API of Keras is being used with Tensorflow as backend in this project. The Sequential model is a linear stack of layers, where you can use the large variety of available layers in Keras. The most common layer is the Dense layer which is a regular densely connected neural network layer with all the weights and biases.

C. Word Embedding

In Word Embedding, we create a dictionary of all the unique words from our data set. We then create the feature vector for our “one-hot” vector sentence. “One-hot” vector is nothing but the vector under consideration whose tag is to be predicted. The feature vector’s length is that of our dictionary. The feature vector fills in 1 if a particular vector of that index is present and 0 if it is not present.

Another way to embed words is by using Padded Sequences. In this, we create a feature vector for every sentence with its length equal to the sentence of maximum length. The feature vector will have the indices of the dictionary words that are present in the vector sentence.

The Embedding Layer of Keras embeds the feature vector in the layer. It requires three parameters-the size of the vocabulary, size of the sequence and the output dimension i.e., size of the dense vector. To plug this output to the Dense layer, we need to Flatten it as it is a 2D output. The Flatten layer creates the output in one dimensional form. Another way to plug the Embedding Layer to Dense Layer is by using GlobalMaxPooling1D/GlobalAveragePooling1Dlaye r The Global max/average pooling simply takes the maximum/average of all features. These layers are for down sampling our data for processing.

D. Convolution Neural Network (CNN)

CNNs, like neural networks, are made up of neurons with learnable weights and biases. Each neuron receives several inputs, takes a weighted sum over them, pass it through an activation function and responds with an output. CNNs have wide applications in image and video recognition, recommender systems and natural language processing. In this project we have used Conv1D layer, one of the many layers in CNN. This layer uses the concept of CNN and down samples the Embedding layer.

E. Hyper parameters Optimization

In this model we perform Cross Validation using Keras library. Here we iterate the algorithm 5 times by keeping Cross Validation constant 4. Thus, the coded is executed 20 times and the best accuracy set is Retained for further computations.

TABLE 2: ACCURACY OF KERAS LIBRARY LAYERS

Algorithm	Accuracy		
	Training	Test	Real
Logistic Regression	0.979	0.819	0.900
Dense Layer	1.000	0.802	0.900
Embedding Layer	1.000	0.810	0.900
Embedding Layer with	1.000	0.819	0.900
Embedding Layer with	1.000	0.846	1.000
Cross Validation	1.000	0.811	0.900

V. CONCLUSION

We learned how to work with text classification with Keras, and we have gone from a bag-of-words model with logistic regression to increasingly more advanced methods leading to convolution neural networks. We are now familiar with word embeddings, why they are useful, and also how to use retrained word embeddings for training. We have also learned how to work with neural networks and how to use hyper parameter optimization to squeeze more performance out of the model.

Hence, we can conclude that SVM, Logistic Regression and Convolution Neural Network gave the best accuracy score.

VI. FUTURE SCOPE

1. Including a module for continuous learning of algorithm by adding new words to dictionary
2. Coalescing the project with speech recognition.
3. Generating a text classification model using Fourier transform.
4. Adding an algorithm that predicts neutral reviews as well
5. Detection of explicit word from dictionary and reporting the review as spam

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Library Manager

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***Abstract*—Library Manager is a Java application that provides the organization an easy solution to maintain record of issue and return of books. It's built on Java platform and uses SQL to maintain the database. Administrator can add students and books. Books can be issued and returned using mainframe of the application. A record of the same is also visible in the application.**

***Keywords—Database Connectivity, Java, MySQL, NetBeans IDE*.**

I. INTRODUCTION

With the increase in the number of readers, better management of libraries are required. Library Manager focuses on improving the management of libraries in a city or town where funding is an issue. Library Manager is an economically feasible application that provides the administrator and students the ease of issuing the book and returning. This project has been developed in NetBeans IDE using Java programming in frontend and SQL in backend.

The main purpose of the project is to maintain the details of books and students to achieve an easy circulation system between clients (here: students) and library i.e. issue and return of books. Moreover, the administrator can use this software to access information about books kept in library, students registered in the library management system, details of issued and returned books, etc.

II. PROBLEM STATEMENT

With the increasing of number of students in books and their demand, maintaining a library using the old management methods is too much complex and time consuming and hardly possible to adapt to the development of times. Hence, we need to design a well-organised and effective system which is an alternative to tedious task of maintaining records in big libraries. The management application should be able to authenticate administrator, provide facility to add student and books record and manage the basic transactions viz. issue and return of book. It should also display the record of the same in tabular format.

III. LITERATURE SURVEY

Abdul Kadir in his paper "Library Management System: Impact on Library Environment" wrote that with the advancement of technology, library need to be ready for change and bring the technology to the library in order to retain their customer's interest in visiting the library. Thus, in this situation, library's system should be improved as well to facilitate staff or librarian in doing their work effectively.

IV. PROPOSED SYSTEM

The proposed system is called as Library Manager which a Java application connected to SQL database. It let administrator to add members, add books, search members, search books, update information, edit information, maintain record of borrow and return books.

Library Manager will help in maintaining data of books issued to learners and books available in the library. This helps librarians to spot any book at any given time in the library. This kind of Library management system can be easily customized as per individual's requirement. The major advantages of Library Manager over manual entry is it's feature that enables system administrators to keep an eye on the library department's functioning and also enables librarians and users to maximize time and efficiency.

COMPONENTS OF LIBRARY MANAGER

Library Manager's architecture is divided into three layers – Control Panel, Main Frame and Operation. Each layer performs different based upon connectivity with data base.



Fig. 1: Architecture of Library Manager.

1. CONTROL PANEL

The control panel is the first module of Library Manager. It is responsible for authentication of administrators. It consists of following three options:

a) Login.
b) New Account Registration.
c) Forgot Password.

1.1. LOGIN



Fig 2: Login Screen.

Login screen is the first page of Library Manager that is visible to users. This is an authentication layer that provides access to administrator if and only if credential that user inputs matches with the one stored in SQL database. There are three options on this screen – (a) Login (b) New Account and (c) Forgot Password.

If the user has already created his account and remembers his username and password, he can directly access his account using the Log in option.

1.2. SIGNUP

If the user wants to create a new account, he can do it so by using the New Account option which is provided on Login screen.



Fig 3: Signup Screen.

The Signup screen gives option to add a new administrator by with the help of unique username and password. It also enables the user to select one security question and give its answer. The answer of the security question is stored in the database and is helpful in case of retrieving password if user forgets it.

1.3. FORGOT PASSWORD

The third option provided on control panel is Forgot Password. This feature helps the user to retrieve the forgotten password after answering security question whose answer was provided during account registration.

When the user clicks on Forgot Password option, he is redirected to the page shown in Fig. 4. User is expected to provide correct username with which registration was done. When user clicks on 'Search' option, the java programming code retrieves name and selected security question from User table in SQL database. Hence name and security question is automatically visible by clicking search button.

Now the user is expected to provide correct answer to the security question. If the answer given by the user is found correct, java code fetches the password of the user and displays it on the screen automatically.



Fig 4: Forgot Password screen.

1.4. INITIALIZING SCREEN

After successfully logging in by inputting the correct password and username, this screen pops up before the main frame of Library Manager. It is also known as splash screen. It consist of a progress bar whose speed is controlled by thread function in java. It signifies a successful login and acts as connecting link between control panel and main frame of Library Manager.



Fig 5: Initializing Screen.

2. MAIN FRAME

The main frame is the second layer of Library Manager which accessible to user only after successful authentication. It contains all tools to perform library management task. The various operations available on main frame are –

(a) Book Registration

(b) Student Registration

(c) Generate statistics

(d) Issue Book

(e) Return Book

(f) About Us



Fig 6: Main Frame of Library Manager.

The main frame serves as a user interface and helps in performing various operations by administrators.

2.1. BOOK REGISTARTION

The first button of mainframe redirects the user to add new book screen. It gives facility to add the books available in library to the database of Library Manager. Operations like issue and return can only be performed on books that are available in the database.

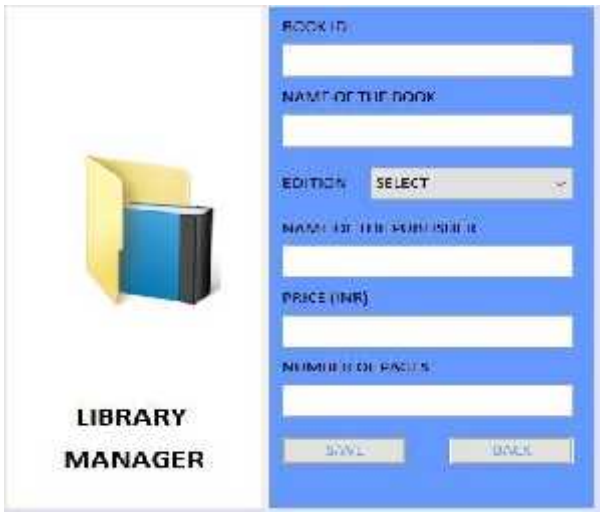

Fig 7: Book Registration Screen.

On this screen, the user can fill up information of books such as the price, the number of pages the book contains etc. and register new books. The Book ID is a unique

number generated automatically for each book by the database. The SQL ensures that no two book have same Book ID. This feature enables the developer to use Book ID as primary key for performing further operations on database.

2.2. STUDENT REGISTRATION

The second button of mainframe redirects the user to add student details into the database. The database of Library Manager generates a unique student ID for each student of the institution.



Fig 8: Student Registration Screen.

Here the administrator can add student's information such as the student's name, student's father name, and their respective branches etc. With the help of unique Student ID and Book ID the main operations – Book Issue and Return of Books can be performed by Librarian.

3. OPERATIONS

The third layer of Library Manager provides the facility to carry out library management task – Book Issue and Return of Books. It access the data generated by the help of two primary keys – Book ID and Student ID and performs updation and record generation on it.

3.1. ISSUE BOOK

The first operation of library management is issue of books to clients (here: students). It is carried out by providing suitable Book Id of the book to be issued and Student Id, whom book is to be issued. When administrator inputs both IDs and click on search, Library Manager will automatically retrieve the student details and book details as shown in fig. 9. Once information of student and book has been retrieved from the database, administrator can select the date of issue. This feature has been added by the help of an executable JAR file called as jcalendar1.4 in NetBeans 8.1 IDE.

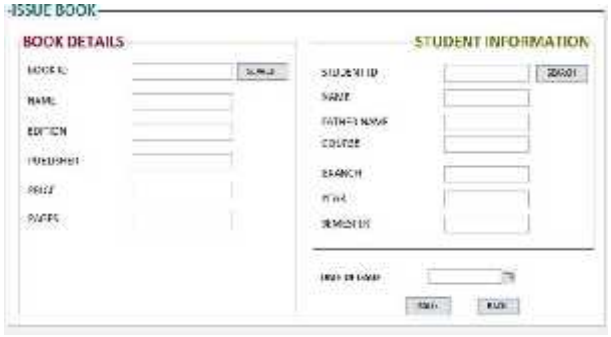

Fig 9: Issue Book Screen.

Once the book is issued to the student, a record gets generated in IssueBook table of SQL database which contains the proper record of book that has been issued and students who has issued the book.

3.2. RETURN BOOK

The second operation of Library Manager is to maintain the returned books record. When a student returns the book that was issued against his Id, the administrator can use Return Book option available on main frame to create the record for return transaction.

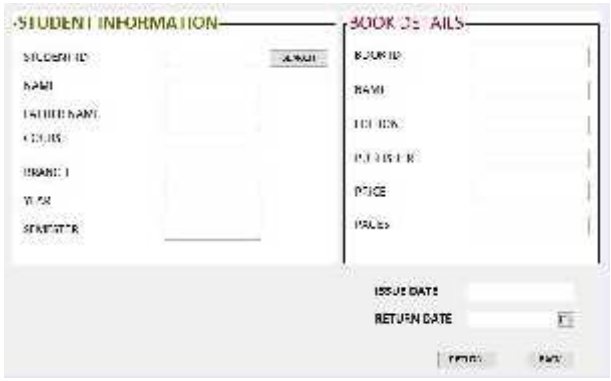

Fig 10: Issue Book Screen.

It is done by help of one of the primary key – Student ID. Librarian can enter the ID and click on search. This will fetch data from IssueBook table of database and automatically display student details, book details and date on which book was issued. The Librarian is required to add date of return and click on 'return' button. After this action is performed, the data will be generated in ReturnB,ook table of database and can be displayed using Generate Statistics button of main frame. The book that was issued previously would now be available in library and can be issued by others.

V. FUTURE SCOPE

Advanced features such as fine calculator, count of number of books remaining, printing of issued and return

books record can be implemented with more knowledge of Java programming. Further improvement can be done in field of UI and UX.

The software can be made automated using Machine Learning algorithms and image processing concepts to achieve a smart system which will be able to detect book details from cover page of the book. It can also be linked to biometric system in order to automatically input student's details.

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Data Transmission through Laser Light

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***Abstract*— The Laser communications systems are atmospheric wireless links. These work similarly to fiber optic connections, except that the signal is distributed in free space. Although the transmitter and the receiver must require conditions of line-of-sight, they have the advantage of removing the need for broadcast rights and buried cables. Laser communications systems can be implemented easily as they are cheap, compact, low- power and do not require any studies on radio interference. Usually a laser diode produces the carrier that is used for the transmission signal.**

I. INTRODUCTION

Laser communication is one of the Wireless communication system's emerging regions. Because of its low noise level, it makes it one of the best communication platforms for information exchange. Laser communication is currently adopted in satellite communication for space research activities, making laser communication one of the research areas of wireless communication due to its performance on low noise ratio, inexpensive low power, durability and resistance to radio interference.

II. LITERATURE SURVEY

Optical communications has not been started in modern era. The Egyptians invented it before 5000 years by transmitting signal using glass and the Troy fall was transmitted in VI BC by the Greeks through torches . All Modern day optical fiber communication is based on ancient system. The functioning Laser was first operated by Theodore H. Maiman in May 16, 1960 [1] and first visible light laser diode was demonstrated by Nick in almost 1960 [2] and latter it was improved by several scientist of the world including USA at IBM, MIT Lincoln Laboratory, Texas in 1962 [3]. Low attenuation optical fiber invented by Kapron in 1970 can be used for communication through Laser [4]. A project has been done to transmit voice data from one station to other for short distance by using different types of high quality and costly lasers such as Gas lasers, Chemical lasers, Excimer lasers, Fiber-hosted lasers, Photonic crystal lasers, Semiconductor lasers, Dye lasers, free electron laser etc where one condenser microphone for capturing sender voice, one transistor BC548 as amplifier, a photo transistor as receiver and a LM386 basic power amplifier IC and 0.5w Speaker was used [5]. In other project, signal was transmitted by using laser torch through laser beam just like fiber optic communication. In this system, in transmitter a 9v condenser is used for taking the audio signal coupled with laser beam and in receiver an NPN photo transistor, common emitter amplifier and speaker is used.

III. CONSTRUCTION

The entire circuit can be divided into two parts: transmitter and receiver. The transmitter circuit is built around timer 555 (IC1). IC1 is wired as an astable multivibrator generating a pulse train at its pin 3 that serves as the modulation input for the laser diode. Set the frequency of this pulse train to around 1 kHz using pre-sets VR1 and VR2. The potential divider arrangement of resistors R2, R3 and pre-set VR3 is used to reduce the peak amplitude of the pulse train. The driver circuit for the laser diode is built around IC LM356 (IC2), transistor T1 and a few discrete components. The transmitter circuit is powered by two 9V batteries that provide +9V, -9V and ground supplies. These voltages are provided to the transmitter circuit through DPST switch S1. The receiver circuit (shown above) is built around IC3, IC4 and a few discrete components. The gain stage is built around IC LM356 (IC3) with gain value of (R6+R7)/R6. The output of IC3 drives a speaker through the emitterfollower arrangement configured around transistor T3. The unity-gain buffer stage built around IC4 facilitates viewing of the received signal on an oscilloscope if so desired. The receiver circuit too is powered by two 9V batteries that provide +9V, -9V and ground supplies. These voltages are provided to the receiver circuit through DPST switch S2[6].

IV. CIRCUIT DIAGRAM

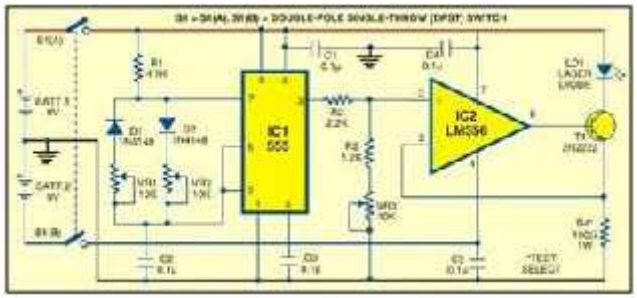


Figure1: Transmitter circuit

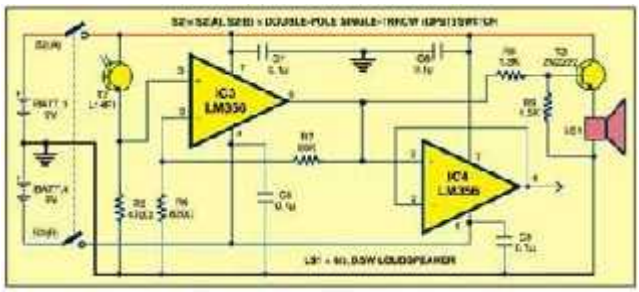


Figure 2: Receiver circuit

V. WORKING

The 555 Timer IC is an integrated circuit (chip) implementing a variety of timer and multivibrator applications Depending on the manufacturer, the standard 555 package includes over 20 transistors, 2 diodes and 15 resistors on a silicon chip installed in an 8-pin mini dual-in-line package (DIP-8).[4]

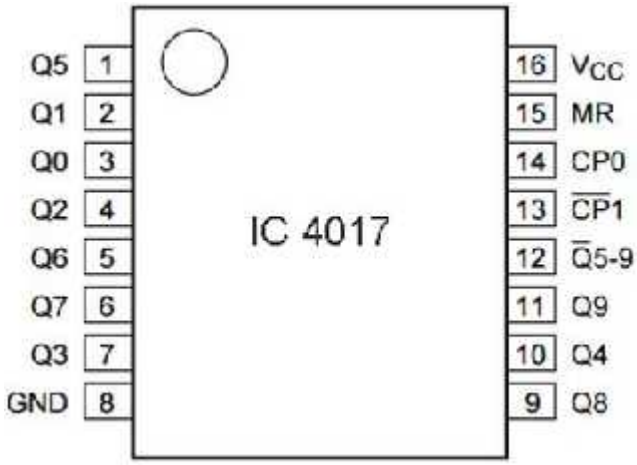
The 555 has three operating modes:

Monostable Mode:- in this mode, the 555 functions as a "one-shot". Applications include timers, missing pulse detection, bounce free switches, touch switches, frequency divider, capacitance measurement, pulse-width modulation (PWM) etc.

Astable Mode: free running mode: the 555 can operate as an oscillator. Uses include LED and lamp flashers, pulse generation, logic clocks, tone generation, security alarms, pulse position modulation, etc.

Bistable Mode or Schmitt trigger: the 555 can operate as a flip-flop, if the DIS pin is not connected and no capacitor is used. Uses include bounce free latched switches, etc.

4017 IC is a CMOS decade counter chip. It can produce output at the 10 pins (Q0 – Q9) sequentially, means it produce output one by one at the 10 output pins. This output is controlled through the clock pulse at PIN 14. At first, output at Q0 (PIN 3) is HIGH, then with each clock pulse, output advance to the next PIN. Like one clock pulse makes the Q0 LOW and Q1 HIGH, and then the next clock pulse makes the Q1 LOW and Q2 HIGH, and so on. After the Q9, it will start from the Q0 again. So, it creates sequential ON and OFF of all the 10 OUTPUT PINs. Below is the PIN diagram and PIN description of 4017:



This circuit uses 555 timer as an astable multivibrator. Working of the circuit is simple. Align the transmitter and the receiver so that the laser light directly falls on the phototransistor. The speaker connected between the emitter of T3 and ground beeps to indicate that laser communication is taking place. You can change the pitch of the audio beep by changing the frequency of the transmitted signal through presets VR1 and VR2 in the transmitter.

VI. RESULT

The speaker connected between the emitter of T3 and ground beeps to indicate that laser communication is taking place. You can change the pitch of the audio beep by changing the frequency of the transmitted signal through presets VR1 and VR2 in the transmitter.

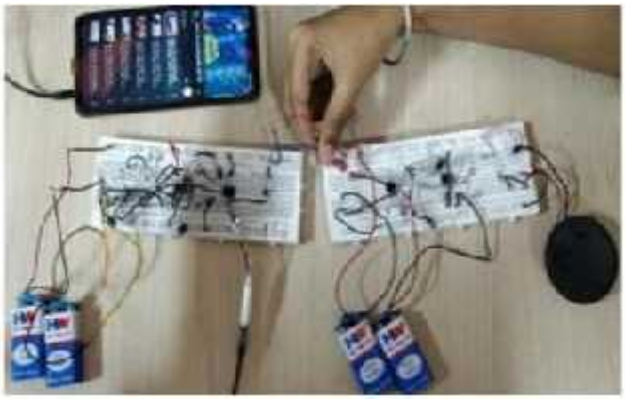


Figure 3: Circuit on breadboard

VII. APPLICATIONS

In the Laser communications systems bandwidth could be distributed in neighborhoods by putting laser communication systems on top of homes and pointing them towards a common transceiver with a fast link to the Internet .With possible transmit speeds of up to a gigabit per second ,other applications for Laser communications systems technology include temporary connectivity needs (e.g. sporting events, disaster scenes, or conventions), or space based communications. With the powerful laser, it would even be possible to communicate using satellites to reflect the signals. It can be used to reproduce sound in large public meetings on open grounds or for communication between tall buildings. Direct communication between high-rise buildings in a crowded city would become easy.

VIII. CONCLUSION

Laser is used in both domestic and international networks today. Ultimately these optical systems provide the bandwidth that is in such demand. Laser Torch Based Transmission and Reception is cheaper and simpler than RF transmitter and receiver in design. It is also possible to use Infra-Red and Blue-Tooth for voice transmission and reception purposes but their range is small compared to their price. This idea can be effectively realized and used in conference room, political assembly, and classroom, as well as for general conversation between two houses. It is better to use for general conversation with neighbors where confidentiality is a prime issue.

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STUDENT ATTENDANCE MANAGEMENT SYSTEM

Kalp Shah, Harsh Modi and Pragnesh Poojary
SE E&TC B

***Abstract*- Attendance management is important to every single organization; it can decide whether or not an organization such as educational institutions, public or private sectors will be successful in the future. Organizations will have to keep a track of people within the organization such as employees and students to maximize their performance. Managing student attendance during lecture periods has become a difficult challenge. The ability to compute the attendance percentage becomes a major task as manual computation produces errors, and wastes a lot of time. For the stated reason, an efficient Web-based application for attendance management system is designed to track student's activity in the class. This application takes attendance electronically and the records of the attendance are storing in a database. The system design using the Model, View, and Controller (MVC) architecture, and implemented using the power of Laravel Framework. JavaScript is adding to the application to improve the use of the system. MySQL used for the Application Database. The system designed in a way that can differentiate the hours of theoretical and practical lessons since the rate of them is different for calculating the percentages of the students' absence. Insertions, deletions, and changes of data in the system can do straightforward via the designed GUI without interacting with the tables. Different presentation of information is obtainable from the system. The test case of the system exposed that the system is working enormously and is ready to use to manage to attend students for any department of the University. Keywords: Attendance Management Systems, Web Application, Absence Management System.**

Introduction

Due to student's interest in classrooms, and whose is the largest union in the study environment of university or institution, so recording absence at a department having a large number of students in a classroom is a difficult task and time-consuming. Moreover, the process takes much time, and many efforts are spent by the staff of the department to complete the attendance rates for each student. So in many institutions and academic organizations, attendance is a very important criterion which is used for various purposes. These purposes include record keeping, assessment of students, and promotion of optimal and consistent attendance in class.

- Student Management system can handle all the detail about a student.
- The student management system is an automated version of manual Student Management System.
- Student Information Management System can be used by education institutes to maintain the records of students easily.
- Achieving this objective is difficult using a manual system as the information is scattered can be redundant and collecting relevant information may be very time consuming.
- All these problems are solved using this project.

As long as in many developing countries, a minimum percentage of class attendance is required in most institutions and this policy has not been adhered to, because of the various challenges the present method of taking attendance presents. The process of

recording attendances for students was in the form of hardcopy papers and the system was manually done. Besides wasting time and taking efforts for preparing sheets and documents, other disadvantages may be visible to the traditional one due to loss or damage to the sheets-sheet could be stolen. The developed system considers as an alternative to the traditional one, it is easy, fast and reliable than the traditional one, especially after the development of information technology and its usage by educational institutions. Therefore, the design of student attendance system has a significant reality meaning. The system is a

Platform Operating System:

>Microsoft Windows

Technologies Used:

>SQLite, JAVA with NET-BEANS, DB Browser

User Views:

>Admin

>Student

LOGIN, SEARCH modules

Admins responsible for managing student records.

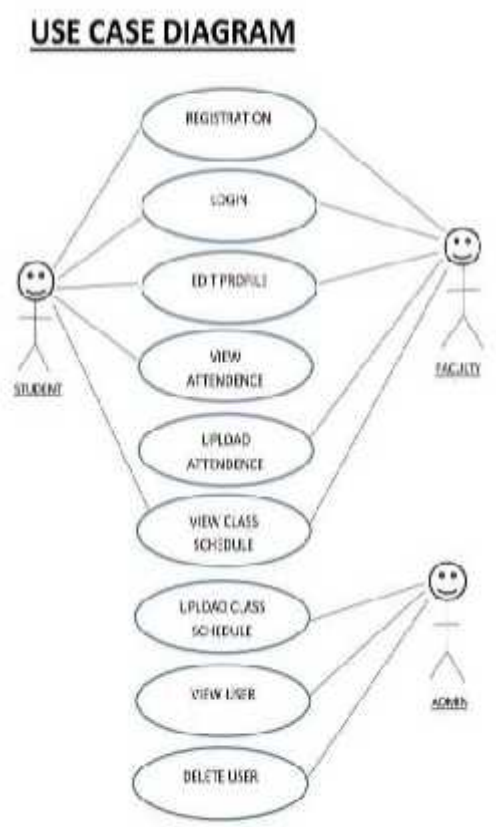
• Login into the Website

• Update student details

• Search student details

• Display student details

Related Work Recently, there has been so much research in the development students absence and attendance system, some of which include Internet systems like web- based system, mobile-based attendance system, some of the others computerized attendance system with hardware technology like fingerprint based attendance system, iris-based attendance system, face recognition based attendance system, RFID (Radio Frequency Identification) based attendance system, and others need communication technology like Bluetooth based attendance system, NFC (Near Field Communication) based attendance system and other systems such as using technologies utilized in



The system promotes a semi-automated approach in capturing the student attendance, i.e. by having the students to flash their student cards to the RFID reader In most institution attendance part of student's continuous valuation or there have conditions that student must be met before they allowed to sit for examinations so very important to use attendance management in educational institutions. The system required minimal hardware, NFC tag, and NFC-enabled mobile device. The benefits of like these systems eliminate many paper

works involved in it, removing the opportunity of losing attendance data, can generate different presence reports easily by a click of a mouse, etc. The proposed system i.e. web-based system the most common attendance system that available because it is friendly and easy to use, less cost, no need extra hardware, and more than this a student cannot intentionally register fake attendance record in the daily presence sheet. So the next section will explain in details.

Design and Implementation

The Student Attendance Management System (SAMS) has designed with the MVC architecture and implemented with the powerful Laravel Framework. In order to increase use of the application and make it easy to use and attractive, JavaScript and its jQuery libraries, and AJAX use. In this section, explain the system contents will be presenting.

Basic Flow:

- The Website prompts the administrator for the user name and password.
- The Administrator enters the user name and password.
    - The Website verifies the password and sets the user's authorization.
- The Administrator is given access to the Website to perform his tasks.

Alternative Flow**:**

The administrator enters invalid username and password then he will not be allowed to enter the website.

Database:

The system uses MySQL as a language for the database, and the migration techniques for selecting a different type of databases for the system such as SQL Server, SQLite, etc.

INTERFACE:

The application is design with the latest technology of user interface designs by means of its simplicity, lightweight weighted pages, and responsive to all device screens. The system uses Bootstrap framework within it to increase the intuitive perceptions to the user.

CORE OF THE SYSTEM:

The system consists of two main parts, public, and private site. The public site is where everybody can visit it, while the private section is limit to authorized people. The public part consists of a simple page asking for the log in details. So, anyone with the credentials can log in and check his/her attendance details. The private part has designed for staff of the system. There are
5 types of users for this part similar to the staff of University, and they are lists below from the highest level of privileges to the least level of privileges:

FULL ADMIN USER(FAU):

This type of user is normally used by the university registration directory to register all the details of students at the University. This user has all the privileges over the system to control everything within the system. Through this user, HDUs are creating.

Head of Department User (HDU), The head of the department at the university uses this user type to manage the department students. This user can create courses, credits of the courses, theoretical and practical hours for each course, create, department staff, lecturers, and assistant lecturers. This function used to assign the teachers to their courses. With the privileges of this user, editing the attendance details is possible to including the removal of a student attendance. Since the students at each department are categorizing according to their classes (stages), therefore, the first thing this user has to do is to create the department classes.

- Maintenance of student records

- Online registration of students
- Searching/Adding/Removing student records
- Student Management system is a management information system for education establishments to manage student data.
- It provides capabilities for registering students in courses, tracking student attendance.

Staff of Department User (SDU) **:**
This type of user works like a secretary of the department. Within this role, can show all the department's specifics, such as general information, staff details, course details, and classes. The attendance information of involved students can also be discovered, and they can generate reports. Reports can customize as follows:
1) all department students report,

2) a specific class report,

3) a specific course report, or

4) a specific student report

Reports can generate and downloaded as PDF or Spreadsheets formats.

System features:
There are several features available within the approach such as statistics, search function, report generation, recording login details and much more. When a staff enters its console, a dashboard is designing for them. The features of this dashboard depend on the privileges of the logged user. Statistical materials are available for the user which provides up-to date information for the user. The search function can use for a specific student. The function uses Ajax to connect to the database and retrieves relevant information while typing in the search entry box. Autocomplete widgets offer suggestions while typing into the field showing suggestions for the selected entry. While generating reports, there is a wide flexibility inside the proposed system. Besides customizing the type of report producing as stated in SDU section above. Two main categories can select.

Conclusion and Future Scope:
Attendance management is significant to all organizations such as educational institutions. It can manage and control the success of any organization by keeping track of people within the organization such as students to maximize their performance. The proposed system offers the process of monitoring attend students.

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Single Axis Solar Tracking System

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***Abstract*— "Solar Tracking System" is a power generating method from sunlight. This method of power generation is simple and is taken from natural resource. This needs only maximum sunlight to generate power. This paper helps for power generation by setting the equipment to get maximum sunlight automatically. This system is tracking for maximum intensity of light. When there is decrease in intensity of light, this system automatically changes its direction to get maximum intensity of light.**

Keywords—solar energy, solar panels, single axis, without microcontroller

I. INTRODUCTION

Solar Panels are a form of active solar power, a term that describes how solar panels make use of the sun's energy; solar panels harvest sunlight and actively convert it to electricity. Solar Cells, or photovoltaic cells, are arranged in a grid-like pattern on the surface of the solar panel. Solar panels are typically constructed with crystalline silicon, which is used in other industries (such as the microprocessor industry), and the more expensive gallium arsenide, which is produced exclusively for use in photovoltaic (solar) cells.

Solar panels collect solar radiation from the sun and actively convert that energy to electricity. Solar panels are comprised of several individual solar cells. These solar cells function similarly to large semiconductors and utilize a large area p-n junction diode. When the solar cells are exposed to sunlight, the p-n junction diodes convert the energy from sunlight into usable electrical energy. The energy generated from photons striking the surface of the solar panel allows electrons to be knocked out of their orbits and released, and electric fields in the solar cells pull these free electrons in a directional current, from which metal contacts in the solar cell can generate electricity. The more solar cells in a solar panel and the higher the quality of the solar cells, the more total electrical output the solar panel can produce. The conversion of sunlight to usable electrical energy has been dubbed the Photovoltaic Effect

II. EASE OF USE

A. Solar Tracker and its advantages:

A solar tracker is a device that orients a payload toward the sun. The use of solar trackers can increase electricity production by around a third, and some claim by as much as 40% in some regions, compared with modules at a fixed angle. In any solar application, the conversion efficiency is improved when the modules are continually adjusted to the optimum angle as the sun traverses the sky. As improved efficiency means improved yield, use of trackers can make quite a difference to the income from a large plant.

Commercial purpose of solar tracking system: • Increase Solar Panel Output.

- Maximum efficiency of the panel.
- Maximize Power per unit area.
- Able to grab the energy throughout the day.

B. Types of Solar Tracker

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The sun's position in the sky varies both with the seasons (elevation) and time of day as the sun moves across the sky. Hence there are also two types of solar tracker:

- Single Axis Solar Tracker

Single axis solar trackers can either have a horizontal or a vertical axle. The horizontal type is used in tropical regions where the sun gets very high at noon, but the days are short. The vertical type is used in high latitudes (such as in UK) where the sun does not get very high, but summer days can be very long.

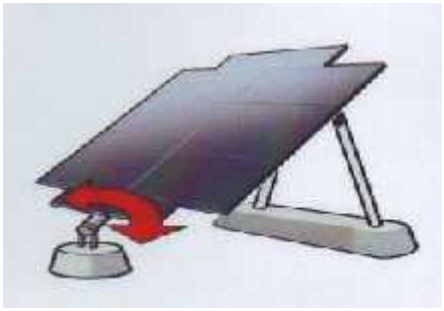

Fig. 1: Single Axis Solar Tracker

• Dual Axis Solar Tracker

Double axis solar trackers have both a horizontal and a vertical axle and so can track the sun's apparent motion exactly anywhere in the world. This type of system is used to control astronomical telescopes, and so there is plenty of software available to automatically predict and track the motion of the sun across the sky. Dual axis trackers track the sun both east to west and north to south for added power output (approx. 40% gain) and convenience.



Fig 2: Dual Axis polar Tracker

III. LITERATURE SURVEY

In the paper [1], written by the authors Ashwin R, Joshuaraj Immanuel K, Lalith Sharavan C, Ravi Prasad P.S, Varun A.K, they have used LDR sensors to sense the light and send the command to the positive relay. When the command from the sensor is received to the relay, the coil is magnetized and sends/transmits the current from one point to another. The one end of the coil is connected to the negative terminal of the battery. The transmitted current sends to the positive terminal of the transistor. The Transistor has three terminals. The first terminal acts as the input. The input given is 9 volts and it is converting the it to 5 volts by the transistor. This output of 5 volts is taken from the third terminal and given to the positive terminal of the motor. The motor has a reduction gear arrangement such that the speed is reduced to required speed. The negative terminal of the motor and the second terminal of the transistor is connected to the neutral which is connected to the battery. The second terminal of the Relay is connected to the positive terminal of the battery. Thus, the solar panel is moved horizontally and the charge is stored in the battery.

In the paper [2], written by the author, Reshmi Banerjee, constant current is given across LDR and constant voltage is given across 555 timer IC. 555 timer IC is used for monostable circuit. LDR is negative temperature coefficient device, so when the circuit is kept under light, resistance across the LDR decreases. As current across the LDR is constant and resistance decrease with light intensity, voltage starts to change its state, this voltage is working as triggering pulse in monostable circuit. CD4017 is used as a decade counter and Darlington pair is used to increase the current gain. This high current is used for driving more load. Resistance is connected in the base of Darlington pair to control the leakage current across CE. Stepper motor is connected with it, which moves in a step. As output of decade counter changes sequentially, speed increases motor torque decreases which gives movement to load (i.e. solar panel).

IV. COMPONENTS

A. Light Dependent Resistor (LDR)

Light dependent resistor is made of a high resistance semiconductor. It can also be referred to as a photoconductor. If light falling on the device is of the high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. Hence, light dependent resistors are very useful in light sensor circuits. LDR is very high resistance, sometimes a sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument.

B B. 555 Timer IC

The 555 timer is a very cheap, popular and useful recision timing device that can act as either a simple timer to generate single pulses or long-time delays, or as a relaxation oscillator producing stabilized waveforms of varying duty cycles from 50 to 100%. The 555-timer chip is extremely robust and stable 8-pin device that can be operated either as a very accurate monostable multivibrator to produce a variety of applications such as one shot or delay timers, pulse generation. The single 555 Timer chip in its basic form is a Bipolar 8-pin mini dual-in-time package (DIP) device

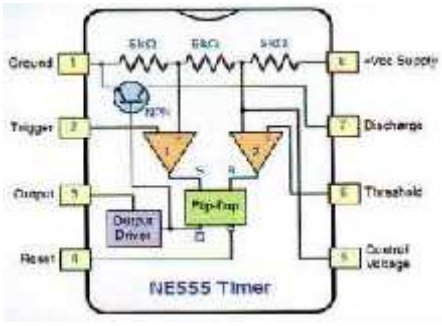

Fig. 3: Diagram of 555ne Timer IC

consisting of some 25 transistors, 2 diodes and about 16 resistors arranged to form two comparators, a flip-flop and a high current output stage.

C. L293D Motor Driver IC

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16- pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H- bridge *Motor Driver integrated circuit* (*IC*). The l293d can drive small and quiet big motors as well, check the Voltage Specification. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given above is the pin diagram of a L293D motor controller.



Fig 4. L293D IC

There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low, then the motor in the corresponding section will suspend working. It's like a switch.

D. Solar Panels

Solar panels are devices that convert light into electricity. They are called "solar" panels because most of the time, the most powerful source of light available is the Sun, called Sol by astronomers. Some scientists call them photovoltaic which means, basically, "light-electricity". A solar panel is a collection of solar cells spread over a large area and can work together to provide enough power to be useful. The more the light that hits a cell, the more electricity it produces.

E. Light Emitting Diode

LED is a semiconductor light source that emits light when current flows through it. When a current flow through the diode, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence. The colour of the light (corresponding to the energy of the photons) is determined by the energy band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device parts of a conventional LED.

F. Resistor

Resistor is an electrical device may be a passive two-terminal electrical part that implements resistance as a circuit component. In electronic circuits, resistors unit of measurement accustomed reduce current flow, alter signal levels, to divide voltages, bias active components, and terminate transmission lines, among completely different uses.

G. DC Gear Motor

DC gear motor is an all-in-one combination of a motor and gearbox. The addition of a gear head to a motor reduces the speed while increasing the torque output. The most important parameters in regards to gear motors are speed (rpm), torque (lb-in) and efficiency (%). In order to select the most suitable gear motor for your application you must first compute the load, speed and torque requirements for your application.

H. 7805 Transistor

A voltage regulator IC maintains the output voltage at a constant value. 7805 IC, a member of 78xx series of fixed linear voltage regulators used to maintain such fluctuations, is a popular voltage regulator integrated circuit (IC). The xx in 78xx indicates the output voltage it provides. A voltage regulator generates a fixed output voltage of a pre-set magnitude that remains constant regardless of changes to its input voltage or load conditions.

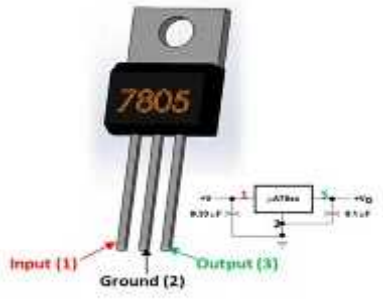

Fig 5. 7805 Transistor

I. Battery

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external

electric circuit to the positive terminal when a battery is connected to an external electric load.

J. Switch

A switch, in the context of networking is a high-speed device that receives incoming data packets and redirects them to their destination on a local area network (LAN). A LAN switch operates at the data link layer (Layer 2) or the network layer of the OSI Model and, as such it can support all types of packet protocols.

V. CIRCUIT DIAGRAM

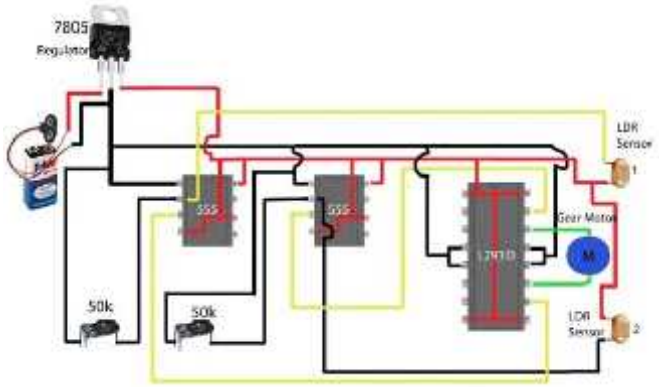

Fig 6. Circuit Diagram

VI. WORKING



Fig 7. Breadboard Model of the project



Fig 8. Final Project

As seen in the circuit diagram, LDR 1 and LDR2 are connected to the pin number 2 of ne555 timer IC (which is the trigger pin of the IC). The potentiometers are also connected as the same pin. The output pins of both the 555 IC; i.e. pin number 3; are connected to pin number 10 and pin number 16 respectively.

As long as the intensity of light over LDRs is uniform, the outputs of the timer ICs is deactivated. The outputs of the timer ICs will go high when the voltage of the LDR will be greater than the Potentiometer.

When the light received at LDR 2 is more than at LDR 1, it offers lower resistance than LDR 1. Therefore, output of the first timer IC is low and the output of the second timer IC is high. This means the input at pin number 10 is low and that pin number 16 is high. This activates the inbuilt H- Bridge Network in the Lm293dIC. The DC motor will move in the anticlockwise direction. The panel will adjust itself in such a way that it receives same intensity of light.

When the light received at LDR 1 is more than at LDR 2, it offers lower resistance than LDR 2. Therefore, output of the first timer IC is high and the output of the second timer IC is low. This means the input at pin number 10 is high and that pin number 16 is low. This activates the inbuilt H-Bridge Network in the Lm293dIC. The DC motor will move in the clockwise direction. Again, the panel will adjust itself in such a way that it receives same intensity of light.

When both the LDR are receiving same intensity of the light, the output of both the IC is low. Hence, the inputs in the Lm293d IC is low. Thus, the motor will not move.

VII. RESULT

1.Sunrise: The track rack begins its day facing the west. As the morning sun rises, the sun rays fall on the LDR. It detects and send signal to stepper motor to turn towards east.
2. Mid-Morning: As the sun rise, the LDR also detects the angle, where it gets maximum efficiency and correspondingly moves towards that direction.
3. Mid-Afternoon: As the sun moves, the track rack follows at approximately 15 degrees per hour, continually moving from one side to another.
4. Sunset: The track rack completes its daily cycle and now faces the west. It remains in the same position overnight until it is awakened by the sun the next day.

VIII. CONCLUSION

The efficiency of the solar tracking panel is 25 % to 30%. Solar tracking systems do not require much more space than a fixed solar panel. We don't need many panels to reach energy efficiency goals, 30% less space is required when you install solar tracking panel with fewer panels. It can be used all year round, even when the sun's intensity is not maximum. Every additional photon collected is more energy that can be

offset from polluting electrical generators like burning coals.

Solar panel trackers are even more expensive than fixed panel systems. An expensive unit will still only generate 30-40% more energy. That means it will take longer to recoup your costs. The solar trackers are complicated to install. Solar trackers can't be installed on pitched roof. A flat, industrial roof may accommodate solar trackers, but they are much more likely to be suited for ground installation. A sun tracking solar panel has many more moving parts than a fixed system. This can mean that long-term maintenance costs may be higher, as there are more parts to wear out or become defective. With a fixed panel system very, few components could fail or wear out. With a solar panel tracking system, it is likely that several parts will need regular care or replacement before they become worn and damage the operation of the system. Therefore, maintenance is the key.

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EFFICIENT CLASS TEST SYSTEM

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Abstract*: This project assesses students by conducting online objective tests. The tests would be highly customizable. This project will enable educational institutes to conduct test and have automated checking of answers based on the response by the candidates.*

Keywords: java, constructor, method, data abstraction

I. INTRODUCTION

The project allows faculties to create their own tests. It would enable educational institutes to perform tests, quiz and create feedback forms. It asks faculty to create his/her set of questions. Faculty then create groups and adds related students into the groups. Further the tests are associated with specific groups so that for creating practice tests, say for educational institutes and as a feedback form. This project assesses students by conducting online objective tests. The tests would be highly customizable. This project will enable educational institutes to conduct test and have automated checking of answers based on the response by the candidates. only associated students can appear for the test. The result of the response would be available to the faculty of the question set. Further the result would also be mailed to the student. This project would be helpful

II. PROBLEM DEFINITION

The generic method of taking tests using online test taking software had loopholes which the candidate exploited. The generic test taking system demands continuous internet connectivity with a high up/down speed. It requires the user to write absurd and long URL links. It is secure but very volatile. Hence, the need for a better and efficient system was felt which has less exploitable loopholes viz. Physical presence of the user at the centre must be vital. The system must be independent of the internet connectivity of the device. Total control must reside with the master network operator. Only the secured marks should be displayed which reduces cheating.

III. WORKING

Java programming language was used to develop the system. Class: a class is an encapsulation of the abstract object. All of your code in Java will be contained in a class. Method: These are functions within a class that perform a user defined function and return to where they were called from. It can either return a value or not. This must be specified in the method header. Variable: A symbolic representation in code to represent a value or data structure. Names are user defined and using meaningful variable names is the biggest pitfall of a lot of new and self taught programmers. Object: This is a hard one for new programmers to wrap their head around. An object is a data abstraction or

“blue print” for a data structure. For example a employee object class had defined variables for the name, ID and payrate as well as methods to calculate pay by passing in hours worked. There's no specific information in this object but when an instance of this object is created it is passed all of the information it needs for each employee object created. Instance: When the “blue print” is used to actually create an object giving it meaningful values and creating a reference in memory to where this object is located. This is done with the new keyword. Constructor: this is the part of the object that is written as a method but with an identical name to the class. This is the default method that gets called when an instance is created. Typically you have multiple constructors depending on the use, but keep in mind they have to have different parameters or else Java doesn't know which one to use. Main method: this is where your program starts. The header for your main method is public static void main(String args[ ]){ }. You can have many different classes within a program but only one main method. The class with the main method is known as your main class. As a beginning programmer most of your code is likely to be written in the main method but as you get more experience you'll find the main method only has a few calls to get the program started.

IV. CIRCUIT DIAGRAM



Fig 1: question page



Fig 2: result page

V. ADVANTAGES

This software is very useful for environment as there is very less use of paper require in conducting test and help faculties to set papers. Also it is secure and ensure that there is not any cheating in examination

VI. APPLICATIONS

This project will enable educational institutes to conduct test and have automated checking of answers based on the response by the candidates.

VII. CONCLUSION

The system can take an digital test without any bug and displays the score upon successful completion of the test.

VIII. PROJECT SCOPE

There are many things we can implement in this project. Like with the knowledge of DBMS, a pool of data can be made to store. Also individual mapping could be added to enhance correspondence.

We can improve security by introducing login id and password. For faculties and students like admin login for faculties and student login for students. This will help in conducting test easily without any cheating.

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Some Studies on Haze Mitigation and Visibility Restoration in Foggy Conditions for Vehicles

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***Abstract* - Roads are considered to be crucial infrastructure components in any country. However, bad roads, bad weather conditions or human factors lead to road accidents. Out of which, road accidents caused due to fog are relatively less but their severity is greater and the risk of life is higher. To address this problem, images captured by cameras embedded in the vehicles are processed at real time to restore some visibility. The proposed solution is to display improvised dehazed images of the road scenario to help drivers anticipate potential collisions. In this article, we summarize the existing work and propose a new image defogging algorithm that works on the original foggy image. Two input images are derived based on Discrete Wavelet Transform (DWT), Contrast Limited Adaptive Histogram Equalization (CLAHE) in HSV Model initially and dehazed output is obtained from fusion algorithm. The dehazing method used in this work is fusion based on dwt. We have developed a modular approach to solve this problem of image haziness. The quantification of restored images will be done using metrics such as edge detection, entropy etc.**

Keywords – Image Enhancement, Visibility Enhancement, foggy Image, Contrast Enhancement, Defogging modules

I. INTRODUCTION

Outdoor scene images are degraded through various reasons; one of the major reason is condition of bad weather presence [1]. Under The adverse weather conditions, the contrast of an image that is grabbed by an in vehicle camera in the visible light range may be drastically degraded. This makes current in-vehicle applications relying on such sensors very sensitive to weather conditions. An in-vehicle vision system should have excellent image defogging capability [2]. Under foggy weather conditions, the color and image contrast, are drastically degraded. This degradation level is improved with the distance from the camera to the object. Fog decreases the contrast image level that affects the visual image quality. In the visual quality, visibility and computer vision, image level field is affected through air-light and attenuation phenomenon

In this work, we summarize some state of the art methods and propose a novel image defogging algorithm that works on the original foggy image as two input images initially and output obtained from two images is taken as input to a new module, and different enhancement processes are performed on the image at each stage and outputs obtained at each module. The dehazing method used in this work are based on Discrete Wavelet Transform (DWT), and Contrast Limited Adaptive Histogram Equalization (CLAHE) in HSV Model. The He's method using Dark Channel prior is implemented for RGB Model [11]. Using the outputs of these two methods a Fusion

The assumptions made are; the scene is dominated by air light. However, most available methods are generic restoration in nature which may cause partly over-enhancing of the image at a short distance. This certainly makes these defogging methods perhaps not suitable for road images. As the results available, image captured in far away region that is most concerned by a car driver can be moderately enhanced, and over-enhancement of the bottom region image can be also limited effectively. In order to adequately compute the defogging effects of various algorithms, the assessment methods based on image feature and visibility distance are proposed for road scene image. To evaluate the model's performance fairly and objectively, the model is trained with two image datasets with different visibility ranges. The comparative study and quantitative evaluation shall exhibit the proposed method can obtain very good defogging image with relatively fast speed [19-23].

Haze image formation model widely used in optics is [17],

$$I(x, y) = J(x, y)t(x, y) + A(1 - t(x, y)), \quad (1)$$

$$t(x, y) = e^{-d(x, y)}, \quad (2)$$

Where $I(x,y)$ is the 2D hazy input image, $J(x,y)$ is the image to be restored, $t(x,y)$ is the transmission depth and A is the atmospheric light. The two parameters to be obtained through this exercise is value of A and $t(x,y)$. The value $d(x,y)$ corresponds to depth of the image and β, is a scattering parameter assumed to be a constant.

As we see,

$$d(x, y) \to \infty, \quad t(x, y) = 0, \; I(x, y) = A, \quad (3)$$

and as

$$d(x, y) \to 0, t(x, y) = 1, \; I(x, y) = J(x, y), \quad (4)$$

The above set of equations underlines the importance of Atmospheric light value. In natural images, the depth ranges up to horizon and extends towards the sky at an infinite distance. In normal practice, this corresponds to most haze opaque pixel in the dark map, which is than spatially mapped to input image to obtain corresponding value of pixel to obtain *A*. Any bright object can be misjudged as *A*. So to avoid this various techniques are offered in the literature. Improper selection of *A* value restores the image badly. So how we attempt to address this problem is discussed in the next section.

The remaining paper is structured as follows. In Section II, we have carried out comprehensive survey on the existing state of the art techniques. In Section III, we present our novel algorithm and in Section IV, the conclusion and in Section V, further work is highlighted.

II. Literature Review

In [4] C. Busch and E. Debers came up with an approach to determine the visibility range under foggy weather conditions from images of stationary traffic management systems. After a manual masking of the road, a wavelet based contrast measurement was performed. The image upon which a maximum of 5% contrast appears, it defines the visibility range in the camera image. From the established camera configuration relative to the road a transformation from image to world coordinates was done. When the distance is ranging from 300 to 1000m the proposed system gives a output of a visibility range in 50m steps, in the range of less than 300 m in 10 m steps. Even if this system was designed for a stationary use, it is interesting in our field of application, as with existing image processing techniques, like an appropriate lane and detection of object, it could be made applicable for the on road vehicles.

In [18] D. Pomerleau announced a system to estimate the visibility range through the use of a camera mounted inside a vehicle. His system is generic and aims to cover possible spectrum of situations of low visibility caused by dazzling, rain, snow or fog. Thereby the visibility range is estimated by the attenuation of the contrast along alike road features like lane markings, banquet or even oil stripes. At first a trapezoid region containing the road ahead is extracted and warped to the bird-eye-view. Then by shifting the rows of the image on this warped view, a straight road profile is sought. The horizontal intensity profile of this image is evaluated at different image rows and from the difference in intensity peaks of the upper and lower rows the contrast attenuation is computed. This contrast change often happens along road features like lane markings.

Another approach to find the visibility range under foggy weather conditions was proposed by Bronte et al. [3].

In this method, two adjacent image regions are extracted, a road and a sky region, each with a region growing algorithm. Further, they estimate the current vanishing point respectively the vanishing line from image features. If the vanishing point is inside the upper sky region, they conclude the presence of fog. Then the image row, where the two regions meet, provides the current visibility range. By perspective projection and assuming a flat world they compute the visibility range in meter. In order to avoid false detections they make use of kind of threshold based preceded no fog detector which sums the magnitudes of gradients in the upper half image region. Since the estimation of the visibility range based on a single image is highly unstable, i.e. it exhibits a large variations with respect to time, the median visibility range is calculated over a explicit period of time.

Whilst all methods presented till now are based on daytime scenes, an approach for nighttime scenes was introduced by Gallen *et al.* [7]. In this approach, the problem is divided into two categories, scenes containing light sources like streetlights, ahead or forthcoming vehicles and scenes with no external light sources. In the first category light propagation around light sources is investigated. If the corona of a light source has a razor-sharp transition to the surrounding they conclude that there is no fog, otherwise that there is fog. The translation is thereby inspected an approach which is based on multistage threshold. Having a scene without external light sources, propagation of light of the vehicle headlights is analyzed. For that purpose, templates for their experimental vehicle at different visibility condition in a fog chamber are recorded. So each template also incorporates a specific visibility range value.

Their method currently averages a specific number of images and compares this average image with all templates. The template with the smallest Euclidean distance in pixel values finally furnishes the visibility range. Unlike above mentioned methods that depend upon a localized image features related to lane markings, road profiles etc. we introduce a scheme which rely on global features of image where the classifier is trained on fog and fog-free images.

In this work, we propose a new image defogging algorithm that works on the original single foggy image as two input images for two modules.

III. Proposed Algorithm For Visibility Enhancement

The algorithm that we will primarily use will be derived from dark channel prior as proposed by He et al. [11]. This method is the outcome of a primary investigation that maximum local image blocks in haze free images consist of some pixels exhibiting very low intensities in one of the color channels in RGB color space. Making use of this information, the relative haze thickness can be precisely approximated and good quality image, free of haze can be recovered. This is a

single image input Algorithm which is applied on a single image.

The block diagram as shown in Fig.1 represents a novel hybrid image defogging algorithm that works on the original single foggy image as the estimation two input images for two modules. Output obtained from two images is taken as input to a third module, and different enhancement processes are performed on the image at each stage and outputs obtained at each module.

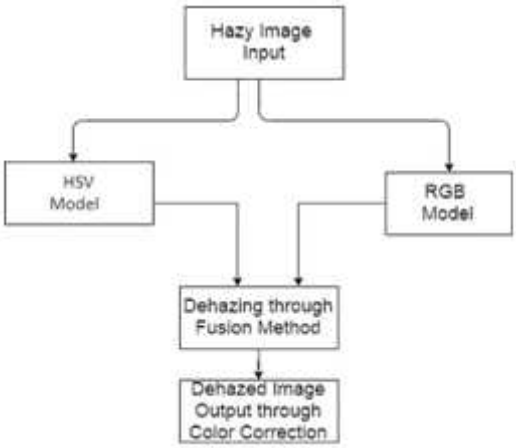

Fig. 1 Block diagram of the proposed study

The dehazing techniques/ method used in this work are DWT, IDWT, CLAHE in HSV Model and is called module

1. The He's method using Dark Channel prior is used in RGB Model which is module 2. Using the outputs of these two methods a Fusion based dehazing method is proposed in this study which makes use of DWT and IDWT.

In module 3, the image obtained at this particular stage is proposed to be corrected to get an enhanced dehazed image as output in order to obtain Haze mitigated image for on road scenes. At module 4, the image is enhanced using image correction techniques such as white balancing. The image obtained after all the mentioned processes has been intended to provide an improvised image output.

The proposed algorithm may achieve very good enhancement results for road scene image by giving a road plane assumption into the atmospheric scattering model. Figure 2 depicts the flowchart of the image defogging algorithm. This algorithm can be divided in four modules.

Module 1: processing Input image through HSV Model to obtain input to Fusion dehazing Module (Ref Fig 3)

The hazy image input available in png format in RGB model is converted to HSV model. The three components are separated as H, S, V respectively. The H or Hue component is submitted to DWT to obtain a LL Band. The LL band is applied on rows and columns to obtain a compressed image.

The output obtained at this process is furnished to Contrast stretching. This output is further inputted to Inverse DWT process to obtain a Inverse Hue value.

The Saturation S remains unchanged. Value or intensity is worked upon by DWT and further inputted to CLAHE technique. The intermediate output is processed using Inverse DWT to obtain an inverse V Value. These values are next converted to RGB format thus to form a processed image.

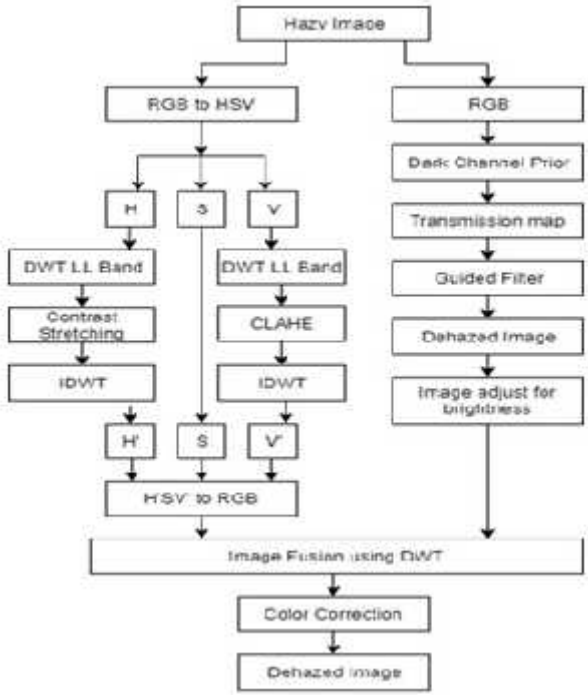

Fig.2 Detailed Flowdiagram

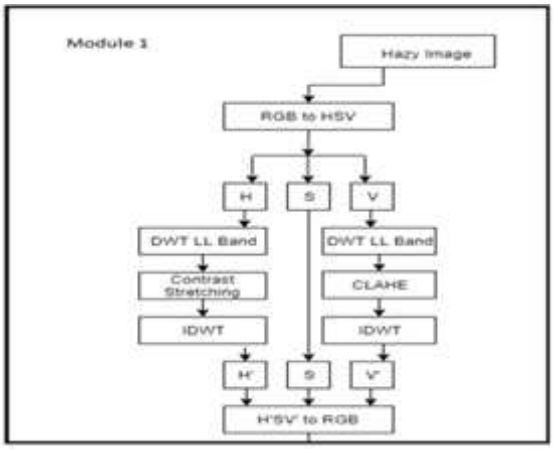

Fig. 3 Module 1

Module 2 : Processing input image through RGB Model

The process that we will use in Module 2 (Fig.4) will be derived from dark channel prior as proposed by *He* et al. [5].This method is the outcome of a primary investigation that maximum local image blocks in haze free images consist of some pixels exhibiting very low intensities in one of the color channels in RGB color space. Making use of this information, the relative haze thickness can be precisely approximated and good quality image, free of haze can be recovered.

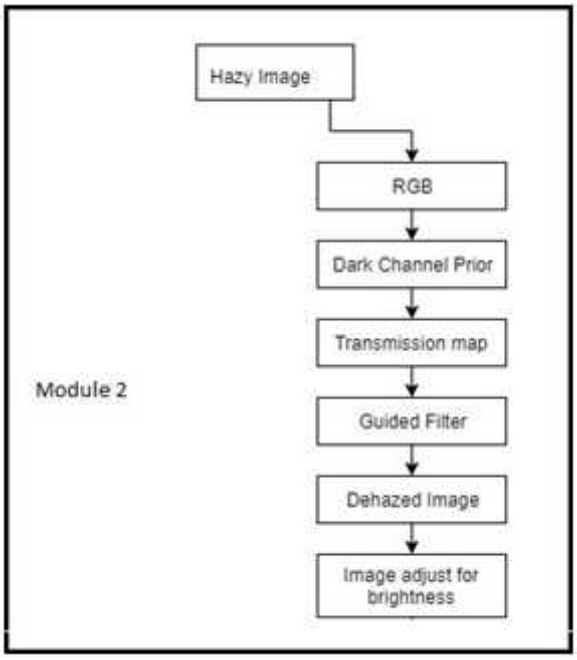

Fig. 4.Module 2

Module 3 : Comparing the two input images to extract best of the features through Fusion based Dehazing technique using DWT to obtain an enhanced image.

Module 4: Color Correction to obtain the optimum output as Dehazed Image to achieve Haze mitigation. The algorithm has to correct the white balancing of the image. Correction process is carried out to obtain the optimum output as Dehazed Image to achieve Haze mitigation

The foggy datasets are publicly available. In addition, we have to collect the dataset with outdoor images and extract visibility values for this study. The available datasets for this study are as mentioned below:

- FOVI dataset
- FROSI dataset

IV. CONCLUSION

The proposed algorithm may achieve very good enhancement results for road scene image by giving a road plane assumption into the atmospheric scattering model.. Outdoor scenes images captured in not good weather suffer from bad contrast. Under conditions of bad weather, the light reaching a camera is severely scattered through the atmosphere. So the image is getting highly degraded due to additive light. Additive light is from scattering of light by fog particles. Additive light is generated through mixing the visible light that is emitted from different light source. This additive light is called air light. Air light is not uniformly distributed in the image. Bad weather reduces atmospheric visibility. Poor visibility degrades perceptual quality of image and algorithms of computer vision, performance for example navigation, tracking, and also surveillance. Actual weather condition is valued information to invoke corresponding approaches. Based on the analysis of atmospheric scattering models and statistics of various outdoor images, for foggy images, we discover that the value highest and lowest in color channels tends to be the atmospheric light value. In this study, a novel algorithm has been proposed for fog or haze removal purpose with combination of edge enhancement method, color enhancement method, adjustable, Wiener filter and also computes the haze-factor out of single image through using an adjustable empirical function without manual input constraint for efficient outcomes.

In this work, we shall use the listed dataset and carry out the experiment on the proposed algorithm and various dehazing techniques available. The finding obtained shall be compared to check the performance of this algorithm to its Contrast to Noise Ratio.

In this work we shall subdivide the image on severity of fog and restoration will be carried out region-wise. We shall use the listed dataset and also carry out the experimentation on site. To reduce the computational complexity we can also adopt machine learning techniques with convolutional and deep neural network with standard classifiers.

V. FURTHER WORK

Based on this novel algorithm, an application may be designed in which a low cost action camera can be affixed on top front of the vehicle and display panel with a processing unit will be mounted on dashboard. The driver shall then look primarily at display and maneuver his or her vehicle through foggy area. The image captured shall be processed using this algorithm to obtain an improvised image of the fogy image. This work may be termed as Dehazing Video application.

Another area of future scope may be processing the image captured at night in foggy weather condition .

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Comprehensive Analysis of Watermarking Techniques using Wavelets and Visual Cryptography

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***Abstract*—The security of the images is a wide concern in multimedia word. The watermarking of the images is of more interest as to provide the copyrights to the images. The delicate images are those images which carries soaring amount of important data that describes an images. Since the utilization of delicate pictures for data trade is expanding, watermarking for these pictures is developing territory of research. The delicate images might be victim of tampering during the transmission therefore watermarking of the images is important as to provide copyrights to it. This paper wraps concise research about some of the enhanced trends in digital image watermarking. It will be useful for the researcher to use proper watermarking scheme for their application. A novel model of security for social media content using Visual cryptography is also proposed. Biometrics of a person is a unique feature of identification. This model will be based on ear pattern as a biometric feature to authenticate the image.**

Keywords—Security, Image watermarking, Biometric Feature, Discrete Wavelet Transform, Visual Cryptography

I. INTRODUCTION

In this expanding world, the use of internet is expanding at a very high rate. With increase in use of internet, there is high possibility of data to be read by the untrusted party while its transmission on over the internet. So the protection of the data to prevent it from getting misused is necessary. The quality of the image is also affected during its transmission. It is important that quality of the image should be preserved as it contains important information [1]. Digital watermarking ensures the authentication of the image. This data protection is provided by Data Hiding [2]. Visual cryptography allows encryption of visual information so that it is protected from the third party and decryption is possible by vision reading. To protect the data the two basic ideas are the bit replacement scheme which works by replacing the least significant bit and the multilayer multi-shares method where overlapping the shares will reveal the protected data.

Watermarking is a very common technique used to solve problem related to authentication and also give copyright protection. Watermarking can be used for text, image, audio or video protection. Watermarking techniques are divided into invisible, visible or dual. Invisible watermarking is a technique where the watermark is embedded in the host image and it's hidden to human vision. It is only visible by extraction process of the watermark. Visible watermarking is a like stamping watermark on the document or text so that it gets authenticated. Dual watermarking is combination of both visible and invisible techniques [3].

Watermarking can be performed is spatial domain and also in frequency domain. In spatial domain image is defined by spatial coordinates of its pixels. The secret messages are embedded directly using pixel manipulations. The most common method is least significant bit insertion method. Pixel connectivity, pixel intensity or edge based data embedding methods are based on pixel manipulation. Frequency domain consists of decomposing of image into spatial frequencies. Frequency domain watermarking mainly depends on transforms. The data is embedded into the transform of an image rather than on the direct pixel values. The image is then converted back to spatial domain for the viewing purpose [3].

The remainder of this paper is structured as follows. Section II highlights the work carried out in this field. Section III describes our proposed model. Conclusion and discussion is listed in Section IV.

II. LITERATURE REVIEW

Visual Cryptography is a scheme introduced by Moni Naor and Adi Shamir which made it easier to share the secret images data without encryption or decryption of the image [4]. This scheme is secure and easy to implement. In this scheme a cover image is splitted into two images called as shares. Each share contains black and white pixels evenly distributed. This individual shares do not reveal any information about the cover image. Overlapping the shares will show the contents of the cover image. The information hidden using visual cryptography can be increased by using multi-share visual cryptography [5]. Visual cryptography can also be performed by using a secret key. This secret key is shared

between the two parties for the secure communication. On sender side image is encrypted by using secret key, while at receiver side it is decrypted using same secret key [6].

Even with advance computer and technologies, it is not always feasible to decrypt the secret message. So it is always advisable to keep the data safe with simpler computation. Increasing the number of shares makes the intruder difficult to know the secret image. Intruder can get hold of a one share and introduce a fake share which will reveal a fake image. Hence the chances of revealing the original secret image is minimum hence highly classified information can be sent using visual cryptography [7]. The visual cryptographic scheme based on XOR operation can create 'n' number of shares. Less than 'n' number of shares will not reveal any information about secret image [8].

Biometrics is a science that deals with indentifying individuals mostly on the basis of their physical qualities as fingerprint, iris, etc. Normally a biometric scheme requires an image of the biometric part (fingerprint/iris image). The features from the image are extracted that signifies the biometrics of the individual Biometrics is widely used to identify the individual, but it can also be used to find the characteristics of the individual such as its gender, age, height, weight, eye color etc. Biometrics has two major purposes: Identification and Authentication. Identification is a process of claiming of an identity whereas; Authentication is the process of verifying the identity Acquiring biometric data consist of 4 steps: (i) Image Acquisition, (ii) Pre-processing, (iii) Feature extraction and (iv) Comparison [11].

Watermarking is a way of hiding data into a host image which remains intact even after decryption. Various schemes have been adopted in literature review to implement the algorithms based on watermarking. One important field is frequency domain. These are classified into: Discrete Cosine Transforms (DCT): DCT helps in breaking down the image into its frequency bands (High, middle and low frequency bands) and thus helps in selecting band in which the watermark can be inserted. Discrete Fourier Transforms (DFT): DFT is similar to DCT but it uses Fourier transforms. This makes it to lack resistance to strong geometric distortion. bands) and thus helps in selecting band in which the watermark can be inserted. Discrete Fourier Transforms (DFT): DFT is similar to DCT but it uses Fourier transforms. This makes it to lack resistance to strong geometric distortion.
Integer Wavelet Transforms (IWT): When input data is consisting of integers rather than the floating point coefficients, after the transform the resulting filtered outputs may not consists of integers, which in turn affects the reconstruction of the image. Hence IWT is used. Discrete Wavelet Transforms (DWT): In time domain, Wavelet is defined as a small wave which will decay. Wavelet transform have advantage as it can analyze the signal at different frequencies at different resolution (multi-resolution analysis) [12].

Mathivadhani and Meena proposed a Biometric based watermarking scheme [13]. The proposed scheme is based on 1-D Haar Digital Wavelet Transforms and Least significant bit substitution method. Here using 1-D Haar Digital Wavelet Transform the original image is first converted to its four sub bands. Every sub band is treated as a share. Secret message is embedded in these shares using the selected least significant bit (SLSB) substitution method. In SLSB substitution method, out of the 3 planes of color image (red, green, blue) only one plane is chosen for the substitution. Two least significant bits of the selected plane are replaced with the secret data. The model was tested with 3 cover images which are Lena, Pepper & Baboon against 10 different attacks. The system had accuracy of around 99% to obtain back the watermark. The accuracy of the system against different attacks is around 81.55% to 98.84%. The limit for the biometric image used, should be less the 40% of the cover image [13].

Hou and Huang came up with a model of image security using Statistical Property [14]. In this method, the two pixels are randomly selected using private key k. These two pixels are compared with each other based on their gray scale value. If first pixel is higher than the second the master share gets white pixel. Otherwise the master share gets a black pixel. In such a way entire master image is created. Then using this master image and watermark image the ownership image is created. This model works by overlapping master image and ownership image which gives the watermark image. The model is tested against various attacks for the Peak Signal to Noise Ratio (PSNR) value and Normalized Correlations (NC). The result showed the system has very good resistance to various attacks and can get the watermark image back without much degradation. The advantage of this model is it does not affect the original image, watermark size is not dependent of the size of original image and water mark could be extracted without the knowledge of original image.

Murty *et al.* proposed a Digital Signature and Watermarking scheme [15]. Here digital signature is created using public key cryptography. It uses HASH algorithm. Watermarking digital signature can be done in spatial domain as well as in frequency domain. In spatial domain it can be done by Least-Significant bit substitution or by SSM modulation based technique. Frequency based techniques can be Discrete Cosine transformation (DCT) or Discrete Wavelet transformation (DWT). Experimental results show that the model can be used for copyright protection and authentication.

Devi *et al.* proposed Dual Watermarking Scheme In this method the primary watermarking scheme focus on the singular value decomposition in DWT which is authorized by the secondary watermarking scheme which uses visual cryptographic concept in DWT. Haar wavelet transform allow the image to be divided into 4 sub-bands. In the primary watermarking scheme the binary watermark is embedded into the image. The secondary watermarking scheme consists of generation of owners share and generation of identification share. The performance of the scheme was evaluated through several attacks such as JPEG compression, rotation, cropping,

scaling, noise injection, median filtering, etc. This scheme proved robust against these attacks. The advantage of secondary watermarking scheme is it makes the scheme more robust and also acts as a backup for primary watermarking scheme. Key plays important role, without key it is not possible to recover watermarks. Performance of the watermarking scheme is better in frequency domain compared to spatial domain.

Surekha and Swamy proposed watermarking scheme for sensitive images [17]. This scheme is based on DWT and Pair-Wise Visual Cryptography (PWVC). First the cover image is decomposed into sub-bands using K-Level DWT. the number of wavelet decomposition levels K depends on the size of host image and size of watermark image. Then final LL sub-band is used for feature extraction. Feature image is created by using a secret key. It is compared with the average of LL sub-band to give a binary Image. Then watermark is concealed into this binary image using a PWVC coding.

The secret key and the number of wavelet decomposition levels are kept secret with the owner. During the process of verification the owner must provide the same secret key and number of wavelet decomposition levels and obtain the public share using similar process. When both the shares are overlaid on each other, the watermark can be obtained. The performance of proposed scheme was evaluated based on parameter PSNR and NC. It was also tested against various attacks and results showed that NC value is above 90% in most cases [17]. This scheme has advantage of reduction in memory space to store the private share.

It is used to generate the owner's and identification share. The watermark is first divided into sub-watermarks of equal size. A sub-watermark is selected and it is used for all motion less frames in the scene. Different sub-watermarks are used for different scenes.

The sub-watermarks are encrypted using the key and are embedded into LL sub-band in the owner's share generation process. During identification share generation process Detection algorithm is used to obtain the identification share, which is X-ORed with the owners share. The resultant is decrypted using the same secret key used while encrypting, to provide the watermark. Experiments conducted to test the performance of the scheme results that scheme is robust against all video attacks related to frame dropping and frame averaging and also robust against many image processing attacks.

Kamble *et al.* proposed a watermarking scheme based on DWT-SVD [19]. This technique is divided into two parts: embedding and extraction technique. In embedding technique the cover image is decomposed using 1-level DWT. The HH sub-band which consists of high frequency coefficient changes responsible for changes in edges only is selected for embedding watermark. SVD of the HH sub-band is calculated.

Watermark is encrypted using visual cryptography into two shares: share 1 and share 2. SVD is performed on Watermark share 1 also. This singular matrix is used to modify the values of singular matrix of the HH sub-band and inverse SVD is applied on it. Inverse DWT is performed on the resultant and watermarked image is obtained. Extraction technique is reverse of embedding technique. Watermark share 2 is used as secret key generated in the embedding technique. It is superimposed to get back the watermark, on the decrypted watermark share 1. The experimental results showed high NC values for different kinds of images under different attacks. The scheme is more robust as it is difficult to extract the watermark information without knowledge of the watermark secret share.

Benyoussef *et al.* proposed watermarking scheme for Medical Images [20]. The proposed method is based on Visual cryptography concept and Dual Tree Complex Wavelet Transform (DT-CWT). In this scheme the watermark image is not embedded into the cover image. The Proposed algorithm is consisting of three stages: watermark concealing, extraction process and watermark reduction. In watermark concealing stage, DT-CWT is applied on the image to create a binary matrix.

This matrix is used to generate a secret share image from the watermark based on the visual cryptographic scheme. This process is also used to generate public share in the extraction process. The public share and secret share can be superimposed to recover the ownership watermark.

The reduction process is carried out to improve the image quality. The algorithm is tested for similarity between extracted watermark and original watermark using normalized correlation. It was also texted against the attacks like compression, blurring, resizing, cropping, rotation, etc. the quality of the attacked images is assessed by Peak Signal to Noise Ratio and Structural Similarity Index. The algorithm was also tested for reliability using false keys. This scheme proved robust against different attacks and also it doesn't affect the watermark image.

Benyoussef *et al.* proposed watermarking scheme based on Region of Interest (ROI) [21]. This proposed method is based on prevailing blocks of wavelet coefficients and visual cryptographic concept. It uses Faber-Schauder DWT transform (FSDWT). This transform only uses first neighboring coefficients and it gives more accurate edge detection. Walsh-Hadamard transform is used to merge the two matrices in a reversible way. In the scheme, the watermark is not embedded in the cover image. The features of cover image are utilized to generate the secret share. FSDWT transform helps to find all the prevailing blocks of the cover image. The reduction process is used which reduces the redundancy data caused due to VSS scheme. The robustness of the algorithm was tested by subjecting the watermarked image to various attacks. The quality of

attacked images is tested using PSNR value. Normalized correlation helps to find similarity between the extracted and original watermark. Some cases NC value obtained was 100%. Also PSNR is observed more than 40 db in most cases [21]. Reliability of the algorithm is tested by using fake key. But the watermark could be extracted only using true key. This method has advantage of embedding a watermark without changing the cover image.

Fatahbeygi and Aklaghian proposed semi-blind image watermarking scheme [22]. This method is based on canny edge detector, Support Vector Machine (SVM), image block classification and visual cryptography. The proposed method has 3 stages: SVM training phase, the owner share construction phase and the owner share recognition phase. For SVM training it uses two image sources. First is original host image source and other source is 5 images generated by corrupting host image. Owner share is constructed by using master share and binary watermark. Owner share recognition is important in order to solve disputes over rightful ownership of the image. The scheme is tested using four host images and one binary watermark image. It was tested for PSNR value and normalized correlation coefficient. This method is completely imperceptible as the watermark is secreted in the host image without modifying the host image. Also watermark can be seen by stacking the two shares without use of computers.

Rani *et al.* proposed zero watermarking scheme [23]. They proposed two schemes which are based on Discrete Wavelet Transform and Singular Value Decomposition. The watermark is not implanted into the host image but using the host image it is encrypted. In scheme 1 the host image is first divided into overlapping blocks. Then each block is decomposed using 1 level DWT. Further SVD is applied to the LL sub-band of the each block and highest singular value of each block is chosen. Random number sequences are generated which are used to pick singular value randomly. Mersenne twister algorithm in Matlab is used to generate random number keys. Differential classification of randomly picked singular value generates master share. The master share is then X-ORed with the secret image to generate ownership share. Ownership identification is regenerating the secret image, which can be done by X-OR between owner share and master share. Secret image is only revealed when master share is generated correctly using right keys. Scheme 2 is more or less similar to scheme 1. In scheme 2 the host image is first decomposed using 1-Level DWT and then there is block-wise separation. Later the process remains similar. Performance evaluation was done using different test images and calculating values of PSNR and NC. Results shows PSNR value lower than 40db but value is sufficiently high to prove authentication of the owner. Scheme 1 show good robustness to various kinds of attacks compared to scheme 2 but scheme 2 is computationally cheaper and faster in processing. [24]

Banik and Bandyopadhyay proposed secret sharing scheme using steganography [24]. The cover image is decomposed by 3-level DWT transform. The secret image is encrypted using Lorenz Chaotic Encryption. This encrypted secret image is embedded with the selected high frequency coefficients of the DWT using pseudo random numbers. Then inverse 3-level DWT is applied to obtain a Stego image. This Stego image is divided into two Stego shares using visual cryptographic concept. This method has Steganography as well as visual cryptography. Hence PSNR value is calculated twice. The results show that PSNR value of Stego image is high around 97 db but visual cryptography its lower than 30db [24].

Kunhu *et al.* proposed a watermarking scheme for copyrights [25]. They proposed this algorithm which depends on the visual cryptographic approach and discrete wavelet transforms. In the proposed algorithm the information about watermark which will give it ownership contents is encrypted into 3 shares using visual cryptography. The original cover image takes is a color image. The each of the encrypted watermark share is RGB layers of the cover image in the wavelet domain. They used 2D-DWT Haar wavelet transformations to decompose the image into blocks. The ownership watermark information is embedded into lower frequency component blocks. The watermark is extracted by 2 levels DWT decomposing of the RGB layers of the copyright protected image, and then the 3 encrypted shares are extracted from the lower frequency component block. Finally the watermark information is decrypted from the 3 shares. The proposed algorithm is tested various images. The noise in watermark caused due to cover images is checked using the Peak Signal to Noise Ratio (PSNR) and Structural Similarity Index Measurement (SSIM). The quality of extracted watermark is tested using Normalized Correlation (NC). The algorithm is also tested against attacks such as JPEG compression, Image Resize, and image rotation attacks. It was found robust against all these attacks.

Singh *et al.* proposed image Steganography scheme based on SVD [26]. It uses Chaotic Sequence to scramble the watermark. First the host image is decomposed by using the integer wavelet transform into its sub-bands. Then SVD is applied on the sub-band LL, which result into singular matrix of the transformed coefficients of sub-band. The logo or watermark image is scrambled using chaotic sequence and it is embedded into the singular matrix obtained above. Later inverse IWT and inverse SVD provide the Steganographic image. Recovery of the watermark image is the reverse embedding process. The performance of the scheme was tested with Lena, pepper and logo image for the PSNR value and correlation coefficient. PSNR values were observed greater than 52 and correlation coefficient around 98%, which makes it hardly noticeable and also recovered image to be closely relatable to the cover

image. The algorithm was also tested against various attacks which gave more than 92% correlation coefficients in the most cases [26]. The proposed method showed better results than DCT and RDWT methods.

Seal *et al.* proposed lossless image encryption scheme [27]. While encrypting, the image is broken down using single-level Haar wavelet transform into its sub-bands. Then every pixel value of the LL1 sub-band is converted into inverted binary form. This inverted binary 8 bit form is divided into 2 parts and again inverted separately. These 2 parts are then concatenated and converted to its equivalent decimal value. This decimal value replaces original pixel value in the image. Then the other 3 sub-bands which contain detailed information of the image are inverted. All the sub-bands are swapped and LL1 is vertically broken down into 2 halves and swapped. The resultant is again broken down horizontally into 2 halves and they are swapped again. Finally there is inverse DWT performed on the image which gives encoded image. The model is tested for correlation coefficients and PSNR. Results show that the decrypted image similar to encrypted image. This makes the algorithm a lossless image encryption algorithm.

Giri and Bashir proposed block based watermarking [28]. This scheme uses Discrete Wavelet Transformation. In this scheme the signature image as a watermark image is embedded in the color image using concept of nearest neighborhood relationship. In watermarking procedure DWT is applied to color image to decompose it into various non overlapping sub-bands. Out of all the sub-bands, HL sub-band is used to embed the watermark. The HL sub-band is further divided blocks if size 4x4. The only first 3 rows and columns are used embedding watermark and the last is kept as separator to separate it out from adjacent blocks. The intensity value is splitted into 8 bits. This 8 bits are embedded by replacing 4th bit plane in 8 neighborhood pixels around the central pixel in every block using a pseudo random sequence. The watermark image is obtained using inverse DWT. Once the embedding process was carried out, it was tested to compute PSNR between watermarked image and original image. Also it was tested to determine the Accuracy Rate of the watermark which is extracted from the encrypted image. In worst case, the PSNR value was found to be 54.53 which is a satisfactory value with respect to perpetual transparency property. Accuracy rate was observed as 90.90 in worst case scenario, which clearly says that this algorithm is robust against various attacks [28].

Kumar *et al.* proposed Improved Wavelet-based watermarking through SPIHT [29]. The proposed scheme is based on Discrete Wavelet transform (DWT), Discrete Cosine Transform (DCT), Singular value decomposition (SVD), Set Partitioning in Hierarchical Tree (SPIHT) and Arnold Transform. First the host image is decomposed using DWT. Then the sub-band is selected and DCT is applied on it. SVD is applied to get the coefficients of the host image. A logo is used as watermark image, which is scrambled using Arnold Transform. Which is transformed by DCT and SVD is applied on DCT coefficients. Then scrambled watermark is embedded into the sub-band of the host image. Further, inverse SVD, inverse DCT and inverse DWT is applied on the embedded image, which results in watermarked image. Then SPIHT encoding is used to get a compressed watermarked image. Performance of the scheme is tested with and without attacks on the watermarked image. The results showed that scheme is robust as well as well secure. Arnold transform provides security while the SPIHT makes the algorithm robust.

Table 1 shows the comparison between various watermarking techniques. The decomposition using wavelets can be single level or multiple levels.

TABLE I : COMPARISON BETWEEN DIFFERENT WATERMARKING TECHNIQUES

Sr. No.	Authors	Purpose	Findings	Results	Methods
1	Mathivadhani and Meena (IEEE, 2011)	Biometric Based Authentication Using Wavelets & Visual Cryptography	Iris image extraction & authentication	Store biometric image inside a color image.	Wavelet Decomposition, least significant bit substitution method.
2	Hou & Huang (IEEE, 2011)	Image Protection Based On Visual Cryptography & Statistical Property	Embedding a watermark	Watermark does not affect the original image. Watermark is not limited to size of image.	Visual Cryptography, Law of Large numbers.
3	Murty *et al.* (SIPIJ, 2011)	Digital Signature and Watermark Methods For Image Authentication using Cryptography Analysis	Digital signature and watermarking	Copyright protection and Authentication.	Encryption and Decryption using Key
4	Devi *et al.* (IJCA, 2012)	Dual Image Watermarking Scheme based on Singular Value Decomposition and Visual Cryptography in Discrete	Copyright protection using watermarking	Robust against various attacks. Also provides secondary watermarking.	Discrete wavelet transform, Visual cryptography, singular value

		Wavelet Transform			decomposition (SVD)
5	Surekha and Swamy (IJNS, 2013)	Sensitive Digital Image Watermarking for Copyright Protection	Watermarking for copyrights	Robust against attacks & reduces size of the shares.	Discrete wavelet transform, Pair-Wise Visual cryptography
6	Singh *et al.* (IJEC, 2013)	Video Watermarking Scheme based on Visual Cryptography and Scene Change Detection	Video Authentication	Robust against video attacks and image processing attacks.	Discrete wavelet transform, Visual cryptography, Scene change detection.
7	Kamble *et al.* (CSIT, 2012)	DWT-SVD based Secured Image Watermarking For Copyright Protection Using Visual Cryptography	Encrypted watermarking	Without knowledge of secret share difficult to extract watermark	Singular value decomposition, Discrete wavelet transform, Visual cryptography
8	Benyoussef *et al.* (IEEE, 2014)	Medical Image Watermarking For Copyright Protection Based on Visual Cryptography	Confidentiality for medical images	Embedding watermark without changing cover image.	Visual Cryptography, Dual Tree Complex Wavelet Transform
9	Benyoussef *et al.* (JIPS, 2015)	Robust ROI Watermarking Scheme Based on Visual Cryptography: Application on Mammograms	Medical applications	Copyright protection and Preservation of confidentiality of data.	Dominant block method, Faber-Schauder DWT, visual cryptography, Reversible Walsh-Hadamard transform
10	Fatahbeygi and Aklaghian (IPRIA, 2015)	A New Robust Semi-Blind Image Watermarking based on Block Classification and Visual Cryptography	Semi-Blind Image Watermarking	Copyright Protection and completely imperceptible watermarking.	Visual Cryptography, Canny Edge Detection, Support Vector Machine (SVM), Block based classification.
11	Rani *et al.* (ICECCS, 2015)	A Zero-Watermarking scheme using Discrete Wavelet Transform	Zero watermarking scheme rightful ownership protection	Two watermarking schemes: 1) Robust to distortions. 2) Computationally cheaper.	Discrete Wavelet Transform, Singular Value Decomposition
12	Banik and Bandyopadhyay (IEEE, 2015)	Secret Sharing using #level DWT method of Image Steganography based on Lorenz Chaotic Encryption and Visual Cryptography	Hide secret data and transmit	Focus on privacy and security of secrete message. Quality of retrieved message may be reduced.	Lorenz Chaotic Encryption, Discrete Wavelet Transform, Haar transform, Visual Cryptography
13	Kunhu *et al.* (IC-GET, 2016)	Hybrid Visual Cryptography cum Watermarking Algorithm for Copyright protection of Images	Copyright protection of color Images	Color images are used as cover and binary logo as watermark.	Visual cryptography, Discrete wavelet transform
14	Singh *et al.* (SIPS, 2016)	Singular Value Decomposition Based Image Steganography Using Integer Wavelet Transform	Steganographic technique	Improved robustness against geometrical as well as image processing attacks.	single value decomposition (SVD), Integer wavelet transform
15	Seal *et al.* (ICICC, 2017)	A New and Resilient Image encryption Technique Based on Pixel manipulation, Value transformation & Visual transformation Utilizing Single level Haar Wavelet Transformation	Lossless Image encryption	Resilient, Robust and highly secure algorithm.	Single level Haar Wavelet Transform
16	Giri and Bashir (IJIT, 2018)	A block based watermarking approach for color images using discrete wavelet transformation	Watermarking for color images	Improved Robustness and transparency is achieved.	Neighborhood based watermarking method, DWT
17	Kumar *et al.* (LLC, 2018)	Improved wavelet-based image watermarking through SPIHT	Image Watermarking	Robust and secure against various forms of attacks.	DWT, DCT, SVD, Set portioning In Hierarchical Tree (SPIHT), Arnold Transform

When more numbers of decomposition is performed it is performed in the LL sub-band. When requirement is edges the higher frequency component HH sub-band is used. As discussed, some papers use Haar wavelet transforms. These systems usually have accuracy of around 99% in extracting watermark back [13].

The key used while encrypting of the watermarks makes the system more robust and makes it difficult to

know the secret image without knowledge of the secret key. One of the papers shows public key cryptography using Hash algorithm. Number of decomposition levels can be kept as secret so that no unknown person can repeat inverse process to know the secret image. Watermark inserted in an image should be totally invisible and should not affect the cover images. In some schemes the size of watermark is depended on the size of cover images. But when size is not dependent it is more difficult to guess the secret image. So it can be used to send secret information over the internet media. Watermark can be used as a secret key.

Reduction in size of the shares is also important as it can simply increase the memory. Lossless encryptions are also presented which help in preventing quality of data while encryption. Steganography and visual cryptography can be used together. In this case the PSNR is calculated separately for both. Results showed that PSNR value is higher for Stegnography than the visual cryptography, as there are more embedding done in visual cryptographic methods.

III. PROPOSED MODEL OF OUR WORK

The security of the social media contents is of more important as anyone can misuse the contents shared on the social media. Adding a Biometrics to the image will authenticate the sender. If the image is misused by an intruder, the sender can provide copyrights of the image. The most widely used biometrics is Fingerprint and Iris. Fingerprint is commonly used to unlock the phone by authenticating the user. The Iris can be scanned to unlock any safe or door. Ear biometrics is also a unique attribute in the individuals.

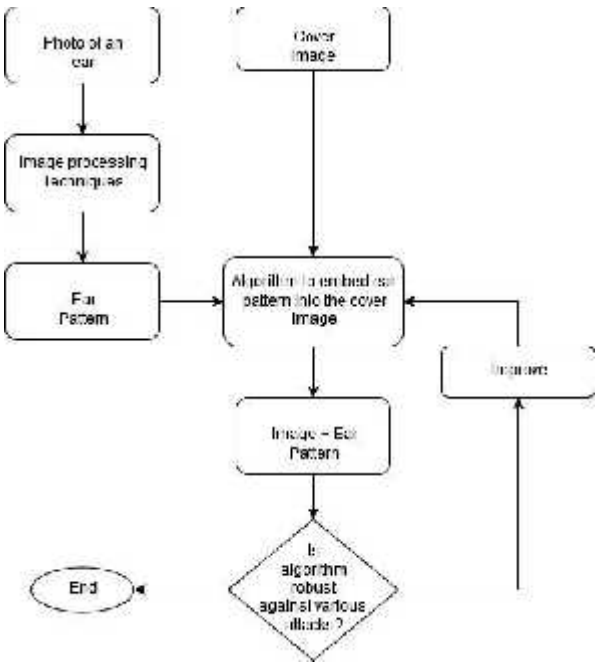

Fig. 1: Flowchart of the proposed Model.

A novel model is proposed which uses ear pattern of the person which is unique for each human being as a secret image. This will act as a watermark to be embedded in an image. Following flowchart depicts functioning of the model.

As seen from the Figure 1, the ear pattern is extracted from an image of the ear. The region of interest that is, the part which covers the border line of an ear is cropped. After selecting the region of interest, the RGB image is converted to gray scale image. It is filtered out to remove any noise in the image. Canny edge detector is used to detect edges in the filtered image. This generates an ear pattern. This ear pattern will serve as copyrights of the image and will also serve as authentication of the owner.

To prove the uniqueness of the ear pattern in every individual, the ears of 5 individuals is taken at random. Their ear pattern is extracted and features of the ear pattern are detected using the SURF detectors. Figure 2 shows comparison test results in Matlab. It is seen that ear pattern of any ear matches to itself only (it perfectly overlaps), else it shows non-matching features.



Fig.2: Matlab simulation result of comparing ear patterns

Using an appropriate embedding technique the ear pattern will be embedded into the host image. Further it will be tested for the robustness of the model with different image processing attacks such as compression, rotation, cropping, noise etc. Also would work in improving the robustness and other parameters related.

IV. CONCLUSION

In today's world we are sharing lot of digital information over the internet media. Researchers are looking forward find the ways to protect the digital information while its transmission. Watermarking is a simple and efficient way to protect the contents shared over the internet. This paper focuses on different watermarking schemes used for different purposes. Watermarking schemes in spatial and transform domain are presented here. Algorithm of each scheme is described briefly. Results are compared in Table 1.

Watermarking schemes are differentiated as per their application. Specific application requires specific watermarking scheme which will result in increased performance. Some applications require hiding of secret data, that is watermark image should be totally invisible where as some applications require watermark to withstand against intruders attacks. Depending upon the application for which the watermark is used, the parameters linked with it can be reduced. Watermarking algorithm should be reversible in nature. It should not affect/alter the cover images. It is difficult for a watermarking scheme to perform satisfactorily in all the parameters against all the kinds of attacks. No scheme can provide protection against all the forms of attacks.

Hence it is necessary to select the right watermarking scheme for the application. The medical applications have been discussed where the medical data should not be corrupted with the use of watermarking. Also to maintain the confidentiality of the patients watermarking should be totally invisible. The reduction process used for these cases helps in improving the image quality. The papers also suggest that performance of the watermarking scheme is better in frequency domain than in the spatial domain.

Visual cryptography has been achieving more spotlights from the researchers due to its simplicity in implementing and its decryption is possible using human visual system only. Visual Cryptographic schemes along with DWT or SVD provides very robust watermarking schemes. Visual Cryptography was initiated its implementation in a binary image, but with advances in research it is now being implemented for colour images also. A high-quality watermark needs to be barely visible. Hence no third party should able to see it without knowledge of extraction technique. Wavelets allow people to work in the frequency domain. Wavelet makes it easier to decompose the image. Wavelet based watermarking schemes provide very robust systems. The challenges faced by the schemes while making it more robust and more efficient are discussed here.

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Image Partitioning Techniques: A Review

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***Abstract* - A process of sub-dividing a digital form of an image into its parts (which might be an object or object-region) is popularly known as image partitioning or segmentation. This division technique allows to extract required parameters, attributes from a digital image, which are useful in further processing of an image. Different practical applications are now-a-days being designed which are based on segmentation. According to requirement of an application different types of segmentation algorithms are formulated, designed and applied. The choice is generally dependent on characteristics and attributes desired. This paper is intended to review existing image partitioning techniques and practices.**

Keywords— Feature, Seed, Segmentation, Region Growing, Texture.

I. INTRODUCTION

The image division is generally used to cluster no. of pixels of a digital image into some pivotal regions and its boundaries. The main reason behind performing image partitioning is to simplify image representation and/or to modify a digital image into more meaningful features and parameters which can be easily formulated and examined in a much simpler way. Image segmentation is quite handy tool in locating objects/regions and the boundaries of those regions (popularly known as principal components) present in any image. This means that an image segmentation/partitioning is nothing but a process of assigning a particular unique label to every pixel contained in an image wherein these components has common sharing of particular attribute/feature of an image (for e.g., intensity, brightness, texture and /or color). Image Division also helps to classify a digital image into a set of unique sub-regions with no overlapping with each other. [1][2]. An image segmentation tool, which is robust, efficient and reliable enough is required in a pre-processing operation stage of digital vision operations. Digital vision operations include object/region detection along with boundary recognition in an image. In image processing, color image segmentation is more allure than gray scale image segmentation, very basic reason behind same is that color image is capable of providing much larger amount of data/information than a gray scale image. Image segmentation tools finds application in various fields like wireless sensing networks, biomedical imaging operations, object/edge sensing, satellite imaging process, computer -vision, and many more to be listed. [1][3][5]

For an image analysis to be meaningful, the partitioned objects/regions must possess very strong correlation between attributes of those objects/regions of interest. This is a very first step in the process of transforming the digital image into subparts for high-level description of an image as objects, features and characteristics. The success of an image analysis tool completely depends upon its reliability in the process of image sub-division, but partitioning a digital image is mostly not so accurate and again it remains always, a challenging task. [1][2][4] Some popularly used techniques are used for image segmentation operations are as thresholding, normalized cut operations, mean-variation, component-labelling, k-means clustering algorithm, edge-detection technique, region growing approach, graph partitioning method and many more in the practice. The specific method/technique of an image segmentation with its scale and level of segmentation are basically designed or chosen on the basis of particular characteristics required for the application being designed. [1][2]

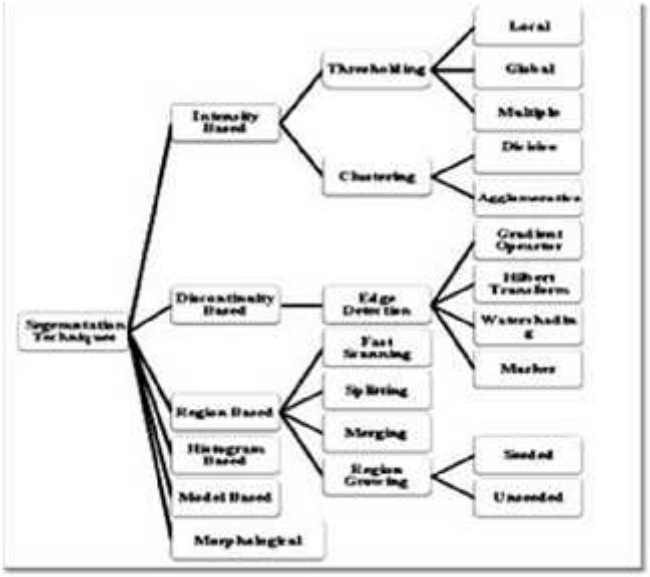

Fig 1. *Popular Image Segmentation Techniques*

II. SEGMENTATION TECHNIQUES

In an image segmentation literature many successful image partitioning methods/tools are proposed and are devised in various applications worldwide. These tools and techniques are briefly discussed here in this section. Figure 1 shows popular image segmentation techniques. [1]

A. Thresholding

The simplest possible approach to the image segmentation task is to use limit threshold. If function (x, y) > T then f (x, y) = 1 else f (x, y) = 0, where T is limit Threshold, which is nothing but a constant value for a particular image and function (x, y) > T is an object point of an image excluding few image background points. For reliable and robust image division tool, the threshold used in process is generaly

automatically selected by operation/application. This is done by using information about objects, an application and the system environment. In fact, the application system must know what is the object size? And the information about object intensity, number of regions present and percentage amount of region populated by the objects. Thresholding tool provides many advantages such as fast and easier computational capability with implementation. The choice of threshold technique being used solely depends upon an image and pixel intensity distribution of objects, regions and background present in an image. Global thresholding is mostly useful for kind of images having clear intensity-density pattern for every object/background in a digital image, such that single threshold value then, is applicable to the complete image. Automatic threshold value selection is desired in this process. [1] [2]

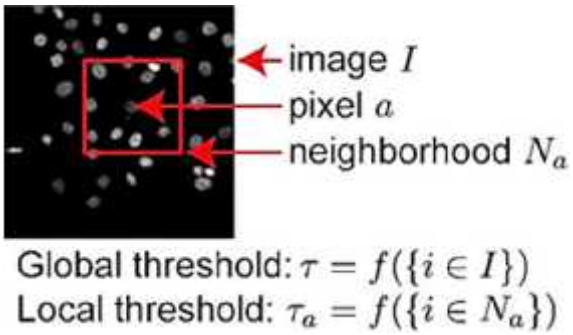

Fig 2. *Threshold Technique Used for Image Segmentation*

B. Clustering

Clustering the digital image for segmentation purpose is nothing but grouping of all data objects into number of subsets popularly called as clusters. provided that these data objects clustered must possess closest possible relation to each other than other data objects present in a cluster excluding current one. The concept of image clustering is solely based on full image information, also it does consider the distance between every pixel with other pixel of data/ image. In clustering method, two neighboring pixels of an image present in same cluster must not be always connected to another. The different clustering techniques are used for purpose of data clustering. Those techniques are classified as partitioned (k-means) clustering and hierarchical clustering. Mean-shift algorithm utilizing density estimation tools are also used for clustering of data in image segmentation for further processing. [1][7]

In hierarchical data clustering method, a digital image is not completely partitioned into number of clusters in a single step, but no. of subdivision is performed in series, which then can be extended to n number of data-cluster. And each cluster of them contains a data object belonging to a separate cluster containing all these objects. Hierarchical clustering techniques are sub-divided into two more types namely agglomerative and divisive tools of clustering. Agglomerative methods of clustering are more popular in comparison. It utilizes basic fusion of the n number of objects into groups where fusion process is performed in a series, whereas divisive clustering method is successive separation of objects into fine n subsets. Hierarchical clustering is better represented with a 2-D diagram (Dendrogram). It helps system in illustrating the fusion and/or division performed at each of stage of processing. Following is one of the classic example of a 2-D dendrogram. [7]

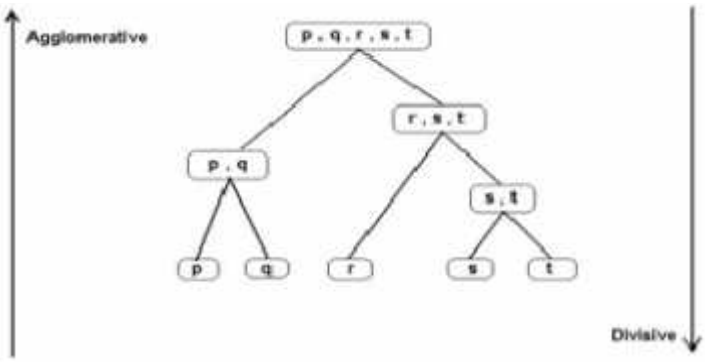

Fig3. *A Dendrogram Depicting Hierarchical Clustering*

K-means clustering is the process of vector quantization, which finds origin in digital signal processing. K-means cluster algorithm is very common tool of data cluster analysis. K-means clustering algorithm is generally used to group up n no. of readings into k no. of groups. Where each of these readings belonging to a nearby mean value cluster, this group/ cluster then serves as a prototype. [7]

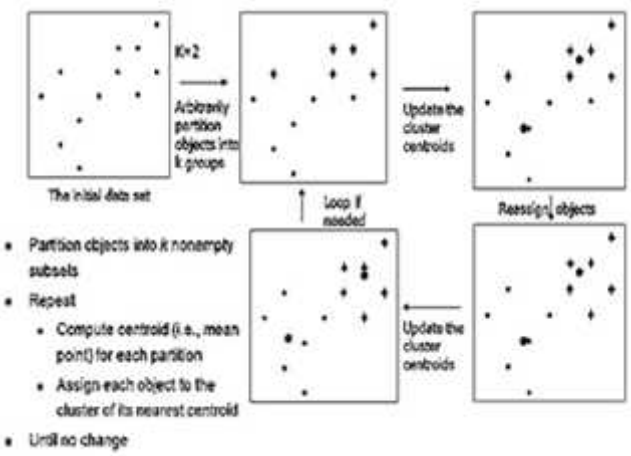

Fig 4. *K-means Clustering Algorithm for Image Partitioning*

C. Edge Detection

Edges and/or boundaries of objects and regions in an image are detected to be used as an image feature. These edges or boundaries are detected based on local and sharp changes in intensity of image pixel. The edges and/or boundaries that are identified during edge detection operation not necessarily be connected in nature. To partition or segment an object and/or region out of the digital image, a closed boundary must be present for such a data object/region. Edge detection method generally works well, also detects all the present discontinuities in intensity and brightness of detected region. Edge detection technique can be implemented for image segmentation purpose to extract information from image, in various application fields like digital medical image

processing, machine and computer vision. Some of the popular edge detection algorithms are Prewitt edge detection, Canny edge detection, fuzzy logic edge detection methods, Sobel edge detection and Roberts edge detection. [1][2][8]

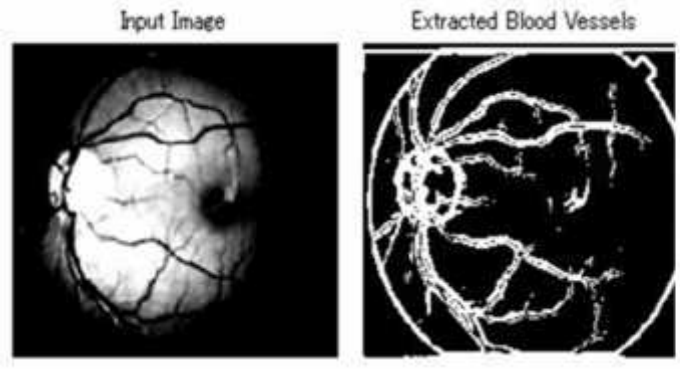

Fig 5. *An Example of Edge Detection Result*

D. Region Growing

Region growing image segmentation technique is the simplest possible pixel-based segmentation tool, which selects initial seed point to start with. This tool for image partitioning is generally used to analyse all the neighbouring pixels around an initial seed point and hence it determines whether all these pixel neighbours can be included in the object region to be segmented. The process is then repeated for several no. times like clustering algorithms. Several important points should be remembered regarding region-growing tools/algorithms. Most important point to be noted is that, the initial seed point selection is always user-dependent. Also more is the information available about a digital image under processing better is the result. Information about pixel-connectivity also proves to be helpful in order to determine particular threshold and initial seed points during process. If the difference between two pixel groups pixel-intensity values is less than a value of similarity, then these regions can be considered as single region. The criteria used for similarities/homogeneity are also some important factors in region growing techniques. Some of the criteria often used for similarity index check are color, grayscale index, and texture and/or shape. [1][2]

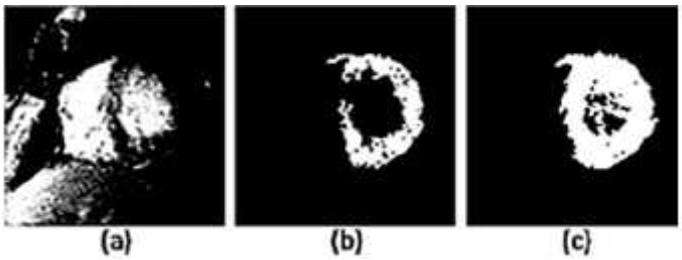

Fig 6*. Seeded Region-Growing an Example*

E. Splitting and Merging

The concept of region-splitting basically is to divide the digital image into a group of regions, disjoint in nature and possessing the property coherency within particular group. If only a splitting process is performed, then the possibly final image partitioned output may contain few (more than one) neighbouring regions possessing similar coherent properties. Hence, generally a merging process is scheduled after every split operation which compares all the possible adjacent regions and merges these regions into one unique region, if required. Hence, these algorithms are called as splitting-merging image segmentation algorithms. [1] [11]

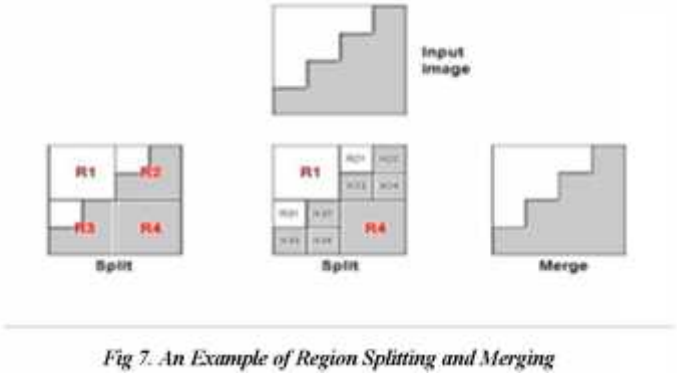

Fig 7. An Example of Region Splitting and Merging

F. Fast Scanning

Fast scanning is another algorithm of image partitioning/segmentation which resembles to the unseeded type of region-growing algorithm, as in both methods number of clusters to be formed are not predefined before actually passing through it. It is very simple in concept and fast processing algorithm. [6].

G. Histogram Based Segmentation

Histogram based image partitioning techniques, when compared to remaining types of image division algorithms and methods; this is a single-pass technique and hence it proves to be a very efficient method in image segmentation. In this image segmentation technique, a histogram from all the pixel components present in an image under segmentation and analysis, is first computed, also for all of the peaks and/or valleys present in this image. This computed histogram can be further implemented in locating the groups/clusters in particular image. Intensity of each and every pixel present in an image is used as a measure, an attribute and/or feature. [1][2]

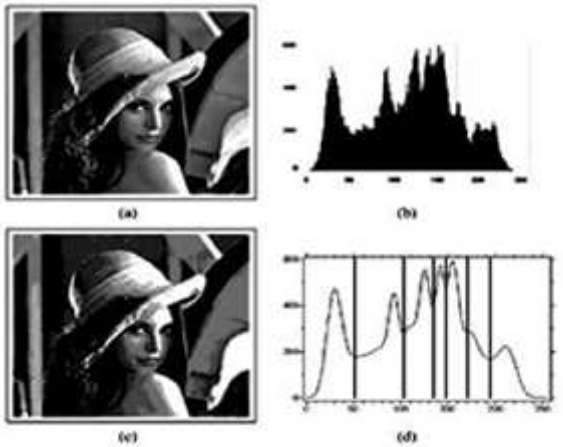

Fig 8*. Histogram based Image Segmentation Techniques*

H. Model Based Segmentation

Model based technique of image partitioning hold basic idea that objects in an image are possessing certain repetitive geometry in its structure. The probabilistic model is designed and easily implemented in tools state-of -art method and level-set based method. [1]

I. Morphological Techniques

Morphological image partitioning technique is a plug-in (Image/Fiji plug-in) which can combine watershed partitioning algorithm with various types of morphological process to segment a gray-scale image. [2]

III. CONCLUSION.

In this paper work, several established image segmentation techniques are reviewed. There are different kinds of an image partitioning methods, which are suitable for various fields and applications. Region-based image partitioning algorithms, especially, the fast-scanning type algorithms are preferred in the applications wherein pixels of each particular cluster must be linked with each other for reliable performance. If sometimes the user desires to divide and classify the digital image into group of pixels, but is not interested in the connectivity of each pixel present in that cluster then data clustering technique, like the k-means algorithm is an efficient and robust option, proving to be a perfect choice. The edge-based image segmentation tool like a watershed algorithm, faces over-segmentation which is undesired, so generally combination of two or more methods is applied in this case. Edge-detection method, Thresholding technique and region-growing methods proves to be superior in speed for global-thresholding purpose but edge-linking type of methods must be performed after image segmentation in such cases. Morphological watershed is also a useful tool for image segmentation.

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E-Governance System for Traffic Infringement Using Automatic Vehicle Number Plate Recognition

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***Abstract*— The number of vehicles has increased tremendously in the last few decades, so it becomes difficult to monitor and manage the traffic. The main concern is how to identify and track the vehicle. For this purpose, OpenCV and image processing technology will be used. The proposed system will detect if any traffic rule is violated by the vehicle and if it happens so then using image processing technique like Optical Character Recognition, the vehicle number plate will be extracted. After extraction of the vehicle number, a message containing the fine's detail will be sent to RTO office and the registered owner's mobile number which corresponds to the vehicle number extracted using the GSM module. Thus, the proposed system will help the traffic department regarding rule violation and vehicle identification at any moment of timei.e. 24x7 and maintain e-governance solution.**

Keywords*— *Automatic Vehicle Number Plate Recognition System, Image Processing, OpenCV, Raspberry Pi.

I. INTRODUCTION

With immense increase of vehicles on roads, enforcement of laws and traffic rules has become difficult. So, in order to automate and digitalize these processes and make them more effective, a system will be needed to easily identify a vehicle and its number plate [1]. From vehicle number plate, it is very easy to identify specific vehicle from large number of database because vehicle number plate is unique number issued by the district-level Regional Transport Office (RTO). A vehicle is provided with a unique vehicle number plate in each country. The vehicle number plate helps to distinguish one vehicle from the other vehicle and to keep records of each and every vehicle.

The proposed system is going to extract the license plate region from complete image of vehicle and then characters from license plate such as numbers and alphabet are retrieved. From retrieved information from vehicle number plate, the vehicle type, its owner and registration details are obtained. The proposed system should be robust to attain the large number of database. The main objective of our proposed system is to detect traffic rule violation with the help of camera and then process the captured image and detect the correct vehicle number plate. After that the detected number plate is checked from the available database at Regional Transport Office (RTO). Once the number plate is identified from database, then automatically the proposed system intimated fine message to vehicle owner as well as control office.

The outline of the paper is as follows: Section II describes the developed techniques used in vehicle number plate detection. Section III gives block schematic, dataflow and interfacing circuit diagram of proposed system. Section IV gives the results of detected vehicle number plate using proposed system. Finally, paper is concluded in section V.

I. LITERATURE SURVEY

In different country, there are various attributes to use the number plate formats such as mechanical dimensions of vehicle number plate, font and colour of characters imprinted on it. Similarly, there are various number plate detection techniques adopted by many researchers to identify the correct vehicle number plate

which is elaborated below:

Sweta Kumari et al. designed license plate recognition model based on Computer Vision technique which recognizes a license plate number. Firstly image gets captured from camera and is feed into the system. Training sets are made according to different characters extracted from image. The characters are retrieved from the images using the training set which is provided to the system. In this system authors used the threshold method and Contour tracing method to convert capture image into machine readable format. Then for number detection they used edge detection technique. In edge detection technique edge density is considered. For determining the pixel of a square image of vehicle, the concept of edge density is used. Here also they assumed the area covered in whole image. Character segmentation and character recognition was used to detect the number which is mainly dependent on neural network [2].

Oroz De Gaetano et al. proposed an idea based on C++ and Character segmentation algorithm in [3]. The image binarization and projection minima processing is used to segment the characters on number plate. The 6.6 ms average

span of time was recorded for completion of task in C++ with low resolution. Even in severe surrounding conditions of number plate recognition was possible but the required accuracy rate was not achieved.

Riazul Islam et al. described the system with the help of structured elements in [4]. For gathering the numbers and alphabets from the captured image of license plate the concept of Optical Character Recognition (OCR) was used. The experimentation is carried out in MATLAB. For checking the moving vehicles and retrieving the number plate accurately from it the mark out is made. Morphological operations were used to implement the design. Minimum numbers of computations are required in the used algorithm. As compared to most of the conventional method it is computationally very inexpensive. The simulation results demonstrated major improvements as compared to conventional systems in terms of character detection rate. However, this system is not suitable for real time implementation.

Ajay Kumar Singh and Souvik Roy in [5] designed number plate recognition system and checked it on real time traffic scenarios. Each module of the algorithm used is efficient. The complete algorithm is described for real time video stream from camera. The concept of Support Vector Machine (SVM) and Artificial Neural Network (ANN) is used for recognizing characters from number plate. For determining the contours on number plate, training is given to the vector machine. Artificial Neural Network is used for character recognition. Even the shredded number plates can be recognized. The application is designed in C++.

Visvanathan and Chattopadhyay proposed a smart building management system. In this system the image of cars owned by the building members are already available in the template created before. The car's number plate is compared against the image in the template using image retrieval and OCR method. The system is not robust enough but computationally it is less expensive. The technique of binarization failed here which was a major drawback [6].

Siddharth Sircar et al. designed a system based on vehicle number plate recognition using image processing. The main concern of this system is to retrieve the number from the number plate within short span and to achieve it the position of number plate must be accurately and efficiently predicted in the captured image. They focused on the clarity of the retrieved number plate that it must be better than the other traditional extraction methods [7].

Amirgaliyev Beibut et al. presented the study on various methods available for Automatic Vehicle Number Plate Recognition. Their objective was to check the algorithms available for recognizing number plate, to find solution for number plate recognition problem. The results were dependent on the distance between the camera and the vehicle. By the keeping the distance short, the performance can be improved [8].

P. Meghana et al. described about image recognition for number plate surveillance. For detection purpose character segmentation and image processing has been used. Here we locate the alpha numeric characters present on the number plate. The OCR is used to convert characters into text i.e. numbers. The parameters such as vehicle speed, different font sizes, language of vehicle number and light conditions are taken in consideration and the best technique according to that was taken for implementation purpose. Hence the results showed better recognition rate [9].

Abirami and Jasmine designed a real time number plate recognition system. They deployed the system using Automatic Licensed Plate Recognition (ALPR) algorithm and OpenCV. ALPR algorithm is based on image processing. It was concluded that open source and free resources and platform can also perform good scientific computing. The results were better than other existing systems as it worked satisfactorily in case of illumination also [10].

Raskar and Dabhade designed a system to develop the security system using the Automatic Number Plate Recognition [11]. This system allows only the authorized and correctly recognized vehicle to enter the specific area. The concept of Back Propagation Neural Network (BPNN) and template matching was used to design the system. They developed an application which was simple and user friendly.

II. SYSTEM DEVELOPMENT

A. Block Diagram of Proposed System

The block diagram of proposed system is shown in Fig.

1. It consists of camera, Broadcom BCM2837 processor with CPU ARM Cortex-A 72 and GSM module. The camera continuously monitors the road and if any vehicle violates the rule then image of vehicle will be captured. The controller detects the number plate from the captured image and searches the information about vehicle owner in the database by using license number. Once the information gather

in database, then information is send to Global System for Mobile communications (GSM) module. GSM module sends the message about traffic rule violation to owner of vehicle and to the regional RTO.

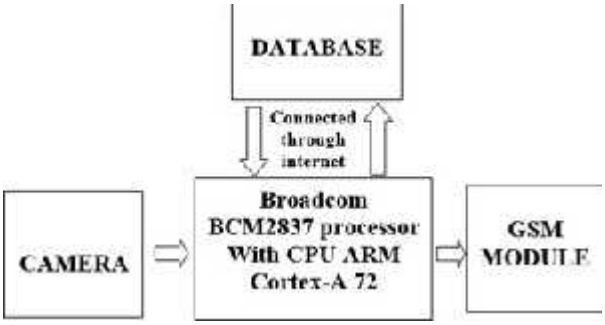

Fig. 1. Block Diagram of Proposed System

B. Interfacing Diagram

The Fig. 2 shows proposed circuit diagram of system which gives interfacing of component with Broadcom BCM 2837 [12]. The camera module is connected to the camera port of raspberry pi, GSM Module is connected to Rx and Tx pins of raspberry pi and Graphical LCD (GLCD) is connected with General Purpose Input Output (GPIO) pins of raspberry pi [13].

The camera is used to monitor the vehicles on the road and capture the image of vehicle which breaks the rule. Broadcom BCM2837 processor is used to extract the license plate from image by image processing and recognize

character of license plate. The GSM system is used to send SMS to owner of vehicle. The databases of vehicles are used to store information of vehicles. In the end, the GLCD is used to display the image of vehicle, number plate of that vehicle, information of owner of vehicle and fine for the traffic rule violation.

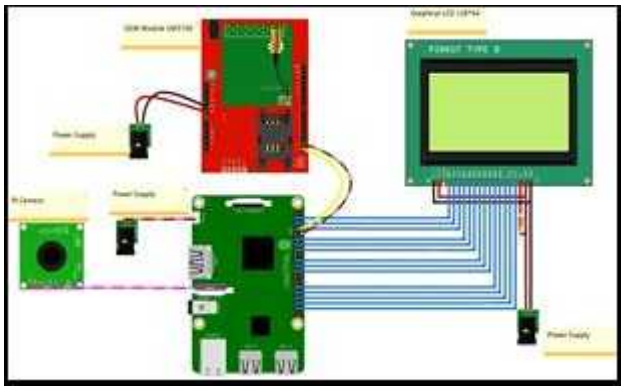

Fig. 2. Interfacing Circuit Diagram of Proposed System

C. Dataflow of Proposed System

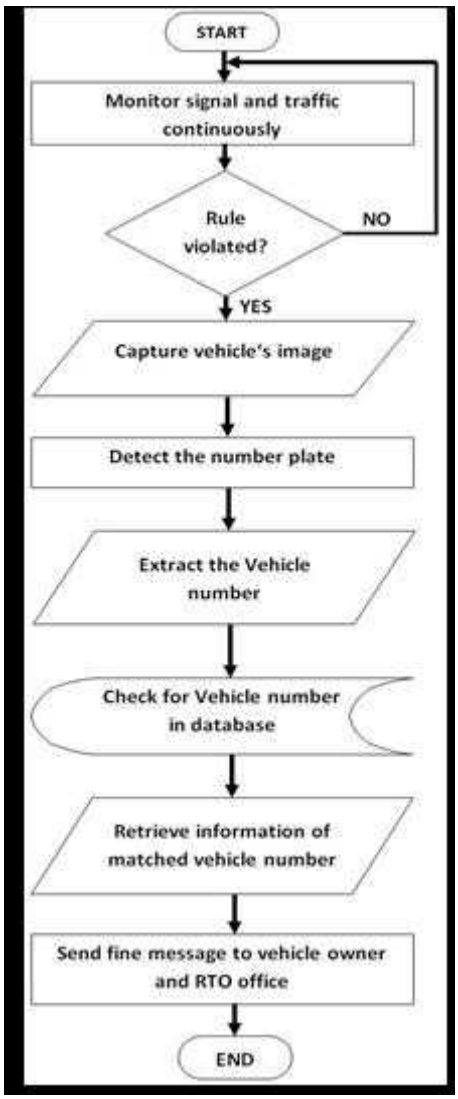

Fig. 3. Flowchart of Proposed System

Fig. 3 shows the flow chart of proposed system. The raspberry pi camera monitors the traffic and signal continuously. By using motion detection, it determines whether vehicle violate the traffic rule or not. If the rule is violated, image of the vehicle gets captured, else continuous monitoring of signal takes place. By using image processing technique such as blurring, thresholding, etc. number plate is detected from the captured image. ANPR algorithm and OCR is used for retrieval of vehicle number from the number plate. The system checks if the number plate is present in database. Once it is found in the database, all the information about the vehicle and owner is obtained. Message regarding the fine is sent to the owner and the RTO office.

The experimental setup is shown in Fig. 4 which consists of Broadcom BCM2836 processor, LCD , Pi Camera , GSM Module SIM800

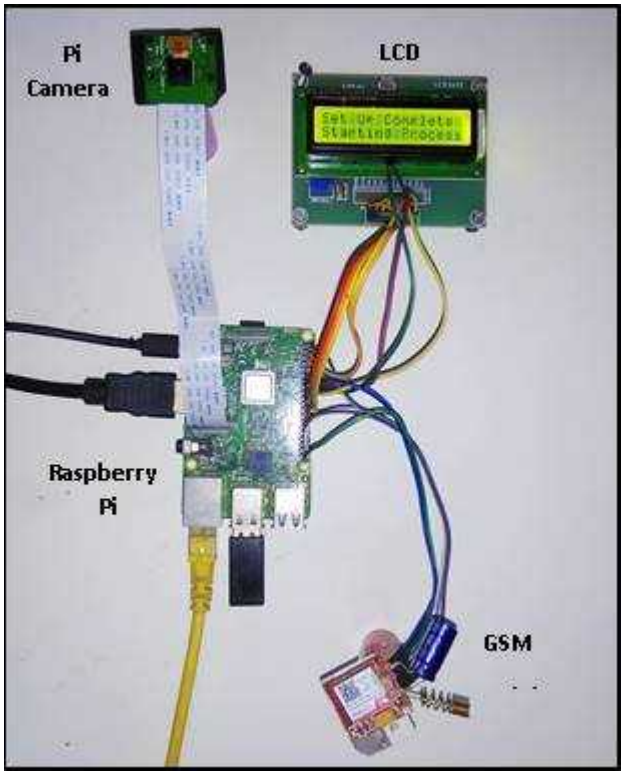

Fig. 4. Hardware Setup of our system

IV. PERFORMANCE ANALYSIS

In this section the process of automatic number plate recognition consists of following stages by using OpenCV and image processing:

A. Detecting traffic rule violation and capture image

The traffic rule violation detection is done by using OpenCV software. Then image is captured by camera. For real time we can also use ANPR Cameras, which are specialized types of CCTV camera which capture license plates on still and moving vehicles. The CCTV camera has captured the vehicle with its number plate as shown in Fig. 5



Fig. 5. Source Image (RGB image)

B. Pre processing

The RGB (true colour) image is then converted into a gray scale image as shown in Fig. 6 for easy analysis as it consists of only two color channels.



Fig. 6. Grayscale Conversion of Source Image

Median filtering is then implemented for the effective removal of speckle noise, salt and pepper noise (impulsive noise) [14] and the resultant filtered image is shown in Fig.

The aim of this process is to increase and improve the visibility of the image.

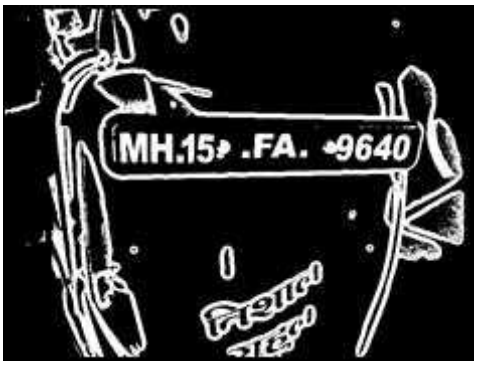

Fig. 7. Gaussian Filtering applied on Grayscale Image

C. License plate recognition

The character on number plate is extracted by character segmentation and by character edge detection method such as canny edge detection method Canny Edge Detection, Sobel Edge Detection, Prewitt edge detection, Log edge detection. The thresholded image is shown in Fig. 8 by using specific threshold of image segmentation.



Fig. 8. Thresholded Image

Then standard Indian number plate character is recognized by optical character recognition (OCR) method as shown in Fig. 9. [15].

But for non-standard number plate character are not recognize by OCR, this are detected by Machine learning and Neural network by using python library such as keras, Tensor Flow, NumPy, pandas and scikit.



Fig. 9. Detected Vehicle Number Plate

D. *Fetching data with SQL Database*

Fig. 10 shows snapshot of database used in the system which will be stored in the internal Memory of System. When the vehicle number is detected, then the number is searched in database for the corresponding details. If the detected number matches with any vehicle number of the database then name of owner and mobile number registered with that vehicle is sent to the system. After that system sends an SMS on that mobile number

Number Plate	Name of Owner	Mobile Num	Type of Vehicle
MH15FA9640	VISHAL BHOSALE	780714331	BIKE
MH15DS1998	ANIKET SURYAVANSHI	9822771572	BIKE
MH15AB4200	MAHESH BARAVAKAR	9455442211	CAR
MH15AC6547	SHUBHAM PHAD	7775642313	CAR
MH15GY5779	NAYAN BONDE	9988838883	CAR
MH15GZ2142	LUCKY KHANDALE	9449434851	CAR
MH15FA8888	VARSHA GORE	9765415445	CAR
MH15GY5546	PRIYANKA GHUME	8888666643	BIKE
MH15DZ3214	PRAVIN RAJKUMAR	7777888811	TRUCK
MH15GH4621	HEMANT SATPUTE	7973844841	BUS
MH15GL9865	SALONI DESHMANE	7974554455	BIKE
MH15AX6814	DIVESH KOLI	9245647845	CAR
MH15GD5222	GANESH DATEY	9984561321	CAR
MH15DZ8445	PRAKASH NAGARE	8484848484	CAR
MH15AK0007	VINAY PATIL	9847494384	TRUCK
MH15FA4665	PANKAJ SOANWANE	7893877894	TRUCK
MH15IA6560	SUNIL GORADE	8873643121	CAR

Fig. 10. Snapshot of SQL Database of Number Plate

E. Correspondence with Government Agency

The characters which are recognized are displayed in the monitor at RTO, as well as SMS about traffic rule violation and fine for that violation is sent to owner of that vehicle by using GSM module SIM900. This SMS will contain the details of the penalty which owner needs to pay to get his fine record cleared. The snapshot of intimation message which is to be sent to owner of vehicle as well as RTO is shown in Fig. 11.



Fig. 11. Snapshot of Intimation Message on Mobile Phone of vehicle owner

If the System (Computer/Raspberry Pi) have the internet connection online SMS gateway can be used for sending the messages. An SMS Gateway is the only website which allows a computer or processor to send SMS message to the mobile device on telecommunication network. Because of online SMS gateway we will not require GSM Module and therefore size and cost of system can be reduced. There are number of Online SMS services that can be used such as clicksend, twilio, way2sms, sendpulse, fast2sms and textlocal. Fig. 12 shows the intimation message sent using online gateway.

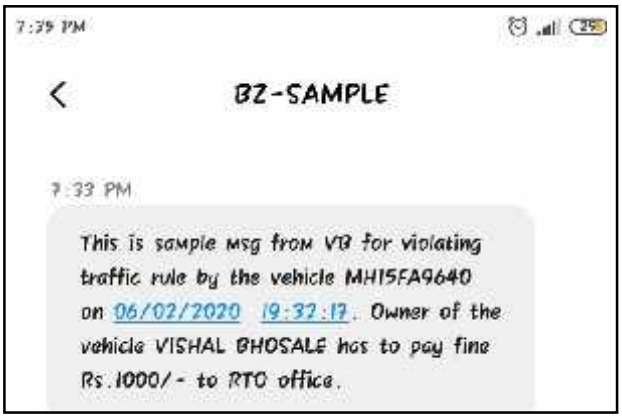

Fig. 12. Snapshot of Intimation Message on Mobile Phone of vehicle owner which was sent using online gateway.

V. CONCLUSION AND FUTURE SCOPE

Among the numerous techniques present for number plate recognition such as Template matching, Segmentation, Optical Character Recognition, Hough Transform we concluded that Optical Character Recognition is the better and effective methodology for implementing our idea. Before the recognition of the image preprocessing is carried

out on the captured image so that the extraction of vehicle number from the number plate is possible. The pre-processing such as applying threshold and median blurring, grayscale scale conversion applied on extracted vehicle number plate for the correctness and accuracy of the system. The retrieved number plate is searched among database and detected vehicle information. In the end, the SMS is sent to owner as well as to Regional Transport Office and maintained data log for the same. In this way this prototype provide robust framework for e-governance in India.

The proposed techniques can be applied for following future avenues:

- Efficient Collection of Toll instead of Fastag Stickers.
- Efficient Collection of Parking Payment without human interventions.

- Detection of theft vehicle and automatic intimation to Police and Regional Transport Office (RTO).

- Monitor Vehicle crossing at Border and prevent infiltration.

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Automatic Text Generation Using Word-Level RNN-LSTM

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***Abstract*— Today, Computers have influenced the life of individuals to a great extent. To give correspondence among humans and computers, natural language systems have proven to be very effective to exchange the data with less personal requirement. Generative models reduce the need of acquiring laborious labeling for the dataset. Text generation techniques can be applied for improving language models, machine translation, summarization and captioning. Text Generation is a type of Language Modelling problem. Language Modeling is the center issue for various NLP assignments such as speech to text, conversational system, and text summarization. A trained language model learns the likelihood of occurrence of a word based on the previous sequence of words used in the text. Language models can be operated at character level, n-gram level, sentence level or even paragraph level. Text can be generated by using Hidden Markov Models and Markov Chains but it is difficult to generate whole sentence using them so we have used Recurrent Neural Networks (RNNs) with LSTM to develop language model that can generate whole new text word by word automatically. Research work displayed in this thesis focused on generation of language model by training different RNNs. The proposed strategy works in two phases. In first stage, training of simple LSTM is done on different datasets and in second stage; sampling is done to generate output text**

Keywords*— *Language Modeling, Data Mining, Natural Language Processing, Hidden Markov Model, Recurrent Neural Networks

I. INTRODUCTION

In recent technologies data mining is one of the most cardinal areas for retrieving valid information from enormous amount of unstructured and distributed data utilizing parallel processing of data. Data mining techniques are enforced in numerous fields to determine the novel information from huge data set. Nowadays data mining techniques are mostly utilized in educational field. Most of the researcher has taken data mining techniques to find the useful information from educational field. Applying data mining in education field is the most prominent research area of today's researcher. The researchers are seeking interest in the educational filed to investigate new research. In Data Mining has great impact in academic systems where education is weighed as primary input for societal progress.

As natural language can be generated by various learning algorithms but neural networks out-performs these algorithms because of hidden layers. These layers create a more complicated set of features which results in better predicting accuracy. The more complicated and informative the features become, the more likely model learn better and give more precise predictions. But neural networks have big limitation that they can't understand the sequence in which current state is affected by its previous states and recurrent neural networks came out as solution for that. In recurrent neural networks each hidden layer depends on the corresponding input at that time step and the previous time step and output is computed using only associated hidden layer. So, with hidden layers of different time steps, recurrent neural networks have ability to remember. But it can't remember over a long-time step due to a problem called vanishing gradient. So, an improvement was required. And Long Short-term memory came out as a potential successor. LSTM has ability to forget which means it can decide whether to forget the previous hidden state or to keep it. It also has ability to decide whether to update the current state using previous state.

A. Long short-term memory

Long Short-Term Memory (LSTM) is a special type of RNN that was designed to model temporal sequences. These networks were first introduced by Hochreiter & Schmidhuber (1997). LSTMs were designed specifically to solve the problem of long range dependency between input sequences in conventional neural networks. So, they can remember information for long periods of time by default. The learning process depends on the magnitude of weights in transition matrix. If the matrix weights are small, it means gradient signal is also small that makes learning either very slow or stops working. In this case gradients are called vanishing. This can make

learning long-term dependencies in the data even more difficult. But if the transition matrix weights are large so it makes learning to get diverged. This situation is called exploding gradients. LSTM model has a structure called memory cell which solves the issue of vanishing and exploding gradients. A memory cell has four main elements which are input, forget and output gate and a neuron that has self-recurrent connection.

The input, output and forget gate regulate the interactions between the memory cell and the environment. The input gate either allows or blocks the incoming signal to change the memory cell state. The self-recurrent connection ensures that the memory cell state remains constant from one-time step to other. It has 1.0 weight and it also avoids any interference from outside. The output gate either allows or prevents the effect of memory cell state on other neurons. The forget gate either allows the cell to remember its previous state or forgets it according to its need.

Generative models reduce the need of acquiring laborious labeling for the dataset. Text generation techniques can be applied for improving language models, machine translation, summarization and captioning.

B. Recurrent Neural Networks

RNNs based models have been used widely for generative tasks such as language modeling, machine translation, speech recognition, and image captioning. Being able to capture important features in the time series is the most notable ability of the RNNs. In the generative RNN models, words from the previous time steps are input to the next time step iteratively. However due to the fact that only training data is seen by the model so during training, the statistics of the hidden states during optimization may be shifted during sampling.

LSTM & GRU are variants of RNNs. These use gating mechanisms which avoids problem of vanishing gradient in simple RNNs. We can compare the text generated by them

C. Our Proposed Contribution

1. To develop text generation system which deep learn one text and then generate new text using Recurrent Neural Networks.
2. To use Google's open source library called Tensor flow for the implementation of RNNs which provides many in-built functions for the computation of complex calculations.
3. To train RNN, LSTM and GRU for developing language model.
4. To compare the results of different models to conclude which network perform well in task of text generation.

This paper organized as follows: Section II describes the literature review. Section III discusses system architecture of proposed system and techniques and tools utilized in big data and educational data mining. Section IV Concludes the paper.

II. LITERATURE REVIEW

We have proposed the way of training RNNs effectively on sequence modeling problems that are difficult, complex and contain long term dependencies. Also trained RNNs on real world sequence datasets that are highly complex .

We have collected datasets for history of India. For example Indus valley civilization, Famous historical monuments, World wars etc.

The collected dataset was then detected and tokenized into sentences and then into words using sentence detector and tokenizer. After tokenizing of paragraphs POS Tagging is done to detect the part of speech of each word. The last step is to remove the stop words.

After training the dataset, we have created the model using RNN-LSTM algorithm.

This application help users to get the information related to the corresponding input. Users can modify or delete suggestions according to their own vision of the unfolding narrative. First, the application identifies the given input. Then it checks the input with the trained dataset to generate the appropriate information. Our application also provides an additional feature of voice typing which is done by voice recognition.

In Paper authors introduce a neural model for concept-to-text generation that scales to large, rich domains. It generates biographical sentences from fact tables on a new dataset of biographies from Wikipedia.

The idea used for LSTM was to pick information at every step of RNN to form larger collection of information. For example, if we want to generate a text for particular area of India using an RNN it may look at a part of the provided input for every word it generates as an output.

III. System Architecture

A. Architecture Overview

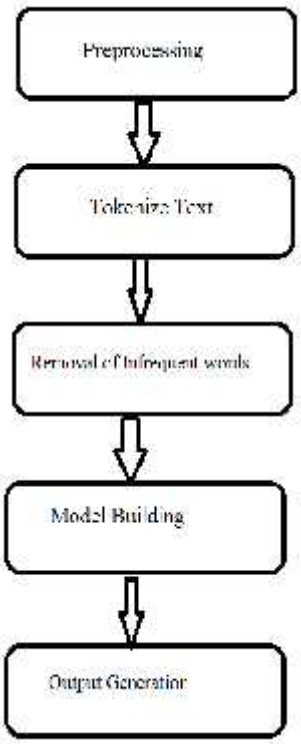

Fig 1. System Architecture

Fig 1. Shows the proposed system architecture. Text generation techniques can be applied for improving language models, machine translation, summarization and captioning. Text can be generated by using Hidden Markov Models and Markov Chains but it is difficult to generate whole sentence using them so we have used Recurrent Neural Networks (RNNs) with LSTM to develop language model that can generate whole new text word by word automatically.

Following steps are used to perform text generation.

1. Preprocessing
2. Tokenize Text
3. Removal of Infrequent words
4. Model Building
5. Output Generation

IV. Conclusion

In this work, we defined a new paradigm of "RNN-LSTM", it automatically generates natural language explanations for recommender systems. We demonstrated the effectiveness of a character LSTM model for generating text. We have compared our approach with the baseline model and obtained lower similarity scores, signifying that the LSTM model is better at generating large text than the simple RNN language model

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Agriculture Product Categorization for Define Quality by Automation using Signal processing

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***Abstract*— In the modern days, grading of fruit is essential phase before marketing and after harvesting. The automatic fruit grading technique senses its irregular region and grade accordingly to its level of defection. The grading of apple is tested into various four classes by considering miner variation in its defective portion; it helps to enhance product quality and consumers acceptance level. The modern images processing tools such as iterative tri-class thresholding methods is applied to optical data of an apple for segmentation and identify the defect segmented area. Mapped gray scale optical data used to analyze statistical features of a fruit, the size and shape features are extracted by using normalized Symmetric GLCM method and fruit allocation into four categories is achieved by using KNN technique with 94 accuracy (Category 1, Category 2, Category 3 and Category4).**

Keywords—Thresholding, segmentation, statistical thresholding, GLCM, allocation, KNN

I. INTRODUCTION

In the modern days the image processing applications are lengthen by using computer vision in different area. The various image processing tools helps to extract important information and classify the object on the basis of various parameters also contribute required theory and algorithm in the various field of science such as weather monitoring system, agriculture and medical. The proper sequential combination of physical model for optical data collection and appropriate computational methods is used for the classification of available image data. Now day's portable computational base computer vision methodology are widely applied in the field of agriculture to monitor the growth of plants and detect defects in the fruit products [1]. The country like India whose social and economical development depends upon the agriculture cultivation it leads to scientific and professional approach in this area. To improve economical growth and utilization of agriculture base products quality by detecting and monitoring the growth fruits which would help to find appropriate market price. In modern food industries before putting in the market it is essential to grade the fruits as per the quality and market demands. Grading is generally performed with the basis of various parameters such as color, shape and size and defects on skin of fruits or vegetables. The conventional food products quality is monitored by manual inspection which is less accurate and time consuming and less efficient for large scale industries. The computer vision base techniques are more accurate and effective.

With modern technique of image processing tools and its mathematical computational provides higher level performance for grading of fruits and blossoming. Automatic grading helps to improve market price and user acceptance ratio along with quality at lower production coast. Various robotic grading processes available that applies based on various color, size, shape and different texture but sensing all the parameters is less acceptable system [2].

The instructional algorithm for robotic system to analysis of quality grading is the challenging; at the primary stage applicable on blossoming with variety intensity detection with help of image enhancing and preprocessing technique to amylase the intensity variation on the pree defined sense. The optical data image segmentation helps to differentiate defective portion of object. Different data which is a part of defective class is extracted by GLCM along with k nearest (KNN) by comparing with standard data base. The similarities in the pattern are classified in four different categorize [4]. The different categorize improve efficiency and lead to better results, the technique is much more supportive to agriculture industry especially for mangoes and apple etc.

The main objective applying modern image processing tools in the field of agriculture is to find out defective farm products along with leaf disease before spreading and reaching to market by analyzing the color, texture with size for grading. The conventional technique of grading by visual is time consuming and expensive with less accuracy. Analysis of agriculture product mainly depends upon the color of leaves and texture is equally important analysis of surface parameters, these parameters helpful to classification from the optical data it provide valuable information to categories classification category and its quality decides the categories [5,6].

The author Shyla Raj suggesting other technique based on Fuzzy C Means (FCM) for data clustering mechanism to detect the defective object by segmentation, defective optical data can be used based on Histogram from Oriented Gradients (HFG) mechanism. Multi-Class support Vector Method

(MSVM) which provides accuracy more than 97% with two categories grading with same method if categories increases efficiency goes on decreeing up to four categories 94.67% but it gives more class like Health, more defect, less defect or serious effect more classification is advantageous[7,8,9].

The researcher Unay and Gosselin [10] suggested a through his comparative analysis about the performance of various segmentation methods, Entropy and different Artificial Neural Network (ANN) methods such as Linear Discriminate Classifier (LDC),Fuzzy Nearest Neighbour Classifier(fuzzy k- NN),Nearest Neighbor Classifier (k-NN), Adaptive Boosting (Adaboost) and Support Vector Machine (SVM) with two bandwidth (RE and IR). The defect part classification is done with help of thresholding of optical image data. The statistical information about the fruit heath, the classification accuracy with SVM was height with isolated segmented data efficiently 89.2%.

The author Leemans suggested method to categorise 'Jonagold' an apples based on its top quality. Basic colour grading classification and Gaussian approach of fruit colour was used for classification to defect detection. Geometric, texture and colour were considered as primary parameters to categorize the fruit. In this experimental study apples were graded into four different grades (Extra, category I, category II and reject) with the help of Linear Discrimination Analysis (LDA) and accuracy 72.3% was achieved. In this method the fruit in categories were graded improved than those used to other groups and the fruits are appropriately graded [11,12,13].

K-Nearest Neighbor algorithm is also applied for analysis of input data with the trained data. It is helpful computation of Euclidean distance measures to find actual deviation in trained data and actual fruit input data in the form of optical. Pragati Ninaws [14] suggested anther technique fruit categorization technique with additional fruit categorizes for detailed features analysis. Shape, size and color, texture analysis based on similarity of pixels occupied in the optical data for increase accuracy of recognition various parameters. For feature extraction parameters based on mean value of color component and shape by data segmentation also area computation and perimeter and entropy values. The categories recognition result achieved up to 90% using KNN algorithm [14]. This method has the limitation that it's more effective with two classes for grading.

Unay and Gosselin proposed a comparative study about the performance of different ANN to grade the apples. The optical data of fruit was differentiated from background by image threshold method. The variation in intensity values of pixel were referred as local features, along with local features some statistical parameter such as Average, Standard Deviation and Median were selected as global features to achieve better results. The author provided comparative study with performance of LDC, fuzzy k-NN, k- NN, SVM and AdaBoot to categories apples into good and detective categories. The better accuracy of 90.3% was achieved by SVM classifier. The limitation of this system is with two categories for grading.

The author Unay suggested the fruit grading system with cascade SVM method. The defective area is segmented by MLP based method with pixel intensity classification. The Sequential Floating Forward Selection (SFSS) technique is used for feature parameter extraction. The different category of apples classification performed with cascade SVM

classification with 85.4% accuracy this method is more expensive for analyze the textural features[11,15]. Kamble Anuraradha [16] in the research study observed that grading of Apple fruit disease by using multi grading classification. The modem image processing tools such as color, morphological and texture features are extracted from pree processing with optical data of agriculture products, which can be classified in various categories to define the quality of fruits.

Researcher K. Vijayarekha developed technique for defect identification of fruit in to multivariate analysis technique for identification of defect segmentation. The technique uses visual and near infrared region taken for the analysis. In this system group all the pixel having equal spectral property into a single cluster irrespective of pixel intensity position of pixel, external defects can be easily identified with help of this method, but this required appropriate process to collect optical data and its processing the fruits which is quite expensive [17].

The conclusion of literature is the proposed technique have two to five categories for grading and some research study proved different method suffer from limitation with accuracy to define efficiency with two or three class grading and in few of the work the dataset used for the experiment was very limitedly, the main difficulty for computation efficiency of the method cannot evaluated efficiently.

II. METHOD APPLIED

This work for Apple grading with iterative segmentation, applied for feature extraction and categorization of different methodologies are used. In the method successive iteratively searched for different classification of pixel method is used for segmentation for identifying defective part which separates foreground and background of optical data of fruit image to separate iteratively with smaller deviation. The GLCM technique is used to extract texture and shape features. kNN method is performed for categorize with Euclidean distance to match the pattern with training data and classify the apple into one of category either Category 1, Category 2, category 3 or Category 4.

III. ALGORITHAM USED

Data: The optical data set of fruit images

Result: Grade of friut (Category 1, Category 2, Category 3, Category 4}
Repeat
Read the optical image from dataset
Preprocessed for image using rgb2gray, median filter, enhancement
Apply iterative segmentation Repeat
Iteratively Partition into object, background and to be identify region
Find the area of TBD region
Until threshold value less the previous preset value Extract grayscale features
Extracting texture feature using GLCM method Extract shape features
Until all fruit training images
Compare input optical image data and training dataset Classify the 16-nearest neighbor
val = rem(Sind(1)/4,1)

IV. OPTICAL DATA SEGMENTATION WITH TRICLASS THRESHOLDING

With the modern image processing objects separation from each other or background is very important. Thresholding is very simple technique for any optical image segmentation in its nature; the basic purpose of segmentation is to digitize a gray scale. Thresholding is the grouping of image pixel on the brightness level, pixels brightness compared with fixed value whether brightness level lower or greater than fixed value, lower valued pixel grouped belongs to black colored whereas higher valued pixels belongs white colored group. The thresholding techniques replace every pixel by new intensity values in an image if brightness level less than the T it replaced by black value and if pixel values greater than T then it replaced by white pixel [18,19]. The first two classes are foreground and background which will not be processed further. The third class which is denoted as to be determined (TBD) region is processed on next iteration and repeat same procedure until calculated Otsu's threshold between two iteration is less than the pre-set threshold. This iterative method divide region into smaller part than previous iteration so it processed on region in depth.

U = F[1]∪ B[1]∪ Ω[1] (1)$U = F[1] \cup \Omega[1]$

Where, U∪ is logical union of operation

For second iteration, it performs Otsu's method to find threshold on region Ω [1] only.

Ω [1] = F[2]∪B[2]∪Ω[2] (2)

A. Feature Extraction

Detecting defect part and extract feature is a challenging task because pixel intensity level slightly deviate, categorization in various variety such as size, shape, color and texture of apple, these extract global features of image need to be extracted by using GLCM method which provide accuracy for feature extraction. The GLCM technique extracts Energy level, Homogeneity, Correlation and Contrast; the Energy measures provide textural uniformity and image smoothness.

B. Classification Fruit

Positioning Figures and Tables: Place The optical data of fruit occupies slightly variation in intensity level it makes tedious task to classify fruit optical input data into one of the category by comparing with training data. The trained data is standard classified optical data stored in the system which provide valuable class comparative information as training dataset. KNN is simple and robust technique for classification. In this classifier method the testing feature vector is categorized by considering k nearest neighbouring vector [8]. The computationally tested Euclidean distance technique are used calculate distance between training and testing optical data with applied input data of an apple for classify in to different categorize such as category1, category2 and category3 and category4.

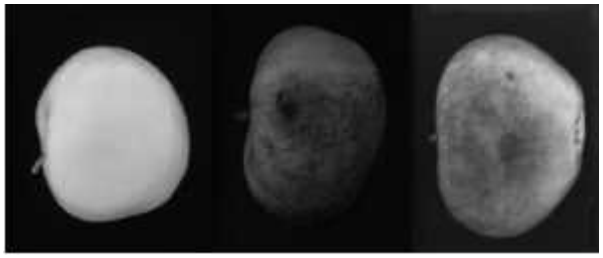
V. EXPERIMENTAL RESULTS

The optical data of an agriculture product apple is classified in two region using modem image tools iterative triclass thresholding method using three class foreground, background and TBD. Once more TBD is classified into three classes in next iteration. Same process repeated for identification assuming smallest part of defective region. At the next stage GLCM method for texture features are extracted specially with considering defective region. The traing data are compared with computed extracted region to classify optical data into any one category of Category1, Category 2 and Category 3 and Category 4. The training and testing process tested though experiment. For training 75% images of good apples and defective Apples are used. For testing 25% images of defective Apples are used. Finally in testing phase, the given input apples optical data categorized into Cattegory1, Category2 and Category 3 and Category 4.

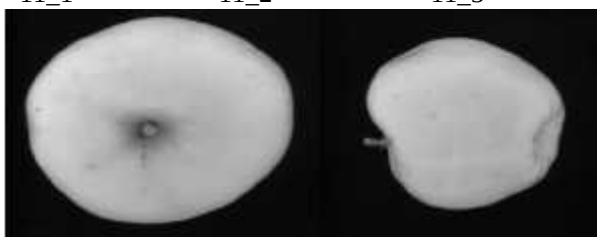
$d(p,q)=\sqrt{\Sigma(qi-pi)2Ni-ui}$ (3)



1_1 5_2 10_3



11_1 11_2 11_3



11_4 12_1

Table I

Method	Accuracy
Leemans et al (2002)	72.0%
Unay et al (2010)	85.6%
Proposed System 94%	

In this article the automatic grading system is proposed to define the quality of agriculture products by classifying it in different categorize. The optical data of apple fruit is segmented by iterative triclass segmentation method to detect and identify small part, detected defective or non defective part decides the category by using GLCM technique. At the last stage apple is categorized into any one of category by using KNN classification (Category 1, Category 2 and Category 3 and Category 4) procedure with 94% accuracy.

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Online Signature Verification using Hybrid Wavelet Transform

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***Abstract*— Online signature verification is a behavioral biometric trait. It offers static and dynamic features for two dimensional signature image. Hybrid Wavelet Transform (HWT) is generated using Kronecker product of two orthogonal transform such as DCT, DHT, Haar, Hadamard and Kekre. HWT has the ability to analyze the signal at global as well as local level like wavelet transform. HWT-1 was applied on the first 256 samples of the pressure parameter and first 128 samples of the output were used as feature vector for signature verification. This feature vector is given to Left-Right and Ergodic HMM classifier for verification. Considering both the HMM model and various HWT combinations, DCT combinations of HWT-1 offer best performance, with DCT 2 DCT 128 combination offering 11.27 % average EER with standard deviation of 5.66 %. Left-Right HMM model offers better performance than Ergodic HMM model for most of the HWT combinations.**

Keywords*— HMM, HWT, Online signature Verification, Left-Right Model, Ergodic Model

I. INTRODUCTION

Handwritten Signatures have been used for centuries for identification and authentication of a person as well as documents. In biometrics classification, it is part of behavioral characteristics like voice, gait etc. whereas physical characteristics include fingerprint, palm print, face, iris, retina etc. [1] Biometric characteristics are universal, unique and measurable and are better than personal ID cards, PIN or passwords. [2][3][4] Biometric system for signatures can operate in two ways. First Verification, in which the individual's signature will be compared with his stored signature in a database to verify that the individual is the same who he says to be. Second Identification, in which the signature will be compared with the many signatures in the database to identify an individual out of many unknowns Automating the process of Handwritten Signature Verification will be useful for document verification in various sectors such as banking, legal documentation etc. There are two types of Signature Verification; offline (static) or online (dynamic). Offline signatures offer two dimensional image of the signatures whereas online signatures have added advantage that it also measures pressure applied by the user, speed of writing, inclination of pen along with the two-dimensional signature image. [5] The user will sign on pressure sensitive writing pads to create the training samples. Every signature sample consist of X-coordinate - scaled cursor position along the x-axis, Y-coordinate - scaled cursor position along the y-axis, Time stamp - system time at the time of signing, Button status - current button status (0 for pen-up and 1 for pen-down), Azimuth - clockwise rotation of cursor about the z-axis, Altitude - angle upward toward the positive z-axis, Pressure - normal pressure applied by hand. Pressure applied by the tip of the pen on the pressure sensitive pad varies during the process of signing. This pressure information is chosen for generating the feature vector. The proposed method is as shown Figure. 1 We find HWT of the pressure. HWT is formed by combining the two orthogonal transforms using Kronecker product. It has the ability to analyze the signal at global as well as local level like wavelet transform. [6] Consider matrices X and Y as shown below.

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1a} \\ x_{21} & x_{22} & \cdots & x_{2a} \\ \cdots & \cdots & \cdots & \cdots \\ x_{a1} & x_{a2} & \cdots & x_{aa} \end{bmatrix}$$

$$Y = \begin{bmatrix} y_{11} & y_{12} & \cdots & y_{1b} \\ y_{21} & y_{22} & \cdots & y_{2b} \\ \cdots & \cdots & \cdots & \cdots \\ y_{b1} & y_{b2} & \cdots & y_{bb} \end{bmatrix}$$

HWT -1 matrix 'TXY' of size (N x N), as shown in Table 1, can be formed by the Kronecker product of two orthogonal transform matrices X and Y respectively, with sizes (a x a) and (b x b), such that N = a x b. For HWT – 1, first 'b' number of rows of the HWT matrix are calculated as the product of each element of first row of the orthogonal transform X with the orthogonal transform Y. For next 'b' number of rows of HWT matrix the second row of the orthogonal transform matrix X is

shift rotated after being appended with zeros. Similarly, the other rows of HWT matrix are generated as set of b rows each time for each of the 'a-1' rows of orthogonal transform matrix X starting from second row up to last row.



Figure 1. Proposed System

II. LITERATURE SURVEY

HWT offers better performance in image compression than the orthogonal transforms used to generate them. [6][7] HWT is also used for water marking [8] and to convert color image to gray image.[9] Various classifiers based on KNN, SVM and NN [10][11] have been used for verification of signatures. In [12], KNN classifier was used with, HWTs of the pressure map of online signatures as feature vector. It offered an EER of 30%. In [13], SVM classifier was used with, a kernel function of online signature time series, based on LCSSs detection, as a feature vector. It offered an EER of 6.84%. Using SVM in conjunction with HMM offered FAR of 1.96% and FRR of 60.43%. In [14], neural network classifier was used with, the approximation and detail component of DWT of the pen position and pen movement angle as feature vector. Using all coefficients of DWT, success rate was 100% with trained signature, 90% with untrained signatures and FRR of 24%. Using selected 25 coefficients of DWT, success rate was 100% with trained signature, 95% with untrained signatures and FAR of 8%.

III. METHODOLOGY

Signature database of 1600 signatures, provided by The First International Signature Verification Competition (SVC 2004) is used. It has signatures of 40 users. Every user has 40 signatures, out of which, 20 are genuine and 20 are skilled forgeries. The first 256 samples of every signature are used to find HWT. The signatures, having samples less than 256, will be padded with zeroes at the end. The first 128 samples of the HWT output are used as feature vector. Discrete Cosine transform (DCT), Discrete Hartley transform (DHT), Discrete Walsh transform (DWT) and Discrete Kekre transform (DKT) are used to form the HWT. [15][16] We have considered following combinations as shown in Table 1.

TABLE 1. HWT COMBINATIONS

Matrix size	DCT (128*128)	DHT (128*128)	HAAR (128*128)	HADAMARD (128*128)	KEKRE (128*128)
DCT (2*2)	√	√	√	√	√
DHT (2*2)	√	√	√	√	√
HAAR (2*2)	√	√	√	√	√
HADAMARD (2*2)	√	√	√	√	√
KEKRE (2*2)	√	√	√	√	√

There are many topologies of HMM such as Left to Right, Ergodic and Ring. We have used Left- Right model [17] as shown in Fig. 2, and Ergodic model, as shown in Fig. 4.

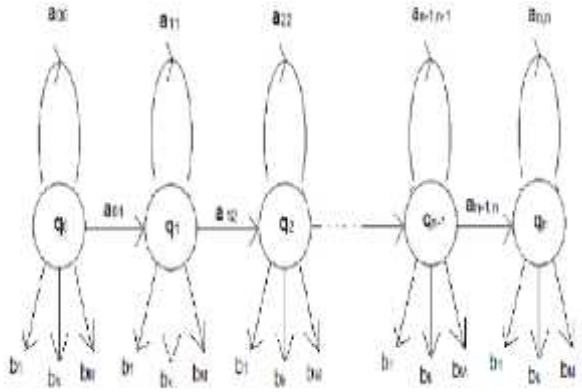

Figure 2 Left to Right HMM model

HMM is represented by the transition probability matrix (A), Observation matrix (B) and initial probability distribution matrix (π). [18] Consider a system which is in a distinct state (S1, S2… SN) at any point of time. In this experiment the number of states (N) of the model are 2. As the number of states increase, the time needed for training increases. The number of observations (M) corresponding to each state are 275. The output of HWT is a matrix of dimension [1 × 256]. The matrix elements from 1 to 128 corresponding to lower frequencies are chosen as a feature vector. Feature vectors are scaled into M number of observations.

Initial Probability Distribution (π): $\pi i = P(q1 = Si)$; $1 \le i \le N$. We assume the initial probability of the first state is 1 and the others are 0 which implies that in the beginning HMM is always in state 1. State transition probability (aij): $aij = P(St = j / St\text{-}1 = i)$. For the left-to-right HMM, $aij=0$ when $i > j$. we are using the HMM of first order so that $aij=0$ when $j > i+1$. For Ergodic HMM, $aij \neq 0$ for i, j. Initially, the state transition matrix is generated using the random numbers such that = 1; $1 \le i \le N$ where i = present state and j = next state. Observation probability (bj): $bj(k) = P(Vk \text{ at } t / qt = Sj)$; $1 \le j \le N$; $1 \le k \le M$; the probability of generating a symbol Vk in state j.

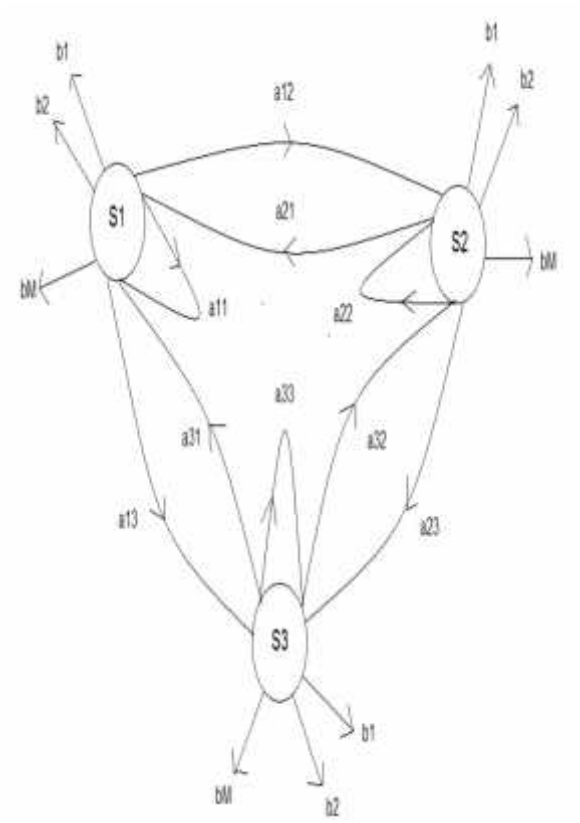

Figure 3 Ergodic HMM model

Statistics and machine learning toolbox of the MATLAB 13 was used for implementation of HMM. Initially a randomly generated transition probability Matrix (A) is generated using MATLAB, Observation probability matrix (B) with equal probability for every symbol and HMM to be in state 1. HMM is trained using the function 'hmmtrain' for 10 randomly chosen genuine signature samples and is used to test remaining 10 genuine signatures and 20 forged signatures of 40 users. This process is iterated 20 times and then average values are calculated.

IV. RESULTS

Performance of the system will be measured on the basis of False Rejection Ratio (FRR) and False Acceptance Ratio (FAR). FRR refers to false rejection of genuine signature and FAR refers to false acceptance of forged signature.[18] FRR is computed as ratio of the number of signatures detected as forged to the total number of genuine signatures tested. FAR is computed as ratio of the number of signatures detected as genuine to the total forged signatures tested. Testing has been carried out for 40 users and then the average FRR and FAR are calculated. In FRR-FAR plot shown in Figure 3, the point where two graphs cross each other is referred as Equal Error Rate (EER). At this point the values of FRR and FAR are equal.

From the observation of Left- Right HMM model shown in table 2 we get following results. The performance offered by DCT 2 DCT 128 and DCT 2 DCT 2 KEKRE 128 combinations is better than Orthogonal DCT transform. The performance offered by DHT 2 DCT 128, DHT 2 KEKRE 128 and DHT 2 DHT 128 is better than Orthogonal DHT transform. The performance offered by HAAR 2 DCT 128, HAAR 2 KEKRE 128 and HAAR 2 DHT 128 is better than Orthogonal HAAR transform. The performance offered by HADAMARD except HADAMARD 2 DCT 128, HADAMARD 2 KEKRE 128 and HADAMARD 2 DHT 128 is better than Orthogonal HADAMARD transform. The performance offered by orthogonal KEKRE transform is better than all combinations of KEKRE.

TABLE 2. EER FOR LEFT- RIGHT MODEL

Left-Right				
Combinations	Avg	Std.	Mi	Ma
DCT 2 DCT 128	**11.3**	**5.66**	**0.8**	**31.3**
DCT 2 KEKRE 128	13.1	5.4	5	28.1
DCT 256	**15.3**	**7.11**	**5**	**36.6**
DCT 2 DHT 128	16.9	10.53	1.5	38.9
DCT 2 HAAR 128	24.4	10.05	6	41.8
DCT 2 HADAMARD 128	24.8	11.97	4.2	47.3
DHT 2 DCT 128	**11.5**	**5.6**	**4.8**	**32.4**
DHT 2 KEKRE 128	12.9	5.5	4.5	28.0
DHT 2 DHT 128	17.4	10.37	3	42.7
DHT 256	**20.2**	**9.53**	**10**	**40.1**
DHT 2 HADAMARD 128	22.3	13.81	0	49.1
DHT 2 HAAR 128	24.2	10.15	3.5	41.8
HAAR 2 DCT 128	**11.9**	**5.86**	**4.5**	**31.3**
HAAR 2 KEKRE 128	13.3	5.57	4.5	28.1
HAAR 2 DHT 128	17.7	10.54	3	42.3
HAAR 256	**22.7**	**13.13**	**8.5**	**67**
HAAR 2 HADAMARD 128	22.8	13.39	2	49.2
HAAR 2 HAAR 128	24.6	10.04	6	41.8
HADAMARD 2 DCT 128	**12.5**	**5.82**	**6.5**	**35.5**
HADAMARD 2 KEKRE 128	12.7	5.56	4.4	28.0
HADAMARD 2 DHT128	17.1	10.71	1	42.6
HADAMARD 256	**19.5**	**11.59**	**1**	**50.6**
HADAMARD 2	22.5	13.84	0	49.1
HADAMARD 2 HAAR 128	24.7	9.68	7.5	42.2
KEKRE 256	**13.6**	**7.29**	**4.8**	**37.1**
KEKRE 2 KEKRE 128	14.0	7	4.2	35.2
KEKRE 2 DCT 128	16.2	8.08	4.5	36.5
KEKRE 2 DHT 128	17.5	10.92	2	42
KEKRE 2 HADAMARD 128	22.4	13.58	1	45.9
KEKRE 2 HAAR 128	27.7	10.11	5.5	42.5

From the observation of Ergodic HMM model shown in table 2 we get following results. DCT 2 KEKRE 128, DCT2 DCT 128 offers better performance than Orthogonal DCT transform, considering DCT combinations. The performance offered by all combinations of DHT except DHT 2 HAAR 128 is better than Orthogonal DHT transform. HAAR 2 DCT 128 and HAAR 2 KEKRE 128 offer better performance than Orthogonal HAAR transform. HADAMARD 2 KEKRE 128, HADAMARD 2 DCT 128 offer better performance than Orthogonal HADAMARD transform. Only KEKRE 2 KEKRE 128 offers better performance than orthogonal KEKRE transform.

TABLE 3. EER FOR ERGODIC MODEL

Ergodic				
Combinations	Avg	Std.	Mi	Ma
DCT 2 DCT 128	**12.9**	**7.47**	**3**	**44.9**
DCT 2 KEKRE 128	15.3	9.19	4.5	46.1
DCT 256	**15.4**	**9.94**	**0**	**50.5**
DCT 2 DHT 128	19.5	11.73	0	44.6
DCT 2 HAAR 128	23.8	12.07	5	45.8
DCT 2 HADAMARD 128	24.9	10.33	5	52.3
DHT 2 DCT 128	**11.5**	**5.85**	**3.5**	**38.1**
DHT 2 KEKRE 128	14.0	8.63	4	45.9
DHT 2 DHT 128	19.5	11.59	0	44.9
DHT 256	**23**	**12.59**	**0**	**43.4**
DHT 2 HADAMARD 128	23.0	12.12	5.5	56.5
DHT 2 HAAR 128	24.5	10.56	5	52.3
HAAR 2 DCT 128	**12.2**	**6.36**	**3**	**40.7**
HAAR 2 KEKRE 128	15.8	8.88	6.5	46.1
HAAR 2 DHT 128	16.5	8.17	0	32.7
HAAR 256	**19.4**	**11.37**	**3**	**44.3**
HAAR 2 HADAMARD 128	23.0	12.75	0.5	43.4
HAAR 2 HAAR 128	25.5	10.06	5	52.3
HADAMARD 2 DCT 128	**13**	**6.94**	**7**	**41.5**
HADAMARD 2 KEKRE 128	14.1	6.66	0	32.7
HADAMARD 2 DHT128	19.7	11.68	1.5	49.7
HADAMARD 256	**20**	**11.69**	**0**	**47.2**
HADAMARD 2	23.3	12.43	1.5	43.4
HADAMARD 2 HAAR 128	24.7	10.43	5.5	50.5
KEKRE 256	**12.4**	**7.53**	**4.5**	**41.8**
KEKRE 2 KEKRE 128	12.5	6.22	5.5	41
KEKRE 2 DCT 128	15.1	7.48	5	34.4
KEKRE 2 DHT 128	19.0	9.38	3	41.0
KEKRE 2 HADAMARD 128	21.6	13.17	1	44.2
KEKRE 2 HAAR 128	23.3	14.02	0.5	46.5

In the Table 2 and 3, we have given the results of EER for various combinations of HWT-1 for left- right and Ergodic HMM model with 2 states, 275 symbols and 10 training samples. DCT combinations of HWT-1 offer best performance, with DCT 2 DCT 128 combination offering 11.27 % average EER with standard deviation of 5.66 %.

Comparing performance of proposed system with the existing systems, based on the comparison of two models for various combination, suitable model for a particular HWT combination is shown in Table 4.

TABLE 4. BEST MODEL FOR VARIOUS HWT COMBINATIONS

Combinations	**Best model**
DCT 2 DCT 128	LEFT-RIGHT
DCT 2 DHT 128	LEFT-RIGHT
DCT 2 HAAR 128	LEFT-RIGHT
DCT 2 HADAMARD 128	ERGODIC
DCT 2 KEKRE 128	ERGODIC
DCT 256	LEFT-RIGHT
DHT 2 DHT 128	LEFT-RIGHT
DHT 2 DCT 128	LEFT-RIGHT
DHT 2 HAAR 128	LEFT-RIGHT
DHT 2 HADAMARD 128	LEFT-RIGHT
DHT 2 KEKRE 128	ERGODIC
DHT 256	LEFT-RIGHT
HAAR 2 HAAR 128	LEFT-RIGHT
HAAR 2 DCT 128	LEFT-RIGHT
HAAR 2 DHT 128	LEFT-RIGHT
HAAR 2 HADAMARD 128	LEFT-RIGHT
HAAR 2 KEKRE 128	ERGODIC
HAAR 256	ERGODIC
HADAMARD 2 HADAMARD 128	LEFT-RIGHT
HADAMARD 2 DCT 128	LEFT-RIGHT
HADAMARD 2 DHT128	LEFT-RIGHT
HADAMARD 2 HAAR 128	ERGODIC
HADAMARD 2 KEKRE 128	LEFT-RIGHT
HADAMARD 256	LEFT-RIGHT
KEKRE 2 KEKRE 128	ERGODIC
KEKRE 2 DCT 128	LEFT-RIGHT
KEKRE 2 DHT 128	LEFT-RIGHT
KEKRE 2 HAAR 128	ERGODIC
KEKRE 2 HADAMARD 128	LEFT-RIGHT
KEKRE 256	ERGODIC

The proposed system is compared with existing systems in Table 5.

TABLE 5. PERFORMANCE COMPARISON OF PROPOSED SYSTEM

Paper	FAR (%)	FRR (%)
[13]	30	30
[14]	1.96	60.93
[15]	0	8
Proposed system	11.27	11.27

V. CONCLUSION

In the proposed method, we have used HWT-1 with HMM classifier for signature verification. This method was applied on SVC 2004 database. Considering both the HMM model and various HWT combinations, we conclude that DCT combinations of HWT-1 offer best performance, with DCT 2 DCT 128 combination offering 11.27 % average EER with standard deviation of 5.66 %. We also conclude that HWT combinations offer better performance than respective orthogonal transforms. Left-Right HMM model offers better performance than Ergodic HMM model for most of the HWT combinations. These findings show that the HWT with HMM has been a feasible method for feature vector

extraction of online signature vector based biometric systems.

VI. FUTURE SCOPE

The proposed method of Online Handwritten Signature Recognition based on Feature Extraction using Hybrid Wavelet Transform Type-I and uses 256 samples of the signature. Hybrid wavelet Transform matrix is also of dimension 256 × 256. The matrix is formed using two orthogonal matrices, one of dimension 2 × 2 and the other of dimension 128 × 128. The other possibilities such as 4 × 64, 8 × 32, 16 × 16 can be tried.

The proposed method uses Hidden Markov Model Classifier. Other classifiers such as Neural Network and Support Vector Machine can be used with Hybrid Wavelet Transform.

The proposed method uses pressure parameter as the feature vector. It is possible to use other parameters or their combinations as the feature vector.

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Content Based Multimedia Retrieval with combined weighted Features

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***Abstract*— Content based retrieval uses the content of multimedia to represent and index the data. The area of multimedia retrieval from its inception to present date relies mostly on single modal analysis. The single modal analysis proved insufficient to satisfy the user's semantic perception and hence a multimodal system has been implemented. The user can present his/her query to the system and the system will automatically come up with search results. The user can present his/her level of satisfaction regarding relevance of results for single modal retrieval and initiate the multimodal search. The user poses a query in the form of a video clip from the multimedia database to the system. The audio contents are extracted from the video clip. The audio features are extracted using Mel-Frequency Cepstral Coefficient for both query as well as database. The top 'n' results are displayed to the user where 'n' is a user input number varying from 1 to 10. The audio search is followed by the video search. In the video retrieval process the key frames are selected from the query clip and the motion vector is calculated by block matching technique. The motion vectors of query file and database files are compared, and the differences are found out thus providing the final rankings. A feedback mechanism is provided by which the user can continue with combined retrieval process. The combined retrieval process works on weighted audio-visual features combined together. It is found that the precision and recall of the combined retrieval is considerably higher as compared to the individual parameter retrievals.**

Keywords- Retrieval, Multimedia, Multimodal, Content Based, Audio, Video.

I. INTRODUCTION

The current multimedia retrieval systems are successful in retrieving multimedia objects, using keyword and query- based approaches. However, they are incapable to retrieve the objects which are context sensitive and annotated inappropriately. Content-Based Multimedia Retrieval (CBMR) aims at developing techniques that support effective searching and browsing of large multimedia object repositories, based on automatically derived features. The current CBMR system suffers from the semantic gap. Though a user feedback is suggested as a remedy to this problem, it often leads to distraction in the search. To overcome these disadvantages, this paper presents a novel idea of an interactive multimodal retrieval system, integrating audio and video content to enhance the retrieval accuracy. Also, the user is involved in the search process after the system finishes preliminary search based on either audio or video feature. The novel search algorithm takes user assigned coefficient as input which determines the weight of audio and video features to refine search results to user satisfaction. The experimental results demonstrate the performance of the proposed system.

II. LITERATURE SURVEY

There have been lots of work in the direction of content-based retrieval from multimedia databases. The work has been in the areas of image retrieval, audio retrieval, video retrieval as well as combined retrieval. some of which are presented in this section. Wei, C.H., & Li, C.T. proposed a general framework for content-based medical image retrieval and constructed a retrieval system for locating digital mammograms with similar pathological parts [1]. To access the various media on the Internet, content-based search engines can assist users in searching the information with the most similar contents based on queries. For example, Hong, S. & Nah, Y. designed an XML scheme to enable content- based image retrieval on the internet [2].

J. T Foote [3] presented an idea for the representation of an audio object by a template that characterizes the object in his purposed system. For construction of a template; an audio signal is first divided into overlapping frames of constant length then using simple signal processing techniques, for each frame a 13-dimensional feature vector is extracted (12 Mel-Frequency Cepstral Coefficients plus Energy) at a 500Hz, and then these feature vectors are used to generate templates using tree-based vector quantizer trained to Maximize Mutual Information (MMI). For retrieval, query is first converted into template in the same way described earlier, then for its similarity search template matching is applied which uses distance measure, and finally a ranked list is generated based on minimum distance. In this system performance of the system with Euclidean distance as well as Cosine distance, is also compared, and experimental results show that Cosine distance performs slightly better than Euclidean distance.

An important work done by Wold et. al. [4], is represented by their system called "Muscle Fish". In this system an audio object is characterized by its frame level and global acoustical and perceptual parameters. These features are extracted at frame level using signal processing techniques and globally using statistical analysis based on frame level features and musical features (for music signals only) using musical analysis. Frame level features consist of loudness, pitch, tone

(brightness and bandwidth), MFCCs (Mel-Frequency Cepstral Coefficients) and derivative. Global features are determined by applying statistical modelling techniques on the frame level features that is, using Gaussian and histogram modelling techniques to analyze audio objects. For musical objects, musical features (i.e. rhythm, events and distance (interval)) are extracted using simple signal processing techniques like pitch tracking, voiced and unvoiced segmentation and note formation. For indexing, multidimensional features space is used. For retrieval, distance measure is used.

S. R. Subramenya and A. Youssef [5] presented a signal processing-based approach using Discrete Wavelet Transform (DWT) for feature vector of an audio object. First of all an audio signals is decomposed using 4-level DWT and then form wavelet coefficients, feature vector is formed using all approximate coefficients and 20%-30% of detail coefficients of all levels obtained during wavelet decomposition. For query processing same procedure is applied. For similarity matching they used Euclidean distance measure.

Recognition in videos could be treated as an application of image-level recognition over keyframes extracted from the video. This is the popular approach to label large video datasets such as the TRECVID challenge [6].

In the Goalgle system for soccer video retrieval developed by Snoek [7], the mode of querying the retrieval systems is an important design aspect. Typically, queries are posed as short text that includes a few keywords, similar to text search engines.

Worring, et al. [8] gave useful insights into how users apply the steps of indexing, filtering, browsing, and ranking in video retrieval. Usage mining in large multimedia databases is another emerging problem. The objective is to extract the hidden information in user behaviours on large multimedia databases. A framework for video usage mining has been presented in Mongy, et al. [9].

Rautianinen, et al. [10] used temporal gradients and audio analysis in video to detect semantic concepts.

Amir, et al. [11] proposed a framework for a multi-modal system for video event detection which combined speech recognition and annotated video. Dimitrova, et al. [12] proposed a Hidden Markov Model using text and faces for video classification. In the TRECVID project by Smeaton and Over, 2003 [13], the current focus is on multiple domain concept detection for video retrieval. TRECVID supports a complete evaluation of video retrieval systems which consider usage patterns, realistic test sets, and compared a wide set of contributed systems.

III. METHODOLOGY

Conventional methods generally use the audio and visual information at separate levels. To overcome the conventional methods of retrieval system leads to a new thought of fusion of audio and visual method. Joint audio-visual pattern would provide strong cues for detecting multimedia events.
Figure 1 shows the proposed framework for the multimodal retrieval. Here the audio and video features are extracted from the user defined query [14]. The separated features from the query are then averaged using average pooling technique. Average pooling uses beta factor which is defined by the user in the Graphic User Interface (GUI) input panel. As per the averaging value which may range from 0.01 to 1, the features are combined using pooling strategies and the final result is displayed.

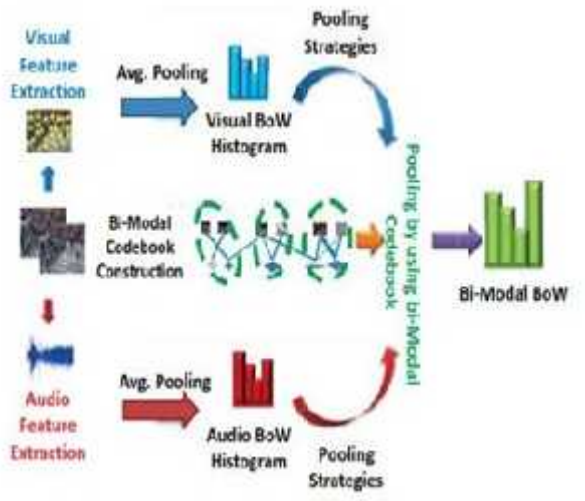

Figure 1: Multimodal Retrieval

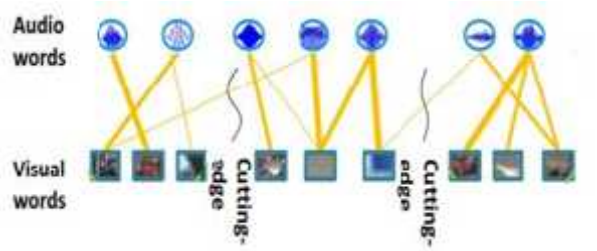

Figure 2: Average Pooling Technique

The above figure elaborates the technique involved. It shows that audio and video features of query separately matches different cutting edge of different samples from the database. Due to average pooling the technique and strategies of different methods are clubbed and indexed to provide a better output compared to single method analysis. The flowchart of the system is presented below.
The multimedia retrieval system consists of the search for a particular query video clip from a database of video clips. Following are the basic requirements of the system:

i. Audio component of the query should match

The audio from the query is to be separated and matched using the MFCC algorithm with all the audio files of the videos from the database and provide rankings to the matched files.

ii. Match videos on the basis of motion vector analysis

The motion vector for each video query will be unique and comparing it with that from the database will

provide an ideal match. This is based on the assumption that the entire query video is available in the database.

iii. Search rankings post processing

After the final processing of audio and motion vector, the system should provide rankings to the search results. The values of the retrieved audio and video feature vector coupled with a weighing factor are being used for this mechanism.

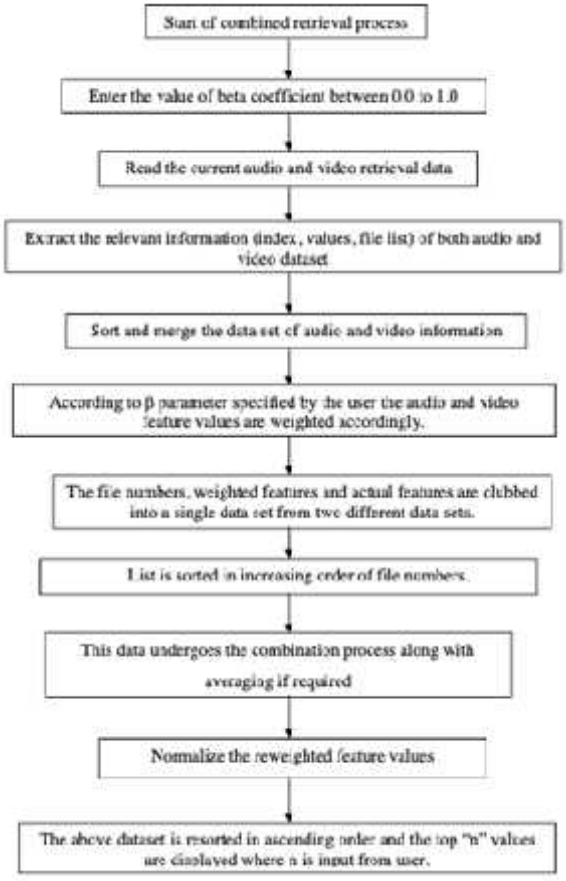

Figure 3: Combined retrieval system flow chart

The weighing factor referred to as the beta parameter is provided by user in the beginning of the combined retrieval process. The top n results are displayed where n is a user specified value in the range of 1 to 10 at the beginning of the retrieval process.

IV. SYSTEM WORKING

The working of the system is as follows

1. The system GUI asks the user to select query from the database and specify the number of retrieved results to be displayed in the range from 1 to 10.
2. Then the audio, video and lastly the combined algorithm can be executed. For the last algorithm, the user has to assign weight to audio and video features. Each of the top 10 values created by running the audio retrieval algorithm and followed by the video retrieval algorithm for a particular query selected by the user is stored as a list. This data set containing both index of the files as well as sorted file numbers in ascending order will be used by the combined retrieval algorithm for further accurate retrieval analysis.
   For example, for query = 29.avi, the audio and video retrieval process give initial output as a list of 10 retrieved files along with their index values.

TABLE 1: INITIAL AUDIO AND VIDEO RETRIEVE LIST FOR SAMPLE QUERY

Audio index	File no	Video index	File no
7	4	5	3
6	10	9	4
5	25	4	23
9	26	3	25
4	27	7	27
2	28	8	28
1	29	1	29
3	31	10	31
10	37	6	41
8	55	2	49

3. The system reads out the collected data from the audio and video retrieval process and takes into account corresponding feature values against the file numbers. The values fetched is on basis of window size of n=10.

TABLE 2: FEATURE VALUES OF LIST

Audio file no	Feature value	Video file no	Feature value
4	0.7728	3	0.8022
10	0.7793	4	0.7262
25	0.7801	23	0.8203
26	0.7703	25	0.8868
27	0.7949	27	0.7584
28	0.7985	28	0.7368
29	1	29	1
31	0.795	31	0.7091
37	0.7674	41	0.7791
55	0.7704	49	0.9275

4. According to the β parameter given by the user (range specified between 0.0 to 1.0) the relevant data (audio feature values and video feature values) are weighted accordingly. The weight assigned to audio is β while that to video is 1- β.

TABLE 3: FEATURE MULTIPLIED BY USER ASSIGNED WEIGHT FOR B = 0.5

Audio feature value (A)	A X β	Video feature value (V)	V X (1-β)
0.7728	0.3864	0.8022	0.4011
0.7793	0.3896	0.7262	0.3631
0.7801	0.39	0.8203	0.4102
0.7703	0.3852	0.8868	0.4434
0.7949	0.3974	0.7584	0.3792
0.7985	0.3993	0.7368	0.3684

1	0.5	1	0.5
0.795	0.3975	0.7091	0.3546
0.7674	0.3837	0.7791	0.3895
0.7704	0.3852	0.9275	0.4638

5. The file numbers, weighed features and actual features are clubbed into a single data set from two different data sets.

TABLE 4: COMBINED LIST

File no	Weighed Featured A/V values	Actual Feature Value
4	0.3864	0.7728
10	0.3896	0.7793
25	0.39	0.7801
26	0.3852	0.7703
27	0.3974	0.7949
28	0.3993	0.7985
29	0.5	1
31	0.3975	0.795
37	0.3837	0.7674
55	0.3852	0.7704
3	0.4011	0.8022
4	0.3631	0.7262
23	0.4102	0.8203
25	0.4434	0.8868
27	0.3792	0.7584
28	0.3684	0.7368
29	0.5	1
31	0.3546	0.7091
41	0.3895	0.7791
49	0.4638	0.9275

6. Then the list is sorted in increasing order of file numbers.

TABLE 5: SORTED LIST

Sorted File nos	Weighed features	Actual Features
3	0.4011	0.8022
4	0.3864	0.7728
4	0.3631	0.7262
10	0.3896	0.7793
23	0.4102	0.8203
25	0.39	0.7801
25	0.4434	0.8868
26	0.3852	0.7703
27	0.3974	0.7949
27	0.3792	0.7584
28	0.3993	0.7985
28	0.3684	0.7368
29	0.5	1
29	0.5	1
31	0.3975	0.795
31	0.3546	0.7091
37	0.3837	0.7674
41	0.3895	0.7791
49	0.4638	0.9275
55	0.3852	0.7704

7. The above list now consists of sorted file actual feature values. This data undergoes the combination algorithm process in which either the actual feature value or the weighted feature value is considered for a particular file depending upon the number of times it occurs in the list.

   If a file number is repeated, it signifies that it was output from both audio as well as video retrieval process. For those files, the actual feature values (not the weighed ones) coming from both audio and video streams are averaged. If there is only a single occurrence of a file, its weighed feature value is considered. This leads to the creation of final combined data set.

   Below is the list of components that are used for designing our model.

TABLE 6: FINAL REWEIGHTED LIST

File number	Reweighted feature values
3	0.4011
4	0.7495
10	0.3896
23	0.4102
25	0.8334
26	0.3852
27	0.7767
28	0.7677
29	1
31	0.7521
37	0.3837
41	0.3895
49	0.4638
55	0.3852

8. The reweighted feature values are normalized.

TABLE 7: NORMALIZED LIST

File number	Normalized value
3	0.5989
4	0.2505
10	0.6104
23	0.5898
25	0.1666
26	0.6148

27	0.2233
28	0.2323
29	0
31	0.2479
37	0.6163
41	0.6105
49	0.5362
55	0.6148

9. The above dataset is resorted in ascending order and the top “n” values are displayed where n is input from user.

TABLE 8: REARRANGED LIST

File No	Sorted Normalized Value
29	0
25	0.1666
27	0.2233
28	0.2323
31	0.2479
4	0.2505
49	0.5362
23	0.5898
3	0.5989
10	0.6104
41	0.6105
55	0.6148
26	0.6148
37	0.6163

10. In the example taken, let the user specified window size be N= 5. In this case, the final output is 29, 25, 27, 28 and 31 which are the file numbers of the top 5 ranked output.

V. RESULTS AND DISCUSSIONS

Step 1: Once audio and video retrieval is over, user is given option whether the result is satisfactory or not.



Figure 4: Main GUI

Step 2: Type “no” if the results were not relevant according to the user. Only then the system will go for the combined retrieval process. If the user types ”yes”, then the system will exit the search process.

In the figure below, the user have typed “no” so as to demonstrate the retrieval process ahead.



Figure 5: User providing relevance feedback

Step 3: If the user is not satisfied with the previous results, there is an option for Combined Retrieval.



Figure 6: Initiating combined retrieval process

Step 4: The user is asked to enter beta coefficient in the range of 0.0 to 1.0.
For example in the retrieval of file no 29.avi, beta coefficient of 0.5 is taken. And the push button for combined retrieval process is clicked.



Figure 7: User assigning weight

Step 5: The system displays the 5 top ranked files along with the time taken for retrieval. Then it plays the files sequentially on mouse click.



Figure 8: Display top result (29.avi)

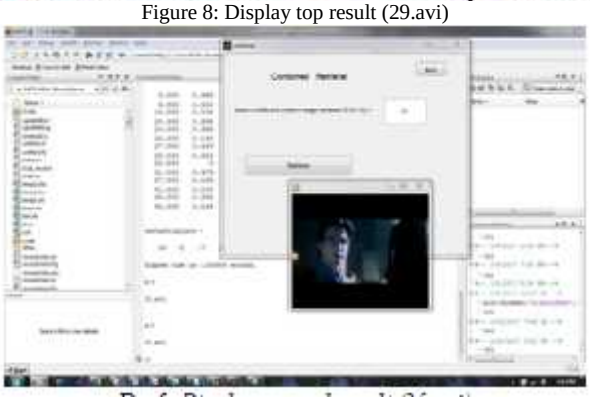

Figure 9: Display second result (25.avi)



Figure 10: Third result (27.avi)



Figure 11: Fourth result (28.avi)



Figure 12: Fifth ranked result (31.avi)

VI. CONCLUSION

In this paper, a novel idea is presented to combine audio and video retrieval schemes by assigning weights to the features extracted by individual retrieval processes. The results obtained with combined audio and video retrieval are considerably more accurate than that obtained by only audio or video features. Also the user can vary the weight assigned to audio and video features to obtain the result as per his/her satisfaction since in this case the retrieval results depend upon the user assigned value of β. For the example chosen here, i.e. retrieval of query file number 29.avi, the value chosen for β is 0.5. This signifies equal weightage of audio and video features.

If the value of the β is less than 0.5, video features are given more weightage whereas for values of β greater than 0.5, audio features are given more weightage. So user can change the value of β and accordingly get different set of results.

The proposed novel approach performs alignment across information domains, across various levels of spatial and temporal binding, and across the scale of the data. This work is important in light of the acknowledged understanding that vision-alone approaches are still far from realizing the dream of semantic multimedia understanding.

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Image Compression Using Wavelet Transforms

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***Abstract*- Always there should be a proper balance between the compression and the quality of the image. The paper consists of two parts: Processing time and the compression of image. In processing time part, it is very important to check whether the algorithm that we are using is fast enough to give the compressed image in a very less amount of time. For achieving this goal, wavelet is a very effective tool with its rich set of rules and the ability to handle the data in a effective manner.**

Keywords—Wavelet,compression,slicing

I. INTRODUCTION

Image compression is a technique in which large amount of disk space is required for the rawimages which seems to be a very big disadvantage during transmission and storage. With increasein technology an efficient technique for image compression is needed. Even though there are so many compression techniques which is present already, but the need for better compressiontechnique is required which is faster, memory efficient and simply suits the requirements of the user. To analyze the parameters of image compression Peak Signal to noise ratio andcompression ratio is an important parameters it gives synthetic performance of the compression amount of compression is given the highest priority so as to achieve the results which are most suitable for our day to day activitiesof images. Image is a 2 Dimensional signal represented by Digital system. Normally Imagetaken from the camera is in the analog form. However for processing, transmitting and storage, images are converted in to digital form. A Digital Image is basically 2-Dimensional array of pixels. Basically compressing an image is different from compressing digital data. Datacompression algorithm which is generally used for Image compression but it gives us result which is less than optimal. In remote sensing, bio medical and video processing techniquesdifferent types of images are used which require compression for transmission and storage. Compression is achieved by removing redundancy or extra bits from the image. There arenumerous data compression algorithm which can be considered as universal number of universalcompression algorithms that can compress almost any kind of data. These are the losslessmethods they retain all the information of the compressed data. However, they do not takeadvantage of the 2-dimensional nature of the image data. Images have certain statisticalproperties, which can be exploited by encoders especially designed for them. Also, for the sake ofsaving a little more storage space and bandwidth some of the finer details in the image can besacrificed.

II. EXISTING TECHNOLOGY

JPEG:

JPEG (Joint Photographic Experts Group) is an image format that uses lossy compression to create smaller file sizes. One of JPEG's big advantages is that it allows the designer to fine-tune the amount of compression used. This results in better image quality when used correctly while also resulting in the smallest reasonable file size. Because JPEG uses lossy compression, images saved in this format are prone to "artifacting" where you can see pixelization and strange halos around certain sections of an image. These are most common areas of an image where there's a sharp contrast between colors.

JPEG 2000:

JPEG 2000 (JP2) is an image compression standard and coding system. It was created by the Joint Photographic Experts Group committee in 2000 with the intention of superseding their original discrete cosine transform-based JPEG standard (created in 1992) with a newly designed, wavelet-based method.While there is a modest increase in compression performance of JPEG 2000 compared to JPEG, the main advantage offered by JPEG 2000 is the significant flexibility of the code stream. The codestream obtained after compression of an image with JPEG 2000 is scalable in nature, meaning that it can be decoded in a number of ways; for instance, by truncating the code stream at any point, one may obtain a representation of the image at a lower resolution, or signal-to-noise ratio – see scalable compression. By ordering the code stream in various ways, applications can achieve significant performance increases. However, as a consequence of this flexibility, JPEG 2000 requires encoders/decoders that are complex and computationally demanding. Another difference, in comparison with JPEG, is in terms of visual artifacts: JPEG 2000 only produces ringing artifacts, manifested

as blur and rings near edges in the image, while JPEG produces both ringing artifacts and 'blocking' artifacts, due to its 8×8 blocks. As of 2016, there were still few digital cameras that shoot photos in the JPEG-2000 (.JP2, .J2K) format, and support for reading these photos is still fairly limited in feature mobile phones as well as smartphones and tablet PCs running various operating systems.

GIF:

The Graphics Interchange Format is a bitmap image format that was developed by US-based software writer Steve Wilhite while working at the internet service provider CompuServe in 1987 and has since come into widespread usage on the World Wide Web due to its wide support and portability.GIF images are compressed using the Lempel–Ziv–Welch (LZW) lossless data compression technique to reduce the file size without degrading the visual quality. This compression technique was patented in 1985. The format supports up to 8 bits per pixel for each image, allowing a single image to reference its own palette of up to 256 different colors chosen from the 24-bit RGB color space. It also supports animations and allows a separate palette of up to 256 colors for each frame. These palette limitations make the GIF format less suitable for reproducing color photographs and other images with continuous color, but it is well-suited for simpler images such as graphics or logos with solid areas of color.

Wavelet Transform

In numericalanalysis and functional analysis, a discrete wavelet transform (DWT) is any wavelet transform for which the wavelets are discretely sampled. As with other wavelet transforms, a key advantage it has over Fourier transforms is temporal resolution: it captures both frequency and location information (location in time). For an input represented by a list of 2^n {\displaystyle 2^{n}}numbers, the Haar wavelet transform may be considered to pair up input values, storing the difference and passing the sum. This process is repeated recursively, pairing up the sums to prove the next scale, which leads to to 2n-1 differences and a final sum. Wavelet compression is a form of data compression well suited for image compression (sometimes also video compression and audio compression). Notable implementations are JPEG 2000, DjVu and ECW for still images, CineForm, and the BBC's Dirac. The goal is to store image data in as little space as possible in a file. Wavelet compression can be either lossless or lossy.

Using a wavelet transform, the wavelet compression methods are adequate for representing transients, such as percussion sounds in audio, or high-frequency components in two-dimensional images, for example an image of stars on a night sky. This means that the transient elements of a data signal can be represented by a smaller amount of information than would be the case if some other transform, such as the more widespread discrete cosine transform, had been used.

Discrete wavelet transform has been successfully applied for the compression of electrocardiograph (ECG) signals. In this work, the high correlation between the corresponding wavelet coefficients of signals of successive cardiac cycles is utilized employing linear prediction.

Wavelet compression is not good for all kinds of data: transient signal characteristics mean good wavelet compression, while smooth, periodic signals are better compressed by other methods, particularly traditional harmonic compression (frequency domain, as by Fourier transforms and related)

Bit plane Slicing

Instead of highlighting grey level images, highlighting the contribution made to total image appearance by specific bits might be desired. Suppose that each pixel in an image is represented by 8 bits. Imagine the image is composed of 8, 1-bit planes ranging from bit plane1-0 (LSB) to bit plane 7 (MSB).

In terms of 8-bits bytes, plane 0 contains all lowest order bits in the bytes comprising the pixels in the image and plane 7 contains all high order bits.

Separating a digital image into its bit planes is useful for analyzing the relative importance played by each bit of the image, implying, it determines the adequacy of number of bits used to quantize each pixel, useful for image compression.

In terms of bit-plane extraction for a 8-bit image, it is seen that binary image for bit plane 7 is obtained by proceeding the input image with a thresholding gray-level transformation function that maps all levels between 0 and 127 to one level (e.g. 0)and maps all levels from 129 to 253 to another (e.g. 255).

III. PERFORMANCE PARAMETERS

There are various performance parameters. Few of them are listed here.

Compression ratio :

Compression ratio is a parameter which is used to measure how much the image has compressed as compared to the original image.

For example if a image is having size of 10 MB is reduced to the size of 2 MB then the compression ratio comes out to be

Compression ratio=Original image size/Compressed image size

=10/2

=5 MB

So the compression ratio comes out to be 5:1.

IV. PROPOSED SYSTEM

Imaging inspection process

Step 1: Acquire the image or images of the inspected product.

Step 2: Image pre-processing of the resulting image or images.

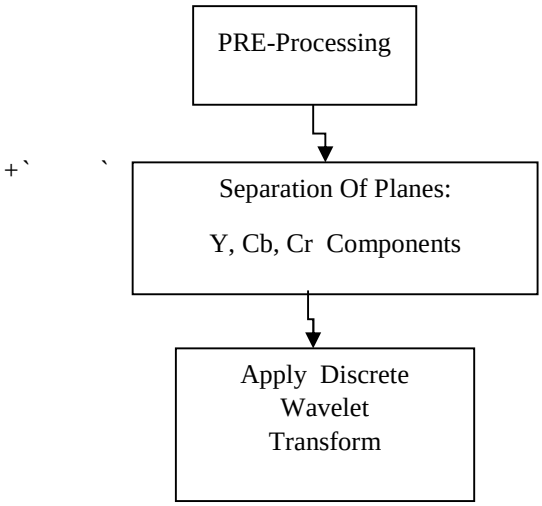
IMAGE	**ORIGINAL SIZE**	**COMPRESSED LEVEL 1**	**Compression Ratio**	**PSNR(Peak signal to noise ratio)**
Test 1	1.72MB	497kB	3.54	72.98dB
Test 2	5.50MB	1.65MB	3.33	78.21dB
Test 3	1.05MB	467kB	2.30	78.53dB
Test 4	612kB	506kB	1.21	78.05dB
Test 5	36MB	27MB	1.33	78.55dB

Step 3: Image segmentation.

Step 4: Object and feature extraction for the obtained segmented image.

Step 5: Detection of possible faults or defects of the product .

Implementation



V. Simulation and Result







Table 1: Comparison Table

Table 2: Compression Ratio Comparisons

IMAGE	TYPE	COMPRESSED LEVEL 1	COMPRESSED LEVEL 2	COMPRESSED LEVEL 3
Test 1	Jpeg	3.54	13.06	47.86
Test 2	Jpeg	3.33	12.52	43
Test 3	Jpeg	2.30	7.79	24.11
Test 4	Png	1.2	3.57	13.28
Test 5	Tiff	1.33	5.25	17.48







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A Review on addiction detection based on EEG Signal

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***Abstract*— This review covers advances of the past decade, in the development of EEG signal processing algorithms for addiction detection. In recent years, various computational approaches have been proposed to detect addiction from EEG recordings. In this paper, we review some of those approaches. Addiction can be of anything such as substance addiction or behavioral addiction. Alcoholism is a substance addiction. Alcoholism is a condition which is characterized by excessive drinking and alcohol dependence. People's alcohol consumption became both a social problem and threats to health. EEG signals, which monitor electrical activity in the brain, are useful for determining a person's current mental status. The screening of addicted patients using physiological characteristics is very difficult task for the doctors. Therefore, brain electroencephalograms (EEGs) signal analysis is popularly used to accurately detect the disorder (or the person is alcoholic or normal). In this paper the classification of Electroencephalogram (EEG) signals correlated with alcoholic and nonalcoholic Subjects with different algorithms is reviewed.**

Keywords—Alcohol Addiction detection, alcoholism, EEG signal classification algorithms.

I. INTRODUCTION

There are around 76.3 million people worldwide who are diagnosed with alcohol disorders. High consumption of alcohol not only affects the human brain but also damages life. People who drink excessive alcohol suffer from blurred vision, imbalanced walking, impaired driving, slurred speech, memory slips, impaired sleep and slow reaction. Long-term alcohol abuse can be called alcoholism. Alcoholism is a common neurological disease which may not only lead to cognitive impairments but also damage the human brain systems [1]. Daily drinking can turn people's habit to their addiction which brings them to stage of alcoholism [2]. Most of them are unaware, when did they cross a thin line between habit to addition and from addiction to alcoholism. The excess use of alcohol is a root of disease, which increases death ratio, it affects socially and economically to our community. In most of the cases, alcoholic peoples are not even willing to take others help to get out of it; this might lead to high risk of life. Deaths reported due to alcohol is of 3.3 million every year which is 5.9% of all deaths [3].

Neuroscience research of the last century of has greatly increased our knowledge about the brain and particularly, the electrical signals emitted by neurons firing in the brain. The patterns and frequencies of these electrical signals can be measured by placing a sensor on the scalp. Electroencephalogram (EEG) is a technology that used to capture the brain signals by placing electrodes in a standard order. EEG recording procedure is either invasive or non-invasive. Non-invasive EEG recordings obtained from electrodes attached to the scalp surface and Invasive EEG recorded from implanted electrodes inside the brain which requires surgery. Noninvasive EEG devices become more popular among researchers and it is one of the widely used brain signal recording methods due to portability, ease and comfort of use, low cost setup and low risky. In non-invasive EEG electrodes were placed at standard scalp electrode positions according to the 10-20 system as recommended by the American EEG Society as shown in figure 1.

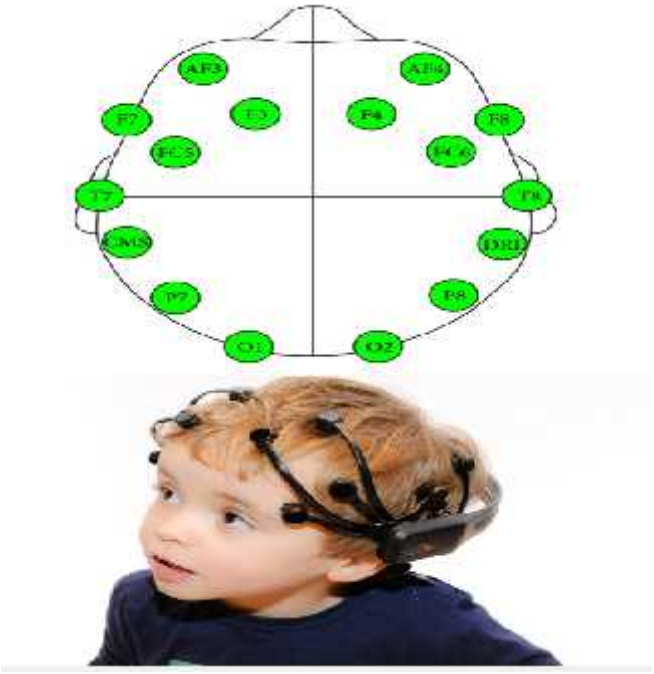

Fig. 1: Brain signal recording using Emotive EEG headset, 10-20 electrode positioning [4]

Collecting EEG signal from the different position of the brain, there are many processes by which the signals have to go through for the classification. EEG signals are in the time series, which gives the information of the amplitude in various time instants. Power spectral band variation in EEG signals, which provide the information of activity going in our brain. We have five different frequency bands which are distinguished by a frequency range [3]. These bands from low to the high-frequency band are called as delta (0-4 Hz), theta (4-7 Hz), Alpha (8-12 Hz), beta (12-30 Hz), gamma (>30 Hz) respectively. These frequency rhythms contain useful information [5]. In all these frequency bands, the most active band is the beta band, alcohol subjects showed higher beta amplitudes, in comparison to control subjects at all electrode locations. The outcome of Bauer's study shows that as the beta amplitude goes on increasing in the alcoholic
subject, it ranges between (19.5 Hz- 39.8Hz) [6]. As our EEG signals are non-linear and oscillatory signals, we use nonlinear parametric time-frequency/scale domain to analyze the signals. Wavelet transform represents our signal into the time-frequency domain. This provides both time and frequency information of the signal. Various classifiers are used for categorizing whether the sample is normal or alcoholic EEG signals.

In this paper we reviewed the different classifiers for discriminating alcoholic from Non alcoholic group. The rest of the paper is organised as follows: Related work is described in Section II. Section III discusses about the literature survey of Different classifiers used for addiction detection. Conclusion is given in Section IV

II. LITERATURE SURVEY

Brain signals can be used to track alcohol consumption.
Various studies on alcohol detection have been performed using EEG-based BCIs. Yazdani & Setarehdan (2007)) have used 4 EEG datasets to classify alcoholic and control subjects with four different classifiers, k-nearest neighbor (with k=5) yielded 79.17% accuracy [7]. Sun et al (2006) employed power spectrum analysis with wavelet transformation of brain signals on alcoholic and nonalcoholic subjects, where power of alcoholics in delta and theta band were greater than controls comparing to other bands [8]. Malar et al [9] also used a similar approach using the Power Spectral Density Analysis of EEG and using wavelet transform. Ziya Eki,et al used artificial neural networks with yule-walker power spectral densities for classification[10]. Kohji Murata et al used the frequency time series analysis to attempt to distinguish between normal and intoxicated states of a person[11]. Jiufu Liu et al. [12] have used wavelet entropy to classify drunken and control subjects. Wang et al [13] have proposed a method using principle component analysis based on graph entropy and J48 decision tree on EEG signals to predict whether a person is alcoholic or not. For this experiment they have used K-nearest neighbor (KNN) and support vector machine (SVM) for feature comparison. Faust et al have developed a Computer based identification of normal and alcoholic EEG signals using wavelet packets and energy measures, where they used 10-fold cross-validated analysis of six classification algorithms. Such as k-nearest neighbor (k-NN) algorithm, Naive Bayes classification (NBC), fuzzy Sugeno classifier (FSC), probabilistic neural network (PNN), Gaussian mixture model (GMM), and decision tree. U. R. Acharya et al. [14] used new automated technique known as Computer Aided Diagnostic (CAD) for identification of normal and alcoholic EEG signals using some of the nonlinear features like as Approximate Entropy (ApEn), Largest Lyapunov Exponent (LLE), Sample Entropy (SampEn), and four other Higher-Order Spectra (HOS) features ,after features reduction different classifiers were used by Support Vector Machine (SVM) by varying kernel functions like polynomials with different orders and a Radial basis function (RBF) kernel. M. R. Bozkurt et al. have used [15] feed-forward error back-propagation ANN (FEB-AND) type of ANN for training the data. For data processing and reducing, they used Yule-Walker Method. The result was obtained here was with 900 epochs accuracy =95%.

III. VARIOUS CLASSIFIERS FOR ADDICTION DETECTION

In order to classify EEG signals, we usually utilize some methods based on pattern recognition. The different stages of pattern recognition methods can be seen in figure2. In this section we will see in detail various classification approaches.

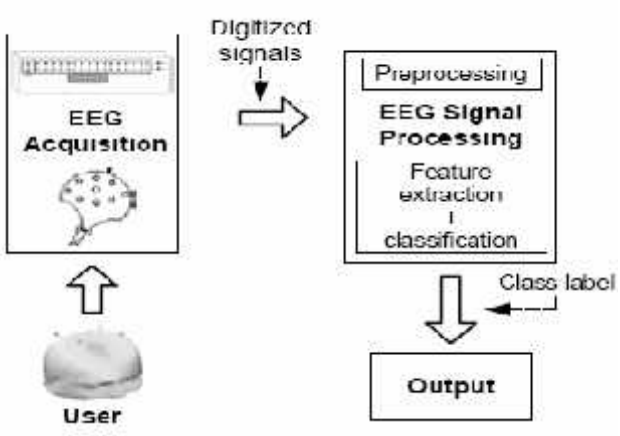

Fig.2 Different stages of EEG pattern recognition [16]

A. Support Vector Machines

Support Vector Machine(SVM) classifiers are very popular in EEG classification problems. Consider the problem of separating the set of training data

$$(x_1; y_1); (x_2; y_2); \ldots..(x_m; y_m)$$

into two classes, where xi is a feature vector and yi are either +1 or -1, indicating the class to which the point xi belongs to. If we assume that the two classes can be separated by a hyperplane

$$wz + b = 0 \qquad (1)$$

and no prior knowledge about the data distribution, then the optimal hyperplane is the one which maximizes the margin. The optimal hyperplane separates the point xi according to the Function

$$f(xi) = \text{sign}(w.zi + b) = \begin{cases} +1 & \text{if } yi = 1 \\ -1 & \text{if } yi = -1 \end{cases} \quad (2)$$

The optimal values for w and b can be found by solving a constrained minimization problem, using Lagrange multipliers

αi (i = 1;....m).

$$\text{maximise } W(\alpha)=\sum_{i=1}^{m} \alpha i-(1/2) \sum_{i=1}^{m}\sum_{j=1}^{m} \alpha i\alpha j yiyjzi.zj$$

$$\text{subject to } \sum_{i=1}^{m} yi\alpha i = 0 \qquad 0 \le \alpha i \le C; \qquad i = 1; \ldots.;m \quad (3)$$

where C is a regularization parameter. Tuning this parametercan make balance between margin maximization and classification violation. So the decision function can de solves as,

$$f(x) = \text{sign}(w:z + b) = \text{sign}(\sum_{i=1}^{m} \alpha iyiK(xi; x) + b) \quad (4)$$

The SVM classifier classifies the data with more than 94.70 % accuracy. [17]

B. Autoassociative Neural Network

The structure of the AANN network used in this work is 5L 10N 3N 10N 5L where L refers to a linear unit and N to a nonlinear unit, the numbers represent the number of nodes in a layer The nonlinear output function for each unit is tanh(Ax), where A is arbitrarily chosen to be 0.66. Two AANN networks are built, one using the alcoholic training feature vectors, and the other using the non-alcoholic training feature vectors. To arrive at an optimum set of weights, the conjugate gradient method is preferred over the gradient descent method in this work. This is because the conjugate gradient method converges much faster than the gradient descent method. Each training pattern is preprocessed so that its mean value, averaged over the entire training set, is close to zero. Each pattern (vector) is normalized so that the component values fall within the range [-1, 1]. This accelerates the training process of the network. The training pattern pairs are presented to the network in the batch mode. The network is trained for 50 epochs.

During testing, the wLPCCs derived from the alcoholic/non-alcoholic test set is presented to both the models. The deviation of the output of each model from its input is used to compute the squared error Ei for each frame or block. This error is used to compute the confidence score ofthat frame or block, which is used as a performance measure for the YEP classification system. The confidence score Ci of the ith frame or block is expressed as Ci=exp(lamdaEi) where the constant lamda is set to 1 in this study. This confidence value is higher if the error is lower, when the frame or block of the test feature vector with the corresponding model. When the frame or block of the test feature vector does not match with the corresponding model, the error is high, and this lowers the confidence score of that frame or block. A test feature vector is compared with each model to obtain the average confidence score C, which is expressed as C=1/N where is the total number of frames/blocks. The average confidence scores of the test feature vectors against the two models are compared to evaluate the performance of the YEP classification system. The performance is evaluated in terms of percentage of the number of test subjects correctly classified out of the entire test set. 52.5 % of the test set is recognized correctly. [18]

C. GA-NN Classifier

Neural Network is a guided training algorithm that has some drawbacks, one of which is having a considerable number of parameters and must be insert manually. The dominance of the number of parameters on the Neural Network lies in the value of weight and bias. The initial weight and initial bias values are randomly assigned which have a major influence on the performance of the Neural Network. So an optimization on the initial weight and bias are needed to support the performance of Neural Network optimally. One method that can optimize the performance of Neural Network is to implement the evolution algorithm, Genetic Algorithm (GA) on the Neural Network method. Network development in this study applies 1 hidden layer consisting of 15 nodes. Using the sigmoid activation function shown in (1).

sigmoid (xi)=1/ 1+exp(-xi) (1)

GA will look for the best weight and bias chromosomes generated from GA's important processes and use the error value of Neural Network to measure the performance of the resulting Network model. Network with the smallest error value is the best Network model that will be used for testing process. The first thing to do with the GA-NN combination is to find the initial population using the Neural Network and store the weight and bias values and fitness functions shown in (2).

$$F=1/(1/N)\sum_{i=1}^{N} (t-a^{-})^2= 1/MSE \quad (2)$$

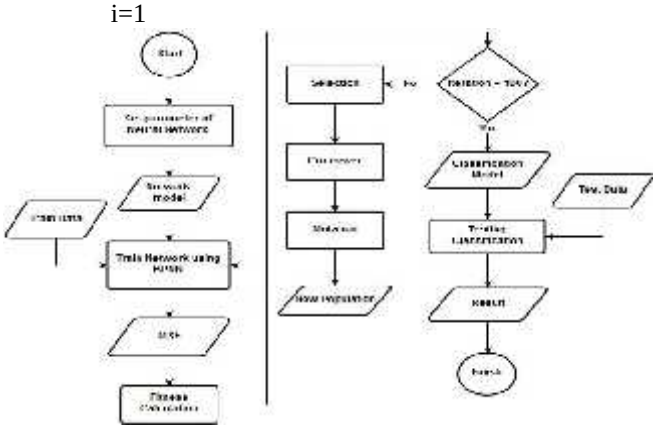

Fig. 3. Flowchart of GA-NN

Where N is lot of training data,t is the target output,$\bar{a}$ is the output results, and MSE is Mean Square Error generated by Neural Network the system will pass the essential processes of GA in the form of selection, crossover, mutation, and evaluation until it reaches the termination criteria = 100 times iteration. Evaluation process in GA by applying weight and bias after GA and re-classification with Neural Network to get fitness value from result of GA process. Overall, the flowchart of the combination of Genetic Algorithm and Neural Network can be seen in Fig. 3. The implementation of Genetic Algorithm (GA) can be a suitable algorithm to optimize the initial weight and bias of Neural Network by increasing the accuracy of 9.00% for datasets 1 and 6.50% for dataset 2. [19]

D. K-NN Classifier

This is a competitive classifier. The *k*-nearest-neighbor approach is so that after determining k we calculate the distances of the test datapoint from all of train datapoints and then choose first k winners. That means the first k shortest distances. Thus, the decision rule is to assign x to the class that receives the largest vote amongst the k nearest neighbors. In this paper we determined k to be one and five.[7]

E. Minimum mean distance classifier

This classifier calculates the distances of the test data point from all train data points that belong to each class and then calculates the mean of these distances. In the end we have mean distances from class one and class two. Thus, the decision rule is to assign x to the class that has the minimum mean distance from test data point x. [7]

IV. CONCLUSION

It is obvious that when compared to control subjects, there is a huge influence in the brain signal of the intoxicated subject. By using portable EEG instruments, the measurement of alcohol consumption can also be achieved using EEG signals very quickly and cost-effectively. Hence portable Emotive EEG headsets with 14 electrodes or even Emotive insight Brain wear with 4 electrodes can be used as a portable alcohol detection system. Further researches can be done to minimize the size of the alcohol detecting device using highly portable arduino or raspberry-pi based computers coupled with portable dry noninvasive EEG headsets. In this paper, various classification techniques which are already used for discrimination of addicts and Non addicts are reviewed and accuracy of every method is given systematically.

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Evaluation Of Health Monitoring System Using Water Quality Index

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***Abstract*—Natural water supplies such as groundwater and surface water have always been freshwater's cheapest and most widely available.The effects of water quality deterioration are far-reaching, impacting health,environment and infrastructure in a very adverse manner.According to United Nations (UN), waterborne diseases cause death of more than 1.5 million people each year, much greater than deaths caused by accidents, crimes and terrorism combined.There were various methods which were gone through for an example;Fractional Derivative Method,Calculation of the Water Quality Index (WQI) and Statistical analysis . There were various considerations regarding all the processes and parameters which led to the final process decision. The availability of good quality water is paramount in preventing outbreaks of water-borne diseases as well as improving the quality of life. The project focuses on Fluorine as the main element of analysis. Fluorine weakens bones and skeletal functions of the body if it's content exceedes a certain limit.This project analyses the data of water bodies in Karnataka and predicts the future values using logistic regression and principle component analysis.The data consists of missing values which have to be calculated using principle component analysis. An algorithm is designed using Matlab which segregates the data into valid and invalid values.**

Keywords— logistic regression,principle component analysis, Fluorine.

I. INTRODUCTION

The problem of water quality management plays an important role in water pollution control and river basin planning. The risk of discharging a pollutant as urban and industrial waste into the river is a constant concern of those who collect and use water from the rivers. Dissolved oxygen (DO) is a primary indicator of the river water quality and has received lot of attention in the literature in recent past[3].The effects of un-clean water are far-reaching, impacting every aspect of life. Therefore,management of water resources is very crucial in order to optimize the quality of water. When data are evaluated and water quality is estimated beforehand, the consequences of water contamination can be addressed effectively. In order to perform effective and productive water quality analysis and forecast water quality trends, it is very important to include a temporal element in the analysis in order to observe and evaluate the seasonal variation in water quality[5].

II. IMPORTANCE OF THE PROJECT

The provision of good quality water is important in the prevention of waterborne disease outbreaks and in the enhancement of the quality of life. There are various harmful chemicals like chlorine,arsenic,fluorine etc. which are dangerous when crossed the minimum value in the water.

According to a recent survey areas which are going through water crisis have been categorised into most vulnerable : Punjab, Haryana, Rajasthan, Gujarat and Delhi. Least vulnerable:North Eastern States, Jammu & Kashmir, Himanchal Pradesh, Uttarakhand, Chhattisgarh, Odisha, Jharkhand and Kerala.From the total amount of water % available only 4% is freshly drinkable and 70% is contaminated [2].

This contaminaton can lead to various health risk which may arise into lifelong sufferings like weakening of skeletal system,teeth,weakness,memory problems,kidney failure,high keratin level,hormonal imbalance etc.Excess Fluoride content in water causes fluorosis and Moderate amounts lead to dental effects, but long-term ingestion of large amounts can lead to potentially severe skeletal problems.Therefore Fluorine is the parameter for this paper.

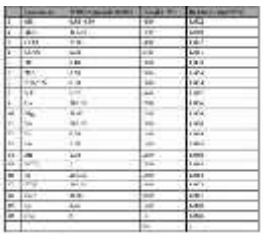


Table 1.Assesment of water quality

Therefore, the evaluation and estimation of water quality levels is essential for societal and economic development.

III. METHODOLOGIES

From a recent survey it has been observed that water scarcity in India is expected to worsen as the overall population is expected to increase to 1.6 billion by year 2050 [7].The project is converting the data into dicotomous form through Matlab using Logistic Regression model.Missing values in between the data will be found out through :-

1)Principle component analysis

2)Interpolation

All the methods relate to biostatistics and predictive analysis. The Principal Component Analysis (PCA) is a statistical method that uses an orthogonal transformation to translate a set of observations of potentially associated variables (entities each taking on different numerical values) into a set of values of linearly uncorrelated variables called main components. This transformation is defined in such a way that the first main component has the greatest possible variance (that is, it accounts for as much variation as possible in the data), and each successor component in turn has the highest possible variance under the constraint that it is orthogonal to the previous components[5]. The resulting vectors are an uncorrelated orthogonal basis set (each being a linear combination of the variables and comprising n observations).

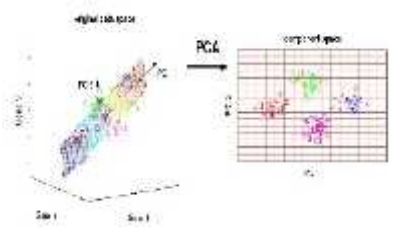


Fig. 1

The main component of a data set is a structured linear combination of the initial predictors. PC1 and PC2 are the main components in the above picture. Let's assume that we have predictors like X, X...,Xp

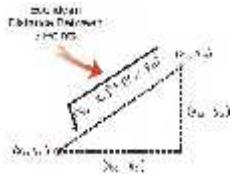
The principal component can be written as:

$Z^1 = \Phi^{11}X^1 + \Phi^{21}X^2 + \Phi^{31}X^3 + ... + \Phi p^1 Xp$

where,

- Z^1 is first principal component

- Φp^1 is the loading vector comprising of loadings (Φ^1, Φ^2..) of first principal component. The loadings are constrained to a sum of square equals to 1. This is because large magnitude of loadings may lead to large variance. It also defines the direction of the principal component (Z^1) along which data varies the most. It results in a line in p dimensional space which is closest to the n observations. Closeness is measured using average squared euclidean distance.



- $X^1..Xp$ are normalized predictors. Normalized predictors have mean equals to zero and standard deviation equals to one.

Is to consider a relation between two points on a line or curve. We should think of the first part of the word' inter' as meaning' enter' to help us understand what it means, which helps us to look' through' the data we originally had[7]. This tool, interpolation, is useful not only in statistics, but also in science, business or whenever there is a need to predict values that fall within two existing data points.

The formula used:

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

Logistic Regression will be used to predict the future values from biostatistics method.

Logistic regression is the correct regression analysis to be conducted when the dependent variable is dichotomous (binary) and, like all regression analyzes, logistic regression is a predictive analysis. Logistic regression is used to characterize data and illustrate the relationship between one dependent binary variable and one or more conditional, ordinal, interval or interval variable more nominal, ordinal, interval or ratio-level independent variables[8].

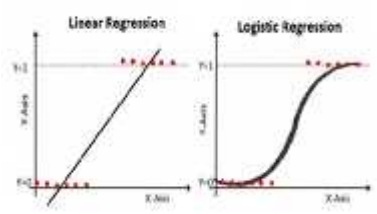


Fig.3

IV. FLOWCHART

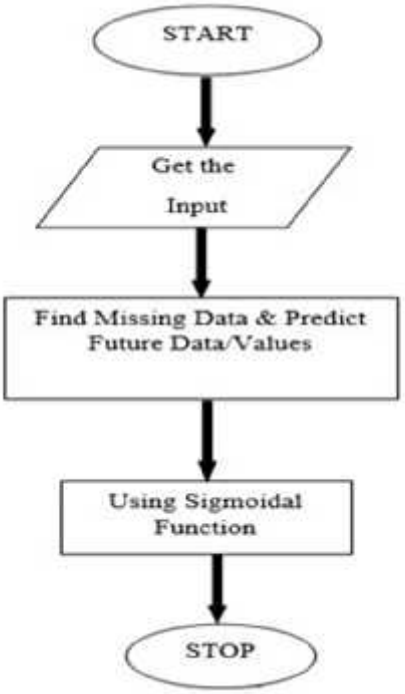
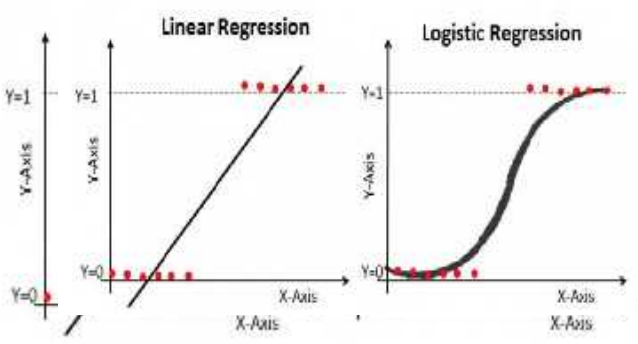


Fig 4. Methodology flow

V. TECHNICAL TERMINOLOGIES USED

A. Units



Ppm(parts per million): It describes the concentration of something in water. One ppm is equal to 1 milligram of something (mg / l) per liter of water.

B. Equations

The project deals with probability of the values which gives insight to use logistic regression of multiple independent variables.There are values which are missing in between which are calculated through principle component analysis and interpolation.Logistic regression model is a concept from biostatistics which predicts the probability of an event [6].Expression that might be used is:

Y=b0+b1*x1+….+bn*xn

Where x=independent variables

In the project that event is the value or quantity of fluorine in the water.The fluorine content should not exceed 0.3ppm or else it will turn the water unfit for consumption.From the values obtained,an approximation is made by converting them into dichotomous form [5].If the range is above

0.3ppm then the value is approximated to 1 else

0.Probability formula of Odds used: Odds $=\frac{P(e\quad)}{1-P(e\quad)}$

VI. PROPOSED DIAGRAM

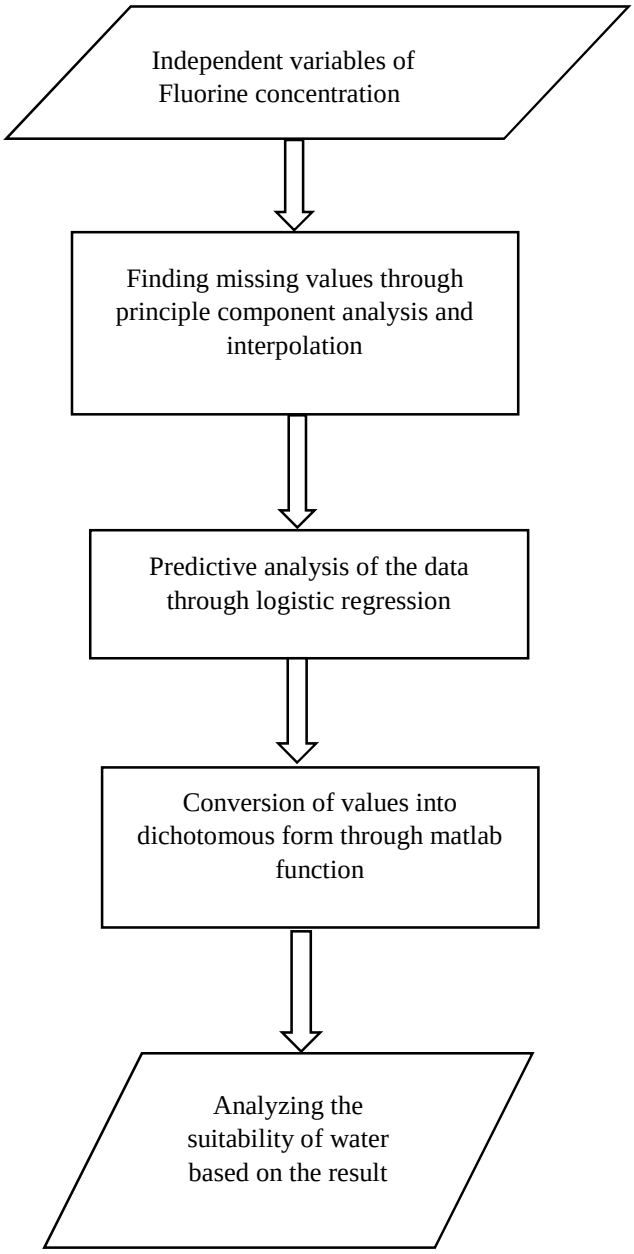


Fig 5. Procedure flow diagram

VII. EXPECTED OUTCOME

The water quality using logistic regression will predict the future value from the following raw data of past 10 years from 27 district of Karnataka using the logistic regression equations in MATLAB. The result will show strong correlation between the independent variables and dependent variable. Therefore makes it possible to know the water quality of a location in the study area before an actual testing is executed. Such results show the utility of the approaches proposed to forecast..It will helps in rectifying the missing values for following years and helps to predict the future value.

VIII. RESULT

The main objective of the project is to find the missing values from the data (Fluorine concentration of Karnataka water bodies),predicting the future and analyzing it to make an observation. Logistic regression can be found to be a statistical modeling technique used when the Y variable is binary categorical. That is, it can only take two numbers, such as 1 or 0. The goal is to evaluate a mathematical equation which can be used to predict the probability of event 1. Once the equation is defined, if only the X s are known, it can be used to predict the Y.

There are various methods which are used for the analysis,many comparisons are made to get on to the output.The project will be an approach to try this method to get the desired output with minimum inconsistencies and errors.There are few methods considered which are PCA (principle component analysis) and interpolation.

The data which is being dealt in the project: Last 10 years data of fluorine concentration of Mysore district in Karnataka.If the data is being analyzed in span of 10 years,interpolation is used to find out the missing values.



Table 2.

The Fluorine concentration changes yearly depending upon various factors which are:

Sr No.	Factors
1	Temperature
2	Population
3	Area
4	Weather
5	Water quality

This data is then converted in dichotomous form which is either 0 or 1.If the value is greater than 0.3 ppm then it is assumed as 1 and if the value is lesser than 0.3 ppm then 0.This analysis provides a pattern which is being generated throughout all the years.The predictive analysis (using extrapolation and logistic regression) can be done on the basis of these observations.

Value of WQI(ppm)	Quality of water
0.6 >	Very Bad
0.4-0.6	Good
0.3-0.4	Excellent
0.2-0.3	Good
< 0.2	Bad

IX.CONCLUSION

This provides certain analysis of all the considered parameters for an acceptable result of the fluorine concentration.The future of water quality modeling seems to be very bright and remarkable with the continuous improvement in technology day by day. Besides further improvements in prediction accuracy, there needs to be a more user-centric approach towards tackling the water quality issues, by involving all the relevant stakeholders, using user-friendly tools and an interactive environment so that the solution actually benefits the target users in tackling water quality issues [1].

ACKNOWLEDGMENT

We are sincerely thankful to our project guide Dr. Sangeeta Mishra for her guidance and constant support by helping us through explaining us various concepts and advice needed for the project.We are thankful to the domain teachers for their useful insight and suggestions regarding the project.

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Design of Assistive Glove for Visually Impaired People Using DSP Algorithm

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***Abstract*— The basic idea of this project is, the use of an ultrasonic sensor along with a Smartphone to aid the person suffering from being visually disable. The proposed model Incorporates of a hand glove strapped around the user's wrist, fitted with an Ultrasonic Sensor, Microcontroller, a Bluetooth Module and, a vibration motor. This system is not only reliable completely but also provides cost-efficient guidance for visually disabled person. Our system is being designed to experiment a wide amount of area using an ultrasonic sensor and a camera of a Smartphone. You are provided with a vast range and a decent speed in the detection of an obstacle. When an obstacle is near, the processor is immediately alerted and the path is conveyed to the visually impaired using tactile system.**

Keywords: ETA- Electronic Travel Aid, TensorFlow, Android Studio, API- Application Program Interface, Arduino Nano, Ultrasonic Sensor

I. INTRODUCTION

There are several visually impaired folks who stay in society. Among us and that they face many challenges for the duration of their each day routine hence in order to make their daily lives easier we made this project. It's a compact tool that assists them to navigate through the streets in general and most of the places. The visually disabled are deprived of many opportunities, because of the disability they have which regularly hinders their boom and development. If we are capable of helping them, then it would be a very great opportunity for the team. The project focuses on developing a person-friendly fee effective warning machine with more sensitivity to make the person comfortable in navigation. This warning system is developed considering in mind the visually impaired person. The distance from an object, the character of the object in front of the user is the parameters used. Various strategies and Varieties of equipment are used to build on these parameters. Making the project cost-effective, robust, reliable and available to everyone is the goal of the project.

II. LITERATURE SURVEY

In the latest years, several ETAs have been evolved to assist the visually challenged in safe navigation [1]. These embrace the optical maser Cane, Mowat sensing element, Nav Belt, Sens Cap, Tyflos, Nottingham Obstacle Detector, Path device, and two-channel Sonic Guide. The shortcomings of those ETAs embrace the masking effects thanks to audible feedback, cost, reduction in walking speed of the user and energy consumption. many offered ETAs aren't accepted by the visually impaired community thanks to the options of increased quality and high price [1]. the selection of sensing element is one in all the necessary factors that decide the potency level of the ETA. it absolutely was found that infrared (IR) sensors were simply confused by the daylight, device, absorbent surfaces and security cameras. Lasers would suffice the purpose but are luxurious also the obstacle detector does not give a satisfying range [1]. But, ultrasonic sensors performed up to the satisfying range in less time and hence, it is decided to proceed with the ultrasonic sensors which proved to be a cost-effective distance measurement system, the feedback given. Through the microcontroller to the user either as a form of audio or vibration.

III. PROPOSED METHODOLOGY

A. Block Diagram

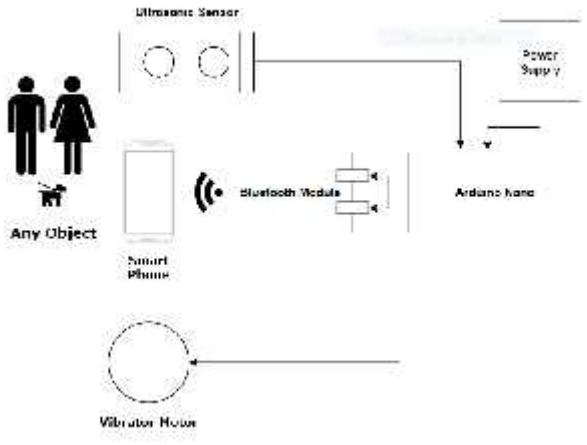

Fig 1. Block Diagram

B. Hardware and Software Requirements

To achieve the objectives, the scope of this project is determined. This project consists of vibration feedback and image recognition techniques. For the hardware, ultrasonic sensors are used as a sensor to detect obstacles at the front and it will send the signal to Arduino NANO which acts as the microcontroller. The

microcontroller will then manner information and sends the sign to vibrator motor so that you can manual through its vibrating remarks. For the software, the design of the circuit has completed the use of fritzing software and this system could be completed using the Arduino software program by putting in through the Arduino IDE software by installing through the Arduino library. Android studio is used to develop the Mobile Application that will capture the image and process it using TensorFlow API, TensorFlow Lite is used for Object Detection, Image class and different picture processing associated operations. Our goal will be to utilize the Object Detection capability of TensorFlow to detect different objects appearing in front of the user. Human perception performs a decisive function. The product will be used for one subject, each for the buyer or medical domain or will be scaled up and put in in massive areas like hallways and rooms wherever it's meant for an outsized set of individuals.

C. Equipment Arrangements

- **Mounting the ultrasonic sensors**: The sensors will have 2 parts. Sender and the receiver. The sender sends ultrasonic waves that travel the distance and the receiver will receive it. Depending on the distance traveled using the basic formula s= d/t we calculate required parameters.
- **Mounting Arduino NANO:** Arduino NANO will do the work similar to the CPU's ALU. It will make all the required calculations of input and output..
- **Vibrators**: Based on the output of the Arduino the sensors will vibrate and the user will feel the vibration. The vibration will make the user feel an obstruction ahead.
- **Image processing**: Image processing will have a camera and the camera will take the pictorial input and the processing will be done using TensorFlow. Offline processing will be done by Arduino.

D. Working Parameters and Techniques used

- **Distance measurement:** Ultrasonic Sensors along with vibrator motor will be used to make an effective radar system to guide robots [5]. Using the combination of Ultrasonic Sensor and vibration motor the requirement of multiple Sensors to get an effective visual of the surrounding can be avoided, thus saving some money in manufacturing the entire robot. The ultrasonic sensor is used as a device to measure the distance between gloves and the object [5]. Android Studio is that the official integrated development setting (IDE) for Google's robot package, engineered on JetBrains' IntelliJ plan computer code and designed specifically for robot development.
- **Image capturing:** The image is captured using the smartphone on a person's body. The image is then rendered using android studio. Android studio is used for camera input and preview.
- **Image processing:** After the image is captured it is processed using TensorFlow is a free and open-source software library used for data library and differentiable Programming across a spread of tasks it's a symbolic arithmetic library and is to boot used for machine learning applications like neural networks. It is used for both research and production at Google .Lite. TensorFlow Lite is specially developed for the Mobile preview interface.
- **Data Transfer:** The data of distance captured by the ultrasonic sensors is transferred using the Bluetooth module to the user's smartphone [2].
- **Data processing:** All the data processing is done by the smartphone on the person's body. The smartphone processes the distance value and the software TensorFlow-lite is also running on the smartphone. The mobile device will not only save space by eliminating a large number of processing devices but also increases speed and reliability.
- **Text to speech:** In this project, the text-to-speech operation is performed using Android Visual Studio [3]. The android studio will call a function that will perform this task.
- **Speech output:** The smartphone will provide speech output. The person can hear the voice through audio- jack or speaker. The distance and the object data will be combined and the user will hear accordingly. For instance, the person near a chair will hear that 'The chair is at 150 cm from you'.

E. Image Processing as Expansion

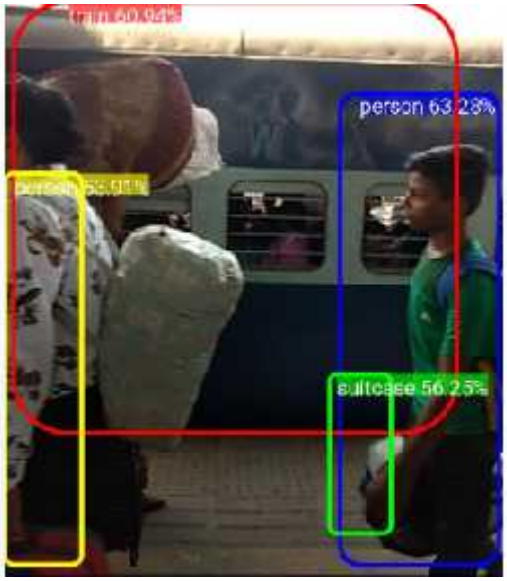

Fig 2. Object Detection

- **Image capturing:** The light particles bouncing back from the object are captured from the capturing device [6]. In the discussed case, the

capturing device is the smartphone itself. The capturing is based on the intensity of light.

- **Storing the image:** Any image captured can be stored. Every picture is divided into associated rows and associated columns and these rows and associated columns form dimensions of the selected picture. The joining point of the rows and associated columns forms a box called a pixel [6]. So storing the picture basically refers to storing the pixels. Each image's pixel has a color. Different techniques are used for the formation of the colors. Different techniques are used for the formation of the colors. The most common of mixing number one hues to get secondary colors, tertiary colors and so on. Each pixel color has a code. The color code is separated down into binary as the processing units understand binary code [6]. The binary is then stored in a storage component. In our discussed case, the image is stored in RAM. The binary length of the image's pixel may vary so the binary is broken into pieces according to length of each address of the storage device. For instance, if the address length is 16 bits and a pixel is of size 128 bits then 8 addresses are required for the pixel. All the pixel bits together form the size of the images' pixel.
- **Image manipulation:** Based on the fact the image information is stored per pixel; the image can be manipulated and used as per user's needs [6]. We can manipulate pictures, form patterns in picture, understand the picture etc. Machine learning can be used for the pictures
- **Machine learning for image recognition:**

  Machine learning plays a deciding role in understanding the image. The image in the form of pixel forms a matrix. A smaller matrix called a mask in moved over the entire image. The mask values, size can be changed according to our needs. This gives us an infinite number of possibilities. The movement of mask over mage provides us the activation map. This process is called convolution. Similarly, many more techniques along with convolution like pooling are used. Now many more images of similar types are taken. The activation maps of all images are taken. This is given as input to our machine learning code. This forms the training set. The program's training set is used to form patterns between pixels [6]. The code 1st makes a random guess and measures accuracy with the actual value. This is most probably a wrong guess. Now the code makes an assumption in different directions. The direction where accuracy increased id the correct one. This entire iteration is known as an epoch. Similarly, several epochs are run and the machine learns about the image. For instance, a machine learning code is given 1000 clips of cats. It takes these images as a required training set and then runs them. Larger the program's training set better is the accuracy. Next, we run it on pictures unknown to the training set. This is our validation set where the code is actually put to test. Here are actual accuracy is known. By repeating the process, we can achieve higher accuracies.

- **Tools for machine learning:** Machine learning code is most commonly written in python and R programming languages. Many platforms provide the code running like Google Collaboratory that tests each unit of code. In our project, all these functionalities are embedded in the application TensorFlow Lite. Tensor flow Lite performs the entire task and uses the smartphone processing system to run it on a validation data set.
- **Bounding box formation:** The tensor flow Lite works by bounding box formation [6]. The box is formed using the co-ordinate plane system. The box starts from the topmost left corner (Xmin, Ymin). The steps for the process are as follows:

  1. Process the image using the package glob. Tensor Flow list files *.jpg and process them one by one. Here * is a wildcard expansion. It expands into any matching character.

  2. Tensor flow processes XML annotations. It uses a PASCAL-VOC format.

  3. Accumulate all the variables and begin training the model on the test data set.

  4. Create the Keras model. Tensor flow uses Mean squared error (MSE) and Intersection over the Union (IOU).

  5. Create a convolutional based artificial neural network (CNN) by stacking convolution2D layers, flattening them out and passing them through a Dense layer.

  6. Tensor flow avoids over fitting and chooses the proper activation layer. For instance, Dropout function in Dense Layer and Leaky Relu activation layer.

  7. Tensor flow trains model until the loss decreases

IV. APPLICATIONS

- **Better environment**: The completely or partially blind will be given a better environment to dwell in. The helper equipment will try to eliminate most of their problems faced by the visually handicapped person in context to guidance for commuting.
- **Cost-effective**: The project will not be too costly. It is made by keeping the Expense in mind. All blind people cannot afford costly cameras so this project will be using an affordable camera and cheap processors.
- **User environment**: The user has gloves and a power supply mounted on the shoulder. The camera will be added additionally to the user's body. These will be all the equipment that is proposed to be lightweight and mounted on the user to be easily available in the market and can be utilized for larger-Scale production.

- **Availability:** All the components used in these projects are easily available in the market. So, it will
- **Robotics:** Ultrasonic Sensors along with vibration motor will be used to make an effective radar system to guide robots. Using the combination of Ultrasonic Sensor and vibration motor the requirement of multiple Sensors to provide an effective visual of the surrounding can be avoided, thus saving some money in manufacturing the entire working robot.

V. RESULT

The project can help and augment the needs of visually disabled people. The project provides the person with feedback about the surrounding. The sophisticated technology helps them to navigate through the roads and in general most of the places. While the user is crossing the road these people are most vulnerable and he probabilities of an accident is very high, therefore. This technology helps to avoid such accidents from ever being occuring.

VI. CONCLUSION

This technology increases the consciousness of the person wearing it. It enhances their movements. The visually impaired are deprived of many opportunities because of their disability which often hinders their growth and development. This project will provide a great opportunity to make their lives easier.

VII. FUTURE SCOPE

In the imminent years, we hope to expand the range of the project and try to make it an industry-level project. For that we'd like to boost its characteristics like vary accuracy strength compatibility we'll additionally give compactness and finishing to the project. We have planned to extemporize the picture processing process using better algorithms and better software. As Artificial Intelligence systems is associate degree ever-growing field there'll continuously be higher techniques evolving with time. The feedback of various people who use our project will be taken and we intend to take constructive criticism and evolve our project ahead. Our plan is to make it accessible to as many people and as cheap as possible soon.

ACKNOWLEDGMENT

This project cannot be entirely made by an individual. The timely completion of the project 'Design of Assistive Glove for Visually Impaired People' has been possible because of our faculty and project guide Mr. Vaibhav Gijare who provided us with guidance and motivation throughout its making. We thank him for giving us an opportunity to create this project. We are also obliged to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge. Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project

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Implementation of Tremor Correction for Parkinson's Disease

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***Abstract* - Physical tremors are a common woe that prevails amongst most people suffering from Parkinson's disease. People suffering from Parkinson's disease lack a chemical substance called Dopamine, which helps in the transfer of electrochemical signals from one nerve to another. The lack of Dopamine causes transmission of either delayed or incomplete signals to various parts of the body which causes the induction of tremors. Such tremors cause a hindrance to the daily activities of patients. Although medication may help control Parkinson's tremors, the tremors usually get worse over time. As a result, to date, the tremors have not been easily counteracted.**

The incorporation of theories like the Gate theory as a form of medication has helped in controlling the tremors. Therefore, the stimulation by a non-painful input suppresses pain. This paper presents a method for correction of tremors caused by Parkinson's disease that abides by the Gate theory by choosing a non- painful stronger external stimulus that is transmitted at the inflicted area over the painful disrupted signals sent by the brain to that area. The focus is on a band made of coin vibration motors inducing the needed external non-painful stimulus in the frequency range of the tremors to be corrected. In addition to this, the paper expounds various systems that monitor real-time parameters such as tremor displacement, muscle strength, and brain signals.

***Keywords*—Parkinson's disease, tremors, Dopamine, Gate theory, coin vibration motors**

I. INTRODUCTION

Parkinson's disease or Parkinsonism is characterized by the progressive degeneration of dopamine-producing cells in the body. Dopamine, being a neurotransmitter is primarily responsible for all nerve to nerve transmissions that occur in the human body [2]. A steady decrease in its concentration causes loss of motor control and thus induces a tremor that usually originates at the arm and with time.

Above the age of 60 and this disorder is known to hamper daily chores such as holding a spoon or signing a document. The main idea of this paper is to illustrate the effect of introducing low- frequency vibrations using a non - invasive wrist band which puzzles the brain to choose between external stimulus and its motor signals abiding by the Gate theory.

Parkinson's tremors usually lie in the frequency range of 4Hz to 7Hz.[1]

The primary woe faced by patients is the lack of affordable means that offer immediate and non-invasive tremor alleviation. A method called Deep Brain Stimulation or DBS is employed by implanting electrodes in the brain and stimulating them to control motor functions and reduce tremors. Since it is risky and invasive, most patients opt for non-invasive methods such as aromatherapy or yoga to reduce the quivers. Methods have been designed to map and troubleshoot certain brain circuits.[3] Another project that was studied is the work executed by Microsoft Research in the development of their tremor- stabilizing 'Emma Watch' which uses the motor vibration stimuli concept studied here.[2]

The above-proposed systems and medications are expensive and heavy, and sometimes patients do not find comfort in using them, for these reasons, this article presents a lightweight, accessible and comfortable system to monitor tremors in patients suffering from Parkinson's disease [1]. This paper also proposes a system that monitors certain parameters such as displacement of the hand and muscular strength of the patient to observe the real-time changes occurring in the patient's motor functions with and without the wristband.[2]

1) Modelling of a tuneable and adaptive device following individual requirements.

2)Monitoring of real-time patient parameters to observe tremor reduction Ensuring the safety of every person who's was displayed by activities such as swimming or riding of sending vibrations in the frequency range of 4Hz to 7Hz (range of Parkinson's tremor) through a patients' hand to research and conclude upon.

II. LITERATURE SURVEY

People with Parkinson's don't have enough of a chemical called dopamine. This is because some nerve cells in their brain that produce dopamine have died. Without it, the symptoms of Parkinson's appear mainly including tremors. For some people, a tremor might be the first symptom of Parkinson's. But this will vary because of not everyone with Parkinson's experiences the same symptoms.

There is no cure for a tremor, but there are ways to manage the symptom. In the early stages of Parkinson's, some people might be able to suppress their hand tremor by squeezing or rolling a ball, pen or similar object

III. Current Scenario

In 2015, PD affected 6.2 million people and resulted in about 117,400 deaths globally. Parkinson's disease typically occurs in people over the age of 60, of whom about one percent is affected. Males are more often affected than females at a ratio of around 3:2. When it is seen in people before the age of 50, it is called early-onset PD. The average life expectancy following diagnosis is between 7 and 15 years. The disease is named after the English doctor James Parkinson, who published the first detailed description in An Essay on the Shaking Palsy, in 1817. Public awareness campaigns include World Parkinson's Day (on the birthday of James Parkinson, 11 April) and the use of a red tulip as the symbol of the disease. The product which available similar to our project is Emma Watch by Microsoft. The Emma Watch was designed by Microsoft. The Emma watch uses tiny motors to create vibrations. When wearing the device, the vibrations seem to cause the brain to focus on the wrist and reduce the brain's messages to that spot, which in turn reduces tremors. It's like injecting white noise into that feedback loop to disrupt it. The pattern of vibration is also important. A rhythmic vibration is effective, for others, a more random rhythm may work better. To control vibration speed, the watch connects Windows 10 tablets.

IV. System Architecture

A. Hardware

The system proposed is one that is customizable and flexible enough to allow multiple patterns to be tested on a patient until a fixed pattern and frequency set is concluded upon. Thus, the hardware components chosen too are conformable giving variable frequency, current and voltage levels. The basic system flow design has been depicted in the figure given in Figure 1.

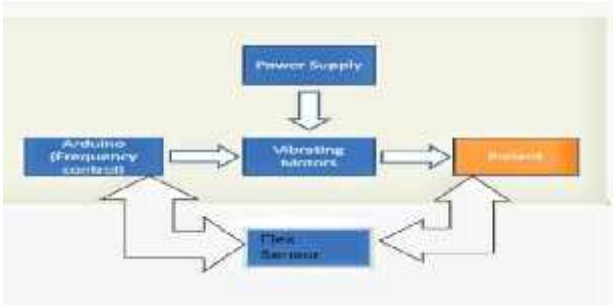

Fig. 1. Basic system flow design

The prime hardware components used are:

a) Arduino

We have used Arduino Nano to generate motor vibrations at different frequencies that can be controlled using the hardware that has been designed. The board helps in varying the intensity and frequency of each motor which will finally produce a digital output. This digital output will be given to the motors.



F*ig. 2. Arduino module*

b) Power Supply:

To eliminate the use of a bulky power supply, we have used a normal 9v battery made primarily from carbon-zinc and alkaline chemistry for stabilizing tremor efficiently. This was done by using a Lm 7805 which is a linear voltage regulator.

c) Coin Vibrating Motors:

Vibration therapy is known to increase the dopamine levels in the dopamine deficit point in the brain and coin vibrating motors of diameter 8mm to 12mm are used in creating a band that encompasses the patient's wrist. This stimulus given by the vibrating motors serves as the non-painful input that abides by the Gate theory. Six motors have been used to lie adjacent to each of the median, radial and ulnar nerves.[3]

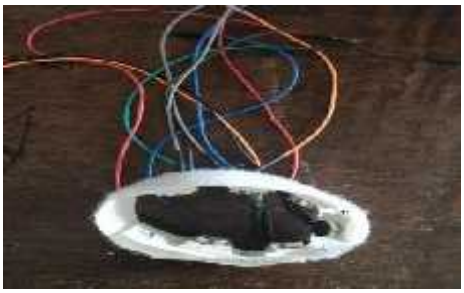

Fig.3. Vibrating motors

d) Patient:

The wrist band would be tied around the wrist of the patient. The patient will be able to control the tremors by calibrating the frequency and intensity according to this own need.

B. Services

Hospital: Hospitals can be primary users of the device as neurological departments often employ cells particularly focused on treating neural disorders such a Parkinson's. The device can be also used to monitor long term effects of any drugs prescribed to a patient by observing the logs of the accelerometer in order to check for increasing stability. We

could also check the periodicity of vibrations and use this method to classify the tremor signals.

V. Result

Currently, most of our data is waveform-based indicating the changes in the tremor intensity. The patients will have access to the logs of the changes in their tremors. The patient will be able to control their tremors by changing the intensity and the frequency of the device in accordance to their needs. The increased stability will allow them to perform actions such as writing or eating with a spoon smoothly without experiencing fatigue even on long term usage. The parameters given below can be measured by the patients and saved on the website. The following parameters of the patient can be measured:

a. Frequency
b. Voltage(intensity)
c. Displacements of Tremors.
d. Muscle Strength

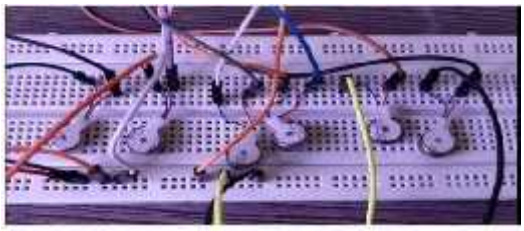

Fig .3. Interfacing with flex sensors

VI. Conclusion

Parkinson's tremors are common in patients suffering from Parkinson's disease. Although technology has provided us with solutions to tackle the disease, the effect of it on the tremors remains unchanged. The tremors for Parkinson's disease lie in the range of frequencies from 4Hz to 7Hz. Thus, a band that can correct the tremors on momentary basis will help the patients to do their daily chores. The device being user friendly, will allow the patients to set the frequency (from 4Hz to 7Hz) and the intensity (0.8V to 3.3V) of device in accordance to their needs (the parameters that reduce the tremors). The device is a small portable band controlled by coin vibration motors without any side effects or fatigue being caused to the patients. This provides a safer and easy approach than being under medication. Due to such attributes, the device can be used for personal or medical use. Observations made after the aforementioned results were:

1. The tremors of the right hand were potentially reduced after wearing the band for a few minutes.
2. No fatigue or pain of any kind was observed.
3. The signal produced by the band proved significant in Reducing/correcting the tremors at 3V rating in the Frequency range of 4Hz to 7Hz.
4. The prototype is a model that can be further developed and expanded. The device can be developed as an app controlled band, also, the logs of the tremors and the medical reports can be saved and accessed from a website portal. Along with this, graphs for any increment or decrement of the tremors can be observed.
5. The prototype is a step towards a smart system for medical or personal use which can aid in reducing the tremors.

Acknowledgement

This project cannot be entirely created by an individual. The timely completion of the project 'Implementation of Tremor Correction for Parkinson Disease' has been possible because of our teacher and project guide Mrs. Sonal Barvey who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge. Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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Implementation of text extraction from an image and conversion into local language

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***Abstract*— Detection of text which is embedded in colored document images is a very challenging problem. To solve this complexity, Optical Character Recognition (OCR) technique is used to extract text from images. There are a lot of potential uses of text extraction in images such as searching, archiving documents, etc. This paper introduces a portable translator, offering translation from many languages to your chosen language, in this case, translation from English to Hindi will be implemented. It aims at using a scanner to convert bitmap images of text to equivalent ASCII codes, which are recognized by the computer as letters, numbers and special characters. This will solve many problems for people who are unable to recognize certain signs or even billboards in the foreign countries. The user has to simply click the picture which has text that is to be converted to local language.**

***Keywords*— OCR, extraction, language, image, text**

I. INTRODUCTION

Visual photographs include complex color, numbers, structures, scale and even pattern variations in the real world. Images give visual perception of a three - dimensional object in two - dimensions. Over the last decade there has been a dramatic increase in tourism over the globe because of easy access to the internet to explore such tourist places, travel and social media, which exposes us to the language barrier. This is an important problem as immigrants travel to countries like the Dutch, Sweden, Singapore, Denmark, Norway, China, etc, where local people still speak Dutch, Mandarin and Latin in their core languages. This can be misleading to both the tourists and the local people. We understand that it is not possible for everyone to be multilingual, which is why we have designed this software to help people interpret foreign languages just a click away.

According to the resources used, Text extraction from images captured via mobile and digital devices J2ME (Java 2 Micro Edition), develops an interactive software application named 'Textract', for text extraction and recognition in natural scene images captured via mobile and digital devices. The texts are subsequently translated into another language (simplified Chinese in this project) so that a device such as a mobile phone serves as a portable language translator.

The paper Text extraction using MATLAB uses automated text detection algorithm which starts with the detection of MSER regions. The resulting multiple segmentation hypothesis are post-processed by a connected component analysis and a gray scale consistency constraint algorithm.

Finally, they are processed by Optical Character Recognition (OCR) software. A selection algorithm based on language modeling and OCR statistics chooses the text result from all the produced text strings. This way text is extracted from images using MATLAB software.

In this paper, we have applied the OCR technique to remove text from the image. OCR is a digital or mechanical conversion to computer-encoded text of typed text, hand- written text and typed text, that may be from the document getting scanned, photo from the document scene from photographs (for example text of the signs and the images in a picture of the landscape), or subtitle text superimposed on the image. To extract text, it needs to undergo a series of procedures such as conversion of the gray scale, contrast delay, smoothing, region segmentation, edge detection and noise elimination. The extracted text from the images converted into language of the user's choice. In this case conversion is done from English to Hindi.

A person is required to be more and more effective in their work in today's fast-growing world. Many of the businesses now are multinationals serving overseas, and

their employees will not only be supposed to be able to work but also to travel to work abroad. Our portable interpreter can work here and support the workers if they're not multilingual. It will also be useful for everyone, because it is very easy to use because the user has only to click on an image and check it as input and in a couple of minutes the response can be received. One cannot employ their own translators as they demand additional charges.

A focus is very often unpredictable because some countries decide to speak in a root language since they emerged in the 1800s or before. Local guides may not always help. Therefore, it is important and many other reasons to resolve this language problem as it can lead to tourists ' problems and sometimes cause innocent victims to struggle in foreign nations.

This paper mainly consists of six sections altogether. Section one gives us an introductory view about the basic idea of the project and its applications in the real world. Section two will be the detailed literature survey showcasing all the referred papers from various international journals and also IEEE papers. Section three consists of the methodology for successful implementation of the project. It lists the various processing functions to be performed such as gray scaling, contrast stretching, image filtering, noise removal etc.

Then after the pre-processing of the image, the image is segmented and the characters are recognized using edge detection and feature extraction techniques. After character recognition using Optical character recognition, the extracted text is then converted into the local language using MATLAB. In this case the local conversion language is Hindi. After methodology, the fourth section contains the expected results after the implementation. The fifth section concludes the paper and includes the summary of the paper. Section six depicts the references used including the technical papers from IEEE and other international journals.

II. LITERATURE SURVEY

In [1], Text extraction from images captured via mobile and digital devices presents the development of a human- machine interactive software application, named ‘Textract’, for text extraction and recognition in natural scene images captured via mobile and digital devices. The texts are subsequently translated into another language (simplified Chinese in this project) so that a device such as a mobile phone serves as a portable language translator. In this project, ten pictures were tested, out of which three showed extra edges. The accuracy achieved in this project was 89%.

In [2], Extraction of text from an image and its language translation using proposes the implementation of text extraction from the image and translating the text. Captured text information from camera in natural scene images can serve as indicative marks in many image-based applications such as assistive navigation, auxiliary reading, image retrieval, scene understanding, etc.

Extracting text from natural scene images is a more challenging problem as compared to scanned documents because of complex backgrounds and also large variations of text patterns such as font, color, scale, intensity and orientation. In this research, handwritten text captured images and few board signs are used as images to extract text and convert it into Hindi language from English. After implementation the total accuracy achieved was 90%.

In [3], Text extraction using MATLAB extracts the text from image and recognizes the text written. Text Extraction and recognition in general have quite a lot of relevant applications such as automatic indexing or information retrieval such document indexing, content-based image retrieval and recognition which further opens up the possibility for more improved and advanced systems. The automated text detection algorithm in this example starts with the detection of MSER regions and a large number of text region candidates and progressively removes those less likely to contain text.

To highlight this algorithm's flexibility, it is applied to images containing a road sign, a poster. The resulting multiple segmentation hypotheses are post-processed by a connected component analysis and a grey scale consistency constraint algorithm. Finally, they are processed by OCR software. A selection algorithm based on language modelling and OCR statistics chooses the text result from all the produced text strings. Images from the internet consisting of quotes and text are tested in this project. The

segmentation accuracy was found to be 100% and total accuracy was 87%.

In [4], they propose a novel text detection algorithm, which employs edge enhanced Maximally Stable External Regions as basic letter candidates. These candidates are then

filtered using geometric and stroke width information to exclude non-text objects. Letters are paired to identify text lines, which are subsequently separated into words.

In [5] Text extraction from images research paper describes that when a machine generated text is printed against clean backgrounds, it can be converted to a computer readable form (ASCII) using current optical character recognition (OCR) technology. However, text is often printed against shaded or textured backgrounds or is embedded in images. Their system takes advantage of the distinctive characteristics of text that make it stand out from other image material i.e. text possesses certain frequency and orientation information; text shows spatial cohesion— characters of the same text string (a word, or words in the same line) are of similar heights, orientation, and spacing. Implementing text extraction from billboard signs as images gave them accuracy of around 87%.

III. METHODOLOGY

This research paper projects six stages namely, Input Image, Pre-processing stage, segmentation, feature extraction, recognition and translation.

In [6], terminologies like smoothing, contrast stretching, gray scaling, image filtering and many others are explained in detail along with their practical applications in MATLAB using various examples.

A.INPUT IMAGE:

To start with, firstly we can obtain images from different sources such as cameras or take the input from databases which are available online such as text embedded images from google or click pictures of certain sign boards with directions and text on it.

B.PRE-PROCESSING STAGE:

Gray Scale transformation- The colored image is converted to gray scale images. The three color components of the colored image that is, red, green and blue colors are converted to gray scale components for simplicity in extracting the text. This is done with the help of the following equation:

$$Y = 0.3R + 0.59G + 0.11B \ldots\ldots\ldots [1]$$

Smoothing- Smoothing is used to remove noise and irregularities along the edges and center of the image we are using various filters for noise removal. Example, Mean filter, Median filter, Gaussian filter, linear filter etc.

Contrast stretching – Contrast stretching is a simple image enhancement technique that attempts to improve the contrast in an image by stretching the range of intensity values it contains to span a desired range of values.

Region segmentation – Region segmentation is the process of dividing a particular image into various sections/regions as in the case of a matrix and labeling them for further enhancement process.

Edge detection – Edge detection is an image processing technique for finding the boundaries of objects in images. It is used for image segmentation and data extraction. It is done by detecting discontinuities in brightness.

Abnormal object removal (Noise elimination)-

The unwanted objects or abnormalities/noise are eliminated in this step.

C.SEGMENTATION:

Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as image objects). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

D.FEATURE EXTRACTION:

Feature extraction is used here to identify key features in the data for coding by learning from the coding of the original data set to derive new ones. – A technique for natural language processing that extracts the words (features) used in a sentence, document, website, etc. and classifies them by frequency of use

E. TRANSLATION:

Furthermore, in the last step of this paper the conversion of language is to be done to be successfully implemented. MATLAB TRANSLATE uses translate.google.com command in the MATLAB software to translate a string from one language to another.

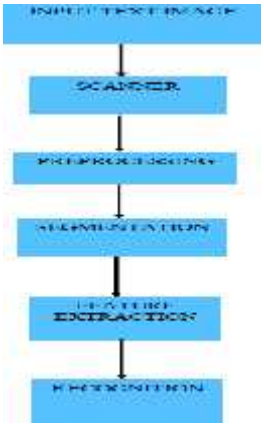

Fig 1.1. Flow diagram for text extraction using OCR

OCR is a widespread technology used to recognize text in images, such as scanned documents and photos. This technology is used to convert any kind of images containing written text (typed, handwritten or printed) into machine- readable text data.

OCR is used in various fields such as banking in which it is used to process cheques without human involvement. A cheque can be inserted into a machine, the written or printed text on it is scanned instantly, and the correct amount of money is transferred to the receiver. In the legal industry, there has been a drastic movement in the last few years to digitize paper documents. This is done to save space and eliminate or neglect the human effort in keeping up with the paperwork. The documents are being scanned and entered into computer databases. Further OCR simplifies the process by making documents text-searchable, so that they are easier to locate on their computer and work with once entered in the database.

Scanners are not completely useful as they cannot provide the feature of editing in your basic word processor. Although scanner can recognize each and every character, sometimes scanned images may not be clear due to dust, which is a hardware defect and the need of file compression due to lack of storage space while saving the scanned images compromises the image quality. In OCR each character on a page is scanned individually. In OCR scanner is equipped with character recognition software which converts bitmap images of characters to equivalent ASCII codes. The scanner first creates bitmap image of the document and then OCR software translates array of grid points into ASCII text which the computer can interpret as letters, numbers and special characters.

To translate bitmaps into text, OCR software examines bitmap of each character and compares it with the set of characters which the machine has been programmed to recognize. Whichever character pattern it matches or nearly matches, is considered to be character read. If a scanned character does not match with any of the already stored character patterns, it is rejected.

IV. RESULT

This paper deals with the extraction of text from an image captured by the user with the help of a camera which acts as the input. After this, the image is scanned and converted into a bitmap using the OCR software. After which the characters are recognized through their special features in the software and then converted into their equivalent ASCII codes, i.e machine readable text. This extracted text is then converted into a local language (Hindi) using MATLAB.

V. CONCLUSION

The process of text detection and extraction from an image using OCR (Optical Character Recognition) and translation of the text into local languages is implemented using MATLAB. We have found that OCR is one of the most efficient methods of character recognition, but the error rate increases while working with handwritten documents due to the change in font size and styles.

As handwriting varies from person to person it becomes difficult for the OCR system to operate efficiently due to the alignment, font and size of different alphabets or characters written by the person on paper. For the testing purposes and for achieving accuracy, we have used computer typed or machine printed documents as inputs.

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Image Recognition from Live Video Using SURF Algorithm

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***Abstract* - In computer vision, Image process is one among the important areas of analysis. Any style of signal process that the input is a picture like images or frames of video. Specifically, feature choice during a very important role in image process. The results of the image process are a picture, or a collection of parameters or characteristics associated with the image. Image-processing techniques which will notice the image on any image or live video applying normal signal-processing techniques thereon. Image process typically refers to digital image process, however analog and optical image process also are attainable. The acquisition of image is observed as imaging and most of the formulas focuses on the trailing algorithm to smoothen the video sequence. On the opposite hand, few strategies use the previous accessible data concerning image color, shape, texture then on. The aim of this paper is to research and review the previous approach towards image trailing and image detection exploitation video sequences through the SURF algorithmn.**

Keywords— Image tracking, Image recognition, Image detection, Background subtraction.

I. INTRODUCTION

Image detection has been a well-studied subject for decades since it arises in many practical scenarios of modern marketing and advertising. Image detection aimed to enable computers to detect the image in an image without human intervention.

Images are key elements for companies and play an essential role in industry and commerce. Different images may have a similar layout but a slight difference in the spatial disposition of the graphics elements, the difference in orientation, size, and shape. The image of different firms exists in the database. The imaged exit in text form, graphic form or in both i.e. hybrid form. Therefore, it is necessary to extract the feature image of the image as well as the test image so that it can identify the text portion and graphic portion of the image properly.

1.1 Pre-processing: It includes the binarization of images. Binarization is the process of converting an image from color to black-and-white (called "binary image"). The binary image contains only two-pixel values 0 and 1. This Process reduces the number of dimensions we must work with.

1.2 Feature Extraction: This process extracts the key-points of all the images. And extract the key-points of the input image with the same technique used to extract the key points from the image. Where the key point is a circular image region with an orientation. It is delineated by a geometrical frame of 4 parameters: the key purpose centre coordinates x and y, its scale (the radius of the region), and its orientation.

There are many ways to extract features with reference to the goals. Some are based on the edges or the corners, other on the curvature of the shape. The different types of techniques for feature extraction are SIFT (Scale Invariant Feature Transform), SURF (Speeded up Robust Feature), HOG (Histogram Oriented Gradient), Template Matching, etc.

1.3 Feature Matching: In this process, features of the image which are stored in a database are compared with the features of an input image. The regions with maximum similar features for the image are considered and hence some part of an image in the image is detected. CDS (Context-Dependent Similarity) is one of the techniques used for matching the key points in the image and detecting the desired image.

II. LITERATURE SURVEY

In the literature survey, we have studied different feature extraction techniques.
Images of different formats and styles exist in the database. To recognize the different types of an image of different images features can be used for extracting the feature and testing images. Using some analysis, there are main three techniques using this testing of images are done, which are Speeded up robust feature (SURF), Scale-invariant feature transform (SIFT), and Histogram oriented Gradient (HOG). SURF, SIFT, HOG is used for extracting the shape-based feature vectors of training and testing images. Finally, to check the relationship between the sample images of testing

sub-images and training sub-images of the classes the Manhattan Distance classifier is used.

2.1 Scale Invariant Feature Transform (Sift)

SIFT, Associate in Nursing word form of Scale-invariant feature rework, is one in all the foremost far-famed algorithms to sight and describe the native options in a picture, fictional by David Lowe in 1999. The SIFT is for extracting good invariant options from pictures which will be accustomed perform reliable matching between the various views of a scene or object. This feature descriptor maintains sensible fame for its properties as a result of it's invariants to scaling, translation, rotation, transformation and partly to illumination changes. The goal of those techniques is to convert a picture during a set of vectors, and these vectors have the characteristic to explain enough the image. As David G. Lowe represented SIFT consists of 4 major stages:

(1) Scale-space peak selection
(2) Key point localization
(3) Orientation assignment
(4) Key point descriptor

First of all, scale-space has to be generated. To generate scale-spaces apply Gaussian over sample image with varying σ value. Then down sample it and find Laplacian of Gaussian. To efficiently locate the key point location in scale space difference of Gaussian.

D(x,y,s) (DOG), is calculated from variations of two close scale separated by a multiplicative factor. A point is decided as a local minimum or maximum concerning neighbourhood points. The orientation and gradient magnitude are computed for each image. An orientation histogram is developed from the gradient orientation of the individual points inside a region around the key point. Then a distinctive descriptor is obtained for each key point. The image gradient and magnitudes and orientations, dependent on the major orientation of the key point are sampled within a 16×16 region. These samples are then assembled into an orientation histogram compiling the contents into 4×4 sub-region. Each histogram has 8 bins covering 360 degrees of orientation. Therefore, having a 4×4×8=128 feature vector is produced for each Key point.

2.2 Histogram Oriented Gradient (Hog)

Histogram of Oriented Gradients (HOG) is motivated on Scale-Invariant Feature Transform (SIFT) descriptors proposed by David G. Lowe. To produce HOG, the cell histograms of each pixel inside the cell cast a weighted vote. In this operation, the histogram channels are calculated across rectangular cells by the calculation of the unsigned gradient. The cells are overlying on half of the area, means that each cell produces more than once to the final feature vector. To measure differences in contrast and illumination, the gradient strengths were regionally normalized, i.e. normalized over each cell. The 9 histograms with 9 bins are then combined to make a 1x81 dimensional feature vector.

2.3 Speeded up Robust Feature (Surf)

SURF, Speeded-Up robust Features, is another image detector and descriptor inspired by SIFT, was first presented by Herbert Bay in the ECCV 2006 conference in Graz, Austria. SURF approximates or even betters earlier proposed schemes for robustness, repeatability, and distinctiveness, yet it can be computed and analyzed much faster.

SURF algorithm is used to extract the interest points from the reference image and test image instead of the SIFT algorithm. SURF is faster than SIFT. The main difference of SURF algorithm is it mainly implemented to the DOH (Determinant of Hessian), the extraction of the feature points in the image are achieved through simplification and approximation, compared to the SIFT algorithm, it reduces the complexity of feature point extraction and it also has the better real-time performance.

The major steps of SURF are: Fast-Hessian Detector Constructing the Scale-Space Accurate Interest Point Localization Interest Point Descriptor Orientation assignment Descriptor Components

Much of the performance increase in SURF is due to Integral Image.

The whole image I$(x, y) of an image I(x, y) describes the total of all pixels in I(x, y) of a rectangular area formed by (0, 0) and (x, y).

- Now compute the Hessian matrix, as a function of both scale and space.
- Then measure Hessian determinant applying the approximated Gaussians.
- The function of rotation-invariant interest points and localizing the size within the image will be classified into three steps.
  - First, determine the edge value for the responses such all values below the predetermined threshold are removed
  - Then, find a collection of candidate points. to attain this each pixel within the scale-space is checked with its 26 neighbour's, combined the 8 points within the native scale and also the 9 in each of the scales above and below.
  - Once interest points are localized each in area and scale.

2.4 EXPERIMENTAL RESULT

Based on experimental results, it's complete that the accuracy of the SURF formula is beyond SIFT and HOG.

Table 1 Percentage accuracy based on Feature Matching

Process	Percentage Accuracy
SIFT	56.66%
HOG	76.66%
SURF	81.66%

The SIFT formula extracts a bigger range of options, however the matter is that the speed for all the process steps. Through it's found that the SIFT has detected a bigger range of options compared to SURF however it's suffered from speed.

The SURF is quick and has sensible performance because the same as SIFT

Table 2 Comparison between SIFT & SURF

Algorithm	Detected Feature points		Matching Feature Points	Feature Matching Time
	Image 1	Image 2		
SIFT	892	934	41	1.534s
SURF	281	245	28	0.546s

III. PROBLEM FORMULATION

The figure shows flow diagram for Image detection. It consists of steps: pre-processing feature extraction, and finally image detection.

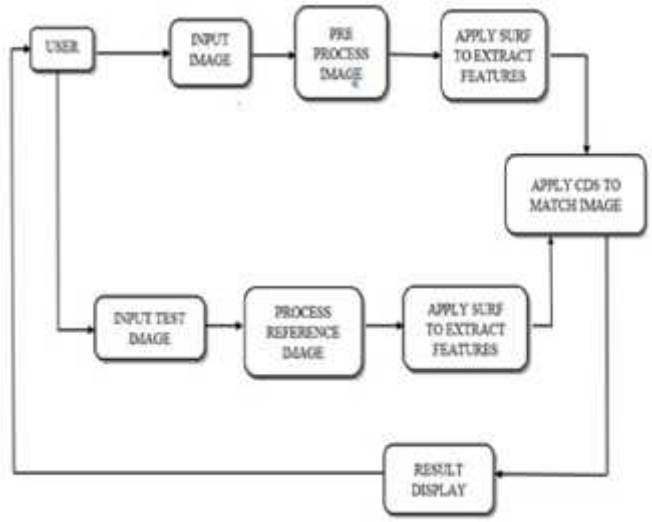

Fig 1 Flow Diagram for Image Detection

The user inputs the look at image and reference image that's needed to be born-again into a binary image. once binarization, the present pictures are the photographs to that SURF is applied for extracting the options. Here, we have a tendency to a victimization the SURF formula as a result of from a literature survey it's found that the SURF algorithm is best than different techniques.

After extracting the options CDS (Context-Dependent Similarity) is applied for matching the key points of the photographs. during this approach, the take a look at image are going to be detected in a picture.

FEATURE MATCHING TECHNIQUE

Context-Dependent Similarity formula enhances the performance in terms of accuracy in image matching and computation time.

CONTEXT-DEPENDENT SIMILARITY

CDS Image Detection algorithm

Let TX = { x1, . . . , xn }, TY = {y1, ... ,ym} be respectively the list of interest points taken from a reference logo and a test image (the value of n, m may vary with TX, TY).

Input: {reference logo image: lx Test image: ly, CDS

Parameter: Є, α, τ, β, Ma, Mr }

Processes: Extract SURF from lx, ly and let Tx = {x1, xn},

Ty = {y1, yn} be respectively the list of interest points taken from both images;

Step 1: For j=1 to n

Find context matching for xj where it is a key point of the reference image.

End for

For j=1 to n

Find context matching for you where it is a key point of the test image.

End For

Step 2: Set p=1 to max=30

Step 3: For j=1 to n

For i=1 to m Compute CDS matrix Increment t i.e. does p++;

End for

End for

Repeat step 3 until p > max or convergence.

Step 4: For j=1 to n do

For i=1 to m do

Compute Kyi|xj

Match between xj and xi is declared only if

Kyi|xj >= ∑ ms=i Kys|xj

Step 5: If number of matches in Ty>τ|Tx| Then image matched i.e. detected

otherwise

Image not detected.

Output: A Boolean value determining whether the source image in lx is identified in ly.

In our project, the SURF algorithm will be used for extracting features and CDS for matching features as these techniques are efficient comparatively.

Sample output:



Fig 2 Sample output

IV. PLANNING OF WORK

The **SOFTWARE REQUIREMENTS**

The software requirements in our project are Open CV and Visual Studio 2013.

4.1 INTRODUCTION TO OPEN CV

An Open CV (Open Source Computer Vision) is an Image Processing library designed by Intel and controlled by Willow Garage. The Open CV is an library of machine learning software as well as a open-source computer vision. It is implemented to stimulate the use of machine knowledge in commercial products and to provide standard infrastructure for computer vision applications.

The library of an Open CV has more than 2500 optimized algorithms, which consist of a broad set of both standard and state-of-the-art computer vision and machine learning algorithms

These all algorithms are used to recognize and identify faces, analyse human actions in videos, classify objects, track moving objects, track camera movements, produce 3D point clouds from stereo cameras, extract 3D models of objects, join images collectively to produce a high-resolution image of an entire picture, find related images from an image database, remove red eyes from images obtained using flash, follow eye movements, recognize spectacle and establish tags to overlay it with augmented fact, etc. The library is used broadly in companies, governmental bodies, and research groups.

Open CV is written purely in C++. It produces C++, C, Java, Python and MATLAB interfaces and supports Windows, Android, Linux, and Mac OS

4.2 INTRODUCTION TO MICROSOFT VISUAL STUDIO

Create the characteristic with the most helpful in class Integrated Development Environment (IDE) from Microsoft. It is used to produce computer programs for web sites, as well as Microsoft Windows, web services, and web applications. Windows Store, Microsoft Silverlight, Windows API, and Windows Forms all are managed Microsoft software development platforms. It can produce both primary codes and obtained code.

Visual Studio carries various programming languages and provides the code debugger and editor to verify nearly any. C, C++and C++/CLI (via Visual C++), VB.NET (via Visual Basic .NET), C# (via Visual C#), and F# these all are Build in languages.

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MEDICAL DIAGNOSIS USING ARTIFICIAL INTELLIGENCE

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***Abstract* - Artificial intelligence (AI) is a rapidly developing technology that has begun to be used in the medical field to improve the professional level and capability of clinical work. In medical, artificial intelligence mainly uses computer techniques to perform clinical diagnoses and suggest some treatments. AI has the capability of detecting meaningful relationships in a database and has been widely used in many clinical situations to diagnose, treat, and forecast the results. Any program designed to serve as an expert to the physician must contain certain basic features. It must have a store of medical knowledge expressed as the information of possible diseases. Depending on the breadth of the clinical domain, the number of hypotheses in the data set can range from a few to many thousands. .In the simplest conceivable representation of such knowledge, each disease hypothesis analyse all of the features that can occur in the particular disorder. In addition, the program must be able to match what is common about the patient with its store of information. We could also provide basic treatment to the patient with homemade natural solution which would be the temporary solution to his problem .We can also give the details of the nearest specialist doctor related to the specific disease, with proper GPS location.**

Keywords— Artificial Intelligence, Medical, Clinical Diagnosis, Treatment, Database, Disease, Patient, Specialist Doctor.

I. INTRODUCTION

Image Any program designed to function a authority to the doctor should contain bound basic options. It should have a store of medical data expressed as illustrations of doable diseases. On the premise of breadth of the clinical domain, the amount of hypotheses within the information will vary from many to several thousands. Within the simplest possible illustration of such data, every malady hypothesis analyzes all of the options that may occur within the explicit disorder. Additionally, the program should be ready to match the patient knowledge with its store of knowledge. Even the foremost advanced programs usually rely upon this basic strategy. AI uses complicated algorithms and package to emulate human noesis within the study of difficult medical knowledge.[1] The most objective of our paper is to be told totally different techniques of computing employed in prediction of malady by mistreatment different computing tools. If operation of body isn't correct, it'll have an effect on the opposite elements of human like brain, kidney etc.

Nowadays, the globe Health Organization (WHO) has calculable that twelve million individuals fall sick Worldwide, per annum because of the guts diseases.[1] UN agency calculable by 2030, almost 23.6 million individuals can die because of diseases as. Prediction by mistreatment computing techniques provides North American country correct results of diseases. During this paper analysis of assorted computing techniques given in tables that were used and useful for medical analysts or practitioners for correct malady diagnosing. It may well be the longer term scope of application which may be apply in medical field this computing technique can predict the malady and can conjointly recommend for the correct drugs. Within the attention field, AI technology was initial applied as a medical diagnostic support (MDDS) system. Miller reviewed the progress of MDDS systems from 1954 to 1993. In 1961, Warner et al. developed a pioneer MDDS system that might be employed in the diagnosing of innate heart diseases. one among the primary much used MDDS systems for clinical diagnosing and simulation exercises was American developed by de Dombal et al. at the University of urban center, Uk, in 1969, within the early Nineteen Seventies, Short life developed AN skilled system known as MYCIN that was wont to determine the organisms concerned in infectious diseases and create suggestions for the employment of antibiotics.[1] By 1990s, an oversized variety of MDDS systems were advanced as well as internal, forensic, medical specialty, pathology, radiology, psychiatry, and so on. Recently, with the speedy development of laptop, internet, advanced statistics, machine learning, and neural networks technology, AI technology is conveyance revolutionary changes across the attention field. Medical AI technology can play a massive role in electronic health records (EHRs), diagnosis, treatment protocol development, patient observance and care, customized drugs, robotic surgery, and health system management. During this article, we have a tendency to initial in brief introduce the prospect of medical Ai technology, and so review the inequities and quality of attention in rural areas of developing countries. Next, we have a tendency to contemplate the roles of medical AI-related technologies, like computer-assisted diagnosing and mobile clinical call support systems (MCDSS), on attention outcomes in rural areas of developing countries. Finally, we have a tendency to propose a structure medical

AI service network geared toward rising the accessibility and quality of rural attention services in developing countries, and urge the event of medical AI technology that's appropriate for rural use. Problem Definition : within the fashionable attention system, chop-chop increasing costs/complexity, the growing myriad of treatment choices, and exploding data streams that always don't effectively reach the front lines hinder the power to settle on best treatment choices over time. The aim during this paper is to develop a general purpose (non-disease-specific) computational/artificial intelligence (AI) framework to handle these challenges. This framework serves 2 potential functions: a simulation surroundings for ability to decide on best treatment selections over time.[2] The goal during this paper is to develop a general purpose (non-disease-specific) computational/artificial intelligence (AI) framework to deal with these challenges. This framework serves 2 potential functions: a simulation setting for exploring varied aid policies, payment methodologies, etc., and also the basis for clinical computer science – associate degree AI that may "think sort of a doctor".[3] This approach combines Markov call processes and dynamic call networks to find out from clinical knowledge and develop complicated plans via simulation of other successive call ways whereas capturing the generally conflicting, generally synergistic interactions of assorted parts within the aid system. It will operate in partly noticeable environments (in the case of missing observations or data) by maintaining belief states regarding patient health standing and functions as a web agent that plans and re-plans as actions are performed and new observations are obtained. This framework was evaluated victimization real patient knowledge from associate degree electronic health record. Stroke, for eighty fifth of the time, is caused by coagulum within the vessel referred to as cerebral pathology. Rehme et al used SVM in resting-state purposeful imaging knowledge, by that endophenotypes of motor incapacity when stroke were known and classified. SVM will properly classify patients with stroke with eighty seven.6% accuracy.[5] Griffis et al tried naïve Thomas Bayes classification to spot stroke lesion in T1-weighted imaging. The result's comparable human knowledgeable manual lesion delineation. Rondina et al analyzed stroke anatomical imaging pictures victimization Gaussian method regression, and located that the patterns of voxels performed higher than lesion load per region because the predicting options.[5] ML ways have additionally been applied to analyze CT scans from patients with stroke. Free-floating intraluminal coagulum is also fashioned as lesion when stroke, that is tough to be distinguished with artery plaque on the CT imaging. Thornhill et al used 3 cubic centimeter algorithms to classify these 2 varieties by quantitative form analysis, as well as linear discriminant analysis, artificial neural network and SVM. .The accuracy for every technique varies between sixty five.2% and 76.4%. They used whole-brain pictures because the input into the SVM, that performed higher than typical radiology-based ways. to enhance the clinical decision-making method of tPA treatment, projected a stroke treatment model by analyzing observe pointers, meta-analyzes and clinical trials victimization Bayesian belief network. The model consisted of various variables and 3 selections for analyzing the procedure of identification, treatment and outcome prediction. Ye et al used interaction trees and subgroup analysis to explore acceptable TPA indefinite quantity supported patient characteristics, taking under consideration each the chance of hemorrhage and also the treatment effectively.[4][5][6]

II. MEDICAL DIAGNOSIS USING ARTIFICIAL INTELLIGENCE

Any program designed to function an adviser to the doctor should contain sure basic options. It should have a store of medical data expressed as descriptions of attainable diseases. Betting on the breadth of the clinical domain, the quantity of hypotheses within the information will vary from many to several thousands. Within the simplest conceivable illustration of such data, every sickness hypothesis identifies all of the options that may occur within the specific disorder. Additionally, the program should be able to match what's known regarding the patient with its store of knowledge. Even the foremost subtle programs usually rely on this basic strategy. The simplest version of such programs operates within the following fashion once bestowed with the chief criticism and once later given extra facts.

1. For every attainable sickness (diagnosis) confirm whether or not the given findings are to be expected.

2. Score every sickness (diagnosis) by reckoning the quantity of given findings that may are expected.

3. Rank-order the attainable diseases (diagnoses) per their scores. The power of such a straightforward program is greatly increased through the employment of a mechanism that poses queries designed to elicit helpful data. Take, for instance, associate degree growth of the essential program by the subsequent strategy:

4. Choose the highest-ranking hypothesis and raise whether or not one amongst the options of that sickness, not nevertheless thought-about, is gift or absent.

5. If inquiry has been created regarding all attainable options of the highest-ranked hypothesis, raise regarding the options of ensuing best hypothesis

6. If a brand new finding is obtainable, continue with step otherwise, print out the rank-ordered diagnoses and their individual adjunct findings and stop.

Steps one through three contain a primitive analysis of the obtainable data, associated steps four through half dozen contain an equally easy data-gathering strategy that determines what information to hunt next. However such a program fails to capture several of the techniques accountable for professional performance as an example, the ranking method doesn't take into consideration however oft explicit options occur during a given un wellness. The program, what is more, has no information of pathophysiology associated isn't able to scrutinize of the

severity of a sickness. The foremost significant issue is that every new finding sets into motion a groundwork method equivalent to considering all un wellness states showing during a textbook of drugs. Even for a high-speed laptop this is often not a sensible diagnostic strategy and for this reason analysis has turned to the study of however specialists perform. The benefits of AI are extensively mentioned within the medical literature. AI will use refined algorithms to 'learn' options from an outsized volume of tending knowledge, so use the obtained insights to help clinical apply. It may also be equipped with learning and self-correcting skills to boost its accuracy supported feedback. Associate AI system will assist physicians by providing up-to-date medical data from journals, textbooks and clinical practices to tell correct patient care. Additionally, associate AI system will facilitate to cut back diagnostic and therapeutic errors that area unit inevitable within the human clinical apply. Moreover, associate AI system extracts helpful data from an outsized patient population to help creating time period inferences for health risk alert and health outcome prediction. AI isn't new, however there are fast advances within the field in recent years. This has partly been enabled by developments in computing power and therefore the immense volumes of digital knowledge that area unit currently generated. a good vary of applications of AI area unit currently being explored with extensive public and personal investment and interest. The United Kingdom Government declared its ambition to form the United Kingdom a world leader in AI and knowledge technologies in its 2017 Industrial Strategy. In Apr 2018, a £1bn AI sector deal between Great Britain Government and trade was declared, together with £300 million towards AI analysis. AI is lauded as having the potential to assist address necessary health challenges, like meeting the care wants of associate ageing population. Major technology corporations - together with Google, Microsoft, and IBM - area unit investment within the development of AI for tending and analysis. The amount of AI start-up corporations has conjointly been steady increasing. There area unit many UK based corporations, a number of that are found out unitedly with Great Britain universities and hospitals. Partnerships are shaped between NHS suppliers and AI developers like IBM, Deep Mind, Babylon Health, and Ultromics. Such partnerships have attracted conflict, and wider considerations regarding AI are the main focus of many inquiries and initiatives inside trade, and medical and policy communities

III. APPLICATION OF AI IN HEALTHCARE AND RESEARCH

A. Healthcare Organization:

AI has the potential to be utilized in designing and resource allocation in health and social care services. as an example, the IBM Watson Care Manager system is being piloted by Harrow Council with the aim of rising price potency. It matches people with a care supplier that meets their wants, inside their allotted care budget. It conjointly styles individual care plans, and claims to supply insights for more practical use of care management resources. AI is additionally being employed with the aim of rising patient expertise. Alder Hey Children's Hospital in Liverpool is functioning with IBM Watson to form a 'cognitive hospital', which is able to embody associate app to facilitate interactions with patients. The app aims to spot patient anxieties before a visit, offer data on demand, and equip clinicians with data to assist them to deliver acceptable treatments.[23][24]

B. Medical Research:

AI will be wont to analyze and determine patterns in massive and complicated datasets quicker and a lot of exactly than has antecedently been attainable. It may also be wont to search the scientific literature for relevant studies, and to mix completely different varieties of data; as an example, to assist drug discovery. The Institute of Cancer Research's will SAR info combines genetic and clinical knowledge from patients with data from research, and uses AI to form predictions regarding new targets for cancer medicine.[24] Researchers have developed associate AI 'robot scientist' known as Eve that is meant to form the method of drug discovery quicker and a lot of economical. AI systems utilized in tending may even be valuable for medical analysis by serving to match appropriate patients to clinical studies.[24]

C. Clinical Care :

AI has the potential to assist the identification of un wellness and is presently being trialed for this purpose in some Great Britain hospitals. Mistreatment AI to analyze clinical knowledge, analysis publications, and skilled pointers may conjointly facilitate to tell choices regarding treatment. Possible uses of AI in clinical care include: • Medical imaging – medical scans are consistently collected and hold on for a few time and area unit pronto obtainable to coach AI systems. AI may scale back the value and time concerned in analyzing scans, probably permitting a lot of scans to be taken to higher target treatment.[24] AI has shown promising leads to sleuthing conditions like respiratory disease, breast and skin cancers, and eye diseases. • diagnostic procedure – the Ultromics system, trialled at John Radcliffe Hospital in Oxford, uses AI to analyze diagnostic procedure scans that observe patterns of heartbeats and diagnose coronary cardiopathy. • Screening for medicine conditions – AI tools area unit being developed that analyze speech patterns to predict psychotic episodes and determine and monitor symptoms of medicine conditions like Parkinson's un wellness. • Surgery – robotic tools controlled by AI are utilized in analysis to hold out specific tasks in hole surgery, like attachment knots to shut wounds.[23][24]

D. Patient And Consumer-Facing Applications :

Several apps that use AI to supply personalized health assessments and residential care recommendation presently on the market. The app adenosine deaminize Health Companion uses AI to control a chat-bot, which mixes info regarding symptoms from the user with alternative info to supply potential diagnoses physician at Hand, an identical app developed by city Health, is presently being trialed by a bunch of NHS surgeries in London. Information tools or chat-bots driven by AI being employed to assist with the management of chronic medical conditions. for instance, the inflammatory disease Virtual Assistant developed by IBM

for inflammatory disease analysis Britain is learning through interactions with patients to supply personalized info and recommendation regarding medicines, diet, and exercise.34 Government-funded and industrial initiatives exploring ways that during which AI may be wont to power robotic systems and apps to support folks living reception with conditions like early stage dementedness, probably reducing demands on human care employees and family carers.[14] The aim is to sight signs of degradation to modify early intervention and prevent hospital admissions.[14][24]

E. Public Health:

AI has the potential to be wont to aid early detection of communicable disease outbreaks and sources of epidemics, like water contamination. AI has conjointly been wont to predict adverse drug reactions, that are calculable to cause up to six per cent of hospital admissions within the Britain.[24]

IV. LIMITS OF AI

AI depends on digital knowledge, thus inconsistencies within the convenience and quality of knowledge limit the potential of AI. Also, important computing power is needed for the analysis of enormous and complicated knowledge sets whereas several captivated with the potential uses of AI within the NHS, others purpose to the sensible challenges, like the very fact that medical records don't seem to be systematically digitized across the NHS, and therefore the lack of ability and standardization in NHS IT systems, digital record keeping, and knowledge labelling. There questions on the extent to that patients and doctors comfy with digital sharing of personal health knowledge Humans have attributes that AI systems won't be ready to genuinely possess, like compassion. Clinical follow usually involves advanced judgments and skills that AI presently is unable to copy, like discourse information and therefore the ability to browse social cues.16 there's conjointly discussion regarding whether or not some human information is inexplicit and can't be schooled. Claims that AI are going to be ready to show autonomy are questioned on grounds that this is often a property essential to being human and by definition can't be control by a machine.[14][13][24]

A. Ethical And Social Problems :

Many moral and social problems raised by AI overlap with those raised by knowledge use; automation; the reliance on technologies additional broadly; and problems that arise with the utilization of helpful technologies and ‘telehealth’.

B. Reliability And Safety :

Reliability and safety are key problems wherever AI is employed to regulate instrumentation, deliver treatment, or create choices in health care. AI may create errors and, if a mistake is troublesome to sight or has knock-on effects, this might have serious implications for instance, in a very 2015 clinical test, AN AI app was wont to predict that patients were probably to develop complications following respiratory illness, and so ought to be hospitalized. This app mistakenly schooled doctors to send home patients with respiratory illness thanks to its inability to require discourse info into consideration. The performance of symptom checker apps victimization AI, has been questioned. For instance, it's been found that recommendations from apps may be excessively cautious, probably increasing demand for reserve tests and coverings.[24]

C. Transparency And Accountability :

It may be troublesome or not possible to see the underlying logic that generates the outputs made by AI. Some AI is proprietary and deliberately unbroken secret, however some are just too advanced for a person's to grasp. Machine learning technologies may be notably opaque thanks to the manner they incessantly tweak their own parameters and rules as they learn. This creates issues for sustentative the outputs of AI systems, and characteristic errors or biases within the knowledge.[11][24][23]

D. Effects On Patients :

AI health apps have the potential to empower folks to gauge their own symptoms and take care of themselves once potential. AI systems that aim to support folks with chronic health conditions or disabilities may increase people’s sense of dignity, independence, and quality of life; and modify people that might otherwise are admitted to worry establishments to remain reception for extended. However, considerations are raised a few loss of human contact and increased social isolation if AI technologies are wont to replace employees or family time with patients. AI systems may have a negative impact on individual autonomy: for instance, if they limit selections supported calculations regarding risk or what's within the best interests of the user. If AI systems are wont to create a diagnosing or devise a treatment arrange, however the health care skilled is unable to clarify however these were found, this might be seen as proscribing the patient’s right to create free, educated choices regarding their health. Applications that aim to imitate a person's companion or career raise the likelihood that the user are going to be unable to evaluate whether or not they are human action with a true person or with technology. This might be knowledgeable about as a kind of deception or fraud.[24]

E. Effects On Health Care Professionals:

Healthcare professionals might feel that their autonomy and authority is vulnerable if their experience is challenged by AI. The moral obligations of health care professionals towards individual patients may be plagued by the utilization of AI call support systems, given these may be target-hunting by other priorities or interests, like value potency or wider public health issues. As with several new technologies, the introduction of AI is probably going to mean the abilities and experience needed of attention professionals can amendment. In some areas, AI may alter automation of tasks that have antecedently been disbursed by humans. this might unencumber health professionals to pay longer partaking directly with patients. However, there are issues that the introduction of AI systems could be wont to justify the utilization of less masterful employees. this might be problematic if the technology fails and employees aren't ready to recognize errors or do necessary tasks while not laptop steering. A connected concern is that AI may build attention professionals contented , and fewer doubtless to examine results and challenge errors.

V. TECHNIQUES

A. NEURAL NETWORK

We will use the heuristic search algorithm or the neural network to take the decision according to the input , and then provide with the proper output

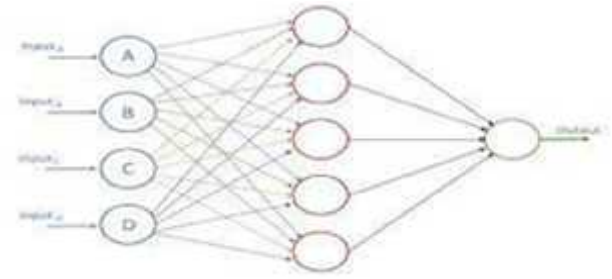

Fig 1 Neural Networks

This Shows that user will provide with his symptoms which would be the number of inputs and then the neural network will analyze the input and according to it the best solution will be provided

B. Heuristic Search

All of the search strategies within the preceding section are unacquainted with therein they didn't take under consideration the goal. They are doing not use any info regarding wherever they're making an attempt to urge to unless they happen to uncover a goal. One sort of heuristic info regarding that nodes appear the foremost promising may be a heuristic perform h(n), that takes a node n associated returns a non-negative real that's an estimate of the trail value from node n to a goal node. The perform h(n) is associate underestimate if h(n) is a smaller amount than or adequate the particular value of a lowest-cost path from node n to a goal.

The heuristic perform may be a thanks to inform the search regarding the direction to a goal. There is nothing wizardly a few heuristic perform. It should use solely info that may be promptly obtained a few node. Typically a trade-off exists between the number of labor it takes to derive a heuristic worth for a node and the way accurately the heuristic worth of a node measures the particular path price from the node to a goal. A standard thanks to derive a heuristic perform is to unravel a less complicated downside and to use the particular price within the simplified downside because the heuristic perform of the initial downside.

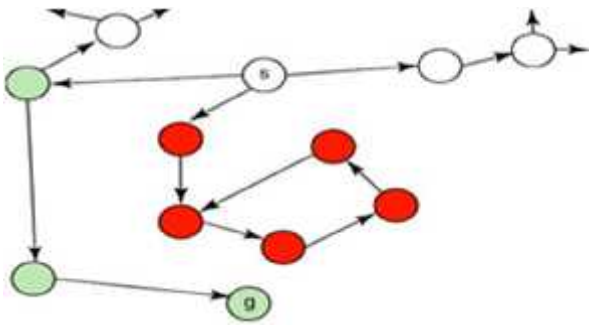

Fig 2 Heuristic Search

VI. RESULT

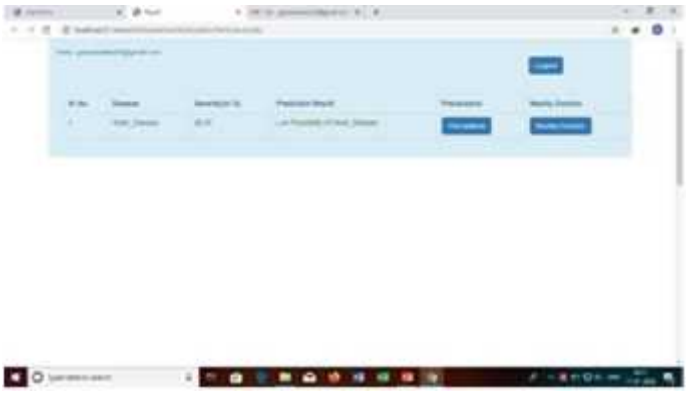

Fig 3 Result

This shows the output of our project on the basis of symptoms Entered by the user the disease has been evaluated which shows the name of diseases and the severity of disease in percentage (%) and also predict the diseases . and we have also provide the precaution related to the disease which we can call it as Home Made medicine and we will also provide the proper prescription to the diseases and if the user is not satisfied with the prescription then there is an option to the user that he can locate the Near by doctor who is expert in the related disease.

VII. CONCLUSION

The planned operating model may facilitate in reducing treatment prices by providing Initial medical specialty in time. The model may serve the aim of coaching tool for medical students and can be a soft diagnostic tool offered for doc and medical specialist. There area unit several potential enhancements that would be explored to boost the quantifiability and accuracy of this prediction system. As we've got developed a generalized system, in future we are able to use this method for the analysis of various knowledge sets. The performance of the health's identification may be improved considerably by handling varied category labels within the prediction method, and it may be another positive direction of analysis. In DM warehouse, generally, the spatial property of the guts info is high, thus identification and choice of great attributes for higher identification of cardiovascular disease area unit terribly difficult tasks for future analysis AI technologies area unit getting used or trialed for a spread of functions within the field of aid and analysis, as well as detection of illness, management of chronic conditions, delivery of health services, and drug discovery. AI technologies have the potential to assist address necessary health challenges, however could be restricted by the standard of obtainable health knowledge, and by the shortcoming of AI to possess some human characteristics, like compassion. the employment of AI raises variety of moral and social problems, several of that overlap with problems raised by the employment of information and aid technologies additional loosely. A key challenge for future governance of

AI technologies are making certain that AI is developed and employed in how that's clear and compatible with the general public interest, while stimulating and driving innovation within the sector.

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[24] Artificial Intelligence (AI) In Healthcare And Research

Implementation of Grain Identification & Quality Check using Image Processing

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***Abstract*—There are various varieties of Rice and lentils. Price fabrication and adulteration have been some of the various issues faced by the consumers, farmers and wholesale retailers. Traditional methods for Identification of these similar types of grains and their quality analysis are crude and inaccurate. Methods were tried to implemented earlier but due to financial inability and low efficiency, they weren't successful.To overcome this problem, the project proposes a method that uses a machine learning technique for identification and quality analysis of these grains. Rice and Lentils which have the maximum consumption have been selected. Lentils are designated into classes based on colors. The method of determining the class of a lentil is by HUE Extraction. The size and color of each Lentil type (i.e. Red, Green, and Yellow, Black, White) are determined to be large or Medium or small, then size and color become part of the grade name. An intelligent system will be developed to identify the type of Indian lentils from bulk samples. The proposed system facilitates kernel size and color measurement using image processing techniques. These Lentil size measurements, when combined with color attributes of the sample, classify three lentil varieties commonly grown in India with the highest accuracy.**

Rice is one of most consumed grains in India so its quality is of utmost importance. In this project, we identify and grade five types of rice and grade them with the help of their distinguished features such as size, color, shape, and surface. Various rice grain has a different shape, size, surface and various lentils come in different colors, Hence the feature that will be extracted is texture and colors. The method of Chain Code with 8 connected pixel is adopted for to calculate the features such as area, shape, perimeter & HUE Color extraction is used for extracting the colors of the grain. The perimeters obtained is then formulated so that each grain can be classified and graded accordingly.

Keywords— Otsu Thresholding, Binarization, HUE Extraction, Watershed Algorithm, Chain Code.

I. INTRODUCTION

There is no efficient tool available in the market to grade the grains, rice, lentils or the other products of the farm. The traditional method which is being practiced since decades is by human inspection. The human inspection comes with a lot of variables depending on factors such as knowledge, experience, ulterior motives, etc. This leads to unfair grounds for doing business. Hence, there is a need for developing an integrated tool for not only identifying the farm products but also grade them efficiently. This will keep maintain the quality and provide a fair price for the products.

We propose to develop an integrated tool to identify and grade farm products using Image Processing.

II. IMPORTANCE OF THE PROJECT

Most of the Indians are directly or indirectly depending on agriculture. Many market surveys have revealed that middlemen take away about 48 percent of the price of rice, 52 percent of the price of groundnuts and 60 percent of the price of potatoes offered by consumers [1] In order to save the farmers from the clutches of the money lenders and the middlemen, the government has come out with regulated markets. These markets are expected to become a system of competitive buying, helping in eradicating malpractices, ensure the use of standardized weights and measures and evolve suitable machinery for settlement of disputes thereby ensuring that the producers are not subjected to exploitation and receive remunerative prices. Even after the implementation of the regulations imposed by the government, there are hardly any efficient means for identification and grading of grains. For an efficient flow of the proposed regulation a proper identification and grading system is required. This project aims to be an efficient replacement for the traditional grading mechanism. It will be a tool for standardization of price for the products.

III. METHODOLOGIES USED

The Project is being developed in Matlab 2018a since it provides a better result for image processing. The project is divided in five phases which is mentioned below:

1. Developing Data Set
2. Pre-processing. 3.Contour Detection
4. Feature Extraction.
5. Classification and Grading.

The Data Set was developed using a CANON 2000 camera. The Data Set obtained in Normal environment proved to be difficult while applying contour detection. Therefore, Data set was developed in controlled environment where darker grains was clicked using white background and Lighter grain where clicked using dark background.

Pre-processing included thresholding and applying noise filters. Two types of Thresholding was used Otsu's when the image contained lot of grains and Binarization when the image contained less number of grains.

After the thresholding contour was detected using Watershed Algorithm.

8-Chain connectivity was implemented in Matlab and features such as Perimeter, Area, Solidity, filled area, Centroid was obtained.

Circularity is a logic formulated from the above features so as to perform Primary classification i.e. between rice and lentils.

$$\text{Circularity} = \frac{(Perimeter)2}{4*\pi*(filled\ area)}$$

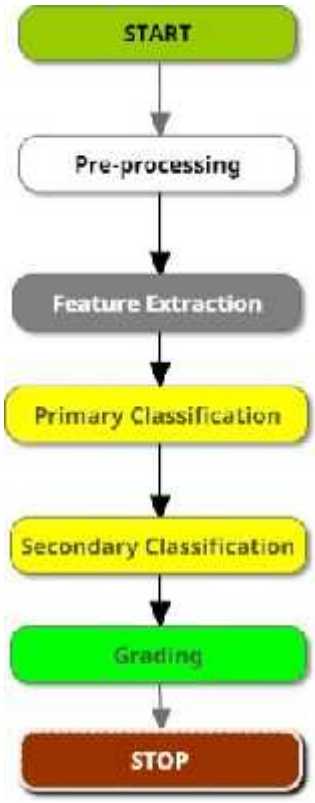

Fig 1.1. System Flow Diagram

The image is first feed to the System where it performs thresholding by using either using Binarization or Otsu's thresholding. The noise in the image is removed using Gaussian noise filters. The contour is then detected by using Watershed algorithm. Concept of 8-chain connectivity is used for obtaining features which then is formulated for classification and Grading. Classification is divided as Primary and Secondary where in the Primary the system will classify between rice and lentils and in secondary it will classify between either types of rice or types of grains.

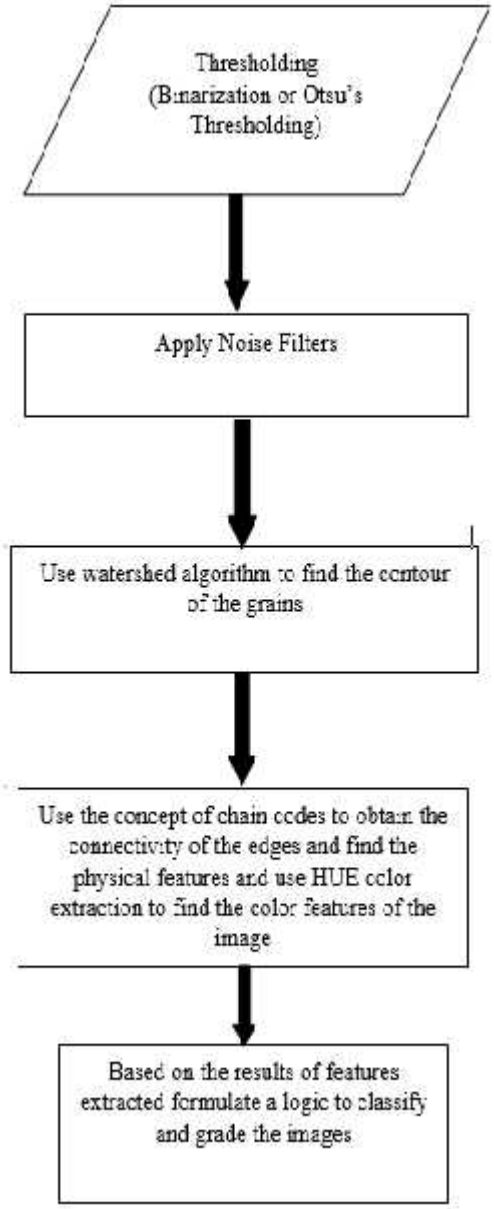

Fig 1.2. Procedure Flow Diagram

IV. EXECTED OUTCOME

Image Processing in Network can evolve the present scenario of identifying and grading mechanism available in the market. Grading of the farm products is an important part of maintaining a fair business grounds for the farmers and the retailers or consumers in some cases. Identification of various features of the given products using image processing and formulating them to provide an accurate classification and grading range can develop a tool whose output can be considered as a standard output for all future transactions.

V. RESULT

The main objective of the project is to Classify and Grade the products. The project is able to successfully identify between rice and lentils. There is need of more distinguishable parameters to grade and classify between same families of rice and lentils. The addition of Machine Learning in the present project can provide a great accuracy and reduce the use of controlled environment.



Fig 1. Input Image for Rice



Figure 2. Result after applying Watershed Algorithm on Rice

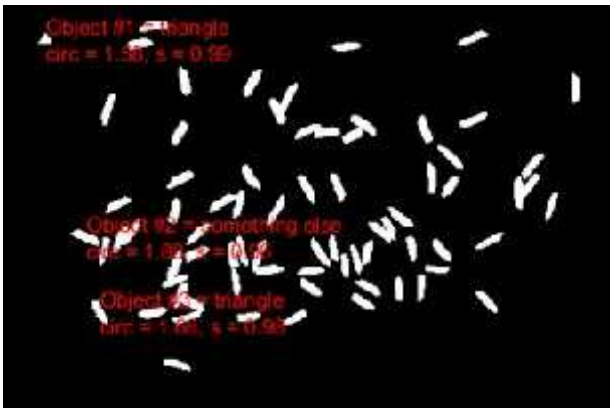

Fig 3. Output for Rice

Table 1. Output Parameters for Rice

RICE					
	AREA	FILLED AREA	SOLIDITY	PERIMETER	CIRCULARITY
	16308	16308	0.960	620.257	1.877
	12322	12322	0.97	509.669	1.677
	11376	11376	0.940	546.946	2.09
	16182	16182	0.967	620.46	1.89
	13323	13325	0.9	556.09	1.84
	13874	13874	0.95	525.941	1.586
	15590	15590	0.970	575.888	1.691
	16227	16228	0.959	622.084	1.89
	12494	12494	0.96	559.401	1.993
	16160	16160	0.962	586.408	1.69
	14317	14317	0.976	527.603	1.54
	14844	14844	0.963	557.902	1.668
	17002	17002	0.963	589.399	1.62
	15065	15065	0.97	543.684	1.561
	13892	13892	0.977	569.005	1.854
	14683	14683	0.945	596.828	1.93
	12182	12182	0.972	535.666	1.87
	13192	13192	0.9733	550.81	1.8
	12574	12574	0.966	503.669	1.60
	16155	16155	0.9486	579.273	1.6
AVG	14388	14388.25	0.962	563.84915	1.77

Table 1.2. Output Parameters for Lentils

LENTILS					
	AREA	FILLED AREA	SOLIDITY	PERIMETER	CIRCULARITY
	16308	16308	0.960	620.257	1.87
	12322	12322	0.9757	509.669	1.67
	11376	11376	0.940	546.946	2.0
	16182	16182	0.96	620.46	1.89
	13323	13325	0.94	556.09	1.84
	13874	13874	0.953	525.941	1.58
	15590	15590	0.97	575.888	1.69
	16227	16228	0.95	622.084	1.8
	12494	12494	0.967	559.401	1.99
	16160	16160	0.962	586.408	1.69
	14317	14317	0.976	527.603	1.54
	14844	14844	0.963	557.902	1.66
	17002	17002	0.963	589.399	1.62
	15065	15065	0.973	543.684	1.56
	13892	13892	0.977	569.005	1.85
	14683	14683	0.945	596.828	1.93
	12182	12182	0.972	535.666	1.87
	13192	13192	0.973	550.81	1.83
	12574	12574	0.966	503.669	1.6
	16155	16155	0.948	579.273	1.6
AVG	14388.1	14388.25	0.962	563.84	1.77



Fig 4. Input for Lentils



Fig 5. Result after applying Watershed Algorithm on Lentils

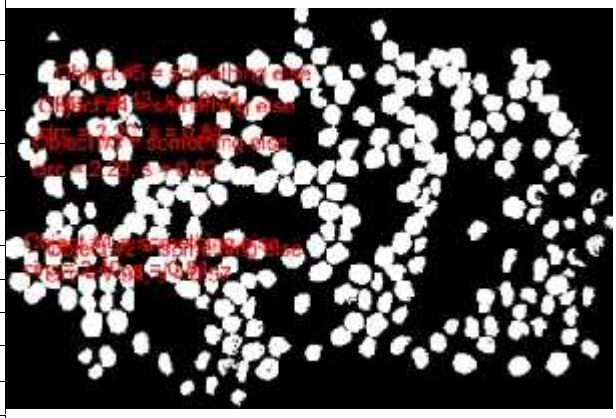

Figure 6. Output for Lentils

When 8-Chain codes were implemented on white basmati and red lentils it was observed that circularity can be an differentiating factor since the average circularity of Lentils was found to be 1.7 and that was rice was 1.14.

A threshold of 1.56 was set for classification purpose.

IX.CONCLUSION

The project provides a basic framework for classification and grading mechanism. Here it is able to identify between rice and lentils with 100% accuracy but needs improvement in classification in its own family i.e. between different type of rice or lentils. There is a need of more parameter to be considered before any implementation of grading mechanisms. With the rapid advancement in Machine Learning the future of grading holds a great promise.

ACKNOWLEDGMENT

The Completion of this project could not have been possible without the guidance and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following

We are very grateful to Prof.Sanjeev Ghosh, Prof.Manoj Chavan, HOD Dr.Vinit Dongre, Dean Dr.Lochan Jolly and Principal Dr.B K Mishra for their endless support, kind and understanding spirit during the preparations of this project.

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Implementation of Door Unlocking Using Face Recognition

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***Abstract*- Facial recognition software is relatively new as compared to fingerprint scanning. Unlike fingerprint scanners, facial verification requires no foreign or addition all hardware. It only requires you to show your face in front of the camera and the scanner will do its work to unlock your device. You don't have to pick up your device or do anything for that matter. This project reduces the human interaction with the hardware with the help official recognition using various image processing techniques. Earlier, people used to use the fingerprint scanners to unlock a door to get access which was accurate only in specific conditions. It didn't work properly when people got their hand dirty so it had to be maintained throughout the day. In that case the fingerprint couldn't be recognized. Fingerprint scanners also are unhygienic as a lot of people use it every day and it spreads a lot of germs which can lead to a lot of diseases. Sanitizing the scanner every now and then is very difficult as a lot of people interact with it throughout the day. This paper focuses on using a raspberry pi, solenoid lock, camera to make a face recognition door unlocking system that is very much accurate, fast, cost effective and hygienic. Open CV is the software where the code is going to be implemented that will have a recognizer which will distinguish different faces. A person just has to stand in front of the camera. Facial recognition is used a lot in mobile phones currently but it is not used a lot for providing security, this project focuses on achieving that.**

Keywords- face recognition, face detection, raspberry pie, security.

I. INTRODUCTION

Finger print scanners are used at many places. They're used in most of the smart phones; they're used at many places for identification purposes as every person has a unique fingerprint. However, like every technology, the fingerprint sensors have their advantages and disadvantages. On the plus side fingerprint scanners are easy to use and saves users the trouble of remembering a password. Fingerprints are unique for everyone and are hard to deceive. On the downside though, the accuracy of a person's fingerprints is reduced when someone gets dirt or grease on their fingers or the scanner.- The scanner is un able to read the fingerprint in such situations unless you clean your fingers or the scanner (or both). The cost of fingerprint technology is considerably higher as it requires both unique hardware and software. The scanner is unable to read the fingerprint in such situations unless you clean your fingers or the scanner (or both). The cost of fingerprint technology is considerably higher as it requires both unique hardware and software. Facial recognition software is relatively new as compared to fingerprint scanning.

This project reduces the human interaction with the hardware. On most devices with a facial recognition feature, the face verification can take place seamlessly. It is fast, effortless and efficient.Alotofargumentshavebeenraisedabouttheissueofsecuritywiththefacialverificationfeatureindevices.However, in many ways, the facial recognition feature in devices only increases the level of security without compromising it. Face recognition has a high acceptability rate than fingerprints. They are also universal in nature as every person has facial features. Moreover, when it comes to the trade off between ease of use and security. Face recognition eliminates this trade off.

Face recognition plays a very crucial role for interacting with people in the society. It coveys people's identity, so it can be used as a key for security solutions in many organizations. It provides an edge over the traditional finger print system as it reduces the human interaction with the software. Nowadays, face recognition system is getting increasing trend across the world for providing extremely safe and reliable security technology. It is gaining significant importance and attention by thousands of corporate and government organizations only because of its high level of security and reliability. This technology is becoming very important for numerous residential buildings and corporate organizations. This technique is based on recognizing human face and comparing the different features of a face with a previously recorded one. This technology has many applications.

II. MOTIVATION

Face recognition is very important as it is fast and cheaper than the traditional finger print system. Since the face recognition system uses a very high number of identification points, it is very accurate. Face recognition disrupts this form of cheating with is common when you have a less accurate systems like fingerprint scanners. It provides the best form of security. Face recognition system reduces the human interaction with the hardware. Finger print scanners become less accurate when it comes in contact with the dirt, sweat, oil etc whereas face recognition system works flawlessly in such cases. Anyone can install a face recognition device, mount the bracket onto the wall, plug in the power supply, plug in network. On the other hand, fingerprint scanners are note a syto setup and configure. Face recognition setup is relatively small and compact.

No special cleaning or maintenance is required for the facial recognition systems. It also supports USB transfer of data where there is no network. It is also very helpful for providing security. It is an increasingly popular tool among the law enforcement agencies; face recognition technology has significantly contributed in the domain of investigation and crime detection. Face recognition can be used to track attendance of employees, students. It can also be used to prevent fraud voters during elections.

The device will recognize you just by looking at it, the human interaction with the hardware is almost eliminated which is the main motivation of this project.

III. LITERATURESURVEY

We went through many research papers and came to know about many techniques for face detection. We were going to use Arduino before but due to its computational incapability and lack of multiple software support, we are now going to use Raspberry Pi for this project.

We referred research papers in which we found out the following, Vivek Bhanse used Raspberry PI to create a system which detects the face and tracks it using the concept of histogram equalization in the paper," Face Detection and Tracking Using Image Processing on Raspberry Pi"[1].

Ibrahim Mohammad Sayem, published a paper," Integrating Face Recognition Security System with the Internet of Things". In which a machine recognizes human face and grants access accordingly.[2]

AymanA. Wazwaz published a paper in which he used a camera to scan a face and convert sittoa binary image and compare sit with the stored binary image in the database using convolution method.[3]

Kruti Goyal, Kartikey Agarwal, Rishi Kumar had published a paper,"Face detection and tracking: Using Open CV" in which they have created a system which takes two input images, first input image is a group photo in which there are lots of people hence there is a lot of face to detect. second input image is an image of the person. We have to check whether this image is present in the group photo or not.[4]

Kruti Goyal, Kartikey Agarwal, Rishi Kumar had published a paper, "Face detection and tracking: Using Open CV" in which they have created a system which takes two input images, first input image is a group photo in which there are lots of people hence there is a lot of face to detect. second input image is an image of the person. We have to check whether this image is present in the group photo or not.[4]a camera and determines which places that particular person can access.[5]

IV. SCOPE OFPROJECT

A face recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial data base. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems.

Some facial recognition algorithms identify facial features by extracting landmarks, or features, from an



image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features.

Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face recognition. A probe image is then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation.

In the 2000 presidential election, the Mexican government employed facial recognition software to prevent voter fraud. Some individuals had been registering to vote under several different names, in an attempt to place multiple votes. By comparing new facial images to those already in the voter database,

authorities were able to reduce duplicate registrations. Similar technologies are being used in the United States to prevent people from obtaining fake identification cards and driver's licenses.

Methodology

The project will consist of three phases:

1) Face detection and data gathering.

2) Training recognizer.

3) Facial recognition.

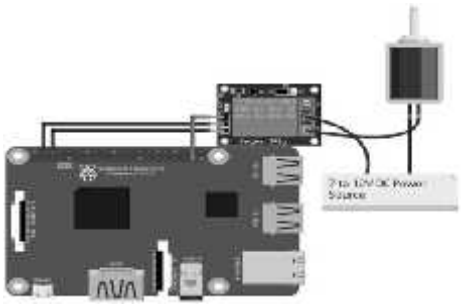

Fig 01. The facial recognition circuit diagram.

The GPIO pins of the Raspberry Pi can give an output of 3.3V but the solenoid lock requires 7-12V to operate. Because of this, we will need to use an external power source and relay to operate the lock. Connect the VCC and GND of the relay module to 5V and GND of Raspberry Pi. Then connect the signal pin of the relay module to the GPIO 26 of Raspberry Pi.

Fig 02. Raspberry Pi

On the other side of the relay module, connect then negative form DC power source to the negative of the solenoid door lock. Connect the positive from the DC power source to the common of the relay module and then connect normally to door lock.

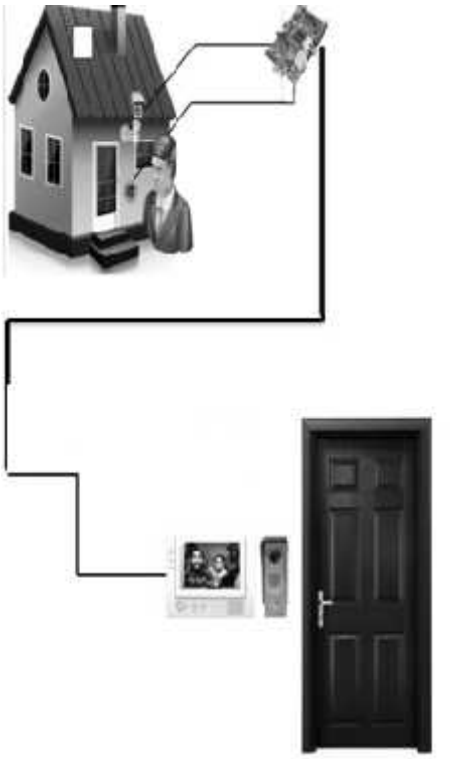

Fig 03. Using camera along with Raspberry Pi to read and compare the input image with the database.

V. COMPONENTSLIST

Table 1 List of components used to build the project

Sr. No	Components	QTY	Justification
1.	Raspberry Pi	1	Required CPU for the project.
2.	Solenoid lock	1	For door Unlocking system.
3.	External DC Power Source	1	To provide power supply to Raspberry Pi
4.	Relay Module	1	To provide interfacing.
5.	Raspberry Pi Camera	1	For face detection and recognition
6.	Breadboard.	1	

VI. FLOWCHART

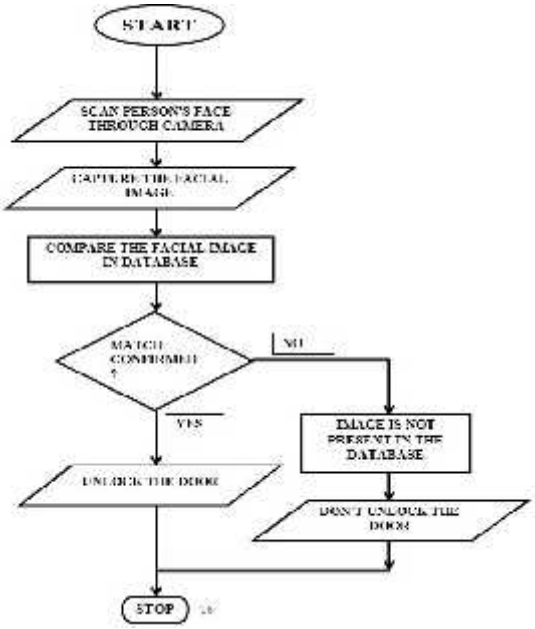

Fig 04. Flow Chart

Initially, we will study how human face detection works. Then we will study the algorithms for human face detection.

We will study how to make device understand the detection of human face.

We will try to implement the process of human face detection through Open CV.

We need to acquire all the required amount of components.

When we manage to detect human faces effectively, we will focus our attention to the human face recognition part.

We write codes to compare the live scanned human image with the image present in the database. We will check for errors and we will try to improve the accuracy.

We will use multiple people’s databases to check the accuracy.

VII. OBJECTIVES

To optimize face detection and recognition speed.

To increase the speed of processing data and to limit the use of hardware.

To increase face detection and recognition capabilities. To help in improving the security with face detection and recognition technology.

VIII. EXPECTED OUTPUT

The door will be unlocked as soon as the face of the person is scanned and compared with multiple facial images of the same person in the database. If the person's image is not present in the database, then door won't be unlocked. The device is expected to work in all lighting conditions. The device will also be able to work if the facial expressions of people change. A lot of images of a single person will be stored in the database and the live image taken will be compared with the images present in the database.

This is project is expected to be very accurate and it is going to remove human interaction with the hardware which will help in longevity of the system.

IX. CONCLUSION

In this paper robot has been developed which is according to human hand gesture. The robot is showing proper responses whenever we move our hand. Different Hand gestures to make the robot in specific directions are left, right, forward, backward. In this project our robot senses any action using flex sensors. It is not restricted to any set of actions.

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Determining Blood Type using Image Processing Techniques

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***Abstract* - Blood Group detection is one of the first and foremost essential requirements for many of the major medical procedures. Traditional ways of detecting blood groups are still prevalent in our modern era of digitization. The laboratory test-ing techniques are susceptible to human fallibility. Microscopy, one such technique, has intermittently proved inefficient since it is time-consuming, the results are difficult to reproduce and there is a need of a domain expert. Our present times necessitate automation of the evaluation process. This process would be very efficient and arguably a lifesaving approach for the identification of Blood Group. We present a technique using Image processing which is a cost-effective way and without the plausibility of human-made error. We evaluated a group of 100 blood samples and our solution achieved an accuracy of 99%. The whole process excludes a major probability of human error while detecting the agglutination from the traditional method and the detection is done within a fairly insignificant amount of time.**

Keywords – ABO system, Agglutination, Blood group detection, Canny edge detection, Rhesus system

I. INTRODUCTION

Road accidents in India claimed over 1.5 lakh lives in the country in 2018, with over-speeding of vehicles being the biggest reason for casualties [1]. It is at these times that one has to perform an urgent blood transfusion. Often the blood groups are not known and one has to rapidly determine the blood group of the victim. Also, in public health centers, there is a large volume of blood groups to be determined. As far as India is concerned the rural population lacks access to labs and trained technicians. The population of India is projected close to 1.37 billion or 1,369 million in 2019. 68.86% of Indian lives in rural areas and 31.14% lives in urban areas[2].

At the time of natural and human-made disasters, blood group transfusions are of utmost importance and human errors can lead to catastrophic results. The conventional system to find the blood group types may take a long time and also trained health technicians may not be available. Even if present they have to make quick tests and decisions. Often in these cases, the universal donor blood is administrated. This may result in some reactions risking the patients life. Also, the universal donor blood type stock levels decrease. Our paper has implemented an automatic blood group detection system. It can perform the basic pre-transfusion test easily and quickly with high reliability and even in remote location.

A. ABO System

Human Blood Group Classification is based on the proper-ties of presence and absence of the antigens A and antigens B on the surface of the red blood cells. Humans thus have four major blood group Type A, Type B, Type AB, and Type O as shown in Figure 1. Type A has An antigen, Type B has B antigen, Type AB has A and B antigens and Type O has no antigens on the surface of the RBC.

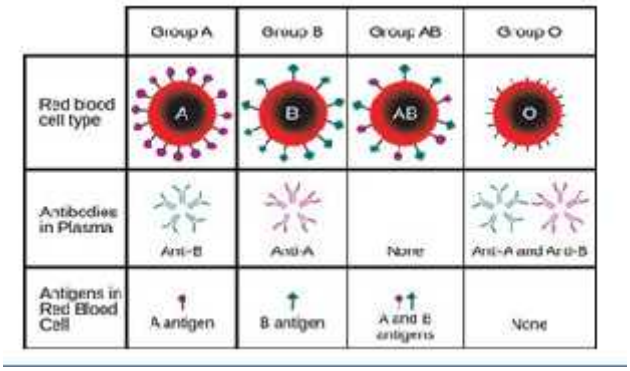

Fig. 1. ABO System

B. Rhesus (Rh) System

The second Blood group system is the Rhesus System. Rh blood group system classifies the blood groups based on the presence and absence of the Rh antigen, often called the Rh factor. The presence of Rh factor in the blood is said to be Rh-positive and its absence denotes the blood type to be Rh-negative. RBC Compatibility using ABO and Rh system as shown in Figure 2.

II. LITERATURE REVIEW

Some scholars have researched in the field of medicine and have published papers such as publications that have been studied and evaluated during the implementation of the proposed methodology. In [3] the authors have detected and classified blood groups using color images, the thresholding technique was applied and a histogram was developed. Blood group was detected by two properties first being Calculation of white pixel density in the segmented region and second being calculating the

total number of objects in each segmented image. Accuracy was optimal in their method of detection.

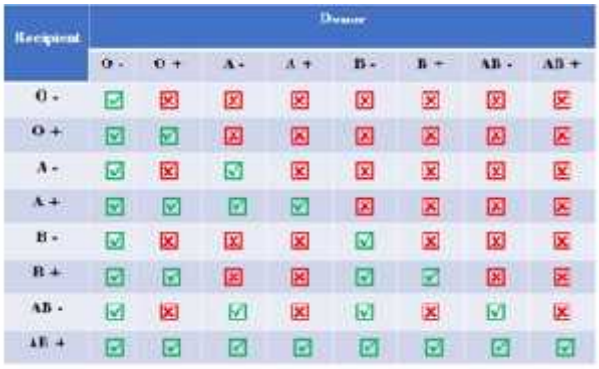

Fig .2. Red Blood Cell Compatibility

Determination and Classification of blood types were done using image processing techniques [4] thresholding and mor-phological operations were used on the slide test images taken from the pathological lab. Agglutination was evaluated from the processed images. In [5] the author has proposed an embedded system that uses an image processing algorithm to perform a blood test based on ABO and Rh blood typing system. Blood sample characterization is done using FPGA in [6]. A proof of concept was developed using image processing and then implanted in FPGA. Edge detection was performed using a threshold algorithm in his proposed method. In [7] Blood group was identified by cluster and patch detection method. The system involves seven steps to detect Blood group. HSV Luminance, Morphological operation and Erosion dilation were few of the steps involved in their method. In [8], the authors have detected blood groups by using image processing techniques which enabled them to detect aggluti-nation automatically and were able to identify blood groups of the individual in a short period with greater accuracy. The SVM classifier was used for the classification of blood type. In [9], an approach for red blood cell (RBC) segmentation for automated counting for RBC is implemented. The methods use YCbCr color conversion, masking, morphological operators and watershed algorithm. The combination of YCbCr color conversion and morphological operator produce segmented white blood cell which is used as a mask to remove WBC from the blood cell image. The final result of RBC segmentation is passed through the marker-controlled watershed algorithm to handle overlapping cells. The authors in [10] have created a portable device for ABO-Rh blood typing and blood pheno-typing. mixture/centrifugation, reading, and interpretation of results have been automated with the use of plate test and tube test images. The system gave results in 5 minutes. Low cost and portability are the advantages of their device. In [11] The authors developed a system to perform blood tests in less time. IMAQ Vision from National Instruments was used to obtain the slide test images. Image Processing algorithms were applied to the captured images and blood classification was done. A database of the patients was maintained to store the information.

III. DESIGN FLOW

A. Flow Diagram

Slide test samples are captured through a high-resolution Camera and stored as PNG image on the personal computer.

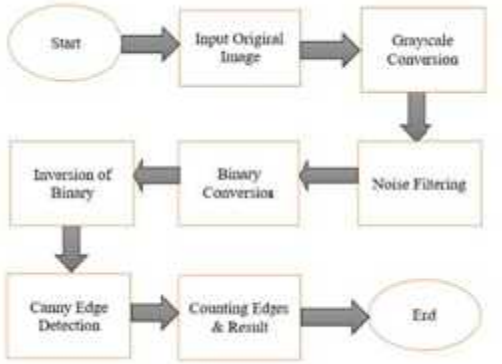

Fig. 3. Flow Diagram of Proposed Method using Canny Edge Detection

B. Acquiring Data

Three samples of the same blood are taken on a slide, each mixed with reagent anti-A, anti-B, anti-D respectively and images of the slide are taken. These images are digital images stored in PNG format and are pre-processed using color plane extraction. The original slide test image is used as input and processed as shown in Figure 3 and the experimental setup is shown in Figure 4.



Fig. 4. Experimental Setup

C. Color Plane Extraction

Color plane extraction extracts one of the three color planes from the image. It converts the 3D pixel images into 2D pixel images it reduces the processing complexity. When we convert RGB to Grayscale image shown in Figure 5, 7 only 8 bit required to store a single-

pixel so 33% less memory needed to store an image. Generally, a Grayscale image indicates the image where each of its pixels is representing a range of a particular amount of light. After Gray Conversion as shown in Figure 5, 7, Median filter is applied to reduce salt and pepper noise as shown in Figure 6.



Fig. 5. RGB and Gray Converted Image

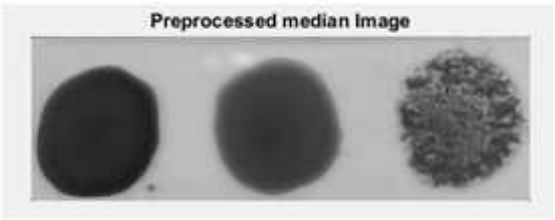

Fig. 6. Median Filtered Image

D. Binary Conversion and Inversion

A binary image is a digital image that has only two possible values for each pixel namely 0 and 1. Determining the histogram of grayscale image binary conversion is performed. The histogram is a 1-dimensional matrix that is used to represent the pixel intensity in frequency distributions. Binary Converted image which has 0 (black) and 1 (white) and the inversion of the binary image which will take inversion of the binary operation and convert white pixels into black pixels and black pixels into white pixels as shown in Figure 8.

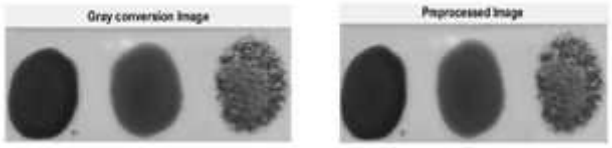

Fig. 7. Gray and Preprocessed Image

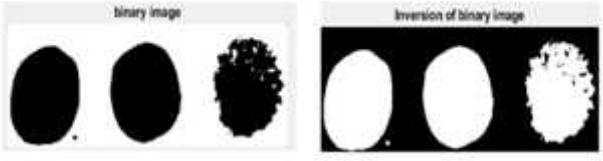

Fig. 8. Binary and Inversion of Binary Image

E. Image Division

It is the process of dividing a digital image into multiple segments within the sets of pixels. It is generally based on two basic intensity values it has m number of rows add n number of columns. Each of the elements in this matrix representation is called a pixel. As shown in Figure 9 the image is divided into three parts Group A, Group B, and Rh factor.



Fig. 9. Image Division

F. Canny Edge Detection

In the Proposed system Canny Edge detection is used to find the edges in the given input image as the performance of canny edge detection operator is much better than Sobel, Roberts, Perwitts, zero crossing and LOG (Laplacian of Gaussian) with respect to image appearance and object boundary localization. Canny edge works by detecting discontinuities in brightness and also is a multistep detection algorithm that is capable of detecting edges from the pixel image. The image is smoothened with a Gaussian filter to reduce noise and unwanted details and textures. Canny edge output is then used to count the number of edges. The result obtained by implementing Canny Edge for the three separated images are shown in Figure 10, and the values of the counted edges are, Group A = 2 Group B = 1 Group Rsh = 20



Fig. 10. Canny Edge Detection

IV. Experimental Results

A. GUI Implementation Result

The different input images of slide test are as shown in the Figure 11, 12.

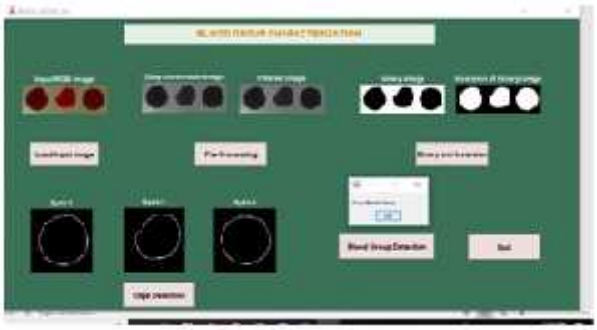

Fig. 11. Blood Type O -ve

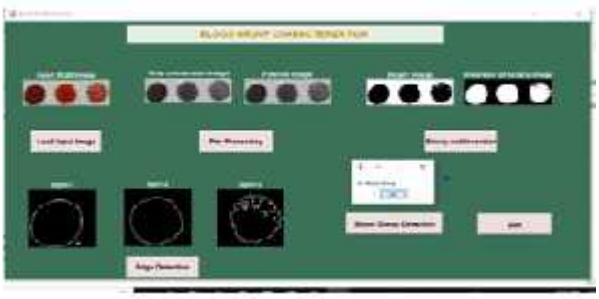

Fig. 12. Blood Type O +ve

V. CONCLUSION

We presented a new and efficient model of blood group detection using image processing techniques. Our dataset consisted of 100 blood samples images collected from the hospitals and those captured by a camera. Using canny edge detection we counted the edges for each image and bY analyzing the data we computed blood type from our samples. Our method does not need domain expert and our whole process is fully automated. Our experimental results with our collected dataset were able to give faster results compared to the laboratory reports. Our model is thus an efficient digital process for blood group detection.

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Detection of Acute Lymphoblastic Leukemia using microscopic images through Image Processing

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Abstract - Acute Lymphoblastic Leukemia (ALL) is a type of cancer of the blood cells and bone marrow. The detection process of ALL is a tedious process and requires time to obtain results, thus a computer based detection system is required. Microscopic images of blood samples of patients with ALL and normal patients are acquired. These RGB images are converted to LAB format and K-mean clustering is implemented to extract nucleus segmented image. After this Morphological operations are performed. The geometrical features are extracted from the nuclei and the images are classified as cancerous and non-cancerous blood cells. These cells are also classified into their sub-types by multi-support vector machine classifier

Keywords – Acute lymphoblastic leukemia detection, LAB conversion, k-means clustering, support vector machine classifier, nuclei segmentation.

I. INTRODUCTION

Leukemia's are malignancies that start in platelets that would typically form into various sorts of platelets. Frequently, leukemia begins in early types of white platelets, however some leukemia's beginning in other platelet types. There are a few sorts of leukemia, which are partitioned dependent on whether the leukemia is acute(fast developing) or ceaseless (slow developing), and whether it begins in myeloid cells or lymphoid cells. Acute lymphoblastic leukemia(ALL) is additionally called Acute lymphocytic leukemia. "Intense" or "Acute" implies that the leukemia can advance rapidly, and if not treated would most likely be lethal inside a couple of months. "Lymphocytic" signifies it creates from ahead of schedule (youthful) types of lymphocytes, a kind of white platelet. Lymphocytes create from cells called bolster vector machine classifier, cores lymphoblasts to get develop, disease – battling cells.There are main 2 types of lymphocytes:-

- **B lymphocytes(B cells)**

B cells help protect the body by making proteins called antibodies. The antibodies attach to germs (bacteria, viruses, and fungi) in the body, which helps the immune system destroy them.

- **T lymphocytes(T cells)**

There are a few sorts of T cells, each with an uncommon activity. Some T cells can crush germs legitimately, while others assume a job in either boosting or easing back the movement of other resistant framework cells.

Granulocytes are WBCs(White platelets) that have granules in them, which are detects that can be seen under the magnifying instrument. These granules contain proteins and different substances that can demolish germs, for example, microbes. The 3 sorts of granulocytes – neutrophils, basophils, and eosinophils

– are recognized by the size and shade of their granules.

The four primary sorts of leukemia are intense lymphoblastic leukemia (ALL), intense myeloblastic leukemia, ceaseless lymphocytic leukemia, and incessant myeloblastic leukemia.

Among these sorts, the most regularly distinguished from the patients are ALL which presently by and large concurred that both hereditary and ecological elements assume an intuitive job in its advancement, and includes 70% of the leukemia cases every year. On the whole, there is an unusual and wild expansion of lymphoid forerunners called lymphoblasts in the bone marrow with captured development. The French American British grouping orders ALL into three morphological subtypes (L1, L2, and L3). The attributes of these sub types are as per the following: L1 cells are moderately little with coarse chromatin and their cores are described by a uniform populace. L2 cells are portrayed by atomic heterogeneity, and these cells are bigger than L1 cells. Lastly, L3 cells are

described by the unmistakable quality of vacuoles within the cell. Their cores are generally homogeneous in populace, and bigger than L1.

Notwithstanding propelled procedures, that is, stream cytometer, immune phenol-typing, atomic testing and so forth., infinitesimal assessment of fringe blood and bone marrow slides despite everything stays as a standard ALL finding method. Thus, this methodology is the most conservative route for beginning screening of patients. Manual assessment of the slides is exposed to predisposition, that is, administrator experience, tiredness and so on., coming about with conflicting and emotional reports. For example, manual assessment has a blunder rate somewhere in the range of 30% and 40% relying upon the experience of the hematologist. This strategy is additionally tedious and dreary. Thus, there is constantly a requirement for a practical and strong framework for ALL screening which can incredibly improve the yield without being impacted by administrator weakness. The greater part of the recently proposed strategies followed the conventional manual methodology performed by a specialist, that is, division of cell, separating its highlights, characterizing the cell. Because of the precision of the consequent component extraction and characterization relies upon the right division of impacts, the division step assumes a significant job. Specifically, a lot of work has been performed to accomplish cells division. A cell identification strategy that uses both power and shape data of the cell to improve the division. Additionally a hypothesis proposes a programmed strategy to section core and cytoplasm of bone marrow white platelet (WBC) in light of the fluffy C implies calculation and essential numerical morphology activities.

Recognition of ALL cells is the significant point of this investigation. To accomplish this point, our work is partitioned into two sections: In the initial segment, we mean to group all cells as ALL and noncancerous cells. In the subsequent part, our advantage is to order all cells into 6 gatherings; L1, L2, L3, atypical, receptive, and ordinary, utilizing multi bolster vector machine (SVM) classifier. The PC based framework that is proposed in this paper for identifying these cells has six primary advances. The initial step is picture procurement. The pictures are caught by a computerized camera that is combined with a light magnifying lens. The subsequent advance is the change of picture from RGB to Lab position. Core division is the third and the most testing venture of this work. Division of cores is performed utilizing k implies calculation on L and abdominal muscle groups of Lab shading space. In the wake of applying division calculation on our pictures, highlights of cores are extricated from the aftereffect of division part and on the grounds that there are a high number of highlights, some of them are chosen as the best highlights. Highlight extraction and highlight determination methodology considered as the forward advance. The fourth step is picture pre-processing. Picture improvement is utilized as pre-processing on this work, and that is for improving the nature of pictures. Two arrangements of geometric and measurable highlights are removed from cores including zone, border, robustness, whimsy and degree as geometric highlights and entropy, mean, standard deviation, vitality, skewness, and kurtosis as factual highlights. The last advance is the characterization of cells. For grouping part, SVM classifier is applied.

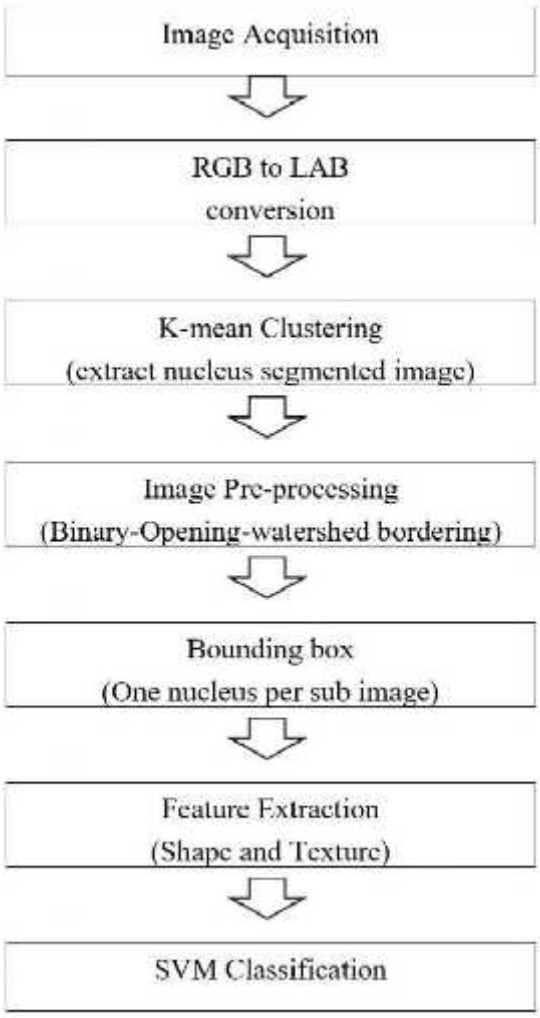

Fig..1 Block diagram

II. METHODS

A. **Image Acquisition**

In this step, we have used a microscopic image of stained WBC cells, to which we can implement the further procedure given. This image is then given a fixed dimension.

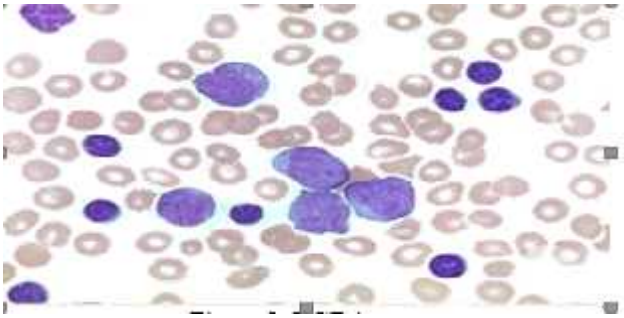

Fig. 2. RGB imag

B. RGB to LAB conversion

This RGB(Red Green Blue) image is converted to LAB space, as it reduces the number of color components used for the further segmentation

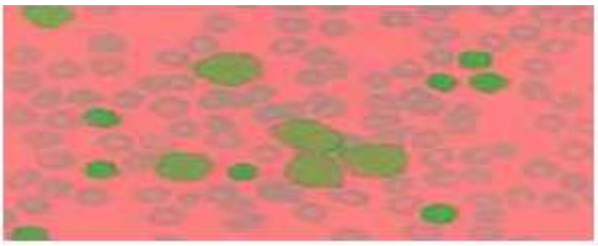

Fig. 3. LAB image

C. Image segmentation using K-mean clustering

The converted LAB(Lightness Chroma Hue) image is then segmented to extract the nucleus of the WBC by using K-mean clustering. K-mean clustering is a image segmentation method that forms groups or cluster of pixels of the image on the basis of a particular parameter. For our method, we used square Euclidean distance and the 'a' and 'b' color component of the LAB image is used for the segmentation

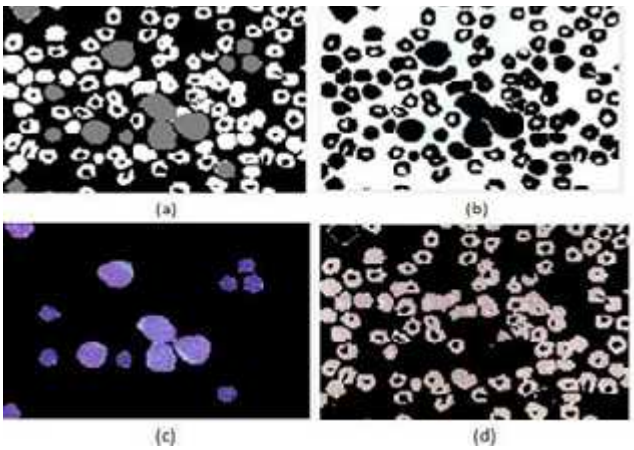

Fig. 4. (a) Clustered image (b) cluster index 1 (c) cluster index 2 (d) cluster index 3

Later the cluster containing the WBC nucleus is extracted



Fig. 5. Extracted nucleus image

D. Image Pre-processing

The extracted nucleus image is degraded. Therefore, this image must be processed before feature extraction and classification. Hence it is called pre-processing The image is processed in three steps, first is converting the image to binary. Second is morphological operation such as opening-closing, to retrieve a filtered image, and watershed bordering. In watershed bordering each nucleus is bordered, to separate every nucleus image. This ensures proper feature extraction

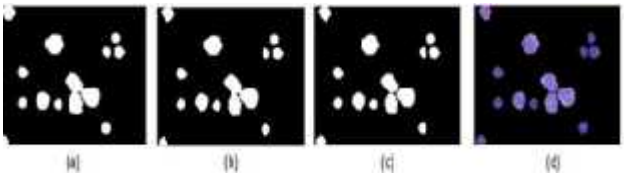

Fig. 6. Morphological operations (a) binary (b) opening and closing (c) watershed bordering (d) extracted image

E. Bounding box

Each nucleus is labeled separately, using bounding box. This ensures the labeling and feature extraction of each detected WBC cell.

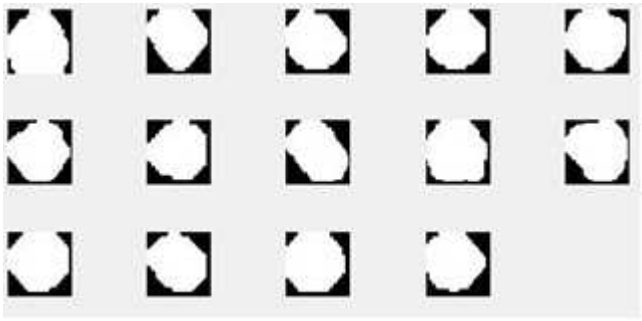

Fig. 7.Separated nucleus using bounding box

F. Feature extraction

For classification of ALL cells from normal lymphocytes, many features can be implemented. The features which we have considered are divided into two groups

1. Geometric Features

2. Statistical Features

1. Geometrical Features

Features such as centroid, area, parameter, major axis length, minor axis length, etc. were considered

2. Statistical Features

Statistical or texture features include entropy, standard deviation, and energy if the HIS image of the extracted nucleus imageAfter feature extraction, the selection of features to maximize the classification of the cells is a very important step.In our method, we have implemented features such as area, parameter, eccentricity, energy, entropy, standard deviation.

G. Classification using SVM

Support Vector Machine is a linear binary classifier which is implemented in machine learning for two class classification. In our method, we have implemented SVM to classify ALL and non-ALL cells. For this, the SVM model is first trained with known ALL and non-ALL cell features. Later the model is tested with image and checked for accuracy. We have used the RBF function as the activation function for our method.

III. RESULTS

The results of this method shows satisfactory classification of ALL cells from the acquired image.

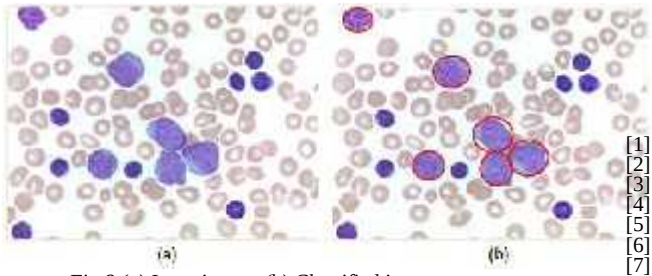

Fig 8.(a) Input image, (b) Classified image

In Figure8.(b) the cells infected with ALL among the WBCs are classified and highlighted. The accuracy table of the obtained results is as follows:-

Types of Patients	Database samples	Obtained Results	Accuracy in percentage
Non-ALL patients	26(338 cells)	323 cells	95.43
ALL infected patients	47(727 cells)	684 cells	94.08

IV. CONCLUSION

In this paper, a PC based technique for characterization of malignant and non-cancerous cells, utilizing just infinitesimal pictures of patients is proposed. The technique is straight forward and has an adequate exhibition and shows precision after effect of 94.08% for ALL patients. Thus, the proposed calculation can be utilized as a colleague analytic device for pathologists. The clinical effect of this exploration is that it will give the pathologists to look at a blood smear for finding carcinogenic cells. A few estimations of approval parameters are low since cells have morphologic likenesses and can likewise make it hard for pathologists during recognition of ALL.

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Water Quality Analysis Using Machine Learning

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***Abstract*— The deteriorating quality of natural drinking water is one of the direst and most worrisome issues faced by humanity. The effects of unclean water are far-reaching, impacting every aspect of life. Therefore, management of water resources is very crucial in order to optimize the quality of water. The effects of water contamination can be tackled efficiently if data is analyzed and water quality is predicted beforehand. This issue has been addressed in many previous researches, however, more work needs to be done in terms of effectiveness, reliability, accuracy as well as usability of the current water quality management methodologies.**

Keyword-- ARIMA model, prediction & evaluation of Water Quality.

I. INTRODUCTION

The problem of water shortage in semi-arid areas has become extremely serious in recent years. Recently various studies show that a lack of water resources could affect nearly 5.5 billion people in 10 years. Appalling water shortages and large volumes of sewage provide serious river and lake water pollution issues in arid areas. The water quality of rivers and lakes has become an integral part to human and economic development. Therefore, the assessment and approximation of water quality levels is essential for societal and economic development. With the advancements in space information science and with a tremendous increase in the use of computer applications in recent years, remote sensing has become an important and useful tool of surface parameter monitoring. It enables us to monitor large scale water bodies that suffer from qualitative problems more efficiently. By means of remote sense, an optical reflectance sensor was used in the study. Optical sensor systems make use of sunlight astheir source of light and are stocked with light-emitting components which provide radiation in specific band regions. The optical sensors produce hyperspectral information on water quality levels in the perceivable and near-infrared ranges. Some of the studies have assessed relationships between hyperspectral reflectance wavebands and waterquality parameters. Recent studies on surface water spectral features and modified model methods haveproved that itis feasible to execute water quality parameter monitoring by applying remote sensing technologies to more water quality variables with higher accuracy. Single water quality parameters like chlorophyll-a, total suspended solids, turbidity levels, transparency levels, levels of dissolved organic matter, chemical oxygen demand, biological oxygen demand, etc.Water Quality Index (WQI) is a means by which water quality data is summarized for reporting to the public in a consistent manner. It is similar to the UV index or an air quality index, and it tells us,in simple terms,what the quality of drinking water is from a drinking water supply.water quality is protected with a virtual absence of impairment condition are very close to pristine levels.These index values can only be obtained if all measurement meet recommended guidelines virtually all of the time.WQI scores are computed for each public water supply system that has been sampled in a sampling season..

The Water quality index(WQI) shows the status of the water quality assessment and has been developed with suitability to the riviers,lakes and reservoirs.This WQI approach has applied the concept based on the comparison between the water quality variables and their respective regulatory standards . It combines several of the water quality variables that have affected to the overall water quality.The simplest WQI has considered variables like dissolved oxygen,total suspended solid,pH and some nutrients .The monitoring data availability and accuracy have also contributed to the development of these models.The developed model should have also been opted to have the most meaningful and understandable response to the communities either to infrom about the pollutant sources or water quality condition. Some of the researchers have developed water quality prediction models with a different approach and application .some of the models were based on regression analysis ,time series. Although estimated models of water quality parametrs are comparatively precies, the produced results are uncertain because water environments are compound and changeable.Thus,a water body spectrum is depicted for

the whole water environment and is not just a single water quality parameter .The introduction of prediction model also could help in assessing and predicting future water quality situation if there is a need for different management strategies . Application of this water quality prediction model gives a benefit in determining the water quality status,where it needs the measurement of various water quality variables, to ensure that the water is safe to use for any purpose.The data includes the measurements of Nitrate(NO3-) parameter which affect and influence water quality.For the purpose of evaluating the performance of the model,the performance evaluation measures used are Mean,Meadian mode in Regression Analysis for the missing data and ARIMA model for the predication of new data.Previous work about Water Quality prediction have also been analyzed and future improvements have been proposed in this paper.This paper is based on prediction of water quality analysis in time series with the help of two predictive model and comparision between the two which are Logistic regression and ARIMA model.

II. LITERATURE REVIEW

The several approaches to identify changes or anomalies occurring on water quality time series data. logistic regreesion, in which support vector machines(SVM),artificial neural network (ANN)&deep neural network (DNN) are used in Fitore Muharemi &Florin Leon ,Machine learning approaches for anomaly detection of water quality on a real-world data set1]

(Journal of Information and Telecommunication),Similarly approaches for event detection on water quality time series data and also represents a case study to find the best model on Anomaly detection on water quality system in N. Singkran, et al., 2010, Determining water conditions in the Northeastern rivers of Thailand using time series and water quality index models, Journal of Sustainable Energy & Environment 2010;[2]To design and develop a low-cost system for the real-time monitoring of water quality using the Internet of Things (IoT) and Machine Learning (ML) inresearch paper (An assessment of seasonal variation and water quality index of the river and lake in india).[4] the physical and chemical parameters of water such as temperature, level, moisture, humidity and visibility are measured using respective sensors. ESP8266, the core controller is employed to process the measured values from the sensors which is in paper " Physio –chemical and Biological study of water of River''.Many further research studies were conducted to evaluate the quality of water from different sources and also different element which are described like TDS,pH,Nitrate,sulphur,phosphorus,florin,chlorine and many others in below mentioned papers.

III. PROPOSED WORK

The water quality of rivers and lakes is becoming central to human and economic development. Therefore, the evaluation and estimation of water quality levels is essential for social and economic development.

Studies on water spectral features and modified model methods have shown that it is possible to perform water quality parameter monitoring by applying remote sensing technologies to more water quality variables with higher precision.

According to the data from previous years we will plot a graph, find the trend of present and then predict the future variations in the concentration of chemical components that is (Nitrate) in the river or reservoirs.Logistic Regression is one of the model which is used for forecasting the data in time series which is done in R studio.

Autoregressive integrated moving average (ARIMA) model is a stereotype of an autoregressive moving average (ARMA) model. Both of these models are fitted to time series for better understanding of data and to predict future points in the series (forecasting).

IV. ALGORITHM

The Algorithm which is to be followed :

1. Visualize the time series.
2. Stationarize the series.
3. Plot ACF/PACF charts and find optimal parameters.
4. Build the ARIMA model.
5. Make Prediction

V. METHODOLOGY

When fitting an ARIMA model to a set of (non-seasonal) time series data, the following procedure delivers a useful general approach.

1. Plot the data and identify any different observation.
2. After plotting the data the mean and standard deviation is determined.
3. Also implementation of maximum likelihood estimation for formation of regression line takes place.

AR MODEL

The process is basically a linear regression of the data in the current series opposed to one or more past values in the same series.

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + .. + \beta_p Y_{t-p} + \epsilon_1$$

Where Y(t)depends only on its own lags. That is, Y(t) is a function of the 'lags of Yt'.

MA MODEL

Rather than using past values of the forecast variable in a regression, a moving average model uses past forecast errors in a regression-like model

$$Y_t = \alpha + \epsilon_t + \phi_1\epsilon_{t-1} + \phi_2\epsilon_{t-2} + \ldots + \phi_q\epsilon_{t-q}$$

Where Y(t) depends only on the lagged forecast errors.Where the error terms are the errors of the autoregressive models of the respective lags.the errors E(t) and E(t-1) are the errors from the following equations:

ARIMA MODEL

Auto regressive integrated moving average(ARIMA) model is a generalization of an autoregressive moving average (ARMA) model. Both of these models are fitted to time series data for the better understanding of the data or to predict future points in the series. The other models like ARIMA models are applied in some cases where data show evidence of non-stationary, where an initial differencing step (corresponding to the "integrated" part of the model) can be applied one or more number of times to eliminate the non-stationary points.

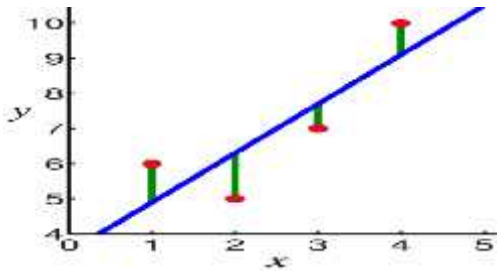
An ARIMA model is one where the time series was differenced at least once to make it stationary and you combine the AR and the MA terms. So the equation becomes:

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots - \beta_p Y_{t-p} \epsilon_t - \phi \epsilon_{t-} - \phi_2 \epsilon_{t-2} - \ldots + \phi_q \epsilon_{t-q}$$

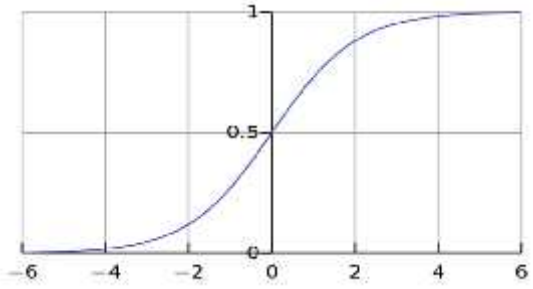
Similarly Regression part of it is as follows,which starts with linear regression part.

Linear Regression:

Linear regression is a basic and commonly used type of predictive analysis. The simplest form of the regression equation with one dependent and one independent variable is defined by the formula y = c + b*x, where y = estimated dependent variable score, c = constant, b = regression coefficient, and x = score on the independent variable.



the regression line is formed by maximum likelihood estimation method.the sum of square of distance between located points and regression line.



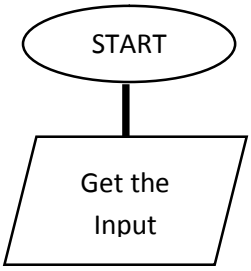
Logistic Regression: Logistic regression is a statistical model that in its basic form uses a logistic function to model a binary dependent variable, although many more complex extensions exist. In regression analysis, logistic regression is estimating the parameters of a logistic model . Mathematically, a binary logistic model has a dependent variable with two possible values, such as pass/fail which is represented by an indicator variable, where the two values are labeled "0" and "1". In the logistic model, the log-odds (the logarithm of the odds) for the value labeled "1" is a linear combination of one or more independent variables ; the independent variables can each be a binary variable or a continuous variableThe logistic function is a sigmoid function. which takes any real input t;where t belongs to Real number and outputs a value between zero and one;for the logit, this is interpreted as taking input log-odds and having output probability.

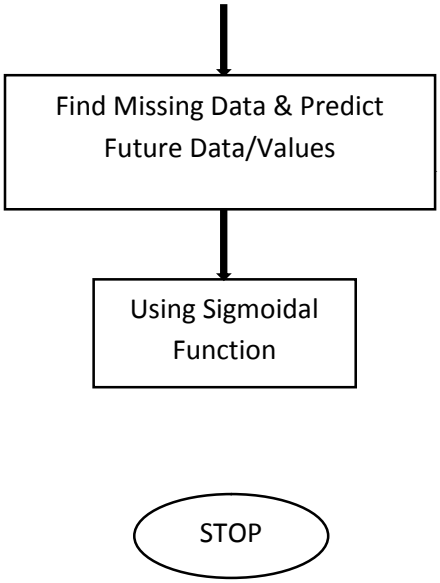
The standard logistic function

$\sigma: R \to (0,1)$ is defined as follows:

$$p(x) = \sigma(t) = \frac{1}{1 + e^{-(\beta + \beta 1 x)}}$$

FLOWCHART



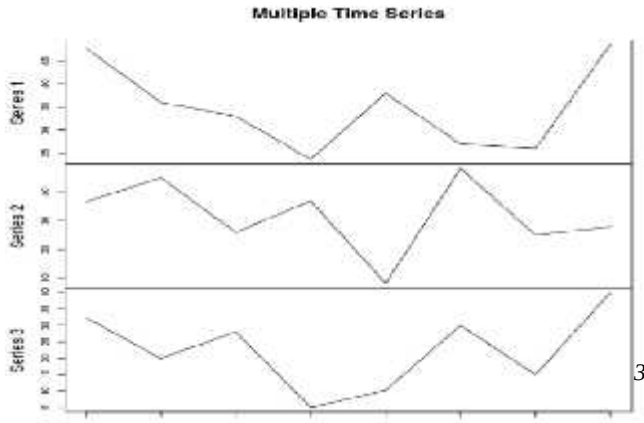


VI. OUTCOME

The project investigate the application of two time series forecasting techniques namely linear and logistic regression in time series to predict the water quality index and also to find the missing data for it whole analysis depends upon previous year data of water quality index.for that first plotting of data in time series is done as following in MATLAB.

Time series :Start =2011,End =2017,Frequency =1

YEAR	Series 1	Series 2	Series 3
2011	47.80	36.60	32.30
2012	36.00	45.00	20.00
2013	33.00	26.00	28.00
2014	23.65	36.98	05.00
2015	38.00	08.25	10.25
2016	27.00	48.20	30.00
2017	26.00	25.00	15.00



VII. CONCLUSION

The main objective was to identify the temporal distribution of water quality at the national scale and the relationship between economic development and water quality using time series analysis, in order to provide a more scientific basis for developing strategies for the protection and sustainable utilization of lakes and reservoirs.

Here we have taken the parameters into consideration to check the quality of water. Thus, with the help of logistics regression and ARIMA Models we check the quality of water using Rstudio for the following parameters.

Thus, with the help of this project we hope to check the quality of water, find the factors needed to improve the quality of water and also predict the quality of water in the future.

VIII . ACKNOWLEDGEMENT

We sincerely thank our guide Dr. Sangeeta Mishra for her guidance and constant support and also for the stick to our backs. We also thank the project coordinator for arranging the necessary facilities to carry out project work.We thank the HOD, Dr.Vinit Kumar Dongre , Dean Academic,Dr. R.R Sedamkar , Vice Principle , Dr. Deven Shah , The Principal , Dr. B. K. Mishra , and the college management for their support.

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Flood Risk Mapping using Remote Sensing and Predictive Analysis

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***Abstract*-Floods are among the most common natural disasters which are highly complex to model [1]. Predicting floods for any location is a long-established problem that has a huge importance in emergency management. Remote Sensing Techniques help in identifying and mapping flood risk areas. The further creation of predictive models using ML algorithms will lead to risk depletion, policy recommendation, mitigating loss of humanitarian lives, and reducing flood-related property damage. Machine learning approaches play a pivotal role in the development of these models that provide improved results and cost-effective solutions [1]. We plan to develop a model using QGIS and R programming that will provide an efficient early warning mechanism that will help in the prediction of floods.**

Keywords—Land Use Land Cover (LULC), Markov Chains, Machine Learning, QGIS

I. INTRODUCTION

Among the cataclysmic events, floods are the most dangerous in making gigantic harm to human life, foundation, farming and the financial frameworks [1]. Flood risk analysis is undertaken to research land use and is also used in the planning and management of future land resources which is done either to prevent economic loss due to natural causes or to enhance the system's ecological balance. Using predictive analysis and remote sensing methods, floods can be predicted in advance, that will not only help in detecting imminent patterns, but will also help us in preparing beforehand to tackle such situations and come up with proper contingency plans. Implementation of predictive mapping techniques became simpler with the advent of predictive modelling techniques and its simple incorporation with other technologies [1]. Robust and precise prediction significantly leads to water resource management strategies, policy recommendations and research, as well as further forecasting and evacuation. Governments are actually under pressure to set up dependable and precise maps of flood risk regions and further prepare for effective management of floods [1]. Governments will be able to devise different policies with the help of this study which are in people's interest and which will eventually help to achieve ecological stability.

1.1 Machine learning (ML)

A data driven model is a type of model that uses ML tech niques to build a relationship between input and output da ta, without having to worry too much about the underlying process.ML is an AI area for inducing regularities and pat terns, making implementation simpler, with low computat ion costs, quick training, validation, testing and evaluation , high performance compared to physical models, and com paratively lesscomplex compared to physical models.One of the characteristics that ML algorithms must be consider ed is that these models are a good as their training where t he system, based on past data, learns the target tasks [1]. If the data is sparse or does not cover a variety of tasks, th eir learning will be limited, and therefore they will be una ble to perform well when put into work.

1.2 ML algorithms used for Flood Risk Mapping

A. Artificial Neural Networks:

It is a model of computation based on biological neural network structure and functions. They are considered as a nonlinear modeling tool for statistical data where the complex associations between inputs and outputs are designed or patterns are associated [1]. As one of the most popular learning algorithms, ANN's are known to be flexible and efficient in modeling complex flood processes with large fault tolerance and accurate approximations, among the ML methods. ANN utilizes historical data and is more reliably used for flood prediction. ANN offers the most appropriate modeling technique and acceptable generalization capacity and speed compared to other models. Every ANN layer essentially carries out non-linear input transformations from one vector space to another. The relatively subpar accuracy, the urge for iterative parameter adjustment and the sluggish response to gradient-based learning process are a major drawback to using ANN.

B. Multilayer Perception:

For a more sophisticated modeling approach, the knack percolation learning algorithm calculates the propagation error in hidden network nodes individually. Non-linear activation functions resolve the major drawbacks of Linear activation function by allowing back propagation because they have an input-related derivative function [1]. And they allow various layers of neurons to stack to create a deep neural network. Because of many variables MLP is considered to be more tough to optimize.

C. Adaptive Neuro Fuzzy Inference System (ANFIS):

Fuzzy logic as a simplified mathematical model works to incorporate the knowledge of the expert into a fluid inference system. FIS further imitates human learning through a less complex approximation feature which offers great potential for non-linear designing of extreme hydrological occurrences such as floods. Neurofuzzy has a BPNN variant and the least square test of error, quick and easy to implement, effective learning and good generalization skills [1].

D. Wavelet Neuro Networks (WNN):

Wavelets transform (WT) can be used by analyzing local time series variation to extract information from different data sources. To boost the data quality, it supports accurate decomposition of an original time sequence. This incorporates wavelet theory and the NN in one theory. WNN, which incorporates WT and FFNN, and the Wavelet-based regression model, which integrates WT and multiple linear regression (LR), were used to forecast floods in time series [1].

E. Support Vector Machine (SVM):

SVM is a supervised learning machine that functions on the theory of statistical learning and the rule of structural risk minimization. With a huge popularity among hydrologists for flood prediction, SVM and SVR raised as the alternative ML methods to ANN's [1]. It is ideal for linear and non-linear classification as well as efficient input mapping into feature spaces. However, high cost of computation and disappointing performance makes it a lesser preferred option.

II. METHODOLOGY

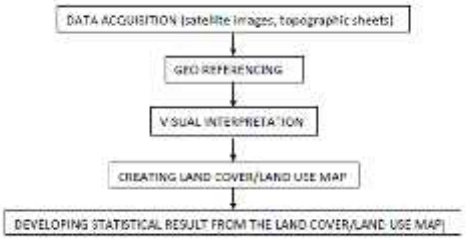
A. Study Area:

Mumbai is the capital of the state of Maharashtra, one of states with the highest population. It is located on a peninsula on the western coast of India sharing borders with Arabian Sea to the south and west, Mira Bhayander and Thane to the north and Navi Mumbai to the east [2]. The study area, i.e. Mumbai Suburban District, has an area of 446 sq. km. and a population of 9,356,962 according to the 2011 census [3]. Thus, the density of Mumbai Suburban district is 20,980 people per square kilometer. With elevations ranging from 10 meters to 15 meters, the city generally lies just above the sea level with an average elevation of 14 meters [3]. This makes the city highly prone to flooding and water lodging.



Fig. 1. Geographical Region of Mumbai Suburban Region

B. Remote Sensing:



Earlier when no remote sensed data was available, changes in LULC patterns were detected using tracing papers and topographic sheets [4]. But that approach has been slow, unsuccessful and unreliable. Wide areas of study involved lots of time, effort and time. Conventional solutions are labor-intensive, time-consuming and less often performed [4]. Therefore, preparation of detailed land use and land cover maps and tracking adjustments at regular intervals of time is comparatively simpler with the advent of satellite remote sensing techniques. In the event of inaccessible areas, the only method of data acquisition is by applying this technique. Quantum Geographical Information System (QGIS) is the software tool used for remote sensing purposes.

C. LULC Map Creation:

LISS - III images were used in the study marked in the years: 2018 to 2015. The processing of the image and classification was carried out using QGIS version 3.3 Zanzibar. Normalized Difference Water Index (NDWI) is used to monitor changes related to water content in water bodies, using green and NIR wavelength [5].

$$NI = (N - S)/(N + S)$$

TABLE I. BANDS OF LISS-III SATELLITE AND THEIR RESPECTIVE WAVELENGHTS

BAND	WAVELENGTH	REVISIT TIME
BAND 2 (VIS)	0.52 to 0.59	24
BAND 3 (VIS)	0.62 to 0.68	24
BAND 4 (NIR)	0.77 to 0.86	24
BAND 5 (SWIR)	1.55 to 1.75	24

D. State Selection:

Since the Markov model is a stochastic state-based transition model, selection of states is an important step. The states need to be clearly distinguishable from the available LULC maps as that will provide greater accuracy.

E. Markov Model:

We have seen that whenever a succession of chance analyses frames a free preliminaries process, the potential results for each examination are the equivalent and happen with a similar likelihood [6]. Further, information on the results of the past investigations doesn't impact our expectations for the results of the following test. The circulation for the results of a solitary trial is adequate to develop a tree and a tree measure for a grouping of n trials, and we can respond to any likelihood question about these trials by utilizing this tree measure. Current likelihood hypothesis reads chance procedures for which the information of past results impacts expectations for future analyses. On a fundamental level, whenever we watch a grouping of chance analysis, the entirety of the past results could impact our forecasts for the following test [6].

This model is often used in tracking, ecological modeling, changes in simulation, LULC patterns and to forecast the amount of land use transition and the stability of potential land development in the focus area. A Markov chain model explains the LULC shift from one time to the next to predict future changes.

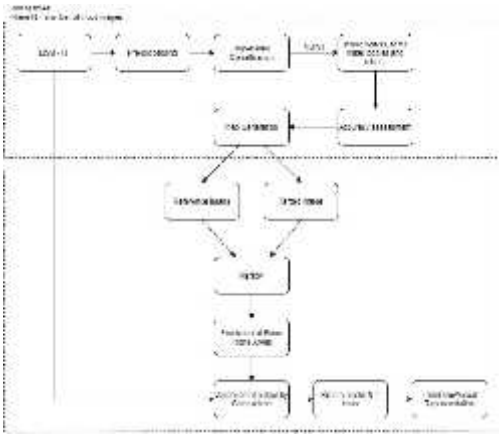
$$S(t,t+1) = P * S(t)$$

Where P is the transition probability i.e. the likelihood of transfer; it is the probability of moving in the next time from the current state to another one. Low transition is predicted to be close to 0, and high transition expectations are close to 1.

$$= \|p_i\| = \begin{Vmatrix} p_{1,1} & p_{1,2} & \cdots & p_{1,N} \\ p_{2,1} & p_{2,2} & \cdots & p_{2,N} \\ \square & \square & & \square \\ p_{N,1} & p_{N,2} & \cdots & p_{N,N} \end{Vmatrix}$$

Markov Chain calculates how much land is estimated to change from the latest date to the expected date [6]. In this method, the transfer probabilities are the output, which is a matrix that records the likelihood that each land cover class will move to each other class. Through the Markov chain simulation, the analysis of two different dates of the LULC images creates the transition matrices, a transition area matrix and a set of conditional probability images. The transition probability matrix for the period of 2008-2015 was determined to predict the 2019 LULC map and thus, any future given date for prediction. The probability of one pixel moving to another LULC or staying in the original LULC can be calculated by producing a transition matrix of probabilities. The transition matrix is generally important for predicting a future classification map. If the hypothesis tested has no significant differences in the observed LULC and the predicted LULC, the model is considered successful for future predictions.

LISS – III images are used for remote sensing analysis. This part includes pre-processing of images followed by supervised classification. NDWI is calculated in this block. After accuracy assessment the corresponding maps are generated. The Markov model depends and makes transitions between a fixed number of states. The states are classified as transient and absorbing states. The absorbing states mark an end to the process and thus need to be selected accordingly. The initial state transition probabilities are determined based on the basis of the initial land cover of a specific state. The transition matrix can be determined by the change in the first iteration. This determines the number of states or in real world, the time required by the process to end up in an absorbing state. This will obviously exist for all states since the given problem is an absorbing state problem but we will estimated the transition to absorption state in a finite amount of time. Multiple iterations will be carried out



and finally we will be able to see the trends or pattern this model will follow.

Fig. 8. Block Diagram of the proposed model

F. Required Software:

I. QGIS:

It is a cross platform free and open source desktop geographic information system application that is used to view, interpret and analyze data from a geographic perspective. It is used to deal with spatial information on a computer and perform spatial analysis. It's a great visualization tool helps in identifying data and tells us how they are related in space.

II. R Programming:

It is a programming language for statistical computing. R and its libraries implement a variety of statistical and graphical techniques, including linear and nonlinear modelling, time-series analysis, clustering and others.

III. Required Packages:

Markovchain (base)
Msm (Multi-State Models for panel data)
mcmcR (Monte Carlo Markov Chain approach)
hmm (hidden Markov models with covariates)
mstate ('Multi-State Models based on Markov chains for survival analysis)
igraph (to perform pretty plotting of markovchain objects)
expm (to perform efficient matrices powers)

Markov models are a decent method to demonstrate neighborhood, covering sets of data, which reflect prompts to our comprehension of locales [7]. Markov chains give a stochastic model of dispersion that applies to singular particles, which gives us the establishment for dissemination we've examined. This stochastic dissemination likewise gives a valuable model of the spread of data all through a picture.

III. RESULT

Using QGIS software as a tool for remote sensing the study area was analyzed for a period of 7 years starting from the year 2008 to the year 2015. During this analysis NDWI values were calculated for each year and their corresponding maps were generated. The NDWI maps of the year 2008 and the year 2015 are being shown in Fig.3 and Fig.4 respectively. In order to have a clear picture of the water bodies present in the study area Band 5 of LISS – III satellite is used that is used for short wave infrared sensing. Band 5 images of the year 2008 and the year 2015 are shown in Fig.5 and Fig.6 respectively. These NDWI values along with rainfall data in the above mentioned years are taken as parameters or variables for carrying out predictive analysis using Markov Chain model.



Fig. 3. NDWI band of Mumbai Suburban Region – 2008

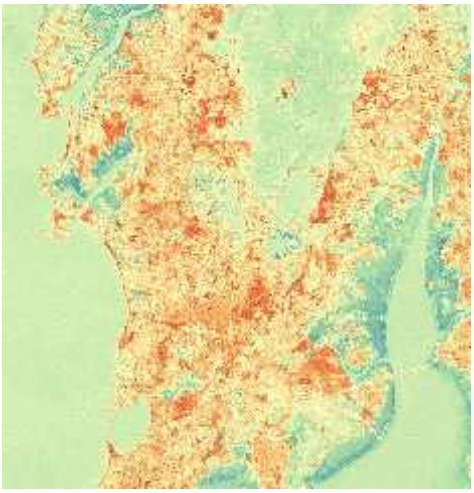


Fig. 4. NDWI band of Mumbai Suburban Region – 2015

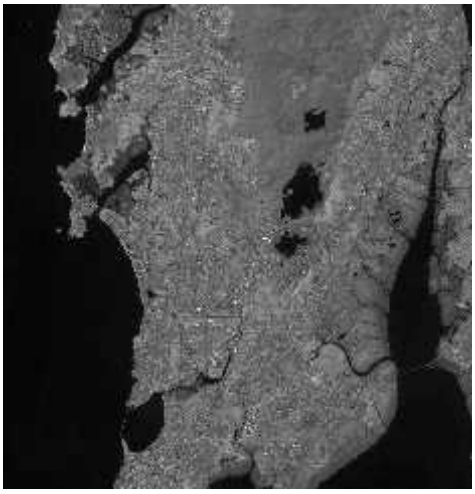


Fig. 5. Band 5 capture of Mumbai Suburban Region – 2008



Fig. 6. Band 5 capture of Mumbai Suburban Region – 2015

IV. CONCLUSION

Superior quality satellite images can be integrated with socioeconomic data in order to build environmental, economic and social threat prediction models. Using these models, one can construct demand-driven applications to help public and private organizations understand, prepare and respond to economic, social and humanitarian losses in a timely manner. Such models can be used to make near-real-time remote sensing applications by adding additional layers of response tools, like alerts and advisories etc. Ideally these applications ought to have the capacity to be scaled from local to global level for disaster and risk management. Some of the benefits it can offer are disaster risk reduction, event prediction for timely response and recovery and allowing stakeholders to better target investments and protect assets.

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Text to Speech Conversion for Visually Impaired Reader

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***Abstract*— It is known that the technological advancements are increasing at a faster pace. But the utilization of technologies in various sectors is very low. It is known that most of the people find it difficult to detect *the* text from the paper and books. So, we propose a system where the text images can be extracted by the system and given to the Raspberry Pi. The Pi processes the text images and reads out the content using speaker. The system consists of a Raspberry-Pi. Here we are using a camera for capturing the image of the text. The output is provided to the background separation unit. At last the output is provided to the OCR. The output of the OCR is given to the Raspberry Pi. The Raspberry pi detects the image content and provides an output signal in the form of audio signal.**

Keywords— Text processing, Text-To-Speech (TTS) synthesizer, Speech Enhancement

I. INTRODUCTION

In our planet of 7.4 billion people, 285 million are outwardly weakened out of whom 39 million individuals are totally visually impaired, for example have no vision by any stretch of the imagination, and 246 million have gentle or serious visual weakness (WHO).[1]

It has been anticipated that constantly 2020, these numbers will as conclusion to 75 million visually impaired and 200 million individuals with visual weakness. As reading is the prime significance in the day by day schedule (content being available wherever from books, business items, sign-loads up, computerized screens, travel tickets and so on.) Of humankind, outwardly disabled individuals face a lot of troubles .[1]

Individuals who experience the ill effects of low vision, sight and visual impedance are not ready to see words and letters in standard newsprint, books and magazines plainly. This can be a troublesome for the person and may also moderate down the person's confidence level. This may also level down their intelligence level. Thus, a device is expected to enable them to read. So, this device can help them scan and read any sort of content by transforming it into voice message. The motivation behind this device is to process the important documents, Reading material, and News Papers as contribution to a voice as output. Every Module for picture handling and voice preparing are available in the device. It likewise can play and stop the output while reading. The expectation up to is that, it has less error rate and less processing time and less cost productivity.

To build up the device Raspberry-Pi 3 along with its camera module and also Pytesseract (Python library) is used. It may or may not require any human supervision. The target of Text to Speech is to change over a given input into a verbally expressed waveform. Text processing and speech generation are two primary parts of a TTS system. The goal is to process the given information content and produce proper grouping of phonemic units. These phonemic units are acknowledged by the speech generation segment either by speech synthesize from parameters or by choice of a unit from a massive speech corpus. For normal sounding speech conclusion, it is basic that the text preparing segment produce a proper grouping of phonemic units relating to an arbitrary information content.

WHAT IS TTS?

Any Text-to-speech framework comprises of two significant components.

Beginning with the output, we need some kind of sound-creating instrument. A text to speech framework the info content is first investigated, standardized and translated into a phonetic or some other semantic portrayal. And then we have Text preparing parts which manages low level handling issues, for example, sentence division and word division [2].

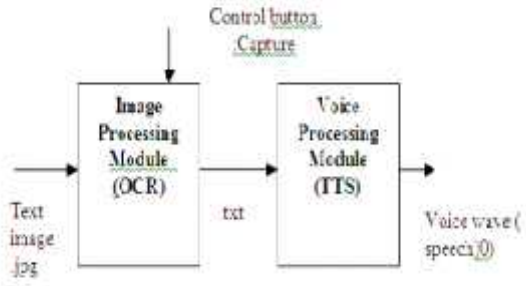

Fig.1 Basic Process [3]

It joins the idea of optical character acknowledgment (OCR) and Text to speech synthesizer (TTS) in Raspberry-Pi 3. This framework used to assist the visually impaired individuals with interacting with computer adequately through vocal interface. Text extraction from shading picture is troublesome task for computer the text to speech change framework is perused the English letters in order and numbers that are in the picture utilizing the OCR strategy and convert it into the voice design. This paper displays the plan usage and trial aftereffect of the gadget.

This device comprises of two sections, picture handling module and voice preparing module. The optical character acknowledgment (OCR) is the procedure that changes over the output or printed text pictures into the text arrangement for further preparation. This paper has exhibited the straightforward methodology for text extraction and its change into speech.

The testing of device was done on Raspberry-Pi 3 module. Text to Speech (TTS) framework creates the more characteristic voice that can be firmly coordinated with human voice. The instances of the speech combination are the voice empowered email and informing. The initial step of speech conclusion is for the utilizations to talk a world in receivers and later that speech is changed over into the advanced organization by utilizing simple to computerized converter and conclusion it to memory. Programming forms the information picture and changed over into text arrangement.
Take Picture: This Square will examine the picture/page that should be heard in the sound arrangement.
Change picture into dim scale/decide ROI: This will make the picture clear for the program and distinguish the districts of intrigue.

OCR handling: Here the preparing will be done as such as to peruse out the content organization from or the characters that are to be heard. It will get to the PIL (Python Image Library) and gTTS (Google text to speech) and along these lines giving the sound as output.

How Text-to-Speech Can Helps Students:

1. Improves word acknowledgment.
2. Builds the capacity to focus and recall data while perusing.
3. Permits children to concentrate on cognizance as opposed to sounding out words.
4. Builds children's fortitude for understanding assignments.
5. Assists kids with perceiving and fix mistakes in their own composition.

Thus, this paper will try to overcome some of the above-mentioned problems. Visual impedance is perhaps the greatest impediment for humankind, particularly at this generation, when data is imparted a ton by instant messages (electronic and paper based) as opposed to voice. Numerous difficulties are faced by a visually impaired individual in his/her everyday life while communicating. The device has been proposed plans to help people with visual disability. Right now, built up a device that changes over a picture's content to speech. The output will be in sound configuration. This will help people with visual weakness.

II. Literature Review

Vinaya Phutak, Richa Kamble, Sharmil Gore, Minal Alave, R.R.Kulkarni has presented a “Text to Speech Conversion using Raspberry - PI”. It emphasizes that Text to talk can change over the substance on picture into sound. For this change doesn't require web affiliation. It is definitely not hard to use, so the outwardly weakened individual can openly use this contraption[2].

Miss.Prachi Khilari, Prof. Bhope V. P. Department of E&TC Engineering presented “A Review on Speech to Text Conversion Methods”
It emphasizes that Text-to-Speech synthesizer has reliably developed from latest couple of decades to get the present shape. The three fundamental strategies for talk mix are Articulator, Formant and coherence amalgamation used in various synthesizers. Various new applications are developed, anyway rationality of built talk has not landed at the common level. Undoubtedly, even in India some investigation affiliations are also working on Text-to-Speech in regional lingos like Marathi, Hindi, Telugu, Punjabi, Kannada, etc. In any case, all of these structures don't copy the human typical talk. There is monstrous degree in progress in the amalgamation to achieve a raised degree of normal and feeling perspective [4].

Amrrith.N P, Dwishanth.P and Rekha.V, Akshay.A presented “A Survey on Text to Speech Conversion”. It emphasizes that the present structures encounters issues while performing channel on reports with complex establishments and the yield is depconclusioned upon to have less precision. The proposed system assures to scrutinize content present in the image for helping blind people [5].

Sujata G. Bhele and V. H. Mankar presented "A Review Paper on Face Recognition Techniques ". This paper has tried to review a basic number of papers to

cover the continuous progression in the field of face affirmation. Present examination reveals that for redesigned face affirmation new count needs to progress using creamer techniques for sensitive figuring mechanical assemblies, for instance, ANN, SVM, SOM may output better execution. The overview of references to give logically quick and dirty understanding of the techniques depicted is selected. We apologize to experts whose noteworthy responsibilities may have been disregarded [6].

Suhas R.Mache, Manasi R.Baheti, C. Namrata Mahender presented a, "Review on Text-To-Speech Synthesizer". It emphasizes that Test-to-Speech synthesizer has steadily developed from last few decades to gain the current shape. The three basic methods of speech synthesis are Articulator, Formant and Concatenate synthesis used in various synthesizers. Many new applications are developed, but intelligibility and comprehensibility of synthetic speech has not reached the acceptable level. Even in India some research organizations are also working on Text-to-Speech in regional languages like Marathi, Hindi, Telugu, Punjabi, Kannada etc. But all these systems do not replicate the human natural speech. There is huge scope in improvement in the synthesis to achieve a high level of natural and emotion aspect [7].

III. BLOCK DIAGRAM



Fig.2 Process Block diagram

CAPTURING IMAGE:

Raspberry pi 3 Camera Module:

The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

FEATURES:

1. 5 MP colour camera module without microphone for Raspberry Pi.
2. Supports both Raspberry Pi Model A & Model B MIPI Camera serial interface.
3. Omni vision: 5647 Camera Module Resolution: 2592 * 1944.
4. Supports: 1080p, 720p and 480p Light weight and portable.



Fig.3 Camera Module [8]

PROCESSING:

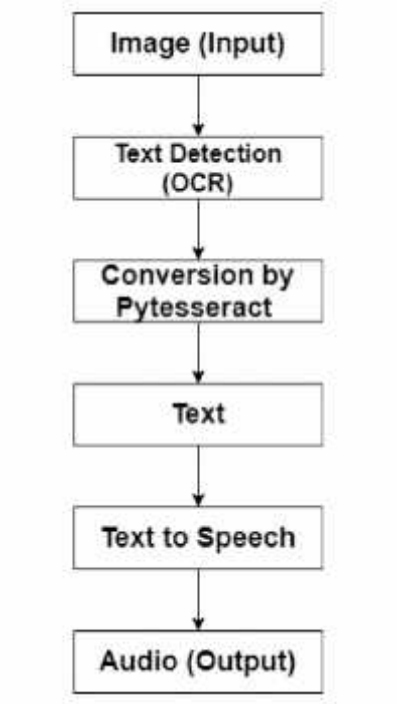

Fig.4 Process Flowchart

Input

The input should be in image format containing of texts.

Text detection

Here, with the help of Optical Character Recognition (OCR), block formation will be done.

Conversion by pytesseract

Python-tesseract is an Optical Character Recognition (OCR) apparatus for python. That is, it will perceive and "read" the content installed in pictures.

Text

This is print the text on terminal for the further processing.

Text-to-speech

The printed message on terminal will presently begin changing over into speech with the assistance of GTTS. GTTS (Google Text-to-Speech), a Python library and CLI device to interface with Google Translate Text to speech API. It is Customizable speech-explicit sentence tokenized
that takes into consideration boundless lengths of content to be read.

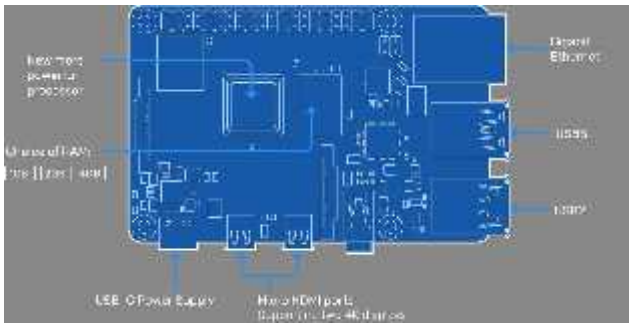

Fig.5 Raspberry Pi 4 [9]

Audio

The output will now be in terms of audio (mp3) and the input text is hereby converted to speech.

EARPIECE:

Headphones customarily refer to a couple of small amplifier drivers worn close by the head over a user's ears. In this project it helps us to hear the output, which has been converted by Text-To-Speech. It also let a visual impaired user listen to an audio source privately Headphones are otherwise called ear speakers, earplugs. It has various connection in Raspberry-PI such as wireless i.e. Bluetooth and a wired connection plug.



Fig.6 Wireless Earphones [10]

IV. Result and Discussion

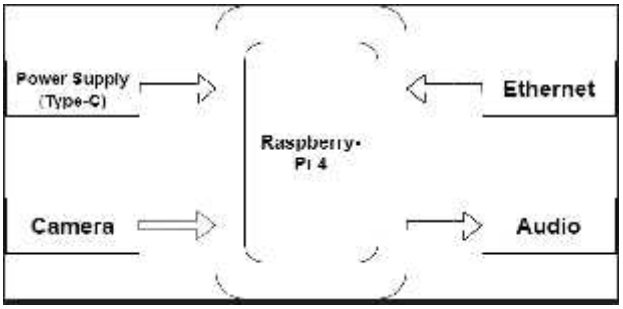

Fig.7 Raspberry-PI 4 Ports

- Text from the image is extracted and converted to audio.
- Both capital as well as small letters are recognized.
- Numbers are recognized as well.
- The font size of the Character should be minimum 12pt.
- Maximum tilt of the text line allowed is 4-5 degree from the vertical.

Text-to-speech devices are frequently utilized with Optical Character Recognition. OCR is an innovation that sweeps printed material into a PC or handheld unit and changes over it to advanced content.
People with learning incapacities who experience issues perusing a lot of content because of dyslexia or different issues truly advantage from TTS, offering them a simpler alternative for encountering site content.
For the individuals who access content on cell phones, perusing a lot of substance on a little screen isn't in every case simple. Having content to-speech programming taking every necessary step is a lot simpler.
TTS permits clients to see message and hear it read out loud all the while.

V. Conclusion

This project uses the innovation of camera-based device that can be advantageous for dazzle individuals to understand records. The work of this project is joining, catching picture, innovation in an implanted framework. This framework comprises of a camera as an information device which identifies the printed text for acknowledgment and that filtered content is worked upon by a product OCR. It will be exceptionally valuable so as to streamline perusing for a Visually Impaired person. The further process is carried by Raspberry-PI. Directly or indirectly, this project is beneficial for every individual. There are some future scope of the project which could help the Visually Impaired person.

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Sound Recorder & Looper

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***Abstract*— Sound Processing is now very significantly used in creation of music wherein basic features like looping are largely involved. Sound Looping is the repetition of a certain piece of sound that needs to be used long term. Our paper focusses on the implementation of a recording and looping system on a one-screen Android App. The aim of our work is a simple and easy-to-use Android Application usable for Real Time Sound Recording and Looping of the recorded sound. Pitch and Tempo Changing features in our app are designed to enable versatility in the usage of our app. The application is primarily targeted at beginner musicians who require feedback of their own work. In this case, the CONCEPT of looping may not be new, but its implementation on a SINGLE USER INTERFACE ANDROID APP is a new approach. Therefore, the end result of our work is to create an integrated recording, looping & audio processing Android Application for usage at a beginner level.**

Keywords— Recording, looping, sound, pitch, tempo, android, interface

I. INTRODUCTION

Sound looping is an emerging concept in live musical performances and with the growing use of smartphones, a single interface application is a requirement for learners and beginner musicians. Our work will introduce live recording and looping of the recorded audio in one single user interface. The minimum use of hardware and peripheral devices will enable portability and simplicity in functioning.

The growing use of smartphones and android applications led us to try and merge music with those applications. Live music today is an emerging field with artists trying to post videos on YouTube as well as performing live on-stage.

Sound looping becomes an essential tool for people trying to involve multiple skill-sets and elements in a single complete musical performance.

II. LITERATURE SURVEY

After referring to five existing research papers from respected publications, we were able to obtain various guidelines required for the implementation of our idea. These include conceptual and methodological corrections.

Our idea combines Android App Development with fundamentals of sound and therefore existing papers from the field of audio became relevant to us.

Some of our primary references are listed below –

1) Smart Loop Sequencer for Music Creation [1]

The publication introduced two concepts of Basic Loop Sequencing and Smart Loop Sequencing. A basic loop sequencer loops and overlaps sounds wherein the control of looping is given to the user. A Smart Loop Sequencer automatically selects loops based on the degree of excitement of input by the user. The platform of work used for both these tools is Microsoft Windows and both are constructed using the language C++

A loop sequencer is expected to be a good tool for non-musicians to compose music. However, it is not easy to appropriately select music loops because a loop sequencer usually has a large scale of loop collection. The concepts of sequencing and mixing of two sound tracks over one another were introduced to us. [1]

2) Audio Pitch Shifting using Phase Vocoder [2]

The concerned paper is a part of the Journal of the Audio Engineering Society, the primary publication of the Institute of Acoustics, Austria.

Pitch shifting of polyphonic music is usually performed by manipulating the time-frequency representation of the input signal. Most approaches proposed in the past are based on the Fourier transform although its linear frequency bin spacing is known to be inadequate to some degree for analyzing and processing music signals.

The concept and usage of Phase Vocoding is an essential factor in the implementation of our work. To be able to inculcate the phenomena of Sound and Acoustics in an Android Environment, certain predefined keywords and Java terms need to be used. Pitch Detection is a possible feature available in the inbuilt Java libraries. Fundamentals of harmonics and frequencies are the primary basis of implementation. The audio recorded by the user through our application will be led to to the Pitch Detection algorithms and further to change it, Phase Vocoding will be used. [2]

3) Reflexive Looper for Structured Music [3]

Reflexive Looper (RL) is a live-looping system which allows a solo musician to incarnate the different roles of a whole rhythm section by looping rhythms, chord progressions, bassline and voice. As seen in figure.1 –

various sound elements can be overlapped and even skipped according to the user's requirement. A reflexive looper avoids any delays and the structuring looks totally continuous. Different sound files are denoted by different colours in the figure below.

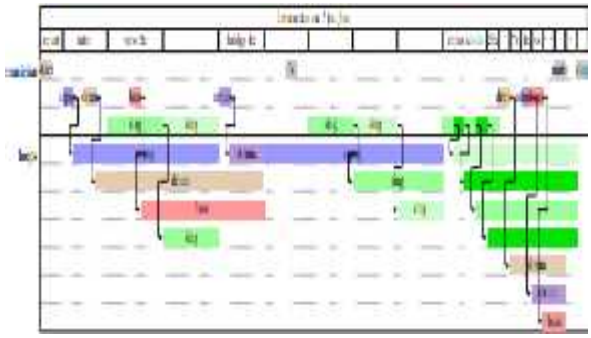


Fig.1: STRUCTURE OF OVERLAPPED SOUND ELEMENTS

Reflexive looping selects particular sound elements to play considering a pre-defined sound intensity. It becomes a smart way to create and compose music. For a basic example, if two sound elements – a singer's vocals and a keyboard's melody – are recorded individually, the looper will choose to make the keyboard silent as both playing together may make the TUNE redundant. Reflexive looping makes sound elements complementary to each other. Ofcourse, both can be played together if the user wishes to. [3]

III. METHODOLOGY

The basic methodology to be used in our paper is the development of coding and the app interface on Android Studio SDK. It is a universal platform used to create and host Android Applications for compatibility on various versions of Android.

The concepts of –Tempo – The tempo of the track is the perceived speed of the track. It is noticeable that different songs have different speeds during playback.

Pitch – In music theory, pitch represents the perceived fundamental frequency of sound. Pitches are categorized into HIGH & LOW. It is known that females speak/sing in a high frequency voice and males in low frequencies.

Need of Pitch and Tempo Changing features – These features can contribute to instant editing of the recorded sound according to requirement. An artist doesn't necessarily have knowledge of ALL SCALES in music. Therefore the recorded audio can be changed to the Pitch and Speed of playback. It is an additional feature but it acts as a valuable option to have last-minute changes.

Consider an example where A MALE GUITARIST records his guitar in a MALE-SUITABLE PITCH. This would be difficult for a FEMALE SINGER to adjust to. Hence instant changes in the recorded guitar can help the singer in such situations.

Android Studio is the premier platform for Android App Development and it was very essential for us that we understand the working and flow of functions in the software. The coding used in the building of our application is going to be Java. Commands for recording, looping and speed variations can be developed using in-built keywords and functions.

The implementation of our work consists of the following STAGES –

1) Getting Acquainted With Android Studio –

This step involves the basic study of the working of Android Studio. It is a drag&drop software wherein each button used has to be individually coded and initialized. It is important that we identify the in-built commands, the syntaxes and the keywords required to set up an application.

2) Studying existing research papers and projects – Selecting relevant research papers and understanding concepts involved in integrating Sound with software is a major development. An Android App based on our subject is a relatively unexplored field but there are some algorithms and models that apply to any software having the ability to record and playback required elements. Software running on Windows and independent Hardware are common in the application of Loopers and identifying the background flow of operations becomes essential.

3) Identifying Algorithms and Setting up the Coding- There are certain algorithms required to allow our software the access to the inbuilt microphones and speakers of our smartphones. There also exist basic processing methods required to record multiple sound tracks over one another without distorting the existing sounds. These processing methods need to be separately executed for Android and cannot be mixed up with languages compatible for computers or iOS.

4) Building the Application Interface – The ideal number of buttons required in the application has to be found out. Each button has its individual coding and therefore any additional element can lead to unwanted complications. The app needs to be set-up and debugged at each step to ensure that it does not crash. The interface is the actual appearance of the application to the user. The buttons used in the interface are given individual functions that can be used by the user according to his/her requirement.

5) Execution of the Application – Setting up step-by-step functioning of each button. Also involves regular error correction and debugging. Crashing is a very common issue when Android Applications are concerned. The designed app is tested for every function and Android Studio enables simulation for the same. The testing of the application is done on a computer and not an Android phone itself. The next stage is the actual transfer of the design from the computer to the concerned Android phone.

6) Deployment of the Application – Ensuring that the designed application is compatible on multiple phones across multiple versions of Android OS. Android has reached its version 10 in 2019 and therefore the execution of the designed application over multiple Android versions becomes tricky. Android Versions 5 and below have become obsolete now.

Below is the representation of the working environment in Android Studio (3.5.3) -

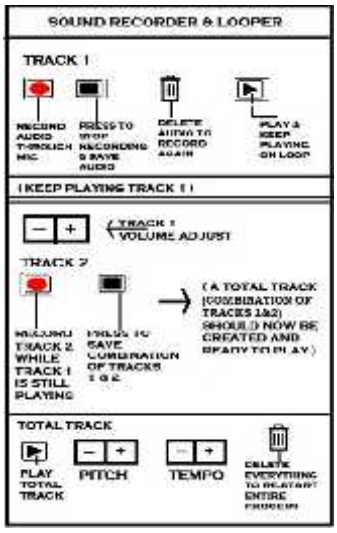


Fig.2: INTERMEDIATE STAGE- BUTTON ORIENTATION

Android Studio is an elaborative drag & drop software wherein each dragged button on the interface is given individual background coding. Every function has a designated button that the user sees on his mobile device

The design of an application involves multiple factors ranging from the targeted version of software, use of inbuilt device hardware, performance accuracy, ease of use, minimal error rates, etc and all these can be separately looked after, on Android Studio (3.5.3)

The figure.2 extensively shows the software environment wherein each used button can be edited in terms of appearance and also its function.



IV. EXPECTED RESULT

Above is the expected User Interface of our Android Application. We are aiming to cover everything in a single screen to ensure convenience for the user. Function of each key is mentioned in the representation. The flow of operations will be –

1) Recording the first single track audio
2) Playing the recorded audio continuously on loop
3) Recording the second audio track and overlapping it on the first.
4) Obtaining a COMBINATION of the two tracks
5) Pitch Changing Feature
6) Tempo Changing Feature

Fig.3: EXPECTED FINAL INTERFACE OF APPLICATION

Our a
tracks back-to-back in real time and a combination of the two tracks should be obtained as a single complete track. The primary feature of the app will be dual track looping and additional features of pitch and tempo changing will also be integrated. The subjects covered in our work include the extensive use of Android App Development tools along with their integration with the technicalities of sound. Pitch, Volume and Tempo are very basic qualities of sound and they become the parameters used for Sound Processing. We learned, understood and executed the processes of application making on Android Studio and the concept of deployment was introduced to us. HMM, Neural Networks and Transforms – all have been previously used for sound processing across various platforms, but Android Studio, with its excellent inbuilt algorithms becomes the perfect and simplest alternative for the development of Sound Based programs.

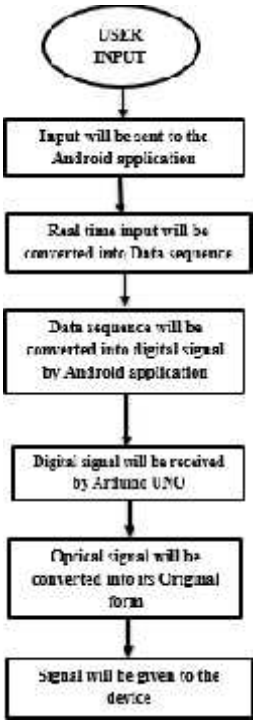


Fig.7: Flow Diagram

V. SCOPE OF PROJECT

Nowadays, robotics is becoming one of the most advanced in the field of technology. It is not restricted to certain set of actions. It can perform rotation of arm, movement of cutter. All the movements are controlled by the DC motor. It is also called as semi-autonomous because it is controlled by the human. With more advancement in technologies and further improvements made, such that the mower is fully autonomous in any given shape of grass field. This prototype can only turn on the cutting blades when green color is detected (assuming grass is only in green color) but grass when dried would turn into yellow and brown and the Bot would assume it as an obstacle. Also the cutting blades won't turn off when a green color obstacle is detected. So these problems of detection of all colors of grass without assuming that they are obstacles can be addressed in the future. Using IoT we can make the field mower inform the water sprinklers in the grass to not sprinkle water till the field mowing is completed. Further, more improvements can be made to avoid obstacles such as pits and manholes which are common in public parks. With technology improving at a rapid pace, the functionality and the performance of the AgriBot can be improved.

VI. EXPECTED OUTCOME

The person will be controlling the robot using an android app. Battery powered automatic AgriBot will relieve the consumer from mowing their own field and will reduce both environmental and noise pollution. The past technology of weed cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work. Also, in old methods lack of uniformity was seen. And also due to the use of engine powered machines increases the air and noise pollution also this weed cutter requires high maintenance.

VII. CONCLUSION

Automation is especially needed in agriculture field for increasing yield of crops. Flexibility of automation system is higher than traditional system. This project is mainly based on minimizing man power as well as cost of the equipment. It is an Agricultural Automation Robot using Arduino. The advantage of this system is that it reduces the labor cost and time. In this the robot is built and established to carry out weed cutting and cutting & picking of fruits. The project presents a low cost, low power, and simple system for device control

VIII. ACKNOWLEDGMENT

The Completion of this project could not have been possible without the guidance and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following

We are very grateful to Mrs. Rupali Mane. Prof. Manoj Chavan, HOD Dr. Vinit Dongre, Dean Dr. Lochan Jolly and Principal Dr. B K Mishra for their endless support, kind and understanding spirit during the preparations of this project. To all the Professors, lab assistants, friends and our parents who in a way or other shared their support, morally, financially and physically.

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Automatic dozy driver detection and halting the car safely for accident avoidance

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***Abstract*—Driving drowsily is an issue that has been troubling various countries for years, and parts of India face compounded risks due to the country's geography and driving style. Driving drowsily is especially dangerous when paired with poor road conditions in rural, mountainous areas. In this paper fatigue detection of the driver and emergency parking to reduce the number of accidents caused due to drowsy driving; which deals with automatic drowsiness detection using image processing and emergency auto parking of the vehicle. The paper also discussed about an algorithm to detect, track and analyze driver's EAR (Eye Aspect Ratio) associated with facial landmarks**

I. INTRODUCTION

Currently, transportation is an essential part of human activities. Driver's drowsiness is a significant factor in a large number of vehicle accidents. Recent statistics show that annually 1,500 deaths and 76,000 injuries can be attributed to drowsiness related crashes. According to the National Sleep Foundation, about half of Indian adult drivers admit to consistently getting behind the wheel while feeling drowsy. About 30% admit to falling asleep behind the wheel at some point in the past year – with more than 45% admitting this has happened at least once in their driving careers at some point in the past year. The National Highway Traffic Safety Association reported that an in 2018 estimated 35,000 car accidents that resulted in injury included drowsy drivers. This amounted to 2.0% of all injurycrashes.

In this paper, we have proposed a system which detects driver's fatigue using EAR (Eye Aspect Ratio) which calculates the distance between vertical dimensions and horizontal dimensions of the eye using the facial landmarks and monitors the value continuously. In this system we have used the EAR (eye aspect ratio). In comparison with the other methods from the different kinds of literatures, our discussed algorithm provides better efficiency and decreases the response time for analyzing the EAR at server as the server is locally setup.The number of frames per second to extract the facial landmarks is set to 40. When the system detects closed eyes and state of emergency, there is an alarm which buzzes. After detecting the face, the dimensions of the eyes are extracted from the face which helps us calculate the eye aspect ratio as defined in our implemented algorithm.

II. OBJECTIVES

The objective of this system discussed in this paper focuses on the idea that the driver's face is continuously monitored and as soon as the eye aspect ratio goes below the predefined threshold value drowsiness of driver is detected. After the detection to prevent any mishaps due to drowsiness, the co-passengers are notified by displaying a warning and then the car is safely brought to halt to prevent any mishap from happening.

III.PROPOSEDSYSTEM

3.1 SYSTEM BLOCKDIAGRAM

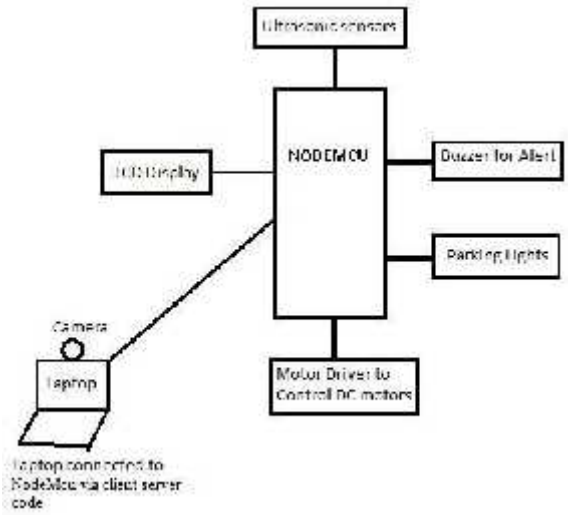

Fig 3.1

Hardware implementation involves the use of Node MCU which is the core, controlling the entire system as soon as the drowsiness of the driver is detected. The fatigue detection python code will be running in the local computer and the hardware code will be running in Node MCU which is remotely located on the car module. The client-server algorithm is used to connect the local computers with remotely located Node MCU on the car module.

NodeMcu acts as Server and the local computer which detects the drowsiness acts as Client. Server and Client are connected to a common local IP. NodeMcu being a server is initiated first and it waits for the client that is the local computer to connect. Once they are connected to a local IP they now can share and transfer messages to each other. When the drowsiness of the driver is detected in the local computer a message is encrypted and sent to the remote NodeMcu in order to trigger the hardware circuit. When NodeMcu receives the message from the local computer it decodes the message and initiates the hardware code.

3.2 SYSTEMFLOW

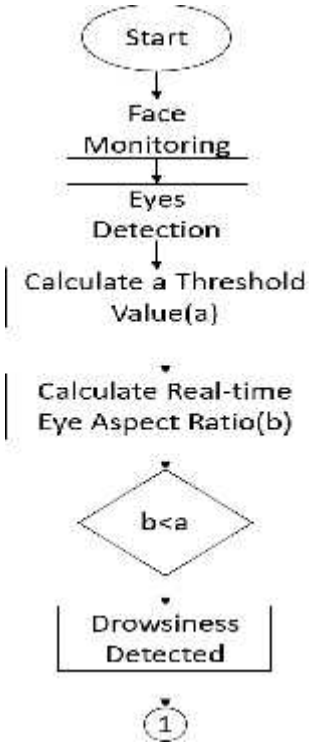

Fig 3.2.1

Fatigue of the driver is detected by applying facial landmark detection and the eye coordinates are being extracted. These eye coordinates values are used to calculate the eye aspect ratio (EAR), which is used to inspect whether the eyes are closed or not. If the eye aspect ratio shows that the eyes have been closed for more than the defined frames per second, then we trigger the hardware circuit and display the driver is drowsy.

SciPy package of python is used to calculate the Euclidean Distance in the calculation of the eye aspect ratio. Operation of OpenCV can be made faster by using Imutils package for image processing functions and applications. Dlib library is used to detect and localize eye facial landmarks. The eye aspect ratio function is used to calculate the ratio of separation between the vertical eye coordinatesand the separation between the horizontal eye coordinates. The value of Eye aspect ratio (EAR) is calculated simultaneously and it is approximately constant when the eyes are open. It rapidly drops down when the eyes are closed. We keep a threshold value of the eye aspect ratio and the number of frames. If the calculated value goes below the threshold value for the given number of frames then the software returns with the message of fatigue detected.

3.2.2 HARDWARE

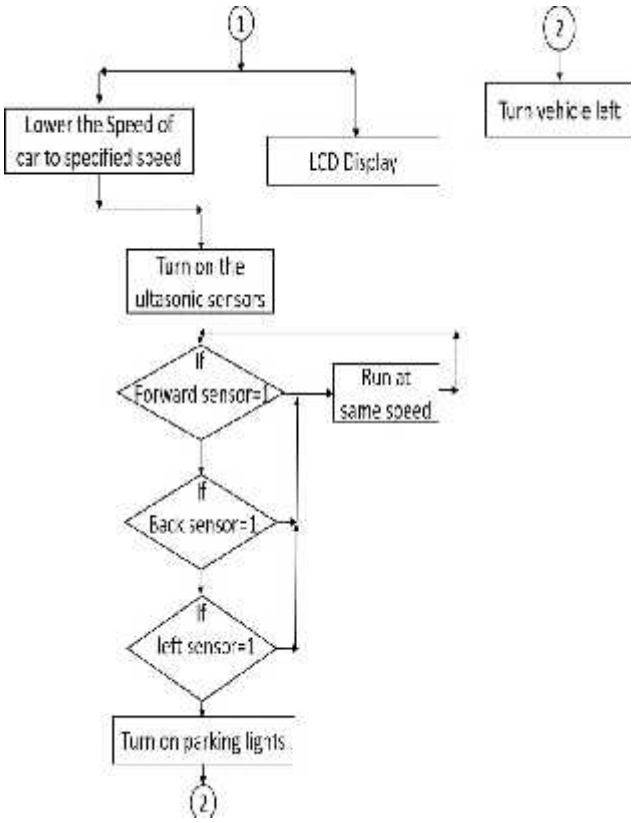

Fig 3.2.2

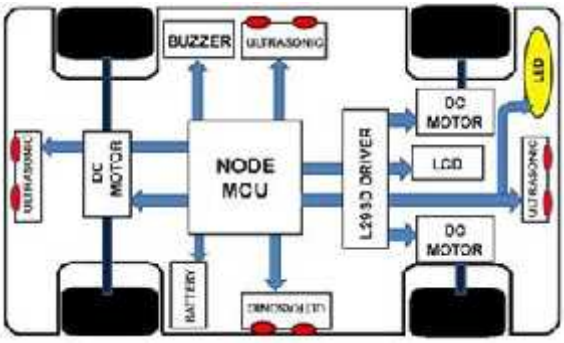

Fig 3.2.3

Ultrasonic sensors play important in parking the vehicle, providing safe automation of parking. The basic flow structure of system after detection of drowsiness of the driver as shown in the FIG (3.2.2)

The flow goes such that as soon as drowsiness is detected it will inform about it to Node MCU using trigger signal wirelessly. Along with that surroundings can be alerted using a simple LCD Display showing a message that driver is drowsy. Then the vehicle would be bought down to a specified speed limit for smooth emergency parking. To help the driver in parking the vehicle at the safe place ultrasonic sensors are turned on, which are fitted around the car. For automating the car for emergency parking first the sensor placed on front and back will be turned on checking if there is any vehicle in front or back of the car. If there is any vehicle it will continue to be in the same state of speed. Sensors will continue checking continuously until there are no vehicles. After getting clearance the sensor placed on the left will be working similarly as the other sensors checking on if there's any vehicle on left. If the road is clear the vehicle will be parked in the left lane of the road with the parking lights on, giving indications that the car is turning to theleft.

IV.EXPERIMENTAL RESULTS

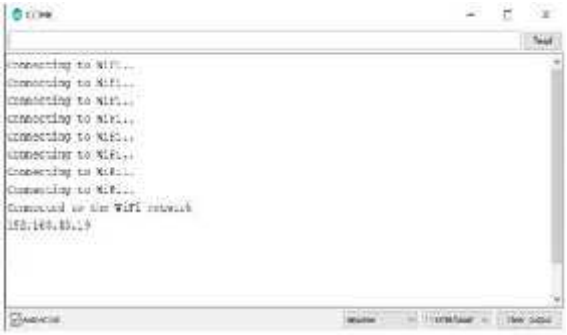

Fig 4.1



Fig 4.2



Fig 4.3 Driver E.A.R >Threshold

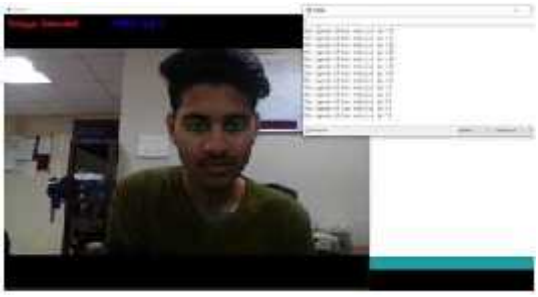

Fig 4.5

E.A.R	DC Motor speed	Ultrasonic sensor	Remark
0.42	255	-	No detection
0.40	255	-	No detection
0.41	255	-	No detection
0.40	255	-	No detection
0.38	255	-	No detection
0.26	255	-	No detection
0.24	255	-	Drowsiness Detected
0.26	230	8	Drowsiness Detected
0.26	205	10	Drowsiness Detected
0.27	180	15	Drowsiness Detected
0.24	130	6	Drowsiness Detected
0.26	155	4	Drowsiness Detected

V.FUTURESCOPE

The idea of our project is the real time detection of a dozy driver and to avoid any accidents that are likely to happen. The goal of this project was kept within what was assumed to be achievable during the timeline and capability. As such some improvements can be made over our initial design for the detection purpose, along with the system for monitoring the eye aspect ratio, there is also a possibility that the posture of the driver can be detected. By making use of the different fitness apps and gadgets available today, the sleep cycle can also be observed, which could help avoid this scenario before it happens. The heartbeat of the driver can be monitored by implanting a sensor on the seat belt and that coupled with the other sensors can be used to give a more accurate apprehension of the drowsiness. In order to safely halt the car, the



surroundings of the car can be perceived by using the ultrasonic sensors. An improvement over that could be the use of laser sensors which could create a rough environment of the car's surroundings, which could then be used by the processor as soon as the driver becomes dozy. This would necessarily be closer to real time implementation of our project. The drowsiness detections of any particular driver can be stored as and when it happens. This can be used by the car renting agencies as well as the taxi services to keep an eye on the driver. By using this information, it is also achievable to design a system to give recommendations about who should drive during what part of the day. This can substantially reduce the possibility of an accident that could happen.

VI.CONCLUSION

1. As shown in FIG4.1, remote NodeMcu on car module and local computer is connected to the local Wi-Fi connection and an IP address is obtained.

2. In FIG 4.2, as it is shown, the client (local computer) is connected to the server (NodeMcu on car module). The server is waiting for the client to detect the moment when the driver is drowsy,by displaying the message “Waiting for drowsiness”.

3. In FIG 4.5, as it is shown, the eyes of the driver are closed which gradually decreases the eye aspect ratio below the specifiedthreshold and therefore the system shows a warning that the fatigue has been detected.

4. From Table 4.1, it can be noted that initially the eye aspect ratio (EAR) is more than the specified threshold of 0.3. Hence the system will not find the driver to be drowsy and the car will proceed without any disturbance. However, when the eye aspect ratio drops below 0.3 for more than 40 frames, the system will issue an alert that the driver is drowsy. As soon as the fatigue is detected a trigger signal is sent to the NodeMcu through the locally setup Wi-Fi connection via the client-server algorithm. As soon as the NodeMcu is triggered, as per our discussed algorithm,

the speed of the vehicle is slowed down in a gradual manner and the ultrasonic sensors will provide the reading according to the presence of any vehicle alongside it. This will ensure that the vehicle is safely halted to prevent any mishap from happening.

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Data Analytics for Healthcare: Prediction of Liver Disease

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***Abstract*- Currently, one of the most prevalent diseases of 21st century is liver disorders, annually causing a huge number of casualties all around the world. A range of therapies have been provided by researchers to evaluate results. It has been proven that early diagnosis is of considerable amount of significance in treating the disease. Using various Artificial Intelligence methods for liver disorders diagnosis has recently become a remarkable development in this field. The idea behind this project is to train a liver patient dataset to be able to predict liver disease using certain algorithms. This will help patients as well as doctors by getting a prior notification about the current condition of the individual's liver. It will also help doctors to keep track of their patients' medical condition and to find any similarity or pattern in different liver patients and thus accordingly provide medications to their patients. It has been observed that various algorithms provide different results in the aspect of efficiency.**

Keywords: Data Mining, Classifiers, Algorithms – KNN, SVM, RF, Naïve Bayes, Big Data.

I. INTRODUCTION

Wide-spread implementation of big data analyses in health care is thirstily anticipated as a result of its potential to greatly improve several areas of healthcare. A huge number of promising applications of massive knowledge in attention exist: higher understanding of disease; pathologic process and classification of complex diseases; development of anticipative prognostic models; reduction of hazards to health; identification of events to support preventive initiatives; improving the healthcare efficiency of the treatment; and personalization of various therapeutic regimens according to the diversity of the patients' characteristics. There are various liver disorders that require clinical care by a skilled and efficient healthcare professional. Research conducted worldwide has proved that a liver, if damaged to a certain degree, can take anywhere from six months to a couple of years to recuperate. To regain the same functioning as that before the damage, the liver requires around two years of time. Hence, it can be conjectured that the diagnosis of a liver disorder is as crucial and vital as that the treatment itself. The study of liver development has significantly contributed to developmental concepts about morphogenesis and differentiation of other organs.

II. RELATED WORK

Data mining techniques have been widely used in the field of health, one of these techniques is classification and has been known to be quite effective in classifying patients who suffer from liver disease with patients who do not suffer from liver disease. There are two data mining classification techniques, namely Naïve Bayes and C4.5. The results show that the accuracy of Naïve Bayes algorithm is higher than that of the C4.5 algorithm. The Naïve Bayes can be considered as the most effective and efficient classification algorithm and has been successfully applied to many medical fields, one of which is to deal with liver disease data. However, there is a varying opinion on whether Naïve Bayes or C4.5 algorithm is better for classifying liver disease. To compare, Naïve Bayes has a high accuracy in small sized databases but for large databases, decision tree algorithm's accuracy is better. Thus, so as to improve the classification accuracy of Naïve Bayes algorithm, researchers combined it with other classification tree algorithms, to produce a technique called NB Tree, which includes the advantages of both, the decision tree algorithm and Naïve Bayes algorithm. Although NB Tree was declared as having higher accuracy than decision tree and Naïve Bayes, this algorithm is rarely used since its implementation is laborious.

III. PROPOSED WORK

OVERVIEW:

The term Big Data Analytics refers to the process of collecting, organizing and analyzing very huge sets of data (hence the name "Big Data") to discover patterns and other useful information. The minimum requirement for a data set to be classified as "Big Data" is that the data must be of petabytes or greater in size.

Such analytics techniques can help organizations in various fields to better understand the information contained within the data, take insights from the data, and will also help identify the data that is most important to the business and future business decisions. Analysts working with Big Data typically want the knowledge (or the insights) that come from analyzing the data.

Data mining is a critical aspect of data mining, and is a vital tool in the field of disease diagnosis. It is done via automation and prediction of disease in the medical field. Data Mining techniques and algorithms are created by Medical Data Diagnosis for analyzing medical data. In previous years, livers disorders have become widespread and liver diseases have become the most fatal disease in several countries. In our study, real patient dataset consists of 416 liver patient records and 167 non liver patient records. These records were collected from North East region of the Andhra Pradesh state of India. The dataset has been analyzed and trained for making classification models to forecast liver diagnosis. We applied different classification algorithms to the above- mentioned, given dataset and parameters such as precision, recall, and accuracy were analyzed to determine performance of these classifiers. Various analyses and development of algorithms were carried for performance improvement of classification models. Ultimately, the results showed promising results in the diagnosis of liver diseases during the initial stages.

K-NEAREST NEIGHBOR ALGORITHM:

The K-Nearest Neighbor algorithm (KNN) is a lucid, user-friendly, and supervised machine learning algorithm that is used to implement both classification and regression solutions. A combination of stored and label instances is used to classify the new data. Similarity measure is then used for computing the distance in between the data that were stored and the new instances. Euclidean Distance, Cosine similarity or the Manhattan Distance are usually used as the similarity measures. We can also say that, for any new data point that we input to the system, similarity to existing data in the system is calculated.

RANDOM FOREST (RF):

Random Forest is a machine learning regression method, which implements classification that works by structuring the liver data into an abundance of decision trees at training time and then outputting the class that is the mode of the classes output by individual trees. Among current algorithms, the Random Forest is one which provides exceptional accuracy. The output classification provided by RF is proven to be quite highly efficient. It can handle thousands of input attributers without variable deletion. This algorithm provides an estimation of which variable in the classification are of the utmost substance and prominence. The process in this algorithm involves the creation of many classification trees. To classify a new liver object from an input vector, put the input vector down each of the trees in the forest. Each tree gives a classification, and says the tree "votes" for that class. The forest chooses the classification having the most votes)

SUPPORT VECTOR MACHINE (SVM):

SVM have attracted a great deal of attention over the past ten years and have been diligently tested to various fields in a multitude of applications. SVMs are mostly used for learning classification, regression or ranking function. The concept on which the algorithm of SVM is built is based on statistical learning theory and structural risk minimization and have the intent of determining the location of decision boundaries. These decision boundaries between the classified objects are known as hyperplane. These hyperplanes are the cause of the optimal separation between the classified objects. SVM is one of the most robust and exact classification techniques in current times. The data analysis in SVM is based on convex quadratic programming, and it is computationally costly, as solving quadratic programming methods require large matrix operations as well as time consuming numerical computations. SVM is discriminative classifier formally defined by a separating hyperplane. The algorithm, when provided with labeled training data, outputs an optimal hyperplane which categorizes new examples. In two- dimensional space, this is a line dividing a plane in two parts where in each class lie in either side. Using transformations called as kernels, we can obtain the hyperplane even in various dimensions. Tuning parameters such as Kernel, Regularization, Gamma, and Margin are used to obtain the optimal hyperplane for a variety of datasets.

J-48:

J-48 classification is an algorithm used to generate a decision tree developed by Ross Quinlan. J-48 is an extension of Quinlan's earlier ID3 algorithm. The decision trees generated by J-48 can be used for classification, and for this reason, C4.5 is often referred to as a classifier. It induces decision trees and rules from liver datasets, which could contain categorical and numerical attributes. The rules could be used to predict categorical values of attributes from new liver records. C4.5 builds decision trees from a set of training data in the same way as ID3, using the concept of information entropy. The training data is a set S=s1, s2 … of already classified samples. Each sample si consists of a p- dimensional vector x1,i,x2,i,...,xp,i where the xj represent attribute values or features of the sample, as well as the class in which si falls. At each node of the tree, C4.5 chooses the attribute of the data that most effectively splits its set of samples into subsets enriched in one class or the other. The splitting criterion is the normalized information gain (difference in entropy). The attribute with the highest normalized information gain is chosen to make the decision. The C4.5 algorithm then recurses on the partitioned sub lists. This algorithm has a few base cases.All the samples in the list belong to the same class. When this happens, it simply creates a leaf node for the decision tree saying to choose that class.None of the features provide any information gain. In this case, C4.5 creates

a decision node higher up the tree using the expected value of the class. Instance of previously-unseen class encountered. Again, C4.5 creates a decision node higher up the tree using the expected value.

NAÏVE BAYES:

This technique is based on Bayes' Theorem of probability. It follows an assumption that the predictors are independent. The presence of a particular feature or attribute in a class is not related to the presence of any other feature or attribute can also be considered as the basic assumption of Naïve Bayes classifier. Consider an example, an object like a fruit may be thought to be an orange if it is orange, round, and about 2.5 inches in diameter. Even if these features or attributes depend on each other or upon the existence of the other features or attributes, all of these properties are independent in their contribution to the probability and point to the fact that this object of type fruit is an orange and therefore it is known as 'Naïve'. Therefore, each feature makes an independent and equal contribution to the result.

$P(R|S) = P(S|R)\ P(R) \mid P(S)$ --(1)

Equation (1) is the formula of the famous Bayes' Theorem and gives the probability of occurrence of an action after occurrence of an action. Here P(R) is the priori of R. If y is the class variable and X is the dependent feature vector. $P(y|X) = P(X|y)\ P(y) \mid P(X)$-(2)

Equation (2) shows the usage of the theorem to our dataset. The Naïve assumption can be incorporated and the algorithm implemented for a dataset.

IV. CONCLUSION

Data Mining and Machine Learning technology is widely used these days in various fields such as WiFi- hot spot detection, diagnosis of various disease, diagnosis of cancer, prediction of type of cancer, etc. Classification and clustering are two major data mining techniques which are extensively used in healthcare sectors for medical diagnosis and predictive analysis.

In this paper, the focus is given on five different clustering method i.e. SVM, RF, KNN, J48, Naïve Bayes. These clustering techniques were evaluated to identify whether the patients have liver diseases or not and what are the chances of getting afflicted by severe liver disorder.

This paper evaluates and compares the performance of these algorithms to classify the patient with liver diseases based on various parameters, which indicate the medical condition of the individual's liver.

From this study, we can conclude that:

1) The Naive Bayes algorithm gives the fastest computation time followed by RF then J48 then SVM then KNN Algorithm.

2) The highest accuracy is given by the Random Forest Algorithm when all algorithms are implemented without any changes and also the precision is maximum in RF.

3) Maximum recall has been obtained by the implementation of KNN Algorithm.

Therefore, we can conjecture that in terms of Accuracy, Precisions and Recall the Random forest is the better classifier then rest of the four classifiers.

For future study, the performance of Random Forest algorithm will be the target of improvement because the number of classification rules is complex and the accuracy can be increased by finding the most significant factor in identifying liver disease patients. By choosing the most significant variables, we hope we can speed up the computation time without loss in accuracy to significantly identify and predict the liver disease.

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Density Based Traffic Control System And Emergency Vehicle Detection

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***Abstract*—Today is the new era of technology and advanced systems. Almost everything that is used is controlled automatically, however there are a few fields in which work is still done manually. Traffic is one of the fields which still uses manual controlling. Traffic is a major problem in megacities. The major issue with Indian traffic is that it is non-lane based. It is one of the reasons of congestion which further leads to an increase in the number of road accidents. A system is developingto optimize traffic control and ensure a smooth flow of traffic. A system is proposed for the detection of emergency vehicles. The aim is to develop a system which manages traffic based on the density of vehicles(Vehicle count). The processor calculates on which side the density is high and accordingly assigns signal priorities based on it. Raspberry pi is used as a microcontroller which provides signal timing based on this. A camera is rotated 360 degree with the help of a dc motor. This camera captures images and then the images are analysed further. The conventional system is based on timer which poses different kind of issues such as traffic jam and wastage of time even when there are no vehicles on the other side. Emergency vehicles also get stuck due to this. All these limitations and the problems posed by them have led to many ideas as solutions. These includedigital image processing using raspberrypi.**

I. INTRODUCTION

The daily life is affected frequently due to the traffic congestion and it poses all kinds of challenges and problems. The major drawback of Indian traffic is that it's chaotic and non-lane oriented. So we need to build a solution framework for Indian traffic that's different from developed countries. The traditional system is based on a timer which causes limitations such as heavy traffic jams, wasting time even if there are no other vehicles. Emergency vehicles such as ambulance are locked in. For achieving more effective Traffic control system, a system is designed based on Raspberry Pi module.

Camera is rotated through 360 degrees by using a dc motor. Using this, the presence and absence of vehicles on the road can be distinguished, and traffic light can be indicated to go red when the road is empty and green when the number is greater. If the maximum time has elapsed for the green light then signal the traffic light to go red even if vehicles are still present on the lane. In many cities around the world traffic congestion is an unrelenting problem.If the maximum time for the green light has elapsed then Signal the traffic light to go red even if there are still vehicles present on theroad.

Traffic congestion is a relentless problem in many cities aroundthe world. Congestion means a lost worker productivity, trade opportunities, delivery delays. Traffic lights which are of current technology use manual operating system for the time allocation and also require high maintenance during the operation. This makes more time lapsing and vehicular traffic is increased. This proposed system results in making the traffic less and allow the vehicles based upon the density on the road. The aim of the project is to reduce the traffic in areas where there is a heavy density of vehicles by implementing Raspberry pi operation along with image processing.

II. EASE OF USE

This project aims at reducing traffic by monitoring the vehicles and evaluating the density. It applies various processes and signals the traffic by providing priority to heavy density regions. It also reduces the human effort of the traffic police who manually manages the traffic at times of congestion on the roads.

III. METHODOLOGY

This traffic controller is designed with Raspberry Pi, Image processing using python, Pi-Camera, IR sensor, motor and RF transmitter and receiver. Image processing is performed to convert the raw images into more accessible form.

The main component is Raspberry Pi which is used to control all, it acts like a controller. Traffic is captured by the camera and this information is sent to pc.
The Raspberry pi is connected to the PC to do the hardware implementation in which it controls the signal using traffic control system. To activate the motor IR sensor is used.

The motor with nails is placed below the traffic light to control the traffic when the red light is on. Use of the RF transmitter and receiver also allows emergency vehicles such as ambulances or any VIP vehicles. The entire project function and flow can be summarized in brief as this flowchart. The Functional block of the Density based traffic light control system is shown in the flowchart Here the Raspberry pi 3B+ is interfaced with IR Sensor to detect the vehicles

SD card is initially inserted into Raspberry pi. In the ras pberry pi, the WIFI module is interfaced with which the PC and hardware kit are connected.This system offers a new method for controlling the processing of traffic light by image using raspberry pi module. A camera is mounted next to traffic light. Using a dc motor the device is rotated around 360. Photo sequences will be identified. Use of digital image processing The image series for vehicle identification and traffic conditions on the road will then be analyzed.

It can be also used for emergency vehicle detection.

A tool like VNC viewer is used to connect the Raspberry pi to the system. Server is the system which is named as PC. Nails are connected to motor to tilt when IR sensor detects the vehicle.

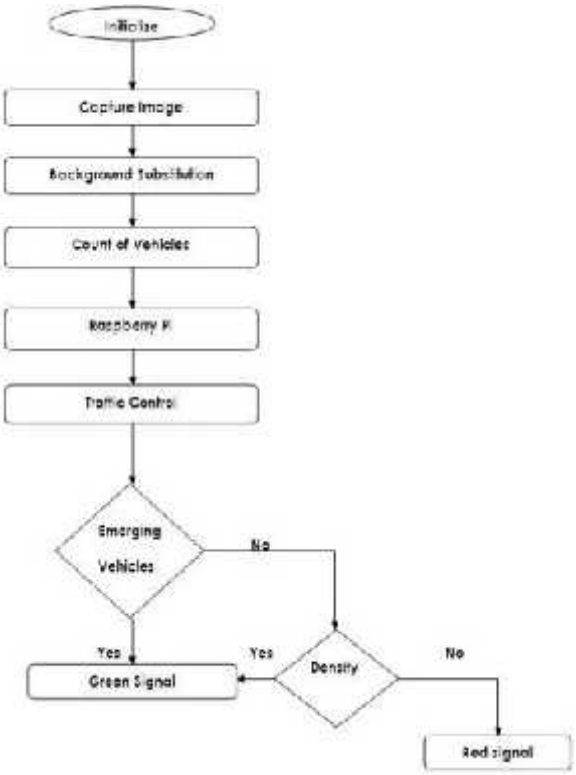
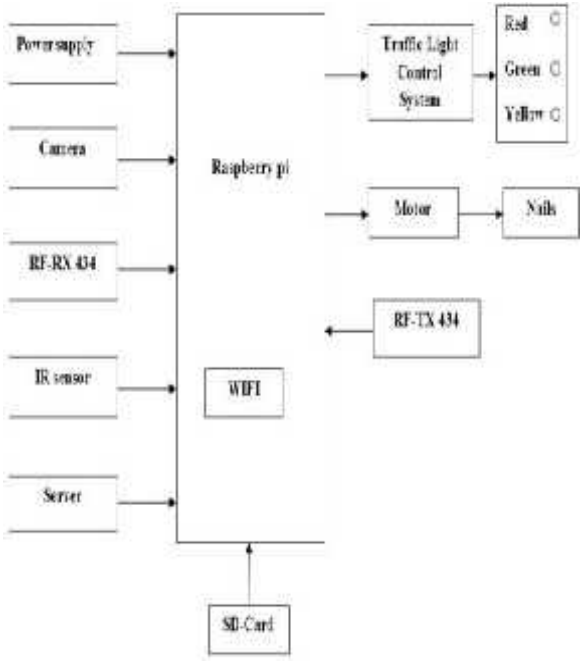
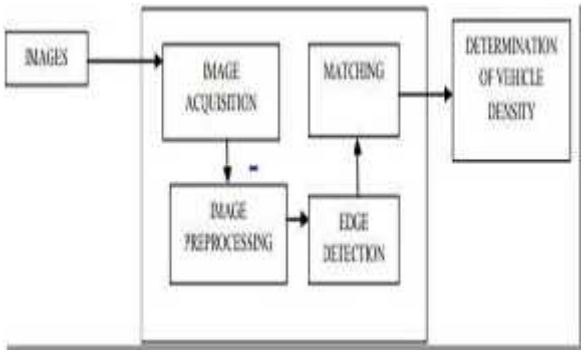
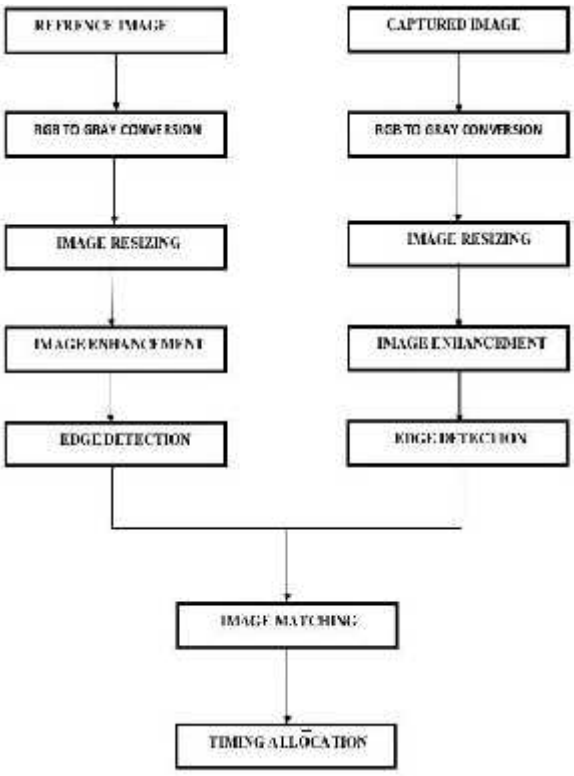


Fig 1 Flowchart





In image acquisition, external USB camera is required and Modifications are to be made in raspberry pi camera set up according to the changing Linux environment. The functions for image preprocessing are imported from open cv libraries and is included in final python program. In Edge Detection there is a change in the gray level. The following are the criteria for Edge Detection –There should be minimum number of false edges, noise sensitivity, good localization, orientation sensitivity. Image Matching is a method in which camera rotates in the clockwise and anticlockwise direction after every complete rotation compared with the reference image.



IV. EXPECTED OUTCOME

This project is expected to reduce the stagnant traffic on the roads and junction. The project will also save time of the people. This project is also designed to replace the old conventional system of timing-based traffic light to density- based traffic light using advanced methodologies. With the help of image processing and Raspberry Pi, a real time analysis of the traffic will be achieved and accordingly the timing for the traffic signals will be controlled and priority for the emergency vehicle will be provided

V. CONCLUSIONS

Density based traffic control system and emergency vehicle detection shows that there are many ways to implement this task but using image processing gives the bestresults.we will develop a density dependent traffic control system according to traffic congestion in cities, u sing Raspberry pi, IR sensor, camera module, image processing. The camera module is installed at the junction of the roads. This gives the count of vehicles on the road, with the help of that count we can control the traffic by allowing the vehicles where the density is more.Emergency vehicle detection is done using radio frequency transmitter and receiver module.

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Improvising the SVC 2004 Database for Online Signature Verification System

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***Abstract*—Online Signature Verification is an instrument used by banks, intelligence agencies and high-profile organizations to verify the identity of a person. In the signature verification program, the digital image of a signature or a similar signature is fed in the system and compared to the signature image in the stored database. The findings of the test revealed that there are certain set of signatures for which the system fails, including genuine signatures. The effects of correlations of various parameters such as x-coordinate and y- coordinate were determined and analysed in order to identify those signatures. In order to simplify the situation, a calculated threshold has been set for both parameters (i.e. X coordinate and the Y coordinate) from the effects of the correlation. By following this method, the signatures that meet both the threshold conditions as well as manually checking procedures have been considered, and the others are discarded for training. Following this method, the SVC 2004 Signature Database has been analysed for further testing and use.**

Keywords: steganography, biometric identification, inception, HWT, HMM, Signature, Verification

I. INTRODUCTION

The online signature verification has come into consideration after several years again due to the digitisation of the things and most importantly the systems through which the payment and verification transactions are performed these days. It is due to this proliferation of the Internet the need for secured means of identification is in steadily rising. This inevitable demand has put forth the biometric identification. The biometric device can either be checked or identified. In the verification mode, the identity of the person is authenticated on the basis of his or her claimed identity. Alternatively, it identifies the person (among those enrolled in a database) in identification mode, without the objects having to produce their identity [1].

In this system a method of convolution is being implemented. The convolution method involves selection of the various sections of the unknown signals and combine it with the wavelet transforms, using a shift multiply and add technique.[3]

The Hybrid Wavelet Transform among the various wavelets and their transforms are best suited for the 2D compression of the of the image. The formation of the Hybrid Wavelet Transformation is processed by using a Kronecker product of two orthogonal matrices. This can be combination of DCT, Haar, Kekre, DHT, Hadamard.[3]

II. LITERATURE SURVEY

This paper [1] presents the basic structure of automatic signature verification process. First input signatures are given for data Acquisition and pre-processing. The extracted features from this are then stored into knowledge base and also forwarded to verification block. Knowledge base compares the signatures with input signatures and identifies the genuine user or authenticates the user as result.

In this paper it is mentioned that how the hybrid wavelet transforms are created using Discrete Walsh Transform (DWT), Discrete Kekre Transform (DKT), Discrete Hartley Transform (DHT) and Discrete Cosine Transform (DCT) for image compression. The Hybrid Wavelet transforms are much more efficient and provide their usefulness in the compression of the 2D images for the required compression rate then their normal orthogonal transforms and wavelets.[2] After proving their worth for the image compression future work could include the extension of the concept to other image processing applications like steganography, biometric identification, content-based image retrieval

In this paper it is mentioned the best combination for the generation of the hybrid wavelet transform. The hybrid wavelet transforms are formed using Discrete Walsh Transform (DWT), Discrete Hartley Transform (DHT) and Discrete Cosine Transform (DCT), Discrete Kekre Transform (DKT) for the compression of the images. The hybrid wavelet transforms are better than their counter parts such as the normal transform wavelets and wavelets.

Handwritten online signature offers x, y, z coordinates and along with pressure, azimuth and altitude of the pen tip. On the first 128 samples of the pressure parameter were considered and hybrid wavelet transform was applied on it. After the application, 1-16 and 33-64 samples from the output were taken into considerations as feature vectors. Using Hidden Markov Model (HMM) classifier with ergodic model, the performance was compared. DHT KEKRE gives maximum performance of FRR 1% and FAR 1 % for 1 –

16 samples. For 33 –64 samples, KEKRE 128 and HADAMARD HAAR offers best performance with FRR 1% and FAR 1%. Feature vector with 33 64 samples offers better FRR - FAR than 1 – 16 samples

This paper [3][4] compares different combinations of transforms and gives the results. Comparing the various combinations of DCT, HAAR, HADAMARD, DHT and KEKRE afore mentioned samples of hybrid wavelet transform of pressure as feature vector we come to following conclusions:

FRR – FAR: 1 – 16 samples offered optimum performance than 33 – 64 samples. For 1 – 16 samples KEKRE 128 offers best performance of FRR 1% and FAR 1 %. For 33 – 64 samples, KEKRE HAAR and HADAMARD HAAR offer best performance with FAR 1% and FRR 1%.

EER: 33 – 64 samples provide with optimum performance than 1 –16 samples. For 1 – 16 samples HADAMARD 128 offers best performance of EER of 8 training samples. For 33 – 64 samples, DHT 128 offers best performance of EER of 4 training samples. 4) State wise FRR – FAR: 1 – 16 samples offer better performance than 33 – 64 samples.

III. PROBLEM STATEMENT

- Left right HMM model DCT combinations of HWT-1 offers best performance until now i.e. average EER is 11.27% and standard deviation of 5.66 %
- And for Ergodic HMM model DHT Kekre combination of HWT1 offers best performance. It gives average EER of 11.50% and standard deviation of 5.85 %
- But there are certain set of signatures where this system fails. Here we have to reduce the Existing EER rate to as minimum as possible.

IV. PROPOSED METHODOLOGY

Globally, in banks three signatures are taken into consideration for creating an account. These three signatures have to be checked for visual similarities. If they are found to be visually different then the application is rejected. Working on the same concept we first check the input signatures of the database that we are using-SVC DATABASE 2004. The Database contains signatures of 40 different users. These 40 different users have 40 different signatures each, among which 20 are genuine and 20 are skilled forgeries. We have extracted the digital signatures from SVC DATABASE 2004 which are visually different as show in the figures, fig.1, fig.2 and fig.3.

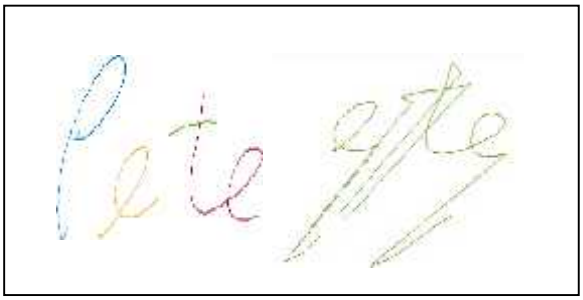

Fig 1. Visually Different genuine signatures of 25th user

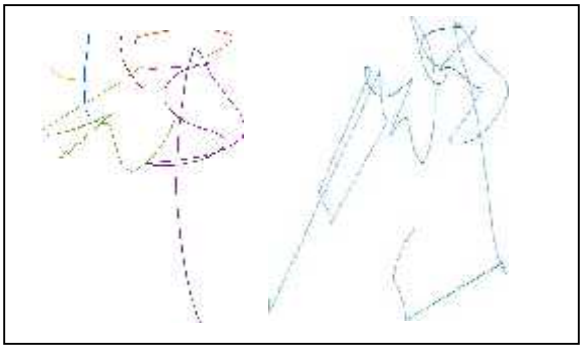

Fig 2. Visually Different genuine signatures of 26th user

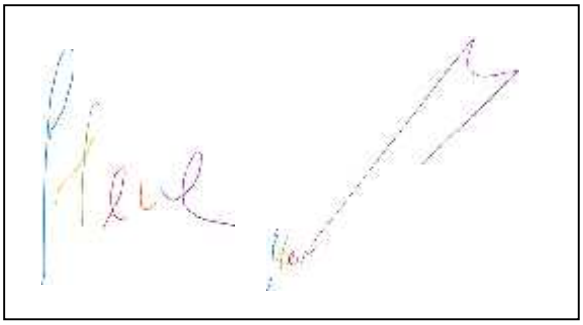

Fig 3. Visually Different genuine signatures of 33rd user

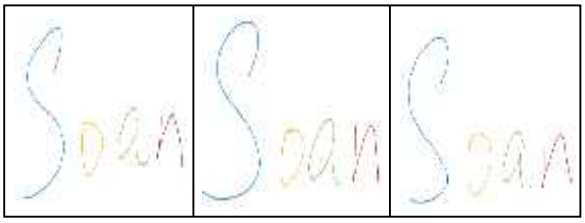

Fig 4. Visually Similar signatures of the user 28

All the signatures of 40 users have been checked visually and found to be non-identical. So, the correlations of genuine signatures of each user are calculated. Because the signatures were not visually matching, X and Y parameters are taken into consideration only. The following figure, fig.5, depicts the flow of the correlation program.

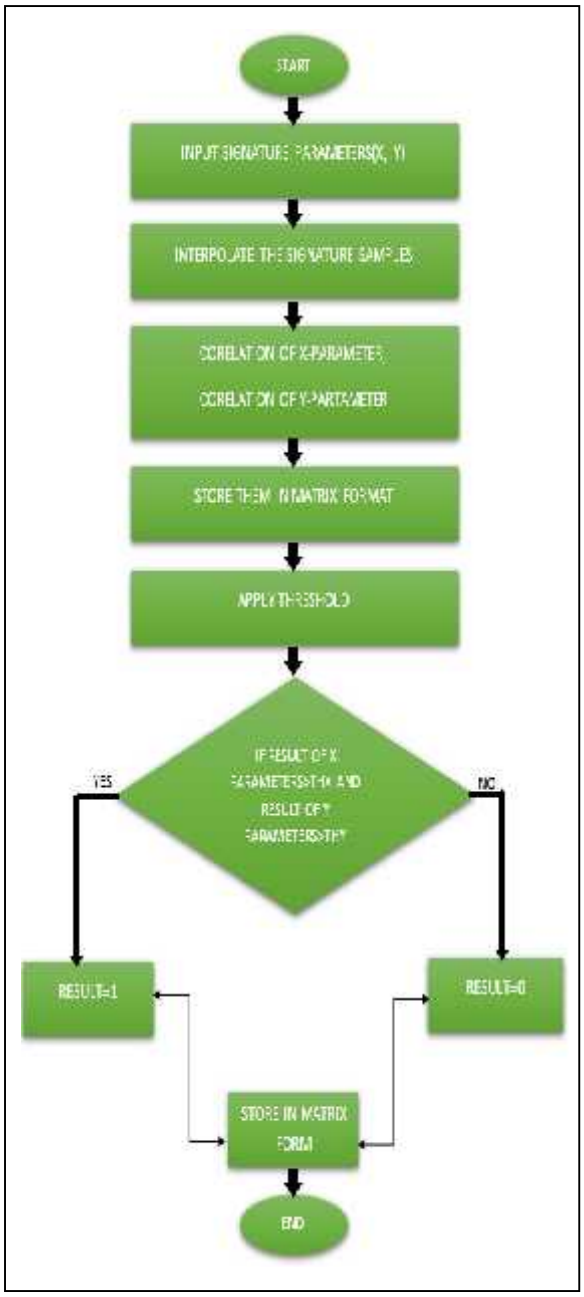

Fig 5. Flowchart of the correlation program

Primarily the data has been imported in the numeric form from the database for each user. X and Y parameters of genuine signatures are extracted and stored in different matrices. Sample sizes are interpolated according to the reference sample size. Correlation of the X and Y parameters is calculated separately and stored into different matrix form in excel sheets.

As known, every user has 20 genuine signatures out of 40 signatures, correlations of these 20 signatures are found and hence 20x20 matrix is formed. Analytically, threshold of each user is defined separately.

The selection of threshold for each user is done such that the threshold, for which maximum number of samples shows good correlation, has been selected.

The overall threshold selection of the signatures has been given in the table, table1. below.

Users	X-parameter threshold	Y-parameter threshold
1	0.85	0.5
2	0.95	0.85
3	0.85	0.8
4	0.94	0.74
5	0.9	0.5
6	0.98	0.7
7	0.95	0.8
8	0.98	0.8
9	0.95	0.6
10	0.95	0.85
11	0.9	0.7
12	0.98	0.8
13	0.95	0.5
14	0.98	0.59
15	0.98	0.65
16	0.92	0.78
17	0.96	0.48
18	0.97	0.25
19	0.93	0.75
20	0.96	0.61
21	0.95	0.51
22	0.96	0.18
23	0.92	0.55
24	0.91	0.45
25	0.92	0.8
26	0.85	0.78
27	0.94	0.82
28	0.95	0.9
29	0.93	0.65
30	0.98	0.5

31	0.93	0.8
32	0.87	0.7
33	0.97	0.8
34	0.93	0.7
35	0.3	0.1
36	0.85	0.8
37	0.85	0.6
38	0.93	0.8
39	0.9	0.6
40	0.97	0.85
OVERALL THRESHOLD	0.8	0.5

Table 1. Individual Threshold values of x and y parameters

Considering the threshold of 40 different user's X common threshold is found out for X-parameter. Same process is followed for finding threshold of Y-parameter. These thresholds are then applied to find non-identical genuine signatures.

Now the correlation results are compared with visually non-identical signatures. Those signatures which are found to be visually defected as well as having poor correlation results after the application of the common thresholds will be discarded from training. The remaining signatures which have good correlation result as well as the manual examination will only be taken into consideration for training the system. The selected genuine signatures are given to the system.

V. RESULTS AND DISCUSSIONS

User wise threshold is identified for both X-parameter and Y-Parameter. Best correlation result is got for user 12. And it is observed that worst correlation result is got for user 35. After finding user wise threshold, overall threshold of each parameter is identified. By identifying this overall threshold for both parameters, a range is identified for which visual as well as practical correlation results will match. Then these thresholds are given to the system as an input to verify whether correlation of these 20 genuine signatures of 40 users matches with the identified visual result. And percentage accuracy is calculated by taking different threshold value for X-parameter and Y-parameter. The best accuracy result which is obtained is 87.5% for threshold of X-parameter as 0.825 and of Y-parameter as 0.455.

X Threshold	Y Threshold	% Matching
0.75	0.42	85
0.75	0.45	80
0.75	0.54	77.5
0.79	0.45	82.5
0.8	0.42	80
0.8	0.45	80
0.8	0.54	80
0.89	0.42	85
0.89	0.45	82.5
0.89	0.54	80
0.823	0.454	87.5
0.825	0.455	87.5
0.826	0.454	80

Table 2. Threshold results for different combinations

VI. CONCLUSIONS

Using pressure as a feature for the SVC 2004 database is problematic because all the genuine signatures are not visually identical. Initially, the signatures which are visually identical are identified then correlation is applied on genuine signatures of all the 40 users. By using correlation those signatures are identified which have bad correlation which pose the problem in the system.

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Pre-processing the EEG data: Detailed comparison between ICA and PCA

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***Abstract*— Over the past few years, we have seen the amount of research in the field of EEG to rise. There has been a lot of development and innovation in the hardware used to collect those eeg signals and also in the ways to analyze it. There are multiple artefacts and unwanted data points which will hamper in the process of getting clean and useable data. In the paper we are comparing 2 techniques to preprocess and remove artefacts from the raw eeg signal which will be further used for analyzing. Those 2 techniques are PCA (principal Component Analysis) and ICA (Independent component analysis). Out of these ICA is the newer one and produces spatially localized and statistically independent basis vectors whereas PCA is a well-known baseline technique used. These findings will be used to preprocess and remove artefacts from the raw data for gaming addiction cases.**

Keywords—EEG, PCA, ICA, Artefacts

I. INTRODUCTION

In the past few years there has been a rise in the use of EEG. Ironically, after 60 years of research, contamination of EEG activity by eye movements, blinks, heart impulses, and muscle and line noise remain a serious problem for EEG perception and study, especially for some patient groups, because refusing polluted EEG segments may lead to inappropriate data loss. The artefacts can be seen in an EEG report as a rapid surge in one of the channels or concurrently in many channels. Artefacts of less severity but longer can also exist in terms of time. Activity of electrically powered devices as well as mobile and energy networks may cause signal disruptions. Multiple companies have developed their own headset to measure these EEG waves together with proprietary software that pre-processes the data and removes most of the artefacts before providing it to the user for further analysis. The paper's aim is to examine blind source separation-based methods such as Principal Component Analysis (PCA) and Independent Component Analysis (ICA) in order to remove various types of artefacts from the EEG signal. The remainder of the paper is arranged as follows: section 2 includes a summary of the techniques used and section 3 describes the case study with both approaches to eliminate EEG objects. The article ends with Section 4.

II. METHODS

A. PRINCIPAL COMPONENT ANALYSIS

One of the powerful tools for the removal of artefacts from the EEG signal is PCA. This aims to reduce a wide array of random variables to a smaller set. PCA is based on rotation of a system of coordinates. The rotation's main goal is to maximize a coordinate's sequential variations, starting from the first.

As for the EEG signal under discussion, the signal from the number specified in (1)

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{k1} & x_{k2} & \cdots & x_{kn} \end{bmatrix}$$

The initial factors in a newly appeared space are characterized by the highest variability. The PCA method allows the separation of certain factors, i.e. components, containing artefacts. It also lets the amplitude of an EEG signal decrease. As a result, an EEG signal is obtained which is reduced by the artefacts. Removing too much information from an EEG signal can however render the signal useless, as now it is depleted of its important information. It is the fragments that are essential for the EEG signal content description which would be extracted in that case. The analysis conducted in Python program using MNE tool shows (see Fig. 1) what appears to be an unprocessed EEG signal, as well as a typical signal after elimination of the artefact. The first picture shows removal of one portion of the EEG signal. The second picture shows how the removal of 12 components of the EEG signal, deteriorates the EEG signal diminishing its quality for information extraction.[2]

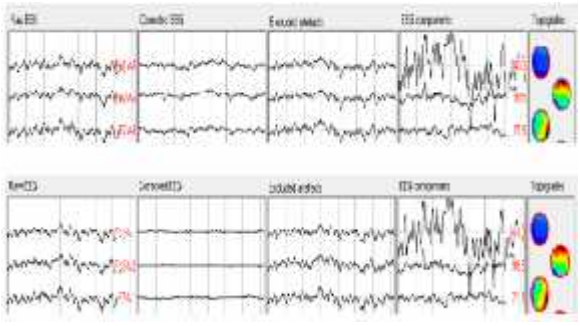

Fig 1: PCA methods applied for artefact removal [2]

PCA is based on a method called as matrix calculus. The first step of the algorithm is to calculate the mean values for the rows and computing the deviation matrix.

$$Xmean = \frac{1}{n}\begin{pmatrix} \sum_i^n i = 1\ x_{1i} \\ \sum_i^n i = 1\ x_{1i} \\ \vdots \\ \sum_i^n i = 1\ x_{1i} \end{pmatrix} \quad (2)$$

Xmean = X - XmeanL

Where L is a row vector. i.e. L = [1…1]1xn (3)

According to the method of Singular Value Decomposition the matrix ΔX may be transformed to: where:

$\Delta X = U\Sigma V^*$ (4)

U is the left unitary matrix of size k x k, which contains the eigenvectors of the matrix product ΔXΔXT, the formula (5) is used to calculate U;

$\Delta X^T \Delta X U = U\Lambda = U\Sigma^2$ (5)

V* is conjugate transpose of the right unitary matrix of size nxn, it contains the eigenvectors of the matrix product ΔXTΔX, the formula (6) is used to calculate

$\Delta X \Delta X^T V = V\Lambda = V\Sigma^2$ (6)

Σ is the diagonal matrix containing the single values of the matrix ΔX. The single values are the square roots of the eigenvalues of both

XT ΔX and ΔXΔXTV, i.e.: Λ = Σ2

PCA's next step is to measure and pick the co-variation matrix's own values. Of the measured numbers, the greatest own values should be chosen. The analysis is carried out on the basis of the chosen values, in order to determine the most important main components.

The larger the eigenvalues, the lesser the information will be lost. The goal is to mitigate loss of knowledge. The eigenvectors are determined by means of a system of linear equations for the chosen eigenvalues. The last step of the algorithm is to approximate the point in the new space, the point that corresponds to the given observation vector.

B. INDEPENDENT COMPONENT ANALYSIS

The second approach that will be discussed is Independent Component Analysis. ICA is a method for determining independent source signals which were mixed together in different ratios. A common example is known as the BLIND SOURCE SEPERATION, which can be explained with the "cocktail party problem". Figure 2 presents a graphic description of the problem. Here the two microphones pickup the two signals but at varying levels. Now the task is to separate the two signals.[1]

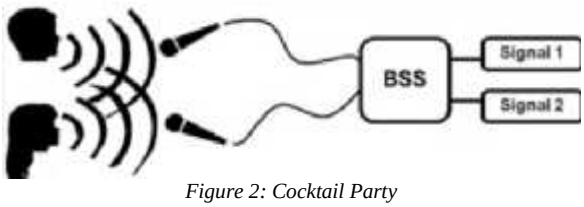

Figure 2: Cocktail Party

EEG signal can be separated as long as they are statistically independent and non-gaussian. An EEG signal collected from the electrodes placed on the head of the person examined is a combination of several independent 263 signals, just as voices in the "Cocktail party problem" are. In order to carry out elimination of selected artefacts, one of the following algorithms may be applied: fastica, picard, and infomax. The technique of ICA can be explained using the equation- U = WX, Where X represents the input EEG signal matrix collected from different electrodes and the columns represent the data recorded at different time interval. ICA determines the unmixing matrix, W (also known as weights matrix) which linearly unmixes or decomposes the EEG data contaminated with artefacts into a sum of temporally independent and spatially fixed components. Now, its origin should be investigated after the decomposition of the signals into new components. The weights matrix is associated with the specified electrodes. If corresponding components are eliminated EEG signal can be created without disturbances and artefacts.

III. RESULTS

The ICA and PCA algorithms were performed on a sample dataset of EEG available on the official website of MNE tools. Upon analysis following observations were made-

1) Both the methods can be successfully implemented for artefact removal from the EEG data. However, there were loss of part of the EEG data caused by the inaccurate separation of components, especially in the case where the artefacts were similar to the EEG data.

2) It seems that the PCA method works better with complex EEG data which include complex artefacts, such as the combined eyes and muscle artefacts (i.e. EEG and EOG). The ICA method, however, might be problematic when the source of EEG and EOG signals cannot be represented by separate independent components.

3) Both methods give positive results regarding muscle artefact detection and correction. Using these methods allows the muscle signal elements to be identified, and thus a clean and plain EEG to be reconstructed. However, in order to get reliable response, large amount of data needs to be recorded.

4) The use of both methods requires manual assessment of the detected muscle components, especially those with the lowest ranks. [3]

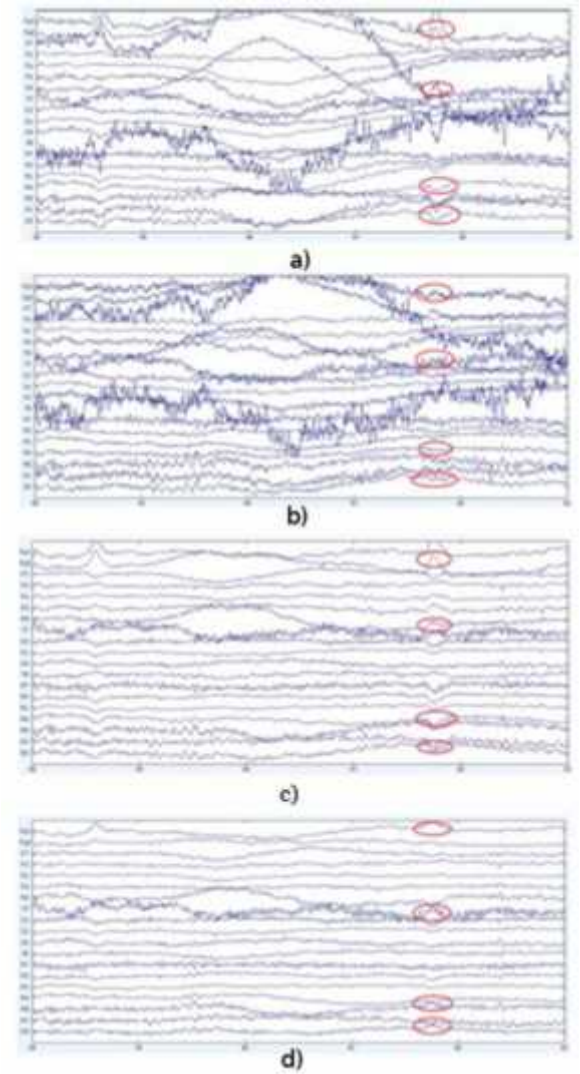

Fig. 3. Results of removal of artefacts due to blinking of eye. a) Original EEG signal b) Result of the application of ICA method, rejecting 1st, 5th and 9th components c) Result of the PCA method, rejecting 1st and 2nd components d) Result of the PCA method, rejecting 1st, 2nd and 3rd components. [3]

IV. CONCLUSION

The PCA and ICA methods discussed above allow a signal to be decomposed into components and the artefacts and disturbances eliminated. Science and technology development allow for ever more accurate signal processing, including the EEG signal. Due to PCA the number of variables can be that. The goal of the ICA approach is to solve the BSS problem. All PCA and ICA show similar results in eliminating EEG signal artefacts. For example, better removal of objects will result in a better communication interface between the brain and the machine. This framework is used in support of disabled people for example in medicine. The paper's goal was to compare two algorithms, ICA and PCA, in terms of the EEG signal artefact correction. The presented case study demonstrates the effects of repair of different types of objects using the techniques mentioned. In terms of computational capability, the PCA method has proven to be quicker and less demanding. The said results will be composed with artefacts specified by the field specialist.

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Gaming Addiction: The Emergence of a New Clinical Disorder

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Abstract- **Anecdotal reports indicated that some online users became addicted to the Gaming in much the same way that others became addicted to drugs or alcohol, leading to academic, social, and occupational impairment. There has been a significant increase in research over the past decade, using different scales and questionnaires to explore the various aspects of addiction diagnosis and treatment. The aim of this paper was to analyse the frequency attributes of addicts and non-addicts' EEGs (electroencephalography) to identify early signs of addiction using physiological parameters and to develop a method for using these findings to alert possible addiction.**

Keywords—EEG, Addiction, Gaming

I. INTRODUCTION

Recent reports suggested that some users were addicted to gaming in much the same way as others became addicted to drugs, alcohol or gambling, leading to academic failure, decreased work performance [1]. In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, the American Psychiatric Association reported within 2013 Internet gaming disorder as a preliminary condition. A subset of components of behavioural addiction like" salience, attitude control, tolerance, withdrawal, conflict and relapse" is defined for addiction to video games.[2]-[3] The purpose of this exploratory study was, therefore, to investigate whether the gaming could be considered addictive and to identify the extent of the problems created by such misuse. Addiction is a mental and physical incapability to stop the use of a chemical, medication, event, or object, even if it causes physical and psychological damage. There are numerous forms of addiction such as alcohol addiction, gambling, gambling, inhalants such as aerosol products, illicit drugs, internet usage, etc. This can all lead to fatal health problems. There is an addiction that may initially be helpful, but most of it is dangerous when taken in excess and for an extended period of time According to the United States. Substance Abuse and Mental Health Services Administration (SAMHSA)'s estimated 21.5 million Americans aged 12 or older in 2014 have a major alcohol or drug problem. Another common type of gaming addiction. This form of addiction is growing in India. With the smartphone market boom, app availability has increased significantly, encouraging adolescents and young adults to keep playing video games, with most of their players playing PUBG. Dependency is a complex but treatable disease that mainly affects the functioning and behaviour of the brain. Detection of dependency is a crucial factor in determining whether the person affected can be recovered quickly and efficiently.

Such factors encouraged us to study addicts ' brain waves and learn exactly what's going on inside the brain. In its early stages, it has become important for us to identify addiction itself. This can help the sufferer to get rid of this disease. According to many types of research, the study of brain waves has been shown to be useful in understanding what symptoms are occurring within the brain of the addict and what particular parts of the brain are being impaired by chronic substance abuse or anything else that addicts to the person. Using the EEG system to monitor the brain waves of abusers and analyse the data can help us achieve this [4]. The EEG system such as the ENOBIO consists of many lobes such as the frontal lobe, parietal lobe, occipital lobe, etc., and studying the variations and patterns in brain waves as compared to a healthy individual using the tenets of different statistical methods that help us diagnose addiction in a person early.

II. MATERIALS AND METHODS

Proposed Method:

Feature Extraction: It aims to reduce the number of features in a dataset by creating new features from the existing ones. These new reduced set of features should then be able to summarize most of the information contained in the original set of features. In this way, a summarized version of the original features can be created from a combination of the original set. Another commonly used technique to reduce the number of feature in a dataset is Feature Selection. Visualization: The democratization of AI is either near or already here—the barrier to developing and deploying neural networks is lower than ever before. But complex deep learning models are hard to train and hard to understand. Interactive interfaces and visualizations have been designed and developed to help people understand what models have learned and how they make predictions. In this post, we survey visualization for deep learning and list takeaways for this emerging field. Signal Decomposition: An Individual Component Analysis Algorithm will be used to decompose. Individual Component Analysis attempts to break down a multivariate signal into non-Gaussian single signals. Sound, for example, is usually a signal consisting of numerical addition of signals from multiple sources at each time t. The problem then is whether these contributing factors can be isolated from the overall signal observed. Blind ICA isolation of a mixed signal gives very good results when the statistical independence assumption is correct. Classification: is when a category such as "red" or "blue" or "disease" and "no disease" is the output variable. A model of classification tries to draw an inference from observed values.

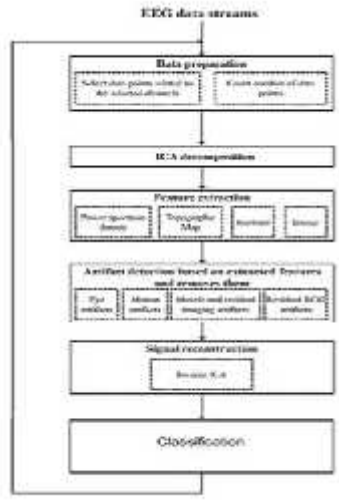

FIG-1. EEG data flow diagram [8]

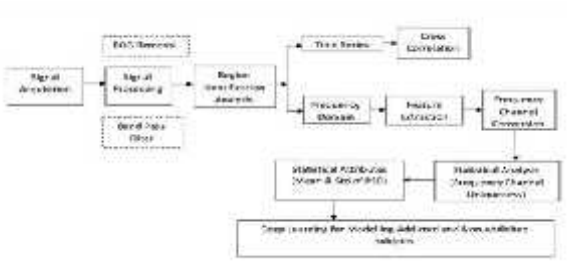

FIG-2. EEG data collection and experimental setup [4]

A classification model may attempt to predict the value of one or more outcomes given one or more inputs. For example, when sorting "spam" or "not spam" emails, "fraudulent" or "licensed" transaction information. In short Classification either predicts categorical class labels or classifies data (build a model) based on the training set and values (class labels).

After the EEG data has been collected from the patients, the information is then passed through various signal processing and feature extraction systems known as software pre-processing, which is done to remove the data from unwanted noise and objects. It is then sent for review after cleaning up this information before it is developed into a dataset. This part of the research includes the application of different statistical methods to the data set.

III. RESULTS

Once we take the addicts' EEG information, we can create a specific database that contains both their EEG waves and non-addicts. The database can be used to create a diagnostic system using different algorithms such as SVM, neural networks, etc. We can use this to decide if the individual is an addict or not after the development of the AI. Various people in the mental health industry can use this to better support these abusers in order to lead a healthier life and thus eliminate mental illnesses such as anxiety, suicides, etc.

IV. DISCUSSION

The goal of this study was to determine the feasibility of a system based on discriminating parameter selection for a mobile game addiction. Game addiction is a major issue that needs to be addressed, as it can cause adverse effects with growing use of technology. This research study may aid in reliably identifying addiction not only for games but also by further examining the frequency elements, and other cognitive and behavioral disorders may be tracked and used for multiple purposes. This application may then be used for self-monitoring implementation of these data in smart gadgets to reduce health risks and optimize better health conditions.All of these are focused on the smart use of biosensors and their integration by wireless connections and the analysis of variables in real time, providing performance and input that can be used through a mobile application or GUI .

The wearable mobile game addiction architecture for treatment has two main stages, which are independent of any human intervention into the system. The first block consists of the EEG information recording electrodes, the electrode location, a high-precision analog-to-digital converter, a digital data packaging system, and a wireless communication module that can communicate with a personal computer and a smart device for further EEG signal processing.

A device that can use commercial EEG sensors such as EMOTIV [5] and NEUROSKY [6] is suggested, but in this case, a design similar to EMOTIV would be preferred due to the multiple electrodes and software development kit (SDK) offered, which may be more versatile in the development of a gaming addiction diagnosis application. Another explanation to choose EMOTIV is that NEUROSKY is used to reach the frontal signal but provided the findings suggest that the occipital area is more important to gaming addiction diagnosis.

V. CONCLUSION

The purpose of this study was to determine the feasibility of a system based on discriminating parameter selection for a mobile game addiction. A final point worth considering is the methodology adopted in this analysis, the statistical techniques applied to the data, and the suggested mobile application design. From the time domain analysis, the occipital region highlighted the distinctions between addicted and non-addicted categories, while the alpha and theta frequencies were clearly distinctive between the two classes from the frequency domain analysis of occipital spectral results.

On the basis of the above results, a conditional logistic regression model was used to estimate the likelihood of addicted and non-addicted subjects based on the alpha and theta mean occipital area frequencies as a predictor variable. In the form of various games, there's an enticing world full of addictive diversions, easily accessible to everyone and quantitative tracking of growing vulnerabilities to such addictions is now a real necessity.

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Person Identification Using Teeth Recognition

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***Abstract*— Dental Biometrics are used in Forensic Dentistry to verify persons based on dental radiographs and dental photographs. This paper presents a method based on human identification using teeth recognition i.e. dental work information. First step is to collect database of Dental radiographs from various dentists. The method consists of Preprocessing, segmentation, creation of dental code and matching. There are six steps involved in pre-processing where the last step creates dental work and all further steps are performed on dental works. Pre-processing consist of different methods such as edge detection, gamma correction etc. Segmentation can be obtained for all DWs including position, size and distance between neighbouring DWs. Dental code is created by Dental work Mask (DWM). After the DC is created, it is compared with other DRs databases. The results are good enough on matching the databases.**

***Keywords*—Human identification, Dental radiographs.**

I. INTRODUCTION

Biometrics is the science and technology of identification using dental works, hands, iris etc. This method is used in forensic medicine for matching their PM radiographs with their anti-mortem radiographs. In some situations, like (plane crashes, accident, fires),biometrics features such as fingerprints and faces are destroyed and it's not possible to work with methods such as face recognition and fingerprint scanner so Dental work help in doing identification because the internal parts i.e. tooth are not damaged. Dental records are used in disaster for victim in the Asian tsunami. It is branch of physics and called as forensic odontology. The algorithm performs DC matching and is implemented in Matlab.

II. LITERATURE SURVEY

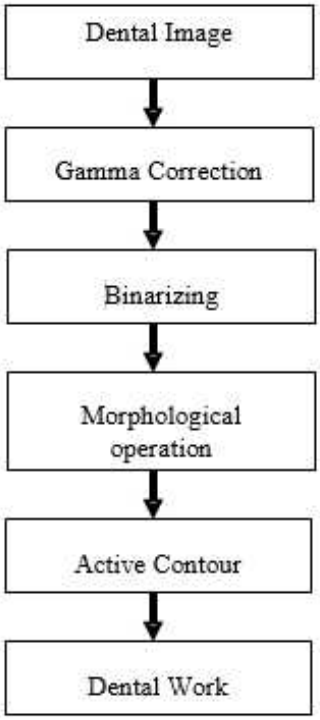
The system proposed in the paper fetches teeth image,resize the image and choose a threshold value and matching is done.If the similarity between two teeth images is above threshold value then it belongs to same person. [1]

The method is tested on two databases i.e. dental radiographs and colored teeth images. The dental biometric analysis gave us the required distances and on the basis of these distances, the feature properties have been calculated.[2]

In this paper, two methods are used to identify human. Computer vision identification can be more accurately done using morphological skeleton transform. Feature extraction is done using Canny Edge Detection.[3]

III. METHODOLOGY

First image is selected from database and gamma correction is applied to it in this step. Gamma correction is a nonlinear operation used to encode and decode image and video systems. It can be used to improve image quality. A gamma with value less than 1 is called as gamma compression and value greater than 1 is called as gamma expansion. It is governed by the power law expression. Next step is binarizing the image. It is defined as process of taking gray scale image and converting to black and white shade i.e. 0 and 1. It can be also called as image thresholding. If the pixels value is greater than threshold value then that value of pixel is converted to black or white and vice-versa. Next step is applying morphological operators. It consist of dilation, erosion, opening, closing etc. Dilation increases the size whereas erosion degrades the size so dilation is preferred for enhancement. Opening is obtained by erosion followed by dilation and closing is dilation followed by erosion. After that active contour is performed using watershed algorithm. It is used to separate different objects in an image. The image obtained is called as Dental Works(DW).



IV. EXPECTED OUTCOME

The Person can be identified using teeth in many applications.It is implemented in Maltab.The result will give better accuracy and can be used by police officers to detect the criminals if they have any previous records of their teeth.The database of anti-mortem and post-mortem are compared and person is identified.It can be used by dentist

to get all the records of their patients.If any natural disaster occurs,then fingers,can get damaged and cannot be used for identification but teeth remains safe so they can be used for authentication.

V. RESULT AND DISCUSSION

We have 60 panoramic dental image from different dentists.We applied the pre-processing step and got the dental works.These DWs are further used for creating Dental code and Matching.Active Contour is identified by Watershed Transform.For performing Watershed we should first calculate Distance transform and complement of distance transform and finally it is applied.Step by step output images of first step are shown below.

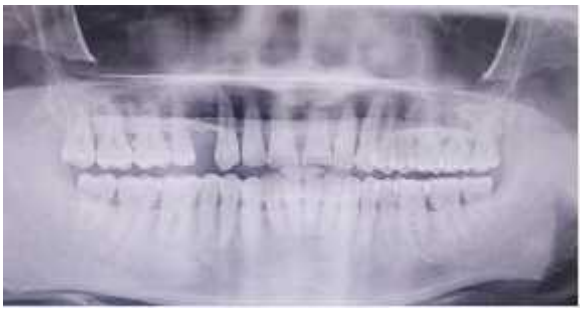


Figure 1: Gamma Correction



Figure 2: Binarized Image



Figure 3: Opened Image

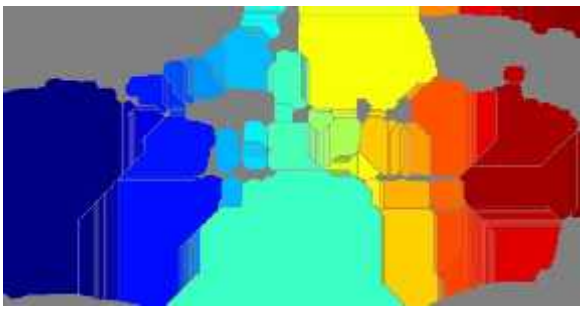


Figure 4: Watershed Transform

VI. CONCLUSION

This paper proposed feature extraction of Dental radiography images.Those features are extracted from dental works.These method can be applied for large scale as well.It can be used to identify in forensic medical.We are trying to extract the maximum accuracy,so we can't proposed effectiveness of this technique.The final image consist of RGB image and contour.Different types of transform can be used in future work.

ACKNOWLEDGEMENT

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Internet of Things (IoT)

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***Abstract* – In this era, the life of human beings is getting simpler as almost everything is automated. Old manual systems are replaced by automated ones. Internet is the most important part of the human lifestyle. Internet of things (IoT) allows devices to connect, sensed and controlled remotely across a network infrastructure. In this paper, we focus on home automation using smart phone and computer. The IoT devices control and monitor the electronic and the mechanical systems used in various types of buildings. The devices connected to the cloud server are controlled by a single admin which facilitates a number of users to which a number of sensors and control nodes are connected. The admin can access and control all the nodes connected to each user but a single user can control only the nodes to which the user itself is connected. This whole system using Internet of Things (IoT) will allow mobile devices and computers to remotely control all the functions and features of home appliances from anywhere around the world using the internet connection. The system designed is economical and can be expanded making life easier for the future generations.**

Keywords – KNX, Openhab, ETS 5, BAOS 771, Catalogue panel

I. INTRODUCTION

The Internet of things is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware, these devices can communicate and interact with other devices over the Internet, and they can be remotely monitored and controlled. In other words, converting or connecting objects in daily use to internet is called internet of things.

For e.g. we can control the fan, light and various other objects with the help of internet.

In the broadest sense, the term IoT encompasses everything connected to the internet, but it is increasingly being used to define objects that "talk" to each other. "Simply, the Internet of Things is made up of devices – from simple sensors to smartphones and wearables – connected together."

By combining these connected devices with automated systems, it is possible to "gather information, analyse it and create an action" to help someone with a particular task, or learn from a process. In reality, this ranges from smart mirrors to beacons in shops and beyond.

"It's about networks, it's about devices, and it's about data," Caroline Gorski, the head of IoT at Digital Catapult explains. IoT allows devices on closed private internet connections to communicate with others and "the Internet of Things brings those networks together. It gives the opportunity for devices to communicate not only within close silos but across different networking types and creates a much more connected world."[1]

"IoT offers us opportunity to be more efficient in how we do things, saving us time, money and often emissions in the process," Evans says. It allows companies, governments and public authorities to re-think how they deliver services and produce goods.

Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.

For example, in a car manufacturing business, we might want to know which optional components (leather seats or alloy wheels, for example) are the most popular. Using Internet of Things technology, we can:

- Use sensors to detect which areas in a showroom are the most popular, and where customers linger longest;
- Drill down into the available sales data to identify which components are selling fastest;
- Automatically align sales data with supply, so that popular items don't go out of stock.

The information picked up by connected devices enables us to make smart decisions about which components to stock up on, based on real-time information, which helps us save time and money.

With the insight provided by advanced analytics comes the power to make processes more efficient. Smart objects and systems mean we can automate certain tasks, particularly when these are repetitive, mundane, time-consuming or even dangerous [2].

II. PROPOSED SYSTEM THREE PHASES OF IOT

1. Making the devices
2. Programming them and connecting them to internet and creating servers to control them on openhab
3. And integrating with alexa via raspberry pi.

Phase 1: Making the devices

First, we need a KNX power supply.
Then we need actuators and dimmers, switches and their drivers
Light and a fan
A box in which they can fit in (must be sturdy enough). KNX device
KNX usb interface
Gateway device

List of KNX hardware

1. KNX BUS
2. ASIN knx power supply 640mA, DINRail with 30 V auxiliary supply
3. ASIN KNX 4 channel 10A flush mounted actuator with 8 binary outputs
4. ASIN KNX 1 channel flush mounted fan controller
5. ASIN 6 gang KNX switch – Black glass/ White Glass
6. BAOS 771
7. GM USB interface

1. *KNX BUS:*

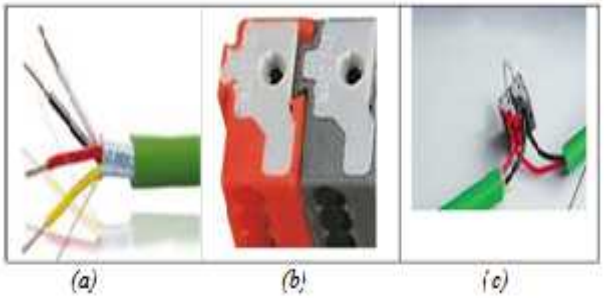

Fig. 1 KNX BUS (a) Twisted pair wire (b) KNX BUS Connector (c) KNX Bus connection

KNX BUS used in our project is twisted pair. It consists of -2- pairs of copper wire. Red and black wires are used for data transfer among devices. Yellow and white wires are used for auxiliary power supply needed for some KNX devices.

2. *KNX Power Supply:*



Fig. 2 KNX power supply

This power supply has 230V as input and 30V as output to KNX bus and 30V to auxiliary power supply.1.1.1 is the default address allocated to the power supply It cannot be changed.

3. *KNX flush mounted actuator:*



Fig. 3. ASIN KNX flush mounted actuator

4x switching outputs 10A
Each output can be used to switch loads
8 local binary inputs, 3.3VDC with 10k Ohm series resistor provided by device.
This device can have any address within address range.

4. *KNX flush mounted fan controller:*



Fig. 4 ASIN KNX 1 channel flush mounted fan controller

Ceiling fan motor controller by latest phase dimming 230VAC is protected by 1A fuse.
Single output for ceiling fan with standard motor.
Local binary inputs for varying speed, 3.3VDC with 10kOHM series resistor provided by device
This can have any address within the address range.

5. *KNX Switch:*



Fig. 5 ASIN gang KNX switch – black glass

This is a square capacitive glass switch with 6 multi-functional buttons. It supports on/off, toggle, dimming,

blind/shutter, value, scene, etc. This device can have any address within address range.

6. *BAOS 771:*



Fig. 6 BAOS 771

It stands for Bus Access and Object Server.
It is used as an interface to connect to KNX both on KNX ip/tunnelling and on data point level with up to 250 communication devices.
This device can have any address within the address range It can have static ip or it can use DHCP to acquire ip Static ip given to BAOS 771 in the present project is 192.168.1.222

7. *GM USB interface:*



Fig. 7 GM USB interface

It is required to push programs, the individual and group address in the devices
It is an interface between ETS5 and KNX devices.
On connection it is automatically detected by ETS5 and allocated a free individual address.

8. *KNX in home automation:*

KNX is an open standard (see EN 50090, ISO/IEC 14543) for commercial and domestic building automation. KNX devices can manage lighting, blinds and shutters, HVAC, security systems, energy management, audio, video, white goods, displays, remote control, etc. Knx evolved from three earlier standards; the European Home Systems Protocol (EHS), BatiBUS, and the European installation BUS (EIB or Instabus). It can use twisted pair in a tree, line or star topology, powerline, RF, or IP links. On this network, the devices from distributed applications and tight interaction is possible. This is implemented via interworking models with standardized datapoint types and objects, modelling logical device channels.
Because KNX is wired, building a KNX system is expensive, especially in already built houses. For the system, new cables and ducts need to be applied in the walls to every input and switch point.

Phase 2: Configuring KNX devices

1. Open ETS ss5 and create a new project.
2. Add a floor under RST (any name) and then add a room under that floor.
3. Add KNX devices from the present project and BAOS 771 from ETS5 catalogue.
4. Assign individual addresses to the devices.
5. Configure all the devices as per the requirement by selecting the device and going on parameters configure switch actuator. We have activated only output 1 and 2 because we have only 1 light Switching. Operations delay is set to minimum and on/off level set to maximum/minimum.
6. Configuring motor control delay - set to minimum setting motor feedback: on start + cyclic, on restart + on change and send rate limitation set to 1second. Now, in motor control we set maximum/ minimum values and in scene we set percentage of increase and decrease.
7. Configuring BAOS 771
   Set ip configuration to static. Give ip to BAOS ie. 192.168.1.222
   Set subnet mask and gateway to BAOS ie. 192.168.1.254 255.255.255.255
8. Now create group addresses by clicking on workplace >Open>new panel > group addresses. Add group as AAA (any name of the group) and sub group (any name) as light and fan. Under light add light on/off and light status. Under fan add fan on/Off, fan speed increase, fan speed decrease and fan speed status.
9. Link all group objects defined in buildings panel to addresses defined in group addresses panel by drag and drop.
10. Now open topology by clicking on workplace> open new panel>topology. In this plane, navigate to the devices and right click then click on download and full download. This is to upload the programs to our KNX devices.
    Now press the programming button of the device which is to be programmed.

NOTE : This fails if:
1. we have duplicate individual addresses.
2. We have more than one device in programming mode
3. We have wrong device in programming mode
4. We are running diagnostics mode on ETS 5.

Select ‘Catalogue’ panel, where one should choose the function ‘Importing’ (Label 1).
The file selection dialog box will appear (Label2), in which we can choose the appropriate catalogue address.

KNX Product files can be downloaded from the website of the appropriate manufacturer.

An even simpler method of achieving this is to use the ETS APP Online KNX Product Catalogue.

For further details, please visit the KNX website under Software/ETS Apps.
The subsequent product import is done via a 'wizard'. Here we can make a detailed choice of, for example, specific products that have to be imported or available languages.
At the end of the 'wizard', all imported products will be listed in the catalogue overview, sorted according to manufacturer. From then on, the products are available for the creation of a new project.

Phase 3 : Integration with Alexa

Now let's create an openhab server to control these devices
For this we need to go on
http://demo.openhab.org:8080/homebuilder/index.html
We can also do this in java.
We need to just fill in the requirements in the home builder section and select habpanel dashboard.
Use of server – for hosting services and communication between KNX and end devices.
Now we need rasberry pi os to integrate the devices with Alexa for it to learn the voice commands.
Alexa uses special skills to integrate it with voice commands.
NOTE: Certified KNX products of various KNX manufacturers are imported.

III. CONCLUSION

The IoT has the potential to dramatically increase the availability of information, and is likely to transform companies and organizations in virtually every industry around the world. As such, finding ways to leverage the power of the IoT is expected to factor into the strategic objectives of most technology companies, regardless of their industry focus.
The number of different technologies required to support the deployment and further growth of the IoT places a premium on interoperability and has resulted in widespread efforts to develop standards and technical specifications that support seamless communication between IoT devices and components. Collaboration between various standards development groups and consolidation of some current efforts will eventually result in greater clarity for IoT technology companies. The future of IoT is virtually unlimited due to advances in technology and consumers' desire to integrate devices such as smart phones with household machines. Wi-Fi has made it possible to connect people and machines on land, in the air and at sea. With so much data traveling from device to device, security in technology will be required to grow just as fast as connectivity in order to keep up with demands. Governments will undoubtable face tough decisions as to how far the private sector is allowed to go in terms of robotics and information sharing. The possibilities are exciting, productivity will increase and amazing things will come by connecting the world.

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Development of Robotic Van for Multitasking

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***Abstract*—In today's world, most of the wireless robots are manufactured based on Bluetooth and Zigbee which has a limited range. Therefore, to overcome this problem we are going to develop a multitasking robot which can be controlled from any distance. Here the distance will not be an issue in the operation of the robot. Development of Robotic Van for Multitasking is based on a satellite communication system that can provide communication over a long-range. The various parts perform different types of operation. The movement of the robot can be controlled wirelessly either from the control unit within its transmitter's range or with the help of a GSM Module from any distance where the corresponding mobile network is available.**

The expected outcome of our project is that it would be capable of spying, bomb detection, exploring the enemy base, detecting harmful gases in industries, mines, and many more places. The structure and design of the robot is adaptive and can be modified in future to enhance its capability for further level.

Keywords—Wireless, GSM Module, Satellite communication, Infinite range, multitasking.

I. INTRODUCTION

Now a days, robots are playing a very important role in human life. The robot can do almost every work more efficiently than a human. It can also perform such task that an individual can't do. Due to use of different types of technologies robots are becoming smarter day by day. Therefore, more and more people are using robots in their day to day life. In today's world, the terrorist activities have become a serious problem in the world. When terrorist attacking civilian areas then their main intention is to cause mass casualties and destroy the public property. After this destruction they usually try to hide in buildings or houses then in such cases soldiers don't have information about number of terrorists hidden in the building and different types of weapons they are equipped with. Most of the times to save their own lives, they take hostages. In order to save the lives of the hostage our soldiers put lots of efforts and sometimes they sacrifice their lives due to insufficient data or some
hidden bombs. In this type of situations, the robots can play a vital role in the military operations. It can be used for extracting the information about the number of terrorists that are hidden in the houses or buildings and
the different types of weapon they are equipped with and even their location can also be found out. In few other cases like mines and chemical industries, labors die due to exposure from poisonous gases and tunnel collapse.

To solve such type problems, we are going to make an infinite range multipurpose robot. This project is based on satellite communication system. The movement of this robot can be controlled using GSM cellular technology commonly used in mobile phones, hence the range is not a limiting factor. As the range of our robot is very large therefore it can be also used to reach or explore such places where human accessibility is still a question. It can also perform reconnaissance tasking enemy base, exploring unknown enemy territory, night security on various spheres, anti-intrusion defense or as a mobile communication base during war with GSM communication from any location.

II. LITERATURE

In 2009, the author named as Avishek Biswas, Kaustav Nandy and Prof Ratna Chakrabarty [1] has discussed about the unlimited range surveillance robot controlled by android application through the internet. According to the paper, they attached a cell phone on the robot in which an android application was installed. With the help of internet they control the movement of the robot.

In 2014, the authors named as Amritanshu Shrivastav [2] has discussed about mobile calling based multitasking rover with password protection and SMS reply using GSM module. According to the paper, he used DTMF and GSM module for controlling the robotic vehicle.

In 2018, the author named asV. Supriya [3] has discussed about the range less robot. She gave an idea about the range less robot. According to the paper, she used a DTMF module and Arduino UNO to control the movement of the robot.

In year 2018, the author named as Anurag Chaudhary [4] has discussed about DTMF based intelligent farming robotic vehicle. In this project, he used DTMF module and microcontroller in order to control the robot.

III. PROPOSED METHODOLOGY

Arduino Mega2560 is a control unit of the Mars Rover which is connected with the camera module and sensor

units along with GSM module, as well as a motor driver to drive the motor of the rover.

When the necessary power supply is connected to the system and when the user will call on the cell phone devoted to Mars Rover through another cell phone, for security purpose there will be Password system so that the unauthorized person can't operate the Mars Rover. The caller will s a text message to enter a password. The user will get whole control of the system if and only if he enters a correct password. The Mars Rover will follow the commands as per user enter for example if user press '2' then it will move 'Forward', '3' for turning 'Left', '4' for turning 'Right', '5' for moving 'Backward'. The gas sensor is connected to Analog pin 'A0', Bomb detector is connected to Analog pin 'A1', Camera is connected to Digital pin '13' of Arduino mega2560. Now suppose Mars Rover senses any poisons gas then Arduino Mega2560 will send a text message to the user that "Poisons Gas Detected'.

Block Diagram:

The designing of block diagram plays a very important role for implementing the system as well as describing the working of any system. The diagram below is the block diagram of the project.

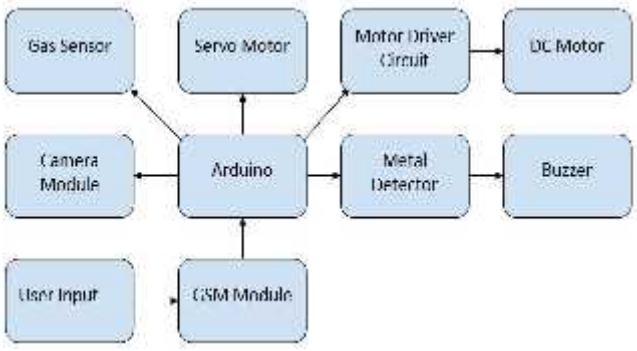

Figure 4.1 Block Diagram of Robotic Van for Multitasking

A. GSM Module

User will give the input to the GSM module through Mobile phone and according to the user's input GSM module give the command to the Arduino. In this project we use SIM 900 model of GSM module. GSM module is used to control the movement of the robot. GSM module (SIM900) is designed with single chip processor integrating AMR926EJ-S core. SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice. Quad-band GSM/GPRS module with size of 24mm x 24mm x 3mm. SMT type which is used customer application. An embedded powerful TCP/IP protocol stack. It requires power supply range of 3.4V-4.5V and low power consumption of 1.0mA (sleep mode). The SIM900 integrate an Analog interface, A/D converter, RTC, SPI bus, I2C, and PWM module.



Fig.1 GSM Module

B. Arduino Mega

Arduino is used as a controller and will control the DC motor with the help of Motor driver circuit. Arduino mega2560 is a microcontroller board with IC ATmega2560 builds on it. It has 54 digital input/output pin in which 15 pins can be used as PWM input/output pins. It also has 16 Analog input/output pins, 4 UARTs a 16 MHz crystal oscillator, a USB connection, reset button, Power jack.



Fig.2 Arduino Mega

C. Camera Module

The Camera module will capture the images of surrounding and display on the screen of a computer or laptop with the help of Arduino. Arduino camera module is the surveillance camera digital image processing chip-OV0706, it is based on TTL communication interface, it is also high sensitivity for low-light applications. It has 300 Kilo pixel lens specially designed for image acquisition.

D. Gas Sensor

Gas sensors can be used for sensing the different types of poisonous gases. MQ135 is an Air Quality sensor module. Which has a high sensitivity to Ammonia, Sulfide and other harmful gases, it is also sensitive to smoke. Its detection range is 10-300 ppm NH3, 10-1000 PPM benzene. It requires a power supply of 5V

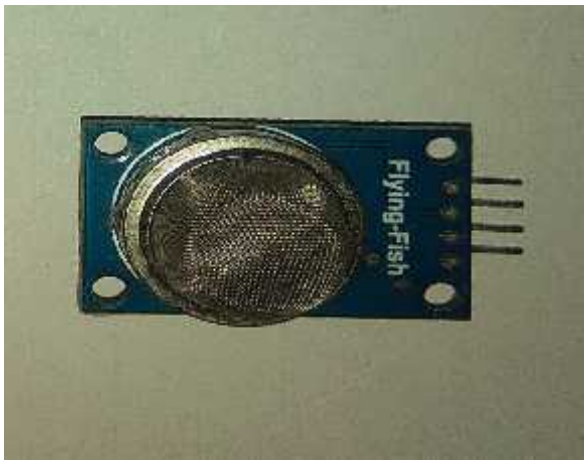

Fig3. Gas Sensor

E. Bomb Detector

Bomb detector is used for detecting the bomb near the robot. It can be created using IC 555 timer. The circuit diagram of bomb detector (Metal Detector) is given below.

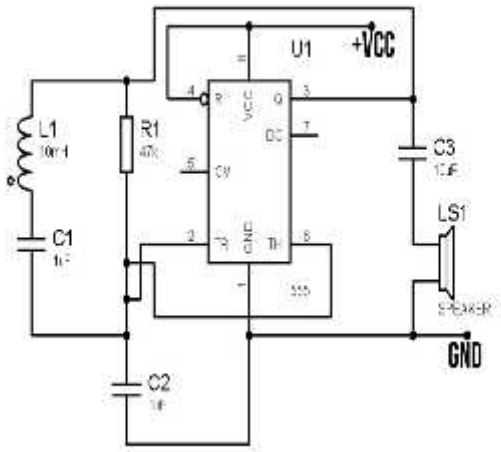

Fig.4 Bomb Detector

F. Motor driver Circuit

Motor Driver L298N is a high voltage and high current motor driver. It receives TTL logic signals. It is used when it needs to operate different loads like motors and solenoid etc. where a H-Bridge is required. Its control unit can only provide TTL output. It has two enable inputs to enable or disable the particular device attached at its output independently. It requires high power motor driver.

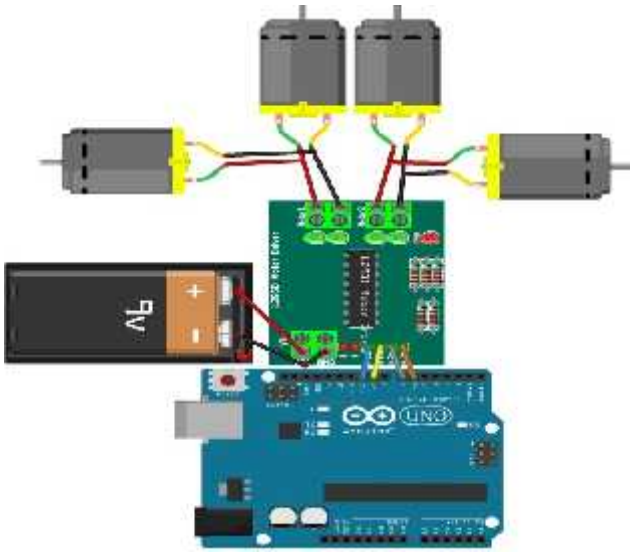

Fig.5 Intrfacing between Motor driver Circuit and DC Motor

IV. RESULT

The expected output of our system is as follows

- Our robot will be capable to detect bombs, land mines etc. in public places, malls etc.
- It will be capable to explore the Enemy base, spying etc.
- Our robot will be capable for detecting the harmful poisonous gases in industries, mines, homes etc.
- Because of satellite communication, it can be controlled from any place in the world.

When we press key 2, 8 in our mobile phone then it will move in forward and backward direction respectively. When we press key 4, 6 in our mobile phone then it will move in left and right direction respectively.

The basic model of our rang less robot is shown below.



Fig.4 Basic model of Robot

V. CONCLUSION

By developing this range less robot, we have overcome the problem of limited range. As, discussed earlier, our robot can be controlled with the help of mobile phone from any place in the world as long as there is the availability of mobile network. The multitasking feature of our robot will help in several sectors such as in military as well as in civil for surveillance, spying, bomb detection, harmful poisonous gas detection etc.

VI. APPLICATION

A. Military Operation

Mobile robotics plays important role in military operation and also used in dealing with potential explosives. It is also used for safety purpose as we know now days terrorist attacks are increasing so by using its camera, we can get information about how many terrorists are hide inside that area. By using this robot, we can save our soldiers life

B. Bomb Detection

It is used find bomb location. As we know in this world bomb blast cases are happening, so by using our robot we can save people life. It is also used for our personal safety purpose.

C. Civil

In civil it can be used to detect harmful gases. In today's world many industries release harmful gases in environment without government permission, so by gas sensor we can detect those harmful gases. Many times, industries face gases leakage problem and some time it becomes very difficult condition so using gas sensor we can get information about that.

VII. FUTURE SCOPE

The aim of our project is development of robotic van for multitasking operation which can be controlled from any location in the world provided that the network should be available in both GSM modules as well as in Mobile phone. But in few places, such as in mines, forests etc. there are network connectivity issues. In such cases our robot may get disconnected from the user. To overcome this problem our robot can be further modified in future with the help of blue tooth or Zigbee. So that when there is unavailability of network then it can be controlled using blue tooth or Zigbee.

On the other hand, the functionality of our robot can be increased by adding the robotic arm so it can also be used in bomb diffusion. For civil use, it can be modified for Pick and place operation.

ACKNOWLEDGMENT

This project cannot be entirely created by an individual. The timely completion of the project 'Development of Robotic Van for Multitasking' has been possible because of our teacher and project guide Mr. Vaibhav Gijare who provided us with guidance and motivation throughout its making. We thank him for giving us an opportunity to create this project. We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge.

Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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ReSurve: Remotely Operated Surveillance Vehicle

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***Abstract*—This paper pursuits to modify the presently used techniques for surveillance at remote and unmanned areas using multi-useful Robot. The robot wagon is included with numerous sensors like Metal Detectors, Proximity Sensors and Camera. This surveillance device would be used for the purpose of safety in entry restricted areas. In this work, the design to expand a video monitoring machine which might seize the video and tracking would be performed at the bottom station. A cellular utility is developed to interface clever telephone with the safety device over Wi-Fi (Wireless Fidelity) community. The evolved cell software may be used for the functioning of the robot wagon and also the live video streaming available over the Wi-Fi community.**

Keywords—surveillance, multi-functional, security

I. INTRODUCTION

Security is the basic requirement for any country. Necessity is the mother of inventions. After the 26/11 attack in India, all countries started focusing on how to control the attack of terrorism and how to improve the security of their nation. As a result, some nations started the use of robots in the guard field. Since tracking of enemies at different areas is very much difficult for soldiers, there is a possibility of human loss in a war situation. The idea presented in this project is to create a surveillance and security-based robot which will help to monitor the activities in the entry restricted areas and dangerous zones. Nowadays, most of the system uses a remotely operated robot with a camera embedded for surveillance. It is given that mostly used surveillance vehicles are wheel-based robots. The wheel-based robot vehicles are more suitable for platforms and terrains. With the advancements in wireless communication technology and internet, the videos and images captured by wheel robot can be displayed remotely on computer or laptop screen.

Surveillance is the process of monitoring particular remote location. This generally occurs in a military scenario for surveilling war areas and adversary territory. There are added risks of losing work force in war like situations. With advancement in technology over the years, however, it is possible to monitor areas of importance remotely by using robots instead of human.

The surveillance robot can be used in unavoidable situations. It can be controlled wirelessly over Wi-Fi Network. It also has night vision camera which will help the user to guide and control the robot wirelessly and sends the live feed to the user on his/her mobile application.

At a primitive level the project aims to make an efficient yet cost effective security system for military application. It can be used for spying in places where human life is endangered. Also, in dark places or at night, there is a problem of non-visibility as human beings are not able to see things clearly. Human effort reduction and protection of human life is a major goal here.



Fig. 1 Surveillance Robot

The basic requirement of the project is surveillance and security of the user. In military purpose metal detectors can be used to detect land mines and guns so that any major harm to the user can be prevented. A proximity sensor is used for detecting any threat to the wagon approaching from the rear side as it is not visible to the user through the interfaced camera. The proximity sensors and metal detectors are interfaced with the Node Microcontroller Unit (MCU).

II. LITERATURE SURVEY

Conventional Wireless Robotics:

Conventional robotics, the controlling and operation of robots is generally completed by means of using RF [Radio Frequency] circuits. These circuits are extensively used for manage and running packages and also are dependable over a small range. The RF circuits include transmitter and receiver which are independent of each different. All the control signals and instructions are sent thru wireless medium in between transmitter and receiver.[4]

There are a number of advantages of RF circuits along with Low cost, Ease of Construction & layout, smooth decoding, less renovation cost etc. Besides these advantages, there are still many critical drawbacks of using a RF circuit.

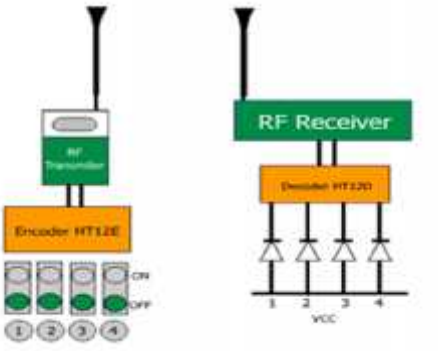

Fig. 2 RFID Transmitter and Receiver

Limited Frequency Range: The frequency range used for standard RF can communicate near approximately three KHz-3GHz. The use of channel separator will increase the reliability however decreases the real usable operating frequency range.

Limited Functions: The restrained wide variety of channels reasons much less number of mixtures and consequently there are less numbers of available functions.

Limited Working Range: The running range of RF circuits with transmitters and receiver may be very small. It starts from some meters to a few kilometers. The running varies from circuits to circuits, however specifically relies upon at the values of physical additives used inside the circuit. Mainly Wi-Fi wireless offerings are utilized in RF transmitter and receiver circuits.

Reliability of Operation: The RF circuits are very prone to mistakes because of outside conditions which include EMI (Electro-Magnetic Interference), medium saturation, absorption because of repetitive reflections from floor. Hence the output recovered isn't usually what is expected. This is probably a serious problem while operating with scientific experimental additives.

Security reasons: This is the principle disadvantage of the use of a RF circuit and the main motive why RF circuits are not favored these days. The RF frequency band is to be had for almost all the customers for records verbal exchange. So there is probably a state of affairs where multiple user is trying to deal with channel for its personal verbal exchange. In such case the frequency band may additionally get interference from another person. Or worst case would be, a few user deliberately seeking to jam our communique community. The RF jammer circuits are very smooth to design; consequently the question of safety arises while RF circuit is used in the circuit. This protection loop hole may be very dangerous whilst the robotic is being used for very exclusive purposes. In areas of navy those safety threats can produce disastrous effects.

III. BLOCK DIAGRAM

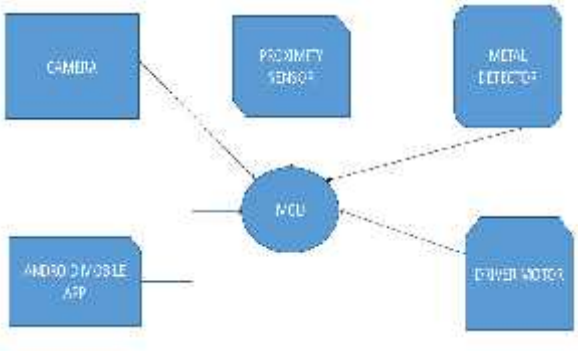

Fig. 3 Block Diagram

IV. FLOWCHART

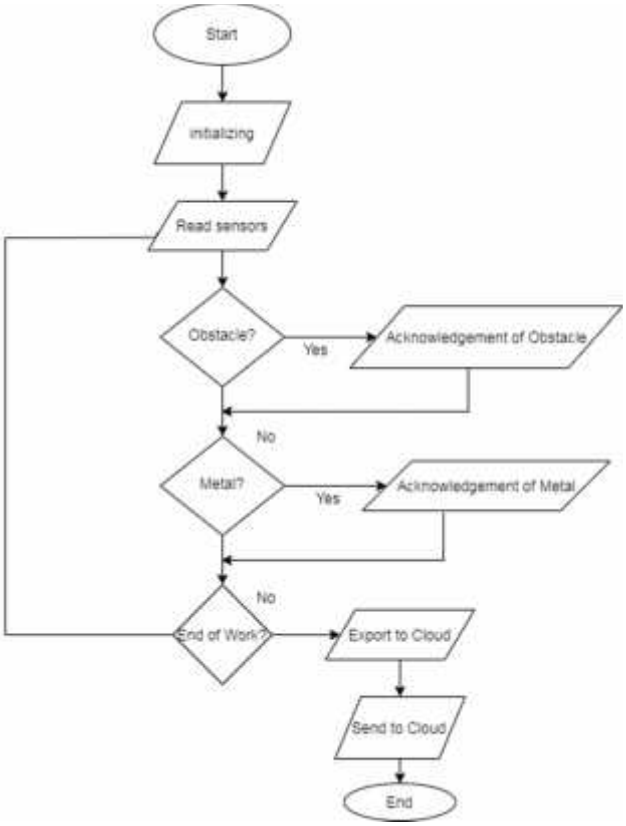

Fig. 4 Flowchart

V. PROPOSED FRAMEWORK

- Structure of the robot

The robotic wagon will have the chassis as its main frame with conveyer wheels which will prevent the slipping of individual wheel and also driving of the vehicle will consume less power as only two motors will be used for driving the wagon. Camera, Proximity Sensor and the Metal detector will be integrated for the purpose of surveillance. The Micro-Controller Unit (Node MCU) functions as the brain of the wagon where all the devices are connected and controlled by it. The Node MCU is connected over

Wi-Fi to cloud and the user can control the wagon from any remote location from cloud.

- Hardware Used:

The following set of Hardware/Sensors/Actuators which are being used are listed as follows:

1. Node MCU
2. Driver Motor
3. Camera
4. Proximity Sensor
5. Metal Detector
6. Supply Unit
7. Wagon Chassis

a) **Node MCU:** This is the main hardware of the project, which uses 128kB of memory and has a storage capacity of 4MB.



Fig. 5 NodeMCU

b) **Driver Motor:** L293D is a monolithic 4-channel driver which can be used to run DC motors and power supplies of up to 16 Volts.



Fig. 6 Driver Motor

c) **Camera:** It is a night vision camera which functions as the eyes of the operator and helps guide the vehicle.

d) **Proximity Sensor:** Passive Infrared Sensor (PIR) is a sensor which functions by collecting the IR light emitted in its field of view.



Fig. 7 Proximity Sensor

e) **Metal Detector:** It is an electronic circuit that has the capability to detect any metallic object in its vicinity.

f) **Supply Unit:** A 12 Volts supply unit will be required to provide supply to each sector of the vehicle.

g) **Wagon Chassis:** Chassis is the main skeleton of the vehicle which functions as the basic structure of the vehicle.

- Software used

Program to be used for the functioning of the wagon will be coded in C programming language.

VI. IMPLEMENTATION

- Designing a robot which is vehicle-mounted, that is capable of carrying the sensors of the metal detectors. Conveyer wheels are used which will prevent the slipping of individual wheel and also driving of the vehicle will consume less power as only two motors will be used for driving the wagon.
- Controlling and managing the wagon wirelessly by a mobile based application. To command the robot remotely regarding the path it has to go through the Wi-Fi network over cloud.
- Surveillance and security can be achieved with the help of night vision camera as the camera uses infrared light which when reflects from any surface, the camera is able to detect the object and display it on the screen.
- The live video is streamed over the cloud to the user screen which functions as the eyes of the wagon in human restricted areas.
- The Proximity Sensor is placed on the rear side of the wagon which will help the user detect any threat approaching from the rear side as the camera is not able to provide vision to the user.

VII. APPLICATIONS

- **POLICE**

In situations where police patrolling is needed, this robot can be used for the detection of metals or any hazardous substance. It can be used for surveillance in entry restricted areas.

- **MILITARY**

This project can be useful for basic supervision and monitoring of military outposts. It may also aid in scouting and spying when under enemy lines.

- **FIRE**

To provide video feedback for site analysis such that an approximation of the ravaged area can be made and then fire fighters can be sent in.

- **NUCLEAR**

Chernobyl is a great example of an application area where this project will be useful, such area can be inspected thoroughly and effects of radioactivity can be measured.

VIII. CONCLUSION

The user will be able to sense any obstacles and obstructions using the proximity sensor. Using the camera, live feed will be provided to the user and as it is night vision camera user will be able to get the feed using low light and night time.
Android mobile app helps movement of the robot which is provided by the user. Also, camera will be interfaced with the mobile app so that user can view the live streaming.

IX. FUTURE SCOPE

The range of area covered by the wagon can be increased if GSM module is used. The range can be enhanced but there is a possibility of no network coverage region where wagon will lose its connectivity. These types of robots can be used for WSN technology where the robot can function as transmitter and receiver by collecting data from the sensors and providing the data to the central location.

ACKNOWLEDGEMENT

This project cannot be entirely created by an individual. The timely completion of the project 'ReSurve: Remotely Operated Surveillance Vehicle' has been possible because of our teacher and project guide Mrs. Poorva Waingankar who provided us guidance and motivation throughout its making. We thank her for giving us an opportunity to develop this project.

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Design and implementations of Arm based Automated water dispenser Model(For coin 2,5,10)

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***Abstract*— Water dispensers are in use in India at many places like Mumbai, Delhi, and many other cities. Most of the places it is not automatic and the operator is needed to operate the machine. Currently, the coin accepting feature is also done manually by an attendant. This project offer a solution to such a problem by proposing an automatic water dispenser machine.**
In this project, attendant will not be needed because coin will be accepted automatically if such vending machine is located in regular Interval in cities like Mumbai the use of plastic bottles can be reduced as well which can save our environment.

Keywords - Attendant, dispenser, plastic bottle, save environment.

I. INTRODUCTION

Water dispensers which are available in Mumbai at various railway stations are not completely automated. Most of them required an operator to operate like accepting and returning coins. Many automatic water dispenser machines accept coins even if the water is not available to dispense. Due to the unavailability of a coin returning system coin stuck in the machine.
Nowadays water bottles are available in the market, but the cost of the bottles is very high. In a city like the Mumbai rate of water is 10 rupees per liter which are quite high. Water bottles produce a huge amount of waste which increases environmental pollution. Hence to overcome all these problems, this system is implemented.

II. LITERAURE SURVEY

Nowadays water dispensers are already available in many areas. But all these vending machines have some disadvantages as mentioned below:-
1) Prof. A.A. Shinde [1] represents the description of Coin Operated Water Dispenser. The water dispensing machine dispenses water on the detection of the right coin (correct denomination).The dispenser is designed using At mega (Arduino) controller. The system would give good performance if advanced controllers like ARM are used.

2) Requirement of image processor:
R. Udayakumar [2] represents the Automatic vending machine prototype model. The coin detector is using Infra-red sensor with different size of vertical blocks on slider for differentiating coin.
Prof. J. S. Kulkarni [3] represents Arduino Based Vending Machine. The water level detector is not implemented.

III. PROPOSED METHODOLOGY

A. Proposed Technology Solution:

As available vending machines have many problems, this vending machive design is proposed to solve existing problems. Following ways can be suggestet to solve identified problems:-

1) An automatic water dispenser system without attendant: This project proposed to design a fully automatic water dispenser machine for which attendant will not require. An arm processor and image processing used for automatically coin detection and according to coin water will be dispensed. Insert a coin of the required amount and the machine will vend the water accordingly.

2) Not accepting coin if the water is tank is out of water**:** The model is based on an automatic water dispenser machine in such a way that if the water is not available in the water tank then it will displayon the LCD screen as an empty tank. If the water tank is empty then the signal will send to the processor and the processor will display it on screen and the coin will be returned.

3) Coin detection using image processing tools**:** This project is using an image processing technique for detection of coins .A database of coins will be stored, as a coin inserted processor compares the images if anyone of coin matches then accordingly an amount of water will be dispense. Hence using this technique this

automatic water dispenser machine can accept multiple coins.

4) Low price and good for the environment: Water from this vending machine will be at a lower price as compare to water bottles. The metallic containers will used and hence can refuse the use of plastic bottles if these machines are available at close distance. Hence these are very helpful for the environment.

B. Block Diagram

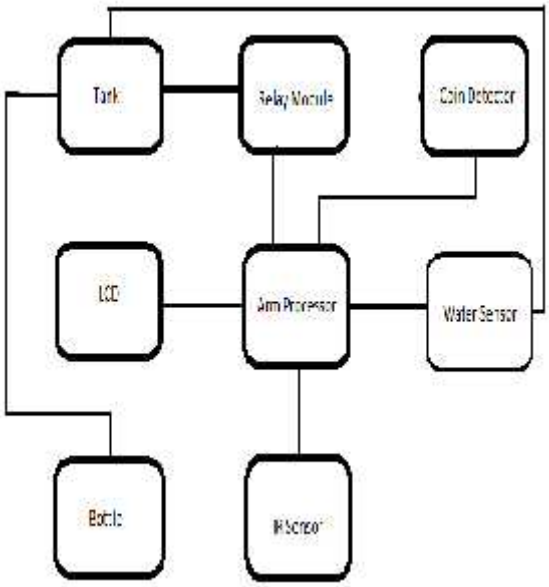


Fig. 1 : Block diagram

C. Designing of Model:

1) The Creation of Database of coins:
The collection of image files will be use to store the images of all coins that are going to accept. If the inserted coin will not match any of this coin than the machine will not accept the coin and will send it back.

2) Detection of coin using the camera:
A camera is used which will take photos of inserted coins. After capturing the image of the coin processor search for matched coin stored in external memory. If any coin matches then the signal will be sent.

3) Decision amount of water to be dispensed:
If inserted coin matches with any one of coin stored in external memory then according to the code, delay will be produce and water will be vend for that amount of delay

V. APPLICATIONS

1. This coin based water dispenser system could be installed in shopping malls, super stores, universities, community centers, petrol pumps and CNG stations for supplying automatic water to the peoples.

2. By using this vending machine, not only water will be dispensed but also any liquid can be dispensing like cola, coffee.

VI. RESULT AND DISCUSSION

Approaches for coin detection:

1) Initially, the approach was to make coin detector using a slider having different slots for different coins as per size. The drawbacks arise are mentioned below:-
   i. As per the Indian currency, some of the coins get matched with each other like some 1 Rs with 2 Rs coins, some 1rs coins with 5 Rs coin.
   ii. The size of the slot should be more accurate.

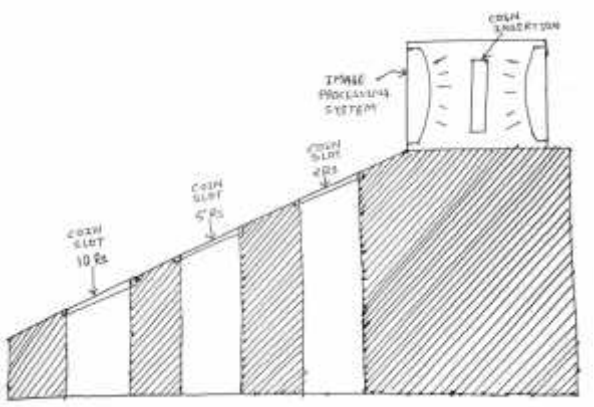


Fig. 2 : Coin detection based on size

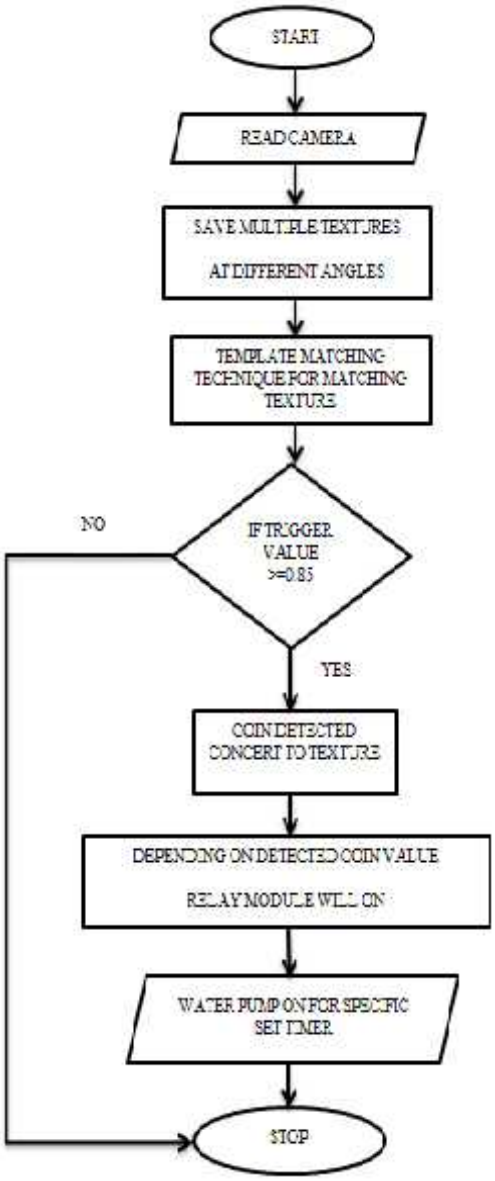
2) Vending machine made which tried to separate coin based on their weights. For weighting different coins, they used electronic DIY kit. But here also, the problem arises is, as per the Indian currency the weight of some coins are almost same.

To overcome these limitations, the image processing is used for coin detection. For image processing to detect coins, the Microsoft visual studio software is used. Microsoft Visual Studio is an integrated development environment (IDE) used for developing computer programs and it is a Microsoft software development platform such as Windows API, windows form, etc. C# (C Sharp) language is used with the OpenCV library for real-time computer vision. Template matching technique plays an important role in coin detection. Template matching is used for finding the area of an image similar to a template. The identical region of the image is found by giving a threshold. The threshold depends mainly on the accuracy for detecting the template or texture in the source image. For the best accuracy, the threshold should be set high (>=0.8).



Fig. 3 : Database of coins captured

The flowchart of coin detection process is as follows:



To interface computer with ARM7, the USB TTL converter is used. After coin detection, the output from visual studio goes to the arm7 processor through serial communication port. The USB TTL Serial cables are a range of USB to serial converter cables which provide connectivity between USB and serial UART interfaces. Depending on the set timer (for particular coin value) the relay gets turn ON. Here SPDT(Single pole double throb) relay act as a switch between pump and ARM processor. The transistor is used to control large amount of current.

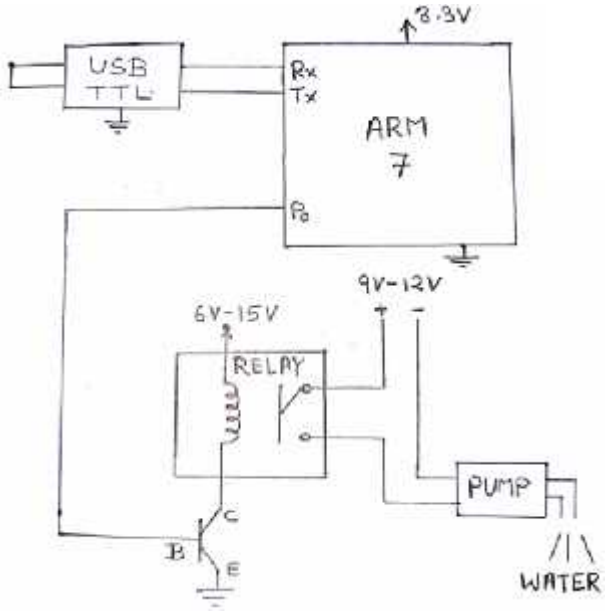


Fig. 4 : Circuit diagram

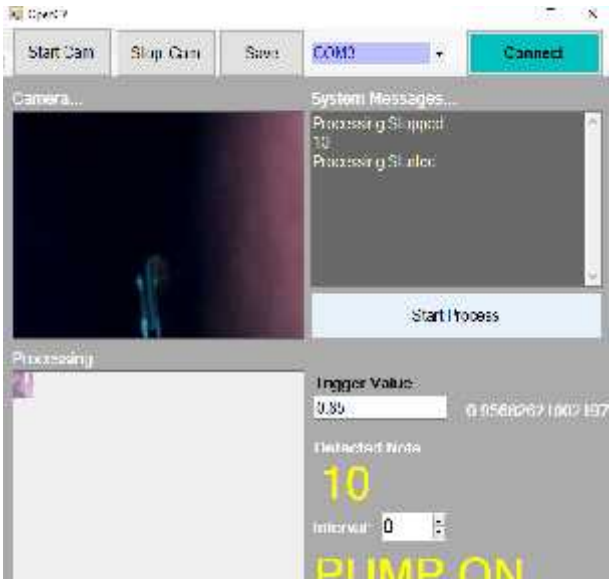


Fig. 5 : coin detected output on visual studio

VII. CONCLUSION

Using this project water gets dispensed automatically on validating specific coin. If everyone carries there metallic bottles or vessels then there is no wastage of plastics and by placing machine in every 500-meter distance, then the requirement of the bottle will be decreased.

This project proposed to design a fully automatic water dispenser machine for which attendant will not require. If the water is not available in the water tank then it will display on the LCD screen as an empty tank. Water from this vending machine will be at a lower price as compare to water bottles.The metallic containers will be use and hence can refuse the use of plastic bottles if these machines are available at close distance. Hence these are very helpful for the environment.

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Implementation of Master-Slave Robot for Food Processing Application

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Abstract*—Robotics is an interdisciplinary branch of engineering and science. Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing. The purpose of this project is to implement the master slave configuration. In today's world there is a huge necessity of domestic robots. Domestic robots are entering into our lives to make our life easy and to increase flexibility. Domestic robots are being used for home automation applications. A home automation system is a technological solution that enables automating the bulk of electronic, electrical and technology-based tasks within a house. It uses a combination of hardware and software technologies that enable control and management over appliances and devices within a house. So, implementation of master-slave configuration which can be used to ease the vegetable cutting process. Some vegetable cutters are designed to use in the home. Commercial vegetable cutters are used by restaurants and in industries. The simplest type of vegetable cutter consists of a screen with blades and two handles. There are many different models of commercial vegetable cutters, each designed for chopping a particular vegetable. We conducted a survey in local areas where we came across a common problem of cutting and chopping of vegetables and fruits, be it senior citizens, working women, hostel students, etc. Presently there are choppers which are very time consuming and the user will have to be physically present and cut vegetables manually. Hence, we are designing a food processor for home application which has wide scope in kitchen equipments that are compact in design. Requiring low maintenance, these machines are used as used for cutting, grinding and chopping of different types of vegetables, fruits and other food products. These machines are high in performance and can be customized as per the requirements of the clients.

I. INTRODUCTION

Manual cutting of vegetable is still prevalent in hostels, education institutes, marriage catering services, restaurants, etc. The amount of vegetables to be cut for the dishes always remains higher than actually what's consumed. The associated difficulties like time constraints, contamination, etc. make it very difficult for any person handling the job. Therefore, there is a need to automate the process of vegetable cutting. Therein, arose a need to automate the process of vegetable cutting, and here we are with a proposal which can aid in easing the load off the people associated with it. At the point when housewives gripe about taking hours in the kitchen to set up an extraordinary feast, it all boils down to how much time it takes to cut the vegetables in the first place. With a slicer, our work time can be lessened to half. Once the vegetables are cut or slashed, our opportunity to set up a dish automatically decreases. The best part about a vegetable is the manner by which uniform our vegetable cuts or pieces will be. On the off chance that we cut a tomato for a sandwich or many other dishes we will see that the red rounds are pretty much a similar thickness. When it is altogether cut up, there is an unmistakable pleasure that is determined when we see them uniformly stacked up and prepared for our sandwiches and many other dishes.

II. LITERATURE SURVEY

[1] In this paper, mobile robot control system based on the master-slave remote operation of mechanical arm. It is divided into two parts, one is the mobile robot deep into the floor, and the other part is monitoring platform in the monitoring center. The main control board of the hardware structure of the robot containing S3C2440 core

board and USB's is interfaced by the CAN bus. This bus is connected to the Sensor Module containing Information Collection Board, GPS, Ds18b20 and to the Motion Module containing FPGA Motion Control Board, Arm, camera pan. This systems consists of 3 circuit boards, two of which are connected to each other via I2C bus. One of which acts as a "master sender" and the other a "slave receiver". This system can be controlled using Internet, which is achieved by using ESP8266-01 and blink libraries. It also allows us to control the system by giving voice commands using HC-05 Bluetooth module and voiceapp.

[2] A wireless irrigation system for a smart home garden that can be integrated with existing smart home control systems. The system consists of slave nodes and a master station each of which is equipped with a wireless microcontroller. Each slave node is equipped with different sensors, a microcontroller and a zigbee transceiver. The slave microcontroller reads and processes commands given by the master robot. A home web-server is interfaced with the master station for remote access monitoring and operation.

[3] The system was constructed with two parts; one is remote control mechanism with Bluetooth (BT) module mounting on both master controller module (remote controller) and slave receiver module (on every home appliance). The other is to design the remote controller with speech-recognition and function of self-learning human voice so that people could directly give command to control appliances. This project is going to be commanded through voice recognition as well as IOT app interfacing through wi- fi, internet ,bluetooth.

III. METHODOLOGY

Several robotic vegetable cutters are available in the market but only few ones are automated vegetables choppers. However, in current state of technology there is no such robot which processes or cuts vegetables using this automated master-slave configuration.

First of all, in the present vegetable cutter, the feeding of vegetable or fruits is not automatic, and a person has to devote his time to feed the vegetable one by one, till the required quantity is cut. Then, the grids are powered by a motor. Considering the fluctuating power supply that, the process has to be electrically powered continuously for operation, is a disadvantage in itself. Most important of all, is the initial investment on the cutter. Therefore, considering all the demerits, the idea for a vegetable cutter using master slave configuration is conceived. Some of the key problems, which were identified for the initiation of this work, are high cost of the existing automated system, Power fluctuations, time consumption in manual cutting and chances of contamination in manual cutting. Thus, below is the proposed diagram of the project:

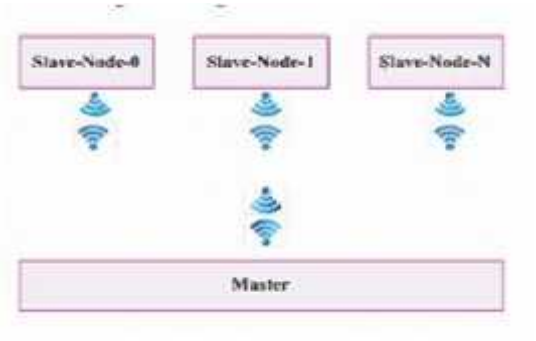

Fig3.1 Master-slave interface basic block diagram

The complete working and flow of the project can be compiled in short as this flowchart. The basic flowchart of the project is as shown below:

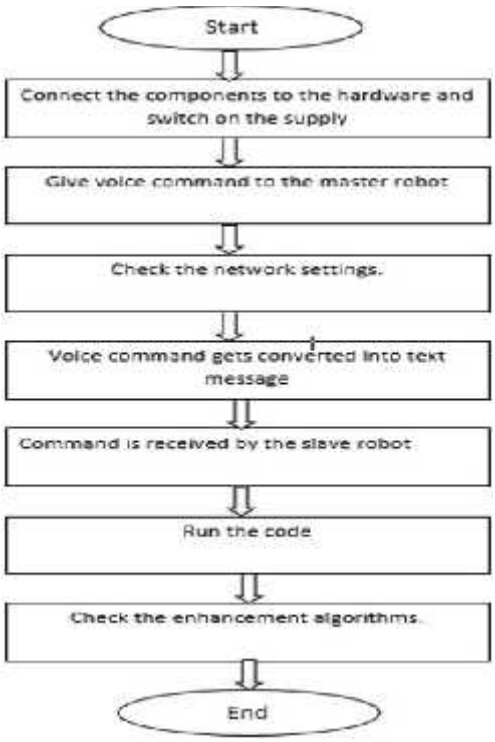

Fig.3.2 Flowchart

In this diagram the mobile application is connected to the main motherboard which is the Master. The command to the master could also be a voice command. The master is

the main control board of the system. The slaves are controlled by the master as per the given task. Master and the slaves are interfaced through a bluetooth module (HC-05). The commands from the user are fed to the master, not to the slaves directly. Hence there is no communication between the user and the slaves.

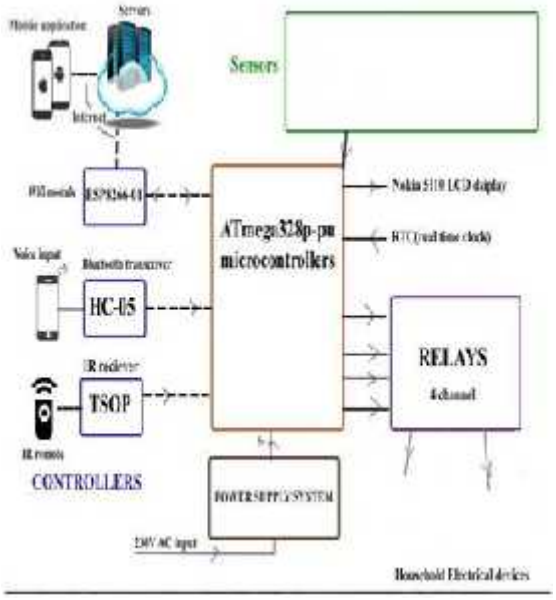

Fig3.3 Basic Architecture

MIT APP INTVENTOR

App Inventor allows to build an application for Android phones using a web browser or a connected phone or emulator. The App inventor servers store the work and helps to keep the track of the project. The App inventor Blocks Editor, where you assemble program blocks that specify how the components should behave.



Fig3.4 MIT App Inventor



Fig3.5 Created MIT App

IV. RESULTS ANDDISCUSSION

According to the given problem statement, the void which will be filled by our project is that it will comprise of the feature of automated vegetable cutter using voice commands as in today's date we have manual vegetable choppers.

Manual cutting of vegetable is still prevalent in hostels, restaurants, etc. The associated difficulties like time constraints, contamination, etc. will be overcome by this master slave automated vegetables cutter and will make it easier for any person for handling the job.

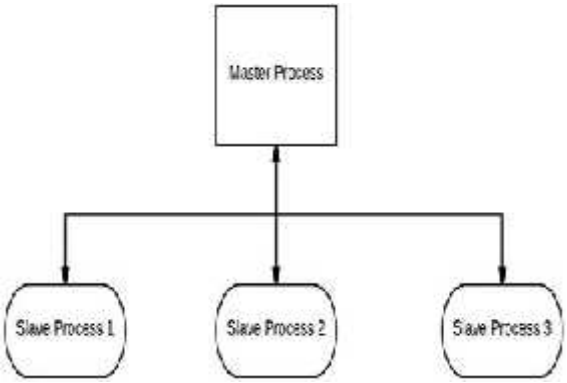

Fig4.1 Master-Slave Block Diagram

V. CONCLUSIONS

We have done the literature survey of various papers to collect ideas for this project. After studying we have proposed our ideas to our project guide. We also

discussed the ideas which we needed to work on this project. Then we completed the final block diagram and started working on code. As per the growing need of society the void between the past products and modified products is that it will decrease labour. It spares time of consumer as this robot which is automatically operated by the master robot. It will have no human interference. We will fill the void by our project is that it will comprise both the features of wet floor cleaning and vaccuum cleaning. Unlike other floor cleaner robots this is not a vacuum cleaner robot. It performs sweeping and mopping operation. Detachable mop will be used for wet mopping. The command flow starts from the user to the slave through master robot. For the vegetable cutter application, the desired vegetable would be chopped automatically in a particular size as per the program designed. These applications would operate from anywhere via a mobile phone just with the help of wi-fi connectivity. We shall be able to get the idea about the need for this product in the society, the success of the product and what further modifications can be made.

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Implementation of Automated Book Picking and Placing Robot for Library

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***Abstract*— As the current world is been started working or getting dependent on robots, it performs various tasks and also are precise as compared to the task done by the human life is more important. Humans simply can't risk their life. Life is precious. If robots can perform such task what is the use or need of Humans doing such task that risk one's life. It also will reduce risk to humanity. The main idea of this project is that robot is designed that follows a predefined line to keep track the library book shelf arrangements. The number of the book that has to be taken is given as input to the robot. Robot gets the data of book by comparing the saved barcode with the books in the shelves. If the particular book which is to be found out by the robot matched with the saved book detail, then the robotic will send a notification to the shelf unit. The corresponding arm will move forward and pick the book and will deposit the book in the basket of robot. The robot will return the book to the collection center, thus the customer can deliver the book from the collection center. This helps and simplifies the job of monitoring the arrangement of books and also reduces the manual routine work done by the library staff.**

Keywords—Robotic arm, Arduino Mega 2560, Barcode Scanner, Limit switch

I. INTRODUCTION

Robotics is a key technology in the modern world, a well-established part of manufacturing and warehouse automation, assembling cars or washing machines, or moving goods to and from storage racks for Internet mail order. Robots have taken their first steps into homes and hospitals, and have seen spectacular success in planetary exploration. In this paper the RFID technology is used. It is mainly focused on the book detection and reducing the human work. Robot technology has been widely deployed into various applications to improve productivity. Inventory tracking is a tedious but important process for inventory management. In particular, a library easily contains hundreds of thousands of books that are frequently borrowed and returned back to the shelves. To facilitate users to easily locate a particular book, books are placed in dedicated areas and sorted in a running sequence based on their so-called call numbers. Library staffs have to ensure that the books are placed in order, an extremely labor-intensive and time consuming process. Library staffs first need to perform shelf reading, i.e., manually search for books that are misplaced in the wrong book sequence, then pick up the book and insert it in the correct location.. Typically they have to pick the books and hand it over to the person to whom the books are being issued.

II. LITERATURE SURVEY

In this paper the proposed system gives the result of fined the book. Misplacing of the books can be identified easily. It reduces the manual work. With the proposed architecture, if constructed with at most accuracy, the robot will pick the book. This helps and simplifies the job of monitoring the arrangement of books and also reduces the manual routine. As development in Robotics is growing fast, we can make robot more autonomous and sophisticated .Also we can develop this system with real time camera implementation [1].

In this paper the proposed system gives the result To pick the specific book and place it on the conveyor this was the first objective of our project which we have achieved. This project implements the concepts of embedded system, robotics and RFID communication. A library is a collection of information resources; it provides invaluable service to its members, to a wider local community. Typically we need a librarian to pick the book and handover it to the person to whom the books are being issued [2].

In this paper we studied the a library easily contains hundreds of thousands of books that are frequently borrowed and returned back to the shelves. Typically we need a librarian to pick the books and hand it over to the person to whom the books are being issued. This might be an easy task in case the library floor area is small. Also, to search for the books by humans takes a lot of time as many a times the books gets overlooked by the

human eyetie. Running of library manually is a difficult task. It is time consuming &laborious. We can overcome these drawbacks through our proposed paper. In this method we are going to maintain an autonomous service robotic assistant whose functionality includes the assistance of individuals within a library environment[3].

This paper elaborates on the key enabling robotic technology for the fully autonomous system, namely, a navigation system with surface tracking capability. A Radio Frequency Identification (RFID) reader is carried by the navigation system to identify the RFID tags embedded in each book. Based on the tag information, a tracking report that highlights missing and misplaced books is generated for the end users. To ensure successful identification, the surface tracking requires high accuracy, for which we propose a filtered Hough transform and a macro-mini manipulator structure. Tests of the across system in a library show high accuracy in the scanning performance[4]

In this paper we studied the use of robots in library is becoming more popular in recent years. The trend seems to continue as long as the robotics technology meets diverse and challenging needs in educational purpose. The prototype consists of robotic arm along with grippers capable of moving in the three axes and an ATMEGA 8 microcontroller. Software such as AVR Studio is used for programming, PROTESUS is used for simulation and PROGISP is used for dumping the program. RFID is used for identifying the books and it has two IR Sensors for detecting the path. This robot is about 4 kg in weight and it is capable of picking and placing a book of weight one kg.[5]

In this paper the proposed system gives the result to develop a robotic automated library system that will help us to use library resources efficiently, like library databases, finding books and showing user profile. The library database is also updated with book issued or returned. Because of electronic and mechanical automation, it reduces the time required for library management tasks. It reduces human interception so the user will get the book faster and the user can easily check the availability of a book from its own place within a campus. The idea of library automation is often achieved with the assistance of this project.[6]

III. SYSTEM MODEL

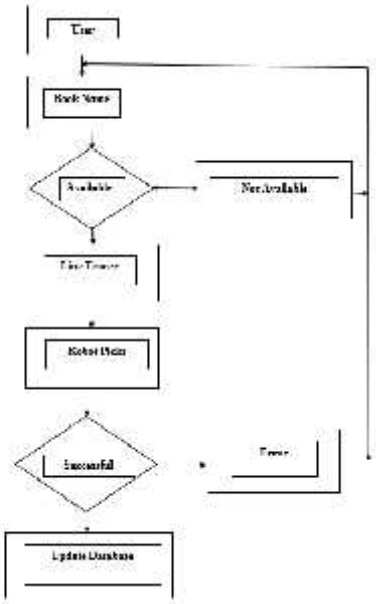

Fig.1 Data Flow Diagram

IV. PROPOSED SYSTEM

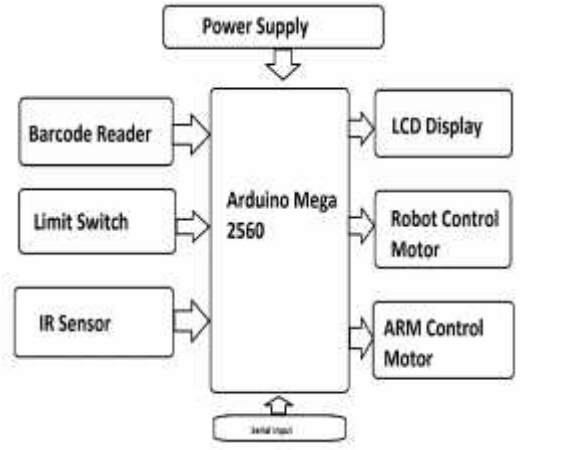

Fig.2 Block Diagram

A. *Arduino MEGA 2560*

The Arduino MEGA 2560 is designed for projects that require more I/O lines, more sketch memory and more RAM. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities maintaining the simplicity and effectiveness of the Arduino platform. This document explains how to connect your Mega2560 board to the computer and upload your first sketch. The Arduino Mega 2560 is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline.



Fig.3 Arduino MEGA 2560

B. Robotic arm

A robotic arm (not robotic hand) is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement.[1][2] The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand.



Fig.4 Robotic Arm

C. Limit switch

A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection.



Fig.5 Limit Switch

D. *Control Motor*

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages. Doe to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc.



Fig.6 Servo Motor

E. Barcode scanner

A Barcode reader or Barcode scanner is an electronic device which is able to scan and decode barcodes. These devices use optical technology such as infrared light. Some readers use an integrated decoder; others have one unit for reading the barcode, and another one to decode the barcode.



Fig.7 Barcode Scanner

F .LCD Display

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels. LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produce an image using a backlight.



Fig.8 LCD Display

G. Infrared sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.



Fig.9 IR Sensor

H. Power Supply

Power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power.



Fig.10 Power Supply

V. METHEDOLOGY

Initially user will enter the required book which is to be shown on 16×2 LCD display. The line following robot which is has a robotic arm mount on it will get a command to scan and pick the specific book with the help of the barcode reader which will detect the book. The IR sensor will take care of the obstacle which will come in path. There are 2 motors which function is in line following robot and one for robotic arm gripper for picking and placing the book. Limit Switch acts as a counter to count the number of the shelf and gives the result about the shelf to the robot.

VI. EXPECTED OUTCOMES

A pick-n-place Robotic Arm using Arduino ATmega2560, Motors, Limit Switch which will be used to pick the book and place it at the desired location. Try to operate the Robotic Arm on basically Line Follower Imparting extra features onto it by adding Line follower concept. A robotic arm will be capable of taking an object from one location and placing it to the other desired location. The robot will follow paths based on the allotted path. The robot will get the location of book shelves and the book-table destination. When the user put the data, the robot will follow allotted path and reaches towards the shelves via limit switch. The barcode scanner starts scanning and found the user given book. The arm will start to pick the book and place it in a tray and then move towards the user table (book-table destination) and handovers the book.

VII. CONCLUSION

The Library Management System allows the user to enter the book details and the person's details. The implementation of the system will reduce data entry time and provide readily calculated reports. Experiments on the robot manipulator were conducted to determine the accuracy of the pick-up process performed. To verify the accuracy of the pick-up process, we set up the experiment by placing the library robot in the perpendicular direction to the bookshelf. The robotic arm and barcode scanner are designed to

scan and pick up a bookcase in a certain range from the reference point, where this range is called active range.

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We express our sincere gratitude to Ms. Rutvi Thakar, Assistant Professor and our project Department of Electronics and Telecommunication Engineering, Thakur College of Engineering and Technology, Mumbai, for her valuable guidance and timely suggestions at every stage of the project, without which this work would not have been possible. We are thankful to her for motivating us at every step and having confidence in our work. We would also like to thank Dr. Vineet Kumar Dongre (HOD Electronics and Telecommunication Department, TCET) for his constant motivation and assistance throughout project work.

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Implementation of Master and Slave Configuration for Floor Cleaning Application

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***Abstract*— In this paper, a low cost and human friendly home automation machine is designed using Arduino board, Bluetooth module and smartphone. A cellphone application is used inside the recommended device which permits the customers to use devices including home equipment and sensors by the use of Bluetooth technology. Nowadays, most of the traditional domestic automation structures are designed for special purposes. Our proposed device is a general purpose home automation gadget, which can easily be put into application in the present domestic scenario. This paper additionally describes the hardware and software program structure of gadgets. The proposed prototype of home automation gadget can be implemented in today's world wherein time is money. Cleaning has been viewed as a time- consuming assignment. However, cleanliness and health cannot be compromised. Many initiatives have been taken towards building intelligent floor cleaners. However, most of these robots had been either used for dry or wet cleaning. Our proposed system is a smart floor cleaning robot best suited for household purposes with both dry and wet cleaning in a parallel manner thus saving time and power consumed. It has both computerized and manual manage modes. The utility developed to control the robot offers flexibility to a person. Thus, the consumer is only a touch away from the robot that is cleaning even without human intervention. This paper presents a wireless master and slave configuration for a smart home application. The system consists of slave nodes and a master station each of which is equipped with a wireless microcontroller.**

Keywords: Home automation system, master and slave, smart floor cleaner, robot, android app.

I. INTRODUCTION

Households of nowadays are getting smarter and extra automated. Home automation offers convenience and creates extra time for human beings. Domestic robots are getting into the homes and human's day to day lives, but it is yet a tremendously new and immature marketplace. However, a growth is expected and the adoption of home robots is evolving. Considering all the demerits, the concept for the master slave configuration for home automation is conceived. The number one objective, is to implement the master and slave configuration for household applications. So, the development of this product involves studies from the scratch that involves different home application slave nodes to be used. Development of prototypes helps to review the product at an earlier and allows further modification and improvement. This project gives a wireless master and slave configuration for a smart domestic application. The system consists of slave nodes and a master station each of which is equipped with a wireless microcontroller.

II. LITERATURE SURVEY

Home automation gadget consists of information technology and control system to reduce the human labor. The fast growth of technologies impacts us to apply smartphones to remotely control the house appliances. An automated tool has capability to work with versatility, diligence and with lowest error. The concept of home automation machine does not only help to decrease the human labor but it additionally saves time and energy. Early home automation structures have been utilized in hard work saving machines but these days its important goal is to provide facilities to people to carry out their day to day ordinary duties and control the house home equipment remotely without having to monitor it in person.

[1] A cleaner robot is an electric home appliance, which works in two modes as per the user convenience "Automatic and Manual". The robot cleaner performs random sweeping and mopping

operation. For obstacle detection and to avoid hurdle, sensors are used. If any hurdle detected then, robot changes the lane automatically but does not stop cleaning action. It follows zigzag path for user convenience.

[2] The system was constructed with two parts; one is remote control mechanism with Bluetooth (BT) module mounting on both master controller module (remote controller) and slave receiver module (on every home appliance). The other is to design the remote controller with speech-recognition and function of self-learning human voice so that people could directly give command to control appliances.

[3] A wireless irrigation system for a smart home garden that can be integrated with existing smart home control systems. The system consists of slave nodes and a master station each of which is equipped with a wireless microcontroller. Each slave node is equipped with different sensors, a microcontroller and a zig-bee transceiver. The slave microcontroller reads and processes commands given by the master robot. A home web-server is interfaced with the master station for remote access monitoring and operation.

[4] In this paper a low cost and user-friendly remote- controlled home automation system is presented using Arduino board, Bluetooth module, smartphone, ultrasonic sensor and moisture sensor.

III. METHODOLOGY

The system has two important blocks hardware and software. The hardware part consists of three main hardware components smartphone, Arduino board and Bluetooth module. Software part consist of Arduino integrated development environment (IDE) and Bluetooth terminal smartphone application which is used for wireless communication between smartphone and master and the slave robot.

The given diagram shows the flow of instructions from the android app to the slave of the home application

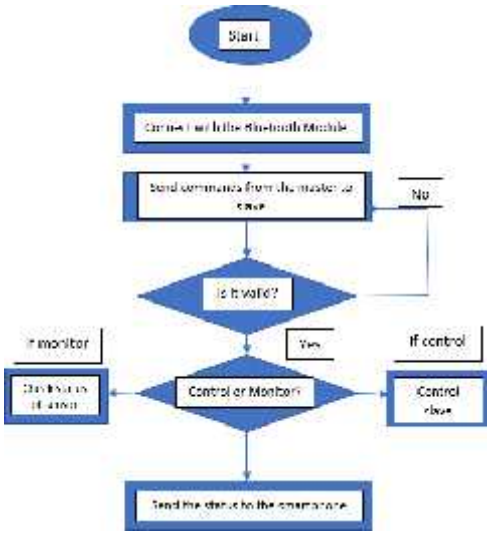

Fig. 1: Data flow chart

The method presents the design and implementation of a robust, low cost and user friendly [5] Home automation system using Bluetooth technology. The design of proposed method is based on Arduino board, Bluetooth module, sensors and smartphone application. Bluetooth module HC- 06 is interfaced with Arduino board and home appliances are connected with Arduino board via relay. Smartphone application is used for serial communication between smartphone and Bluetooth module which is further connected with Arduino board. Proposed method has ability to not only remotely control the appliances but it also monitors the sensors

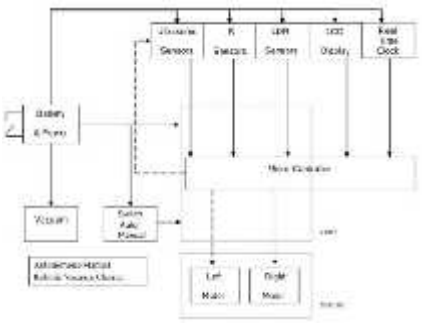

Fig. 2: System block diagram

The below diagram represents the architecture of our model. It shows the interconnection between the user and the master and the master and the slave robot. Hence it shows that the master acts as the interface between the user and the slave robot monitoring all the activities of the slave robot and updating the user

with the status. Here the slave robot is the floor cleaner which is mastered or controlled via a user through the master using mobile application.

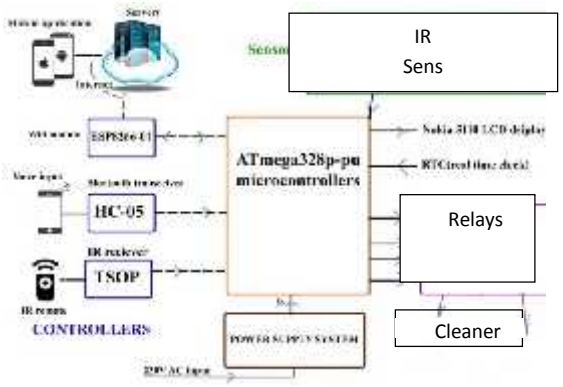

Fig. 3: System Architecture

Below are the list of components that are used for designing our model.

Table 1. List of components

Sr. No.	Components
1.	Arduino
2.	HC-06 Bluetooth module
3.	IR Sensor
4.	Vacuum cleaner
5.	Two robot chassis
6.	Relay module
7.	12V DC motor (100 rpm wheels)
8.	7805 Voltage regulators
9.	12V DC battery
10.	M to F/F to F/M to M wires
11.	L239D motor driver IC

IV. MIT APP INVENTOR

App Inventor allows the user to build an application for Android phones using a web browser and either a connected phone or emulator. The App Inventor servers store your work and help you keep track of your projects. The App Inventor Blocks Editor, where you assemble program blocks that specify how the components should behave.

STEPS:

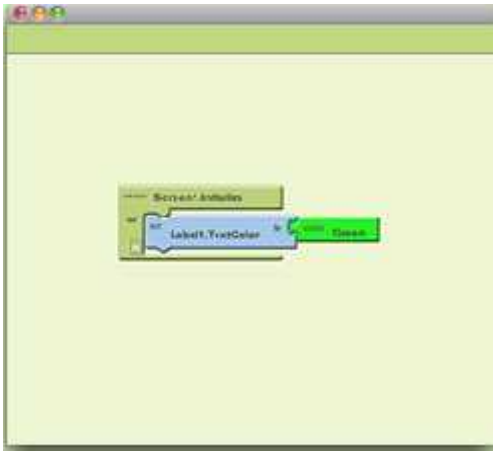

Fig.4.1: App Inventor Designer



Fig.4.2: App Inventor Block Editor



Fig.4.3: Android Emulator



Fig.4.4: Android Phone

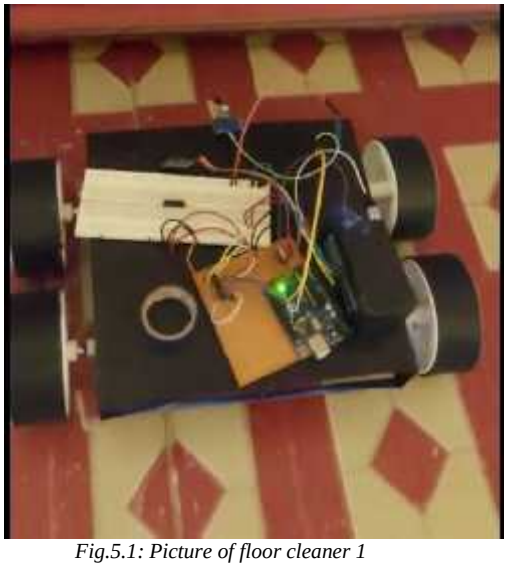

Fig.5.1: Picture of floor cleaner 1



Fig.5.2: Picture of floor cleaner 2

V. RESULTS AND DISCUSSION

The slave can be operated without any manual contact via a voice command given to the master. According to the problem definition, the void which will be filled by our project is that it will comprise both the features of wet floor cleaning and vacuum cleaning. Unlike other floor cleaner robots this is not just a vacuum cleaner robot. It performs sweeping and mopping operation. Detachable mop will be used for wet mopping. The command flow starts from the user to the slave through master robot. MIT App Inventor v2 has been used for developing and the construction of the app. Bluetooth Terminal application was installed in smartphone and a Bluetooth wireless connection was established between smartphone and Arduino. Password protection was used for pairing of smartphone with Bluetooth Module HC-06 to only allow authorized user.

VI. CONCLUSION

The autonomous vacuum cleaner is yet not ready for commercialization. Nevertheless, many of the achieved results are very promising. The shape of the robot is well suited for the application specially for a task like cleaning along a wall, around the legs and in corners of the room. Furthermore, the robot with the sensor system is able to identify the obstacle which then allows the robot to make hypothesis.

The combination of robot's shape, its tactile sensor system and its designed algorithm play well together and make the

task of cleaning and unknown and unstructured environment feasible.

The developed robot is capable of dealing with a real environment in real time.

The model developed is user friendly and compact. It will be having a better performance than existing Bluetooth based conventional floor cleaners. The slave can be operated without any manual contact. The void which will be filled by our project is that it will comprise both the features of wet floor cleaning and vacuum cleaning. Unlike other floor cleaner robots this is not just a vacuum cleaner robot. It performs sweeping and mopping operation. Detachable mop will be used for wet mopping. The command flow starts from the user to the slave through master robot.

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War Field Based Spying Robot

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***Abstract*— On about to increase the protection by victimization this automaton we will apprehend their activities by keeping some safe distance from the enemy, the flexibleness of offensive are hyperbolic as a result of we will apprehend their activities and there'll be a optical maser which will lock the position of the enemy. This conjointly contains a sensing element which will be useful in detection the land mines which is able to result in death and management of this automaton are terribly simply done as a result of its controlled wirelessly and by connecting to Wi-Fi of any mobile. We've got done this project for our army to discover the land mines safely and for the protection of our troopers and to attack them while not keeping our army troopers life on the road. Our project is to introduce the automaton which might be accustomed minimize the human casualties in several circumstances. This automaton is Wi-Fi operated,a wireless camera has been put in it therefore it will monitor enemy once required. A shooting gun has conjointly been put in in it. A metal detector sensor is additionally accustomed detect the metal. The dominant is done by victimization associate golem application on our phone.**

Keywords: Metal Sensor, Wi-fi, Arduino, Motor Driver, Buzzer , Mobile App

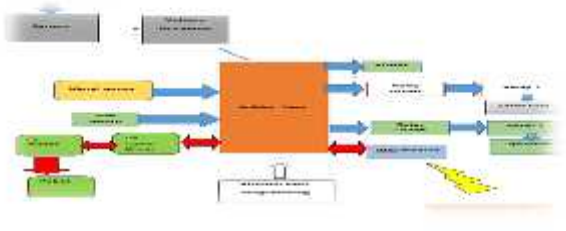
I. INTRODUCTION

Every minute there will be an improvement in the robotics and parallelly there will be many deaths of the soldiers in our country. So if we can design robots that are useful to our soldiers we can save their lives. There are few robots that are helping to our army and this will be the next generation of robot that can be handled very easily by everyone.By using Wi-Fi we can see it in our Mobile and it also has a metal detector that will make the movement stop if it detects any landmine also a laser that will lock the area. For this robot chassis has been designed separately. For this purpose, we have used the DC motor that will be helpful to rotate and stop at a particular angle.

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis. Nowadays, all the devices are more dependent on digital technology rather than analog technology. As an engineer it is our duty to develop robots that are useful to others. This robot is mainly used for Military purposes.

We are doing this project to reduce the death and eliminate the danger in the field. Is there anything more motivating rather than saving lives? The main motive of this robot is to make it user friendly and it can easily move and click images of the surrounding and it can send the information wirelessly. Thus it will give the soldiers an indication about the situation.

This technology will create major impact on smart homes as security will be improved and by using light as a medium of data there will not be any problems related to human disorder. And any amount of data will be easily transmitted in real time without any delay at the speed of light.



II. LITERATURE SURVEY

a. Proprioception based behavioral advances in a hexapod robot

In this paper we study quasi static climbing and dynamic running.it describes about the the postural freedom of the robot.

b. Terminatorbot: a novel robot with dual use mechanism for locomotion and manipulation:

It is a versatile robot that senses the surroundings using sensors and informs the user about it to make the necessary changes in the robot..

c. 7TH Sense-A Multipurpose Robot for Military:

This robot helps in detecting the objects and also for pick and place applications.

d. Internet of Things in industries: A survey:

In this paper we studied about sensors and actuators and their use of IOT.IOT is being used to develop industrial application such as automated monitoring, control, management

Existing System

Here within the existing system there is solely remote observation for robots in the market. Here within the existing system they were attending to management the device from remote location additionally to remote observation (i.e. User Mode). Additionally, to the current they need conjointly enclosed a number of the feature like entrant detection.

Planned System:

Our project is to introduce the device which might be accustomed to attenuate the human casualties in numerous circumstances. This device is Wi-Fi operated, a wireless camera has been put in in it therefore it will monitor enemy once required. A shooting gun has conjointly been put in in it. A sensing element is additionally accustomed detect the metal hardware

Block Diagram:

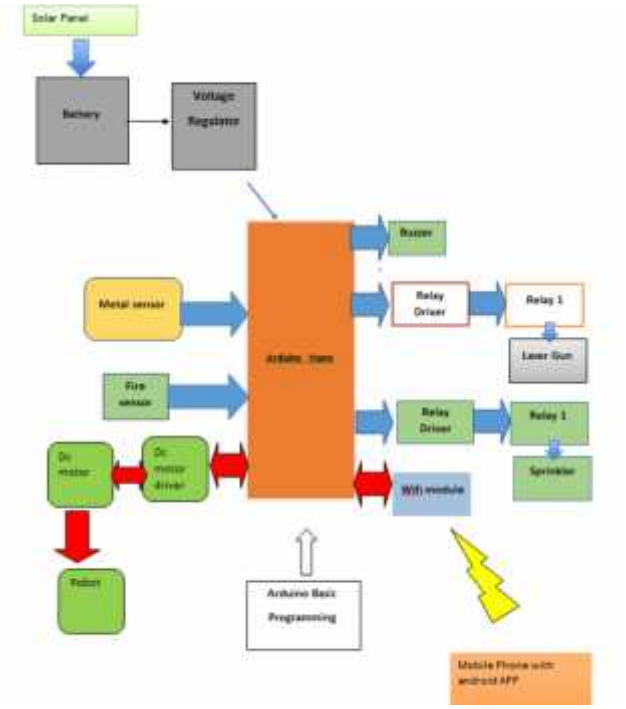


Fig 1: Block Diagram

ESP8266 Module:

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

Laser Gun:

Infrared Beam weapon New style laser sound gun Sound of "Fire" each time trigger is pressed With IC sound & flashing top light Requires 3 AA Batteries

Metal Detecting Sensor:

Detects metal objects up to 7 cm giving active low output with LED indication & buzzer on detecting metal.

Flame Sensor:

A fire detector works by detecting smoke and/or heat. These devices respond to the presence of smoke or extremely high temperatures that are present with a fire. Since a fire detector usually works by detecting smoke and/or heat, and not actual fire, these devices are not usually called "fire detector.

IV. SCOPE OF PROJECT:

Nowadays, robotics has become one amongst the foremost advanced within the field of technology. It's not restricted to sure set of actions. Reduces risk of life. Will increase the familiarity of surroundings. Two area unit 2 unremarkably used methods:

(a) Android APP: An android app could be a software system application running on the automaton platform

Fig 1: Block Diagram

because the automaton platform is constructed for mobile devices, a typical automaton app is meant for a Smartphone or computer running on the automaton OS.

(b) Solar Panel: electrical phenomenon star panels absorb daylight as a supply of energy to come up with DC electricity. electrical

Phenomenon star cells accessible in numerous voltages and wattages.

V. RESULTS:

The person will be controlling the robot using a android app. The robot will keep an eye on the field using night vision camera. It will also detect Land mines and it will sense smoke or fire then it will give us an alarm and sprinkler will be turned on. Additional to it, it can be charged continuously using a solar panel during day time. Apart from these the Robot will never get tired and can be on the field most of the time.

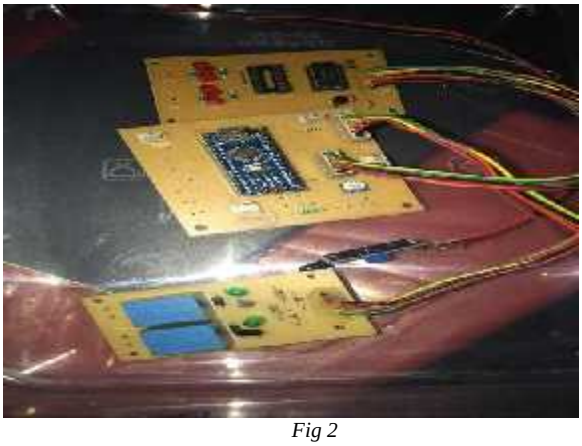


Fig 2

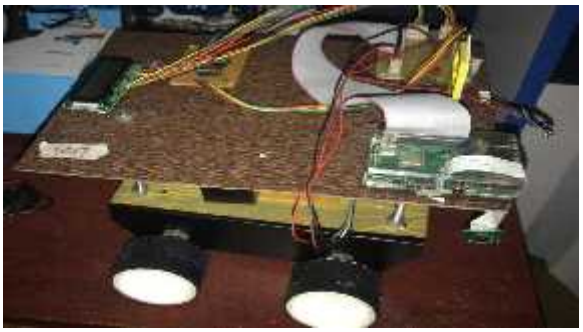
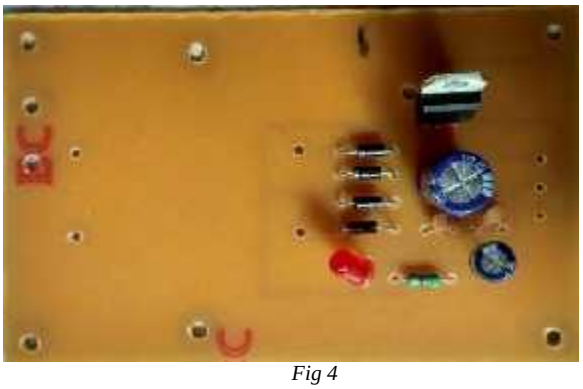


Fig 3



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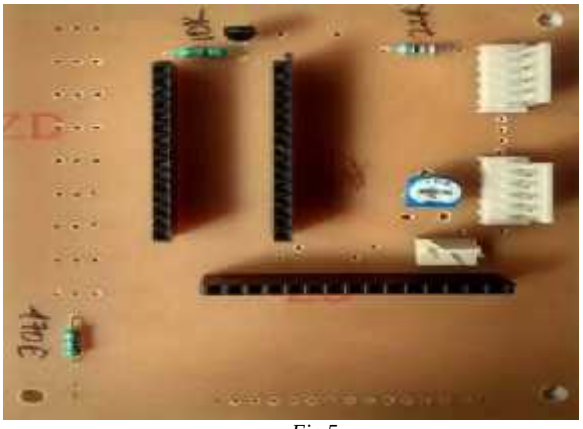

Fig 5

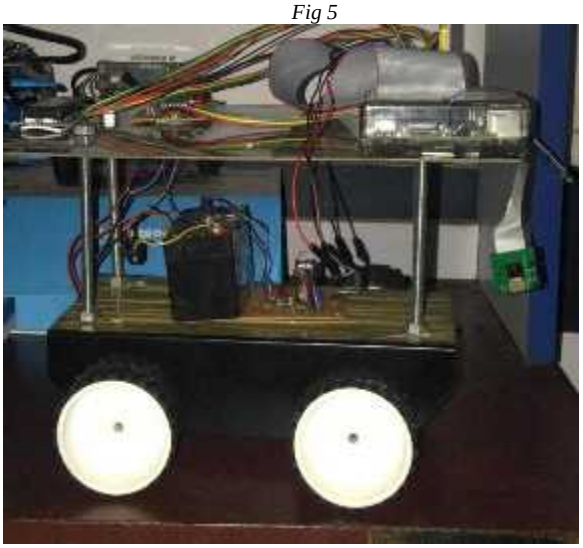

Fig 6

Till now we have done the entire motor driver and mechanical assembly and currently we are working on the app which will control the robot and simultaneously we are working on sensor based applications.

VI. CONCLUSION

Every day our army soldiers will walk into the death, they will keep their life at risk to save our lives. So we wanted to give them or help them giving something that will reduce their risk. That something is my project war field spy robot. This robot will go anywhere and can also climb the steps, detects the bombs and also contains laser that will guide the missile by locking the coordinates of striking area. Finally, it will reduce the risk of the soldiers walking into the death and helps them do their job.

ACKNOWLEDGEMENT

The Completion of this project could not have been possible without the guidance and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following

We are very grateful to Ms. Rashmita Kumari Mohapatra, Prof. Manoj Chavan, HOD Dr. Vinit Dongre, Dean Dr. Lochan Jolly and Principal Dr. B K Mishra for their endless support, kind and understanding spirit during the preparations of this project.

To all the Professors, lab assistants, friends and our parents who in a way or other shared their support, morally, financially and physically. VII.

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Design of Interface for user friendly e-bicycle

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***Abstract*— In today's world interaction between human and machine is very important as it reduces many tasks for the user. So, we will be developing an HMI which will be useful for e-bicycle and it would be useful for many more vehicles. HMI for e-bicycle based on designing and developing a complete new set of controlling and UI/UX for e-bicycle. We're specifically working on the UI/UX part and the controlling part currently being under other group. The idea is based on designing and developing a Graphical User Interface which can be accessible by Touch input as well as by buttons. We're starting with the inputs from motor, hall sensor, Pedal assistance sensor, etc. We're collecting all the inputs and feeding them to a Microcontroller which happens to be our brains for system. All the controlling part is accessible via a GUI with the touch and button inputs. We're mainly targeting on robust and industry standard product design as the device is mainly targeting to a consumer level.**

***Keywords*— HMI, Graphical User Interface, Microcontroller, UI/UX.**

I. INTRODUCTION

The Project is centred on the importance of customer values. As we can see humans are exhausting their renewable energy resources for centuries and same time risking the environment by polluting the air, water and animals surrounding them. Toroid Technology is trying to rectify this situation by launching their E-bicycle in first place. Initially they had created e-bicycle to stop us from burning hydrocarbons which further led to pollution. The first version of their bike is known as "Toroid". Toroid is a more comfortable, faster, safer albeit sustainable mobility. But Toroid technology are expecting more from their e-bicycle. They want their customers to have better experience while driving their e-bicycle which would be having an immersing user interface, more feature, better looks than existing one. They want to give their user's a smooth transition to e-bicycle from what the users currently using. The graphical user interface where we come into picture. We're working on an immersive and very interactive user interface. Same time we're concentrating on robustness of the device. As I said before we're not only working on aesthetics we're thinking of approving industry standards for our device till IP35.

The electric vehicle is one of the emerging fields in the country. Since the petrol/diesel rates touching skies it's just matter of time when peoples are going to move towards electric powered vehicle. Since the Toroid e-bike works for both long and short distances we have a better opportunity to improve them as the international brands such Yamaha and Riese & Müller.

II. CURRENT SCENARIO

Interaction between the user and machine is very important as it makes the machine user-friendly and more detailed. Sometimes in turn, if the device is user-friendly with some graphs, charts and many more things it becomes self-understanding for the user without someone explaining the device functionality and reading throughout the manual.

Fitbit, Apple watch are industries greatest for developing immerse graphical user interface. They use innovative functionalities, sophisticated visuals, realistic images, bold animations, having all this functionality in a HMI improves overall quality of the device.

Although all this device is from this decade as per their functionality. But GUI had been there from starting of computers. ATM, smart vehicles, computers, mobile phones are widely based on Graphical user interface.

Currently, the displays which are in use with the industry are not that much user-friendly. So, we will be trying to design a graphical user interface that would be used for the e-bicycle in order to display the real-time statistics of the parameters such as battery left, the current speed of the vehicle, date and time, distance covered and pedal assist. The system will be so designed that it has low power consumption, variable pedal assist, and HMI for user interface.

III. BLOCK DIAGRAM & DESIGN

The designing of the block diagram plays a very important role as it visually describes the system as a whole displaying the significant elements of the system. The diagram below is the block diagram of the system. For designing graphical user interface we're using Eclipse CDT as embedded simulator and littlevgl as a designing library. QT creator IDE for developing widgets and adobe spark for designing and customizing components.

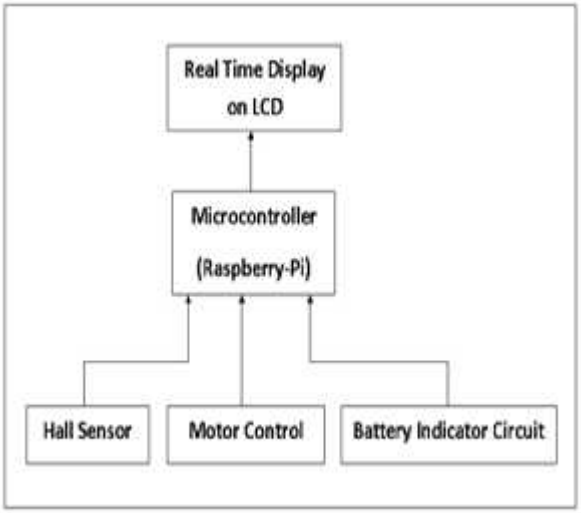

Fig. 1: Block Diagram of Project

On the middle of the screen user can see current speed of the bicycle, it's in km/h. For further development we're adding pedal assist levelling which divided in 3 level as per motor power.

1. Hall Sensor

   Hall Sensor the system uses a hall sensor to continuously measure the rpm of rear wheel, further the RPM is calculated into speed of the bicycle microcontroller.

2. LCD

   LCD for displaying the graphical user interface and controlling the components using touch or button interface.

3. DS3231 Real Time Clock Module

   This module will be used to sync the date, time and year of the device with the real time. Every time when we power on the module will help in real time display.

4. STM32F769I-DISCO

   The STM32F7 discovery kit allows users to develop and share applications with the STM32F7 Series microcontrollers based on the ARM® Cortex®-M7 core. The discovery kit enables a wide diversity of applications taking benefit from audio, multi- sensor support, graphics, security, video and high-speed connectivity features. The Arduino™ connectivity support provides unlimited expansion capabilities with a large choice of specialized add-on boards.

When the user starts the bicycle the user interface shows the splash screen of Toroid industries with animation which stays until all the data asset loads. The splash screen is as shown in the figure below.



Fig. 2: STM32F769I-DISCO



Fig. 3: Splash screen of GUI

As soon as the splash screen ends the device boot onto start screen where it shows battery percentage and time, date. The data displayed on the screen will be real time and in synchronization with current data.

IV. RESULT

The results which were obtained are as follows:



Fig. 4: Basic GUI Display

Initially we were using micropython for creating a graphical user interface (GUI). Above screen shows first GUI created by us using micropython. But later on we realised that there are very few microcontrollers which could support micropython for creating GUI. So we cannot create GUI using micropython as the microcontrollers supporting micropython are also very expensive and our project is to create a Human Machine Interface (HMI).

As micro python could not be used, we searched for an alternative to this problem. So we came up with Qt creator. This is an open source cross platform tool which can be used for creating GUI. It supports multiple languages such as C++ and qml. As it supports C++ it can be used for creating GUI using embedded systems. Also there are ample of microcontrollers which support C++ in the backend of GUI.

V. Applications

1. Better interaction between User and Computer: Graphical user interface gives better interaction capabilities over conventional CLI (Command Line Interface) where we write the commands and send an instruction to the OS or Software.
2. User-friendly :Human Machine Interfaces are used to create user-friendly displays that could be used for creating an interfacing between the machine and humans to make the system user-friendly.
3. Electronic Displays: Human Machine Interface can also be used for electronic displays. An HMI could essentially be a touch screen interface that is used to display e- ink text. HMI electronic displays are used in many applications.
4. Optimizing Industrial Process: Human Machine Interface is used to optimize an industrial process by digitizing and centralizing data for a viewer. By using HMI, operators can see important information displayed in graphs, charts or digital dashboards, view and manage alarms and connect with SCADA and MES systems through one console.

VI. Conclusion

While many Bicycle industries still uses analog controlling equipment's for displaying data to user which also limits the overall capability of the system. Most of them also use terminal controlling using command lines which also inefficient in some ways. The previous version of e-bicycle also uses led for indications of motor levels.

With the help of the proposed system most of the inefficiencies of the previous methods are removed. The use of touch display with the graphical user interface helps not only the owners of the bicycle but also the consumers.

Acknowledgement

This project cannot be entirely created by an individual. The timely completion of the project 'Design and Development of HMI for E-bicycle' has been possible because of our teacher and project guide Dr Sandhya Save who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

We're also thankful to Toroid Technologies for guidance and resources. It couldn't be possible without their guidance. It's always great to have someone from industry backing us.

We are also thankful to Dr Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge.

Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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Design of low cost Data Acquisition system for measuring various physical quantities

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***Abstract*- A Sensible Data Acquisition system was envisioned to make electronic structure inside the compass of understudies and designers. This task centers around the structure and testing of minimal effort, medium speed information securing framework that will be utilized in a wide scope of electronic estimation and trouble shooting applications, guaranteeing, high movability because of little physical measurements. Each useful equipment block is depicted all together, featuring the difficulties that have emerged just as the answers to conquer them. To gurantee expanded unwavering quality, the whole framework was effectively produced utilizing top notch segments and favoured high recurrence PCB materials and methods. The determined qualities were contrasted and then decided based on test signals.**

Keywords —IoT, MQTT, smart display board, led matrix display board.

I. INTRODUCTION

When it comes to hobbyists or engineers the availability of existing DAQ systems rely on a computer being procured and maintained, which can be very costly, so it is beneficial to replace the computer. A computer to run the experiment is the key (and most prohibitive) cost inherent in such a system. The computation power required for information securing and simple handling isn't high, and all things considered, a devoted DAQ PC will utilize a small amount of its accessible power on the given task. A second motivating factor is underuse of the DAQ systems & interface component, translating sensor signals and sending them to the recording machine, or in some cases using computer instructions to monitor the experiment. Even the simplest interfaces cost over 10,000 rupees and require proprietary software that requires an additional license .In many experiments, especially those used for teaching, this cost is considered prohibitive and leads to the sharing of DAQ equipment between groups, or even completely avoiding its use, in this way lessening instructing labs to the monotony of watching a stop-clock while recording the experimental observations. Because of these two issues, we can attack from both ends the lack of a suitable DAQ system. There are some less well-known examples of cheaper DAQ interfaces compatible with non-proprietary data collection, storage and processing devices, but these also require a PC. Also, for any engineer, the availability of high price DAQ is not feasible.

Several off the shelf DAQ solutions were examined to see how they could potentially perform when connected to a Raspberry Pi. While it was seen that significant cost savings could be made , the performance of theses was not very strong. A system based custom hardware would more fully exploit the potential of Raspberry Pi.

A specific structure was envisioned that would be possible anyway would outperform current business commitments. A PC, for instance, a RPI has enough handling ability to perform DAQ endeavors, due to the mix, the Raspberry Pi gives an engaging plausibility due to the blend of insignificant exertion and various decisions for accessibility.

II.CURRENT SCENARIO

Having set up that the Raspberry Pi could either recognize the association of a standard DAQ interface, for instance, those made by National Instruments (NI), or an exclusively bit of equipment, number of potential courses of action have been examined to see what might be attainable. Various potential candidates have been perceived and investigated through web looking. NI makes a USB DAQ, the USB-6008 NI.

This backs the 8 12-bit and 10 kS/s (samples per second) analog inputs and costs in excess of 40,000 rupees. By and by, NI LabVIEW, which isn't achievable for use with the Raspberry Pi, is required to utilize its full usefulness. DATAQ produces the NI interface with comparative execution however at a more significant expense.

Considering the Raspberry Pi and capacities and the kinds of frameworks at present available, it was felt that planning a custom interface was an appropriate choice, both from the perspective of making a framework to coordinate the brief and from the perspective of making the task itself fascinating and challenging.

TABLE I : COMPARISON OF STANDARD DAQ CARDS

Company	Product	Max Aggregate Sample Rate	Lowest Voltage Range	Highest Voltage Range
NI	4 slot cDaq	100	0.125V	10V
DataQ	DI-178	4800	0.01V	60V
GWI	iNet 555	2000	0.02V	10V
Dewetron	DEWE50	2,00,000	0.01V	1400V

III. PROPOSED TECHNOLOGY SOLUTION

Using a raspberry pi provides a solution for the high cost DAQ board available in the markets. Using raspberry pi we are aiming to produce a cheap functional self-contained computer that can be used by the engineers to learn the signal analysis in a better environment. It also reduces the size and complexity of the previously available DAQ boards and provides a better solution to the data analysis.

IV. DESIGN

The design of the block diagram plays very significant role as it visually describes the system as a whole displaying the significant elements of the system. The diagram below is the block diagram of the project.

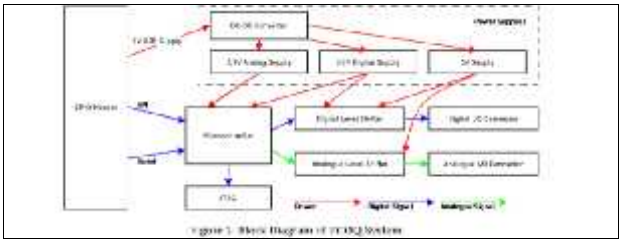

Fig 1. Block Diagram of PiDAQ System

There were a few potential options for the information obtaining some portion of the framework, and the qualities of the Raspberry Pi were significant again here. The host isn't running a constant working framework (RTOS), so care must be taken to guarantee that inspecting is steady and ceaseless in any event, when the host is performing different undertakings. For instance, numerous SPI-based simple to advanced converters (ADCs) have their planning set by the SPI clock, with no inner planning. While the gadget is being perused from they return information, halting if the transport is latent. This implies a continuous stream of peruses must be given, something troublesome without a RTOS regardless of whether a committed gadget driver was composed.

To resolve this, a buffer between the sampling and the communication was required, ensuring that sampling could continue when the Raspberry Pi was performing other tasks. At this point microprocessors enter into contention. Almost every microprocessor incorporates the SPI bus. Some are more powerful than others, in speed or functionality, but the field of potential candidates is huge and reducing it is difficult.

A. Communication*:*

For connectivity, one of the several ports on the Raspberry Pi can connect to the PiDAQ. The SPI bus is based on an architecture of master / slave and uses three main signals: one clock and two data lines.

B. SPI**:**

The clock is created by the master device (SCK line). MOSI (Master Out Slave In) and MISO (Master In Slave Out) are the data lines; they have full duplex communications together. There were several possible alternatives to the system data acquisition part, and the Raspberry Pi characteristics were again important here. The host does not run a real-time operating system (RTOS), so care must be taken to ensure that even when the host performs other tasks, sampling is consistent and continuous. A buffer between sampling and communication was needed to resolve this, ensuring that sampling could continue when other tasks were performed by the Raspberry Pi. Microprocessors are entering into contention at this point.

C. Microprocessor Circuitry**:**

Any microprocessor will require some ancillary circuitry, and the more complex the microprocessor will require the more circuitry. To prevent the high-speed internal switch from coupling to the power supplies,on each power pin, decoupling condensers are required.

D. Power Supply**:**

The specification includes an output voltage of 10V, but the microprocessor operates from a 3.3V supply, which is also the ADC maximum range. The input signals had to be attenuated to connect the outputs to the ADCs.

E. Programming Environment**:**

The code has two distinctly different components the embedded program running bare metal on the microprocessor and the application software running on operating system.

F. Choosing communication interface**:**

Different communication interfaces such as USB, SPI, etc. were considered. However, given its system-specific advantages over USB, SPI was selected.

G**.** Physical Interfaces and PCB Design:

The components above were assembled onto a custom PCB. This allows surface-mount components to be used (where stripboard or veroboard do not) and is considerably easier to design for a system which requires good noise immunity and large numbers of

interconnects. The design was four-layer (two outer signal layers and two inner power planes)



Fig 2. The Pi-Face Digital I/O Board

The Raspberry Pi has connectors on all of its sides, so there is no particular value in placing the connectors in a specific way in relation to them, either in line or opposite. Instead the placement is dictated by the logical arrangement of the blocks of the circuit. In the original plan for the project it was expected that extra functionality would be added to a Mk II PCB so the basic circuitry was kept as compact as possible – this included confining components to the top of the board (which had additional benefits for increasing ease of assembly). Figure 2 shows the outline of the placement chosen.

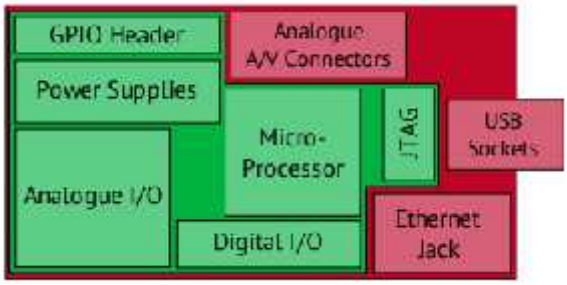

Fig 3. PCB Block Layout in green. The red area shows the underlying Raspberry Pi

G**.** Interfacing Data acquisition part of the system

There were several possible alternatives to the system data acquisition component, and here again the RPI characteristics were significant. The SPI bus is built into almost every microprocessor. In terms of speed or functionality, some are more powerful than others, but the field of potential candidates is huge and it is difficult to reduce. The decision was made to base the device on an ARM processor for this task. In addition to the raw processing power, this was based on several factors such as the availability of free, high-quality development tools and standard peripheral libraries. The cost was fair, even in small quantities, especially when considering large-scale production.

H**.** ADC Interface**:**

The specification includes an output voltage of 10V, but the microprocessor operates from a 3.3V supply, which is also the ADC maximum range. The input signals had to be attenuated to connect the outputs with the ADCs.

I. User Interface and testing**:**

The user interface final iteration was divided into two parts. Live data was displayed by the controller, allowing sessions to start and stop. A command line application was created to display recorded data. For a final test of the analogue inputs, the system was connected to another microcontroller generating a sine wave using its analogue output capabilities. The sine wave was correctly reproduced, with no discontinuities, in terms of the time axis, showing that the system did not drop or corrupt data.

TABLE II : COMMUNICATION BUSES ON THE RASPBERRY PI

Port or Bus	Data Rate	Software Support	Connection
Universal Serial Bus (USB)	480Mbps	Mature interface for user peripherals. Libraries exist for easy implementation on host. Requires considerably more complex device software.	On side of device
Serial Peripheral Interface (SPI)	125Mbps	Used for internal peripherals in embedded systems. Host software exists but in less common form. Simple implementation on device	GPIO port
I²C	Speed upto 3.4Mbps.	As for SPI.	GPIO port

I²C and SPI are developments of sequential. They were intended for the mix of chips on a single circuit board, and permit numerous gadgets to be associated with a similar sequential transport (I²C through tending to, SPI through gadget select lines) while supporting higher information rates. Given this structure objective, have support is normally executed as gadget drivers with setup to demonstrate which gadgets are associated with the different ports and addresses. Nonetheless, 'conventional' drivers are accessible which permit the gadgets to be gotten to in similarly as a sequential port. The additional layers of convention don't present a noteworthy obstruction to execution, and the main huge contrasts among I²C and SPI are that SPI is full duplex and able to do quicker speeds.

Given these attributes, SPI was the most reasonable transport to utilize. USB is excessively perplexing, and sequential is excessively straightforward and moderate. The SPI transport had the extra bit of leeway of being situated on the GPIO header, which would permit simpler mechanical mix of the framework.

Method for measuring temperature in a Data acquisition Board (DAS)

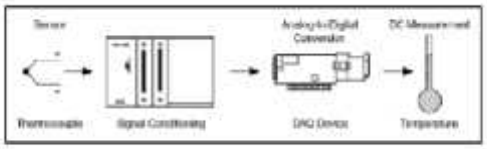

Fig. 4 Block diagram of Thermocouple

Using a thermocouple as shown in the following figure is a common way for measuring temperature with a DAQ system because thermocouples are cheap, simple to use and obtain. Thermocouples generate a temperature-based voltage that varies.

You can measure a voltage with a thermocouple and use a formula for converting the voltage reading to temperature.

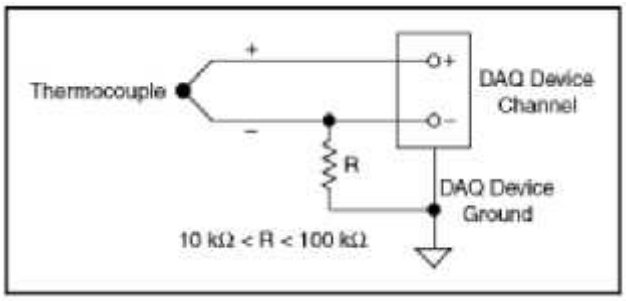

Fig. 5 Interfacing Thermocouple with DAQ

The standard thermocouple wiring, as illustrated in the figure below, uses a resistor, R, only if at any other point the thermocouple is not grounded. For example, if the thermocouple tip was already grounded, a ground loop would be created by using a resistor and incorrect readings would result.

As is regularly the situation with configuration extends, the parts that were relied upon to be simple were found to be troublesome, and this implied the task didn't attain the expected outcome it set out to. In specific, at the arranging stage the capacities of the RPI to handle the amounts of information included were overestimated, and ample more idea ought to ought to be given for making the framework productive, both as far as memory and preparing time. The System Software at that point took significantly longer to create than envisioned, expending the remainder of Lent term also, leaving no opportunity to plan a PiDAQ Mk II. The User Software is more simple than initially imagined, its advancement time being in like manner constrained. It was chosen to drop the PiDAQ Mk II from the venture as the advantages from having a direct thermocouple interface were little. At the time the mistakes in the advanced I/O hardware had not been found, in the event that they had been, at that point there would prove to be a more prominent catalyst to modify the PCB. The PiDAQ Mk I, be that as it may, indicated that the picked engineering was appropriate for the main job, the chip functioning as wanted from a beginning time. The framework that has been fabricated can accomplish a 5 kS/s rate on four channels, which is still quick enough for a huge assortment of lab applications. During the time invested in accomplishing this rate a parcel has been found out about the complexities of a DAQ framework and specifically how the condition of the RPI impacts on the arrangement picked. For instance, the adaptability of Linux and the nearness of the GPIO header permitted the SPI correspondences to be actualized without composing a driver, yet this made structuring the interface to Python all the more actually testing.

V.APPLICATIONS

1. Boiler and furnaces temperature measurement
2. ECG for medical purposes
3. Acceleration measurement for automotive
4. Real time location of Automobile
5. Low cost and efficient system

VI. CONCLUSION

The lower speed and single center processor of the Raspberry Pi require altering the outlook of the software engineer as, on the off chance that you anticipate sensible execution, the RPi can't be modified as calmly as a quad-center PC. In like manner with the system spilling of information – at high information rates the overhead of the convention turned out to be noteworthy and the guileless structure must be supplanted. Something as little as the compose speed of the SD card in the RPI displayed a bottleneck which was not at first imagined.

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Smart Trolley System

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***Abstract*— The paper introduces a smart trolley which is of great use for shopping at the supermarkets remedying the difficulties like waiting in large queues at the payment counter, dragging the trolley throughout the shopping time and calculating the total cost of the items taken, hence providing the quickest shopping experience. At the end of shopping, the customer can swipe the shopping card in the built-in billing system of the trolley for payment which will be accounted at the main counter. Hence the paper lights up a new way of shopping for the fast world out there.**

Keywords- barcode scanner, Arduino uno, smart shopping cart, Bluetooth module, display, weight machine, RFID card.

I. INTRODUCTION

Customers tend to exceed their budget when they are shopping at a shopping center. Moreover, they end up in long queues for the products to be scanned and billed. The Smart Shopping Cart addresses the above problems with ease. It helps the customer in ensuring that he does not exceed his pre decided budget and only buys the essential commodities actually needed by him. This system is profitable for the shopping centers as it can help in reducing the number of billing counters and in turn will help in reducing employee costs significantly. There is an implementation of Bluetooth module which will directly send the data to the central billing unit (server). A microcontroller is installed on the cart for data processing and a LCD touch screen is equipped as user interface. In order for the smart cart to communicate with the server, Bluetooth technology have been chosen. Also there is a load cell (weight scanner) installed on the smart cart for weighing items. The weight scanner also helps do a security check. For example, if a mean user puts one item into the cart without scanning, an extra unaccounted weight will be added. The system must also have a feature to delete a purchased product in case the customer changes his/her mind. The system should also contain a buzzer system which initiates automatically whenever a product is scanned. When shopping has been done by a customer, the payment can be made at the checkout point using the billing data generated on the smart cart.

II. .LITERATURE REVIEW

In the proposed system ,it becomes hectic for customer to stand in queue for long time. Hence proposing to develop a smart billing cart that will scan and make a bill within cart. In this system every product has a barcode and every cart will be having a barcode reader and Wi-Fi attached to it[1].This paper targeted to minimize the Queue at a billing counter in a shopping complex. Smart Trolley does the same by displaying the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter. The hardware is based on Arduino Uno, RFID Reader Module, RFID Card and Buzzer Radiofrequency identification (RFID) may be a technology that uses radio waves to transfer information from associate electronic tag, known as RFID tag or label, connected to associate object, through a reader for the purpose of identifying and tracking the object [2]. In this proposed system the customers have to scan barcode of every product with android mobile which they wish to purchase and drop into the shopping cart and then proceed to checkout at the billing counter. The billing process is quite tiresome and highly time consuming. We have proposed a “Smart Trolley System Based on Android” which aims to reduce and possibly eliminate the total waiting time of customers i.e. other system takes 10 minutes while our proposed system takes 5 minutes, lower the total manpower requirement from billing counter and increase efficiency overall[3]. This Paper proposed to develop a low-cost intelligent searching aid that assists the client to go looking and select product and inform the client on any special deals out there on the product as they move around within the shopping complex[4]. Automatic billing System through RFID and ZigBee" proposed to develop a cart with a Product Identification Device (PID) which will contain a microcontroller, a LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID scanner on cart, meanwhile product information will be stored into EEPROM attached to it and this EEPROM information will be send to Central billing System through ZigBee module[5] .

III. PROPOSED WORK

The Current Shopping system in malls and supermarkets is as follows. The customer has to take the items to be purchased and put them in trolley. After he is done choosing the items, he has to go to the billing counter and wait in the queue till his turn comes. After waiting in long queues when he reaches the counter, all the items are to be scanned by the barcode reader in order to prepare the final bill. This is very time consuming and tedious task. To make the shopping experience of customers quick and easy, there are some basics steps which works as follows.

- An application system with billing and database management facilities
-
- A microcontroller is installed on the cart for data processing and a LCD touch screen is equipped as user interface.
- In order for the smart cart to communicate with the server, Bluetooth technology have been chosen.
- There is also a load cell (weight scanner) installed on the smart cart for weighing items. The weight scanner also helps do a security check. For example, if a mean user puts one item into the cart without scanning, an extra unaccounted weight will be added.
- The system must also have a feature to delete a purchased product in case the customer changes his/her mind.
- The system should also contain a buzzer system which initiates automatically whenever a product is scanned.

IV. SYSTEM ARCHITECTURE

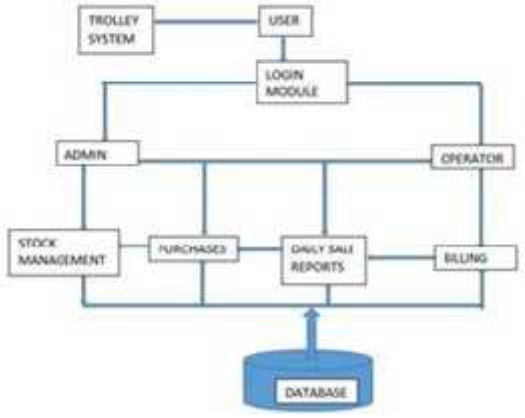

Fig -1 Architecture

This is the System architecture of our system. It is overall schematic of project. It defines the modules and working of all the components of the project.

This is the Use Case diagram of the system in which the interactions of several users with system are shown. There are three types of users who will access the system. They are customer, Administrator and operator. Administrator can access overall Application system, whereas operator at the billing counter can only access the billing module of the system. Customer will only be able to access the trolley module while purchasing items.

V. FLOWCHART



Fig -2 Flowchart

Above is the Flowchart which shows the complete working of the billing system , working of hardware on trolley and application software's printing module.

VI . ALGORITHM

1. Scan an item with a barcode scanner.
2. If the barcode is scanned, barcode reader can read the data related from memory.
3. Display the data and cost with help of LCD.
4. The item is added automatically the item cost also add and produce the total cost .
5. If any item is removed, the total cost is subtracted by the particular removed item and again the process will be continuing
6. Send the total amount in the billing system
7. Print the bill.

VII. FUTURE SCOPE

The Smart Shopping Trolley System aims to assist in person shopping in order to minimize the

considerable amount of time spent in shopping as well as the time needed to quickly find the desired product.

The proposed system's goal are as follows,

1. Reduces the hands needed in the section on billing.
2. Reduces the management's expenses.
3. Users must keep an eye on the overall amount of bills throughout the buying process.
4. Reduces the time spent on the counter for billing.
5. Increases the happiness of the customer.
6. Simple control of stocks.
7. Customers don't have to wait to check in long queues.

VIII. CONCLUSION

Certainly, this system is a definite necessity for the retailmarketing industry to step up its portfolios and cope with technological advancement. It also saves resources and money. The Smart System has been designed to function as a mobile self-checkout system that gives users the flexibility to make retail store purchases from it. It is designed to be highly efficient and fully compatible with the current system of the retailer.

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Implementation Of Swarm Drones Using Telemetry Communication

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***Abstract*— This article points out that despite multiple advantages of drones, one of the gruesome tasks is maneuvering multiple drones with separate control units as it becomes tedious, expensive and it requires a specialist. This paper helps overcome this drawback by using a single control unit to maneuver multiple drones. This can be done using Swarming. Several drones are controlled using a common transceiver. The slave drone follows the function of the master drone and replicates it. Implementation of this action in distance management requires two simple principles described below.**

1. If the copters are too far away from each other they have to move closer autonomously.

2. If the copters are too near, they must autonomise

Copters give each other GPS coordinates so that they can be mindful of the location of the surrounding copters and keep a certain distance. Getting this behavior helps one pilot to fly in real time several copters while using only 1 remote controller. This work has many uses including livestock as well as search and rescue missions. We are taking an important first step towards the effective remote control of multiple drones from 1 but there is still more work to be done as future work will concentrate on contributing to the low-level maintenance actions in more complex behaviors.

Keywords— component, formatting, style, styling, insert

I. INTRODUCTION

I. INTRODUCTION

A group of bees is called bee swarm. Honey bees rarely fly by themselves; they always travel in groups. Swarming is a mechanism where the honey bees travel as they obey the queen bee. It is possible to implement the same configuration using drones. Drones are unmanned aerial vehicles which have widespread use in today's world. A pilot may at one time fly a single drone but what if he wants the ability to fly multiple drones with a single controller. There have to be some changes in the copters ' software to do this. UAVs come with a range of sensors and functionalities. All of these built-in sensors provide many uses to the autopilot and with the availability of open source software, it is very easy to increase the capabilities of autopilots. Therefore, we have just used Pixhawk autopilot / APM 2.X In a natural swarm of bees, each and every individual performs his or her own function here, the function of each member is not assigned to the queen bee.It helps us to solve challenging tasks of efficiently covering a huge area of plot using a single control system that makes it attractive for different applications. First, an Arduino Uno was linked to the Pixhawk, which communicated through UART. The ArduCopter firmware has been updated to send data, including the Arduino GPS coordinates, to the Pixhawk periodically (4 Hz). The 2.4 GHz transceiver was then attached to the Arduino so that the data could be transmitted wirelessly to the nearby copters. That copter would use the GPS coordinates of other airborne copters to ensure that the defined distance from the adjacent drones was preserved. If the measured distance to a neighboring copter falls outside the limits of the target distance, copters will autonomously adjust their pitch and roll speed to correct the discrepancy. The great advantage of this work is that it can be repeated and used with great ease as well as minimal cost since the only added hardware was an Arduino Uno and the 2.4 GHz transceivers. This work also contains numerous applications because the productivity of tasks usually carried out by one pilot can be increased. The control of several copters by a single pilot makes it possible to rapidly scan for areas of interest, since more copters can enter an area faster than a copter.Many higher level behaviors have yet to be added on top of the distance maintenance behavior we've built, so this can certainly be an interesting focus of future research.

II. LITERATURE SURVEY

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wasps and swarms, crowds, flocks and shoals of vertebrates such as shoals of fish and birds.

2. A Review and Future Directions of UAV Swarm Communication Architectures IEEE 2018 by Mitch Campion, Prakash Ranganathan, and Saleh Faruque Department of Electrical Engineering University of North Dakota Grand Forks, ND
58203: The effectiveness of UAVs has significantly affected the aviation industries. The disruption is expected to continue as the technology and policy evolve. This paper reviews literature on the UAV swarm and suggests a swarm architecture that will allow higher swarm
autonomy and reliability.

3. Design and implementation of an unmanned aerial vehicle for autonomous firefighting missions 12th IEEE International Conference on Control & Automation (ICCA)Kathmandu,description for the many purposes to which swarming can be applied in warfare is too narrow. A more useful explanation is provided by Paul Scharre of the Center for a New American Security, who defined swarming as “large numbers of dispersed individuals or small groups

4. The use of unmanned Aerial Vehicles for Disaster Management 2015 by Ged F. Griffin University of Melbourne, Centre for Disaster Management and Public Safety: This paper addresses possible applications of unmanned aerial vehicles (UAVs) for age ment in disaster man. Based on the current state of the art and diversity of research, there is considerable evidence to support strategic investment in UAV technology to develop new and enhance existing operational capabilities.

5. Distance Control Between Multiple Drones for Stable Communication 2015 IEEE by Riho Motooka, Takeru Katagiri, Shintaro Murayama,Junji Takahashi, Yoshito TobeRyo Nishikawa: UAVs are flying objects that can be controlled either manually or by stand-alone control software. In this paper they have implemented a system called SQCUAIR to control an appropriate wireless communication distance between two UAVs and to evaluate basic performance using AR.Drones.

6. A Research Framework on Mission Planning of the UAV Swarm 2017 by Xin ZHOU,Weiping WANG ,Tao WAN,Xiaobo LI, Zhifei LI:The mission planning of the UAV swarm is described in detail in this paper in the following aspects: basic concept, command and control (C2) swarm
modality, contents and main UAV swarms mission planning technologies. This paper considers the biggest difference between the UAV swarm and
the general UAV method in mission planning is the distributed swarm architecture..The following set of Sensors/Actuators which are used in the system design are listed as follows:

III. PREVIOUS WORKS

A considerable amount of research has been done in the drone field, Drones has now become an integral part of the tech community. Georgia Tech has achieved great results of having multiple copters flying autonomously in a research done. The drones in these cases fly in a pre-programmed direction. RAND companies John Arquilla and David Ronfeldt wrote their first seminal work on drone swarming in the military in 2000. Given the value of their work.The methodology which was of our convenience used GPS coordinates. Here each copter was made aware of the GPS coordinates of the surrounding copters. This has its own drawbacks one being that GPS is not always accurate technology and before flight its necessary to check the distance between the copters. As long as the verifications are carried out the method given turns out to be quite successful.

A. Copter Communication

The copters were communicating with each other via wireless transceivers of 2.4 GHz. One transceiver was attached to each copter along with an Arduino, with the Arduino serving as the bridge of contact between the APM autopilot and the transceiver.The APM sends data via UART to an Arduino, at 4 Hz. The Arduino takes the information it receives, and sends it via the 2.4 GHz transceiver to the other copter. On the other hand, once that information is obtained by the other copter's Arduino, the Arduino must store the data and wait until its APM is ready to read it.

B. Distance Measurement

The data that is transmitted to and from neighboring copters typically includes the following information:

1. GPS Latitude
2. GPS longitude
3. GPS Altitude
4. Compass orientation

Compass Orientation is an essential part of allowing copters to operate from one remote controller. Airborne copters must stay compatible with each other, because when, for example, the pi-lot raises the pitch of the copters, the copters will shift in the same general direction. Therefore, compass orientation is always sent along with location data so the copters can align their compasses automatically if necessary. One copter serves as the leader in this auto-alignment process so any copter that is a non-leader must auto-fix its alignment to match that of the leader.

Apart from the compass orientation, GPS is a critical part of distance maintenance. It is noted that GPS data obtained is only accurate if HDOP is below 1.5 meters. If valid GPS data is collected from another copter, then GPS and HDOP data are stored along with their respective five most recent values.



V. EXPECTED OUTCOME

Here we are using two copters i.e.the master and the slave.As the name suggests the when the master is operated the slave/s follows the master.It reduces the complexity of controlling each and every vehicle with a different controller.The slaves are at a predefined distance from the master and they maintain the same distance throughout the flight unless changed.These distances can be changed during the flight which makes it suitable for variety of purposes.

VI. RESULTS

After effective assembly and initialization of two drones, a master and a slave, only the master drone is fed the predefined path. The spacing between the master and the slave drone is established with the help of software. The slave unconsciously replicates master drone gestures. The position of the slave in relation to the master is kept at a specific distance.

Using GPS, after configuring the master and slave drone, the drones can fly autonomously on the predefined route and

avoid collisions using ultrasonic distance sensors with the aid of collision avoidance algorithm.

VII. FUTURE SCOPE

If manmade or natural disasters such as a flood or earthquake, etc. arise, bringing emergency responders in can be extremely dangerous, even though there is an alert system available for people who need help badly. Drones are useful and aid in after - the-disaster recovery, but most require individual pilots who fly the unmanned aircraft remotely.This reduces the speed with which rescuers can view an entire area affected and can prevent direct assistance from reaching victims. Autonomous smart drones with integrated image processing APIs that have a longer flight time and can relay image analysis in real time to remote locations will help in early detection and appropriate resource mobilization.

VIII. CONCLUSION

This work makes a significant contribution to drone swarming. While previous research has been done on this subject, the drones are following a predefined route. The work done here allows multiple copters to fly from 1 controller, allowing a pilot much greater real-time control over multiple tiple copters. An additional benefit of this work is that it can be repeated and used with great ease as well as minimal cost, since the only added hardware was an Arduino Uno and the 2.4 GHz transceivers.

With one being agri-culture, this research has many consequences, as wide fields can be covered without the need to remove batteries and carry out multiple flights, as several drones can be flown together. Another application is search and rescue, where, with several drones flying together, specific areas can be searched for orders of magnitude quicker. Currently, swarm drones are often used in battle, where they usually serve two main purposes to search the area and strike the enemies.

IX. ACKNOWLEDGEMENT

We are sincerely grateful to our project guide Mr. Nikhil Tiwari for his encouragement and constant support by helping us understand different concepts and advice required for the project. We are grateful to the domain teachers for their useful insight and suggestions regarding the project.

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Implementation of Hand Gesture based Motion Control Robot

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***Abstract*— As the world is getting better and better the need of human workers risking their lives for the need of their respective field is reducing drastically. The human life is obviously more precious than the need of working under some hazardous condition. One might say that the robots and automation are stealing the jobs of the one in need but the robotics industry is in the rise and they create more jobs further more in that field. This project reduces risk to human being but also labor. This will bring change to the society. We were inspired by the ease with which a robot can be controlled by the user if the robot has a similar appearance as that of the user. The user feels operating in real time when he works directly by moving his hands and fingers rather than using buttons to control the robot. This project provides the system that can reduce the human effort in a great way and also ensure the safety of the operator by complete being in to the isolated and harsh condition and finishing the work in an efficient way.**

Keywords- Gestures, robotic arm, pick and place, Arduino, gyroscope, industrial purpose, servo motor, mobility.

I. INTRODUCTION

Gesture is the best and easy way to communicate with each other. People with certain disability can use gesture as a way to communicate with others. Nowadays, robotics is becoming one of the most advanced fields of technology.[1]
Here the system is provided with the ability to grip on certain objects. So, if a person has a problem in grabbing certain objects then he can use this to pick them up. It is not just that robots are used for industrial purpose or mining, it is also used in making car. This robot can be used for many purposes such as medical, Humanoid and Toy.[2]

It can easily mimic your actions. Here your hand acts as master and the robot acts as a slave. For rescue purpose it can lift patients from one place to another. It can also provide neutralizing military targets. The user feels as if it is operating in real time when he is just moving his hands and fingers.

II. MOTIVATION

In general terms the robots are controlled by the switches and joysticks. But this switches and joysticks have their own limits and restrictions. Even though they provide a large number of applications and options but that doesn't define a good accurate control. There are many restrictions in using these switches and joysticks that we can overcome using different modules depending on the application of the robot. [1]

One specific application that we can point out is the use of this module for helping the handicaps for controlling their wheelchairs. Even though it doesn't guarantee an ultimate solution to their problem but it can be said as a helping idea.

The one specific application for which we are using robot is for industrial purpose. But just having a robot being controlled effectively doesn't mean that the robot itself is useful, for that purpose we came up with a solution to provide a robot with an arm. In general, the robotic arm can be used for various purpose or application. Depending on the application the robotic arm can be modified by the operator for example robotic arm could be used for application such as welding, pick and place, fitting and maintenance, etc.

There are many ways for operator to communicate with the robot. By doing a small research we picked NRF24L01 module as a compatible communication method. We needed something cheap but reliable. In this project we have used transceiver module. Here we have the benefit of providing a very small amount of power for the communication which is actually less than lighting up a small LED [3].

III. LITERATURE SURVEY

After detailed comparison with previous works, many of projects used image processing for gesture recognition. This creates a serious problem such that the arm is restricted with certain limited actions which are predefined. By using MPU6050 sensors we can eliminate this problem as there will be no burden on the system also.The gesture movements are already coded. It

can only perform certain set of actions which are being coded in the program. The robotic arm is created to imitate the human hand movements employing a hand glove. The hand glove consists of gyro meter for the wrist and elbow movements. [4]

IV. SCOPE OF PROJECT

Nowadays robotic systems and control units are not limited to switches and joysticks. There are many ways like regulators, potentiometers, joysticks, switches, cameras, voice command, artificial intelligence, etc. Similarly, a robotic arm can be controlled by numerous methods as mentioned above but, we are using a potentiometer setup to control the other robotic arm on the operator side.
In further development we can add image processing to monitor our hands or palms which will be used as a control system for our robot. This can be done by providing a camera to the computer which will analyze the movements of our palms, the algorithm in our computer will recognize the required command for our robot. This will help the operator to provide lots of commands using single hand as a gesture control.

In terms of development for the robotic arm we can add numerous amounts of attachments that can be changed with regards to our application. This can vary from maintenance work like welding, fitting, pick and place, all the way to provide complex tasks like emergency medical help or lifesaving applications such as saving lives in fire hazard or any other natural disaster. With enough computing power we can provide a robot with an AI system that can take its own decision at critical situations.

V. PROBLEM DEFINITION

Even though joystick and switches are the highly used system around the world for the controlling of the robotic system but they have their own limitations and restrictions as mentioned above in the sub topics.
To provide a better control over the system and its mobility we came up with the idea to use the gyroscope. The module that we use have many features like calculating angle of x axis, y axis, z axis and also the acceleration of the x axis, y axis and z axis.[5]

There are numerous ways that we can use this data for over a certain application. The most prominent way we can use this is for the mobility of the handicap person.

Furthermore, these robots are useless if they are not capable of doing something meaning full. Hence, we provide the system with the robotic arm. As mentioned above the robotic arm can be used in many ways.

In terms of communication we are using transceiver module This transceiver module is capable of long-range communication in an open field for above 500 meters normally. It has the benefits of low power consumption and easy configuration with the Arduino.

VI. BLOCK DIAGRAM

The block diagram consists of the Arduino nano as the brain of the system which has various modules connected to it. At the transmitter side the system consists of four potentiometer which send the data to the Arduino. Along with that the data from the MPU6050 is also sent to the Arduino. At the end the data collected by the Arduino is sent to the NRF24L01 Module.

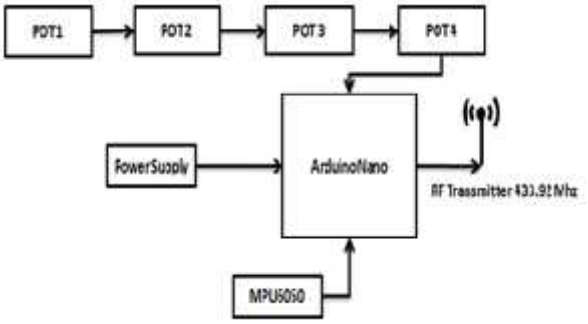


Figure 1: Block diagram of Transmitter section

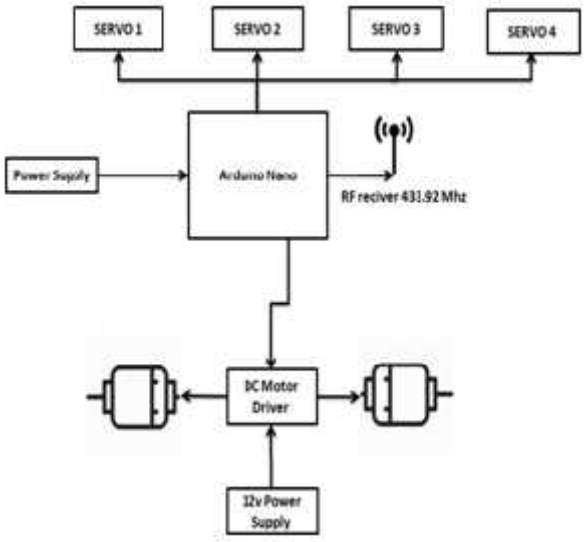


Figure 2: Block diagram of Receiver section

On the receiver side the data received by NRF24l01 is sent to Arduino and this data is collected and analysed. There are four servos connected to Arduino, these servos are fed with the data from the potentiometer. Along with that the motor driver L298n is connected to the Arduino for controlling the motors.

Arduino nano: The Arduino nano is the most important part of the entire system that will work as the computer system on our robotic arm. It gathers the information from its connected devices and performs the required calculation on it. Along with that it also provides the required output to the output devices connected to it. There are numerous techniques possible on this little piece of computer.



Figure 3: Arduino Nano

Dc Motor Driver(L298 N): The dc motor driver here ensures that the motors are provided with the enough power to rotate at their max potential as the common output from the Arduino is no sufficient enough to provide enough power to the motor and keep the robot moving. This particular motor driver has 6 pins on it i.e. 4 input for direction and 2 pins for the speed. [5]



Figure 4: DC Motor Driver

RF transceiver (NRF24L01): RF transceiver (NRF24L01) is generic passive device. The data provided to it through the Arduino is directly transmitted. To set up the RF transceiver onto the Arduino, we use the virtual wire library. This library is built in such a way that it is easy to use for the coder for writing complex codes such as sending multiple data in a single string or just sending single data along with the option to change transmission rate. [3] [6]

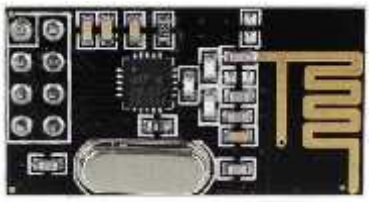


Figure 5: RF transceiver (NRF24L01)

Gyroscope/Accelerometer (MPU6050): This is an active device with its own microcontroller embedded onto it. It has a wide range of library; the latest library is the one that we will use for this project. It provides the data for acceleration on x axis, y axis and z axis and also the gyroscopic values of x, y and z axis. We will use the gyroscopic values of x axis and y axis for our project. [5] [7]



Figure 6: Gyroscope MPU6050

Servo motor: Servo motor is an active device which has its own microcontroller onto it. It takes the data provided by the Arduino. By the data provided to it, it determines the position of the shaft. It has the range of 0 to 180 degrees. Here we are using servo motor as the actual robotic arm. [8] [9]



Figure 7: Servo Motor

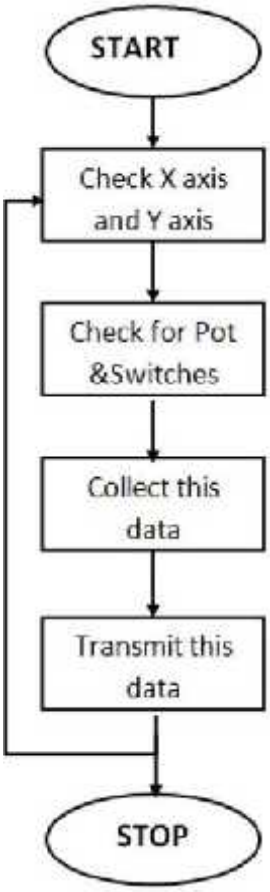
VII. COMPONENTS LIST

TABLE 1: LIST OF COMPONENTS USED TO BUILD THE PROJECT

Components	Quantity	Justification
Arduino Nano (ATMEGA 328P)	2	Computing
Servo motor 12kg torque	3	To provide arm movement
Servo motor 1kg torque	5	Claw
Motor driver L298n	1	To drive the motor
Dc motor	4	To provide mobility
RF transmitter and Receiver	2 set	For wireless communication
Gyroscope/Accelerometer MPU6050	1	To provide gestures
Car base	1	
Connecting wires		Connections
Battery	1	Supply power
Arduino cable	1	

Glove	1	

VIII. FLOW CHART



Transmitter: The system starts with the detection of the x and the y axis on the gyroscope module and these data are stored in a variable on Arduino. Next the status of potentiometers and the switches are checked and stored on the Arduino. These data are stored accordingly in their variables and then prepared for transmission. Once these data are transmitted, the cycle repeats again.

Figure 8: Flow chart of Transmitter section

Receiver: On the receiver side the system first checks if any data is received or not. If the data is received then these data are segregated accordingly and stored. Next, the switch status is checked and if the switch is ON then the potentiometer data is copied to the servos and motors are at halt position and this goes on till switch is in ON position.

If the switch position is OFF then the X axis a Y axis data is checked for being in the conditioned limits. If that's true then data is transmitted to the motor and servos are set to the default position.

Once these conditions are checked and executed, then the whole program is repeated.

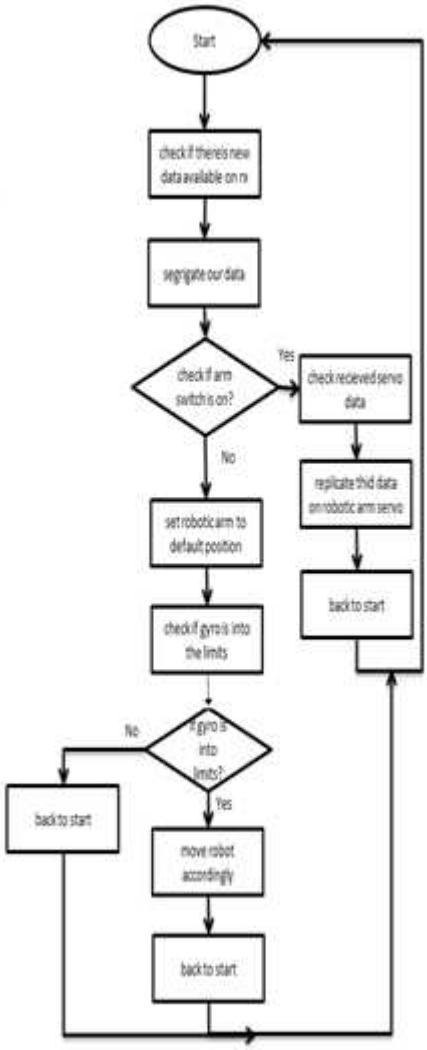


Figure 9: Flow Chart of Receiver Section

IX. CIRCUIT DIAGRAM

In the circuit diagram of transmitter section, Arduino nano (ATMEGA 328) is connected to a shield. Pot 1,2,3 & 4 are connected to the Arduinos A0, A1, A2 and A3. In MPU6050, the SCL is connected to A5 and SDA is connected to A4. The interrupt pin INT is connected to pin no D2. It requires 5V of power supply. Here the 2.4Ghz RF Transceiver is connected to Arduino via data pin which is on D12. It requires 5V of power supply.

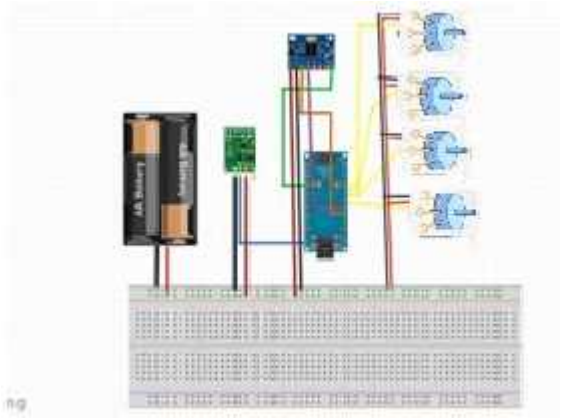


Figure 10: Circuit Diagram of Transmitter Section

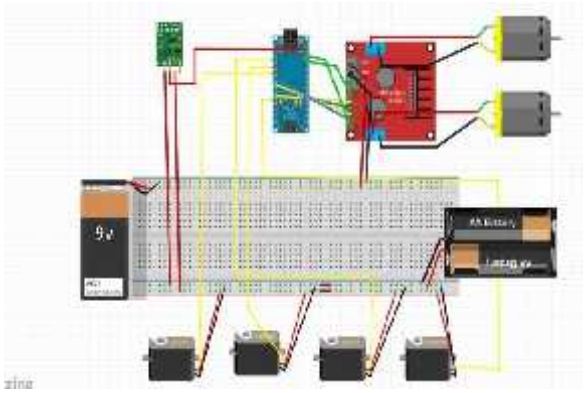


Figure 11: Circuit Diagram of Receiver section

In the receiver section, the servo motors 1,2,3 and 4 are connected to Arduino A0, A5, A6 and A7. RF transceiver is connected to Arduino vis data pin on D11.To provide the motor with sufficient power, we use L298n. L298n is connected by E1 on D9 and E2 on D10.M1 and M2 on A1 and A2, also M3 and M4 on A3 and A4. The dc motor is connected to L298n and provided with 12V power supply.

X. OBJECTIVES

The dc motor is connected to L298n and provided with 12V power supply. To develop a robot that can be used for industrial applications where it's dangerous for human worker. To help physically challenged people. To fabricate robot hands, this is capable of applying independent forces to a grab object. To produce a wireless artificial robotic hand which mimic the human hand for manipulating the objects. To control the movement by using the glove to integrate with hand and tele operate by RF wireless module where it's dangerous for human worker. To design, develop and implement a reliable robot arm with enhanced control and stumpy cost.

XI. RESULTS AND DISCUSSION

Up till now we have successfully completed the transmitter part, where we can efficiently get the correct data of the movement of our wrist and get it into the system. The data that we collect from the wrist on our MPU6050 module is correctly stored in the transmitter system, in terms of X axis and Y axis. Along with that the data from the potentiometer that controls the arm on the other side is now correctly communicating with the system. The data that we get from the potentiometer is converted and prepared to send over RF module. The NRF24L01 module is also working fine with the system and shows no error. If these data are sent correctly over the NRF24L01 and used properly the as per the theory this can work in a precise manner.

XII. EXPECTED OUTPUT

The person will be wearing a glove that will be integrated with the gyro module. This module would provide the data to the Arduino. By using the data, the Arduino would figure out the x and y axis on the module. Also, the Arduino is receiving the data from the potentiometers. All these data would be transmitted to the RF module. On the receiver side this data would be used to control the direction of the robot along with speed. Also, the robotic arm on this side will be controlled by the data receiver from the Arduino.

XIII. CONCLUSION

In this paper robot has been developed which is according to human hand gestures. The robot car is showing proper responses whenever we move our hand. The different hand gestures to move the car in specific directions are left, right, forward, backward. The robotic arm is controlled by the potentiometers.

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Implementation of AgriBot

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***Abstract*— More than 40 percent of the population in the world chooses agriculture as the primary occupation. In recent years, increased interest has grown for the development of the autonomous vehicles like robots in the agriculture. Agribot is a robot designed for agricultural purposes to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary functions involved in farming. The existing agricultural robot performs basic elementary functions like harvesting, planting and spreading the pesticides. The Proposed system aims at designing multipurpose autonomous agricultural robotic vehicle which can be controlled through Bluetooth for weed cutting and cutting and picking of crops. This is especially important for the workers in the area of potentially harmful for the safety and health of the workers. These robots are used to reduce human intervention, ensuring proper irrigation and efficient utilization of resources.**

Keywords— Agriculture, AgriBot, Autonomous vehicle

I. INTRODUCTION

Many countries in Asia including India are agrarian economies and most of their rural populations depend on agriculture to earn their livelihood. Aimed at increasing the productivity and reducing the labor involved, this robot is designed to execute the basic functions required to be carried out in farms. All kinds of agricultural robots have been researched and developed to implement a number of agricultural products in many countries. This Agribot can performs basic elementary functions like Weed cutting, cutting and picking of crops. The application of agricultural machinery in precision agriculture has experienced an increase in investment. It uses basic components like DC motors, robotic arm, cutters and Arduino as the main controller. The mechanical design of the robot is also simple. It is programmed to carry out the above functions simultaneously. In remote operated AgriBot the range of grass cutting equipment is limited as the signal strength is very weak and also the equipment required for these AgriBot is sophisticated and expensive. In this work to overcome these limitations remote controlled Agribot is incorporated with a mobile phone which acts as a link between user and weed cutter. This project considers the implementation of a robot which can be operated wirelessly using Bluetooth technology. Every action of the Bot is controlled by the microcontroller. Precision autonomous farming is the operation, guidance, and control of autonomous

II. PROPOSED FRAMEWORK

A. Solar Grass Cutter With Linear Blade

It also has led to technological improvements in agricultural techniques. It is a vehicle controlled by Arduino controller. It enables efficient grass cutting of prescribed length.

B. Grass Cutting Machine By Solar Power, International Journal and Magazine of Engineering, Technology, Management and Research

The prototype of an autonomous agribot for next generation weed detection is shown. it uses machine vision algorithm to classify plants as weeds or crops according to the requirement.

C. Smart Field robot for weed cutting, International Journal of Science and Research

The robot is capable of making a hole in the soil upto certain depth.

D. Solar Based Wireless Grass Cutter

It uses machine vision algorithm to classify plants as weeds or crops according to the requirement.

III. PROPOSED WORK

Problem Definition:

In the time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is manmade and can be seen in our own daily lives, more specifically in our own homes. Gas powered lawnmower are in 90% of U.S. home and they create 5% of the total U.S. pollution. Green technology initiatives are being support by both the government and cooperates business. Our new design for an old and outdated habit will help both the consumer and the environment. Battery powered automatic lawn mower will relieve the consumer from mowing their own lawns and will reduce both environmental and noise pollution. This design is meant to be an alternate green option to the popular and environmentally hazardous gas powered lawn mower. Ultimately, the consumer will be doing more for the environment while doing less work in

their daily lives. The past technology of weed cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work. Also in old methods lack of uniformity can be seen. Also due to the use of engine powered machines increases the air and noise pollution and this weed cutter require maintenance.

Planned System:

The self-propelling electric remote control AgriBot is a Bot that has remote control capability. This prototype is robotic user friendly, cost efficient, safe to use, efficient to use, and environmentally friendly. It can save significantly on labor costs. Along with the various ages of users, this AgriBot can also be used by people who have disabilities and are unable to use a regular push, or riding AgriBot. The prototype will also be automatic and will run on a charged battery with no cords to interfere with operation. This cordless electric AgriBot includes remote control capability which is less expensive than a robotic AgriBot with sensor capability. This robot AgriBot design is safe to use. With its remote control capability the AgriBot stays within the boundaries of the lawn because the user is able to have fun control over the AgriBot with the controller. This prototype is also environmentally friendly. There is no need for gas, oil, and engine to use this device because it is electric powered.

Block Diagram:

This block diagram of AgriBot shows the components that will be used for implementing the robot.

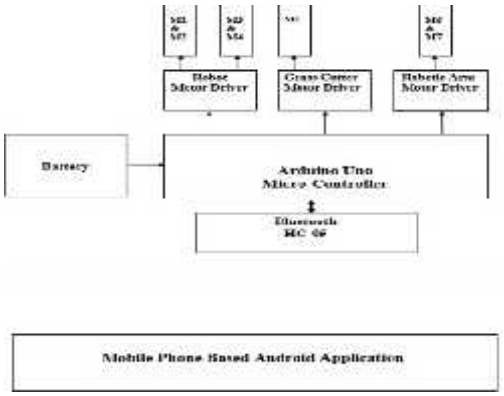

Fig.1: Block Diagram

A. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 . The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits.

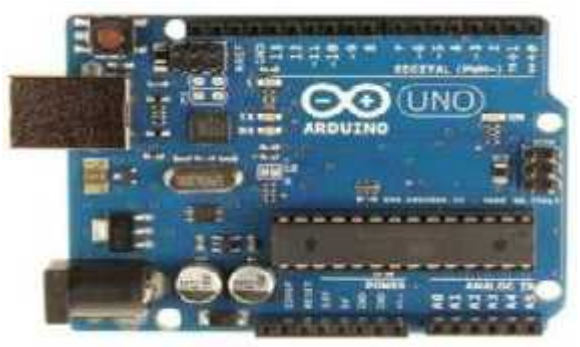

Fig.2: Arduino Uno

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

B. Robotic Cutter:



Fig.3: Robotic Cutter

A blade that rotates in a horizontal plane (about a vertical axis). Some mowers have multiple blades. The blade features edges that are slightly curved upward to generate a continuous air flow as the blade rotates (as a fan), thus creating a sucking and tearing action.

C. Motor Driver

In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently.



Fig.4:Motor Driver

Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller

D. DC Motor



Fig.5: DC Motor

DC Motor – 200RPM – 12Volts geared motors are generally a simple DC motor with a gearbox attached to it. This can be used in all-terrain robots and variety of robotic applications.

Circuit Diagram:

Below circuit diagram shows the connection of Atmega328p microcontroller with Power supply, Bluetooth Module, Motor Driver etc.

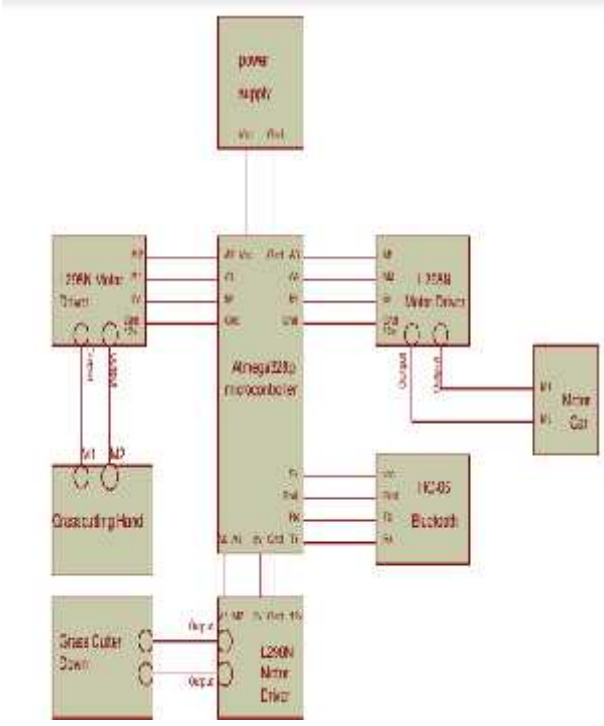

Fig.6: Circuit Diagram

Working:
Battery is power source of this project, in starting our controller wait for Android Application Connection, once connection established. Controller start taking user input command from android application which is given with the help of Bluetooth technology. Based on the command received by the controller as we are using Arduino uno as controller, its moves the Robot on left-right or forward- backward. Arduino gives the TTL output to Motor Driver and motor driver create the respective control signal to drive th YES or. User also have controlled on weed cutter motor and robotic arm cutter.

IV. DATA FLOW DIAGRAM

This Diagram represents the data flow based on the working of the project.

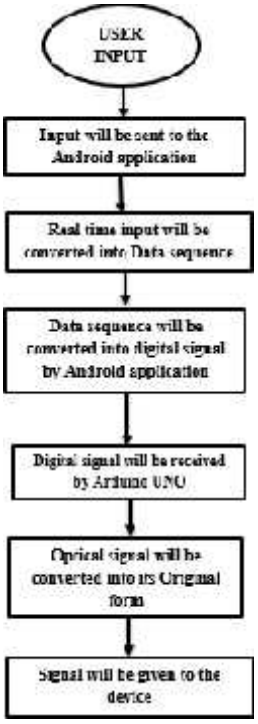

Fig.7: Flow Diagram

V. SCOPE OF PROJECT

Nowadays, robotics is becoming one of the most advanced in the field of technology. It is not restricted to certain set of actions. It can perform rotation of arm, movement of cutter. All the movements are controlled by the DC motor. It is also called as semi-autonomous because it is controlled by the human. With more advancement in technologies and further improvements made, such that the mower is fully autonomous in any given shape of grass field. This prototype can only turn on the cutting blades when green color is detected (assuming grass is only in green color) but grass when dried would turn into yellow and brown and the Bot would assume it as an obstacle. Also the cutting blades won't turn off when a green color obstacle is detected. So these problems of detection of all colors of grass without assuming that they are obstacles can be addressed in the future. Using IoT we can make the field mower inform the water sprinklers in the grass to not sprinkle water till the field mowing is completed. Further, more improvements can be made to avoid obstacles such as pits and manholes which are common in public parks. With technology improving at a rapid pace, the functionality and the performance of the AgriBot can be improved.

VI. EXPECTED OUTCOME

The person will be controlling the robot using an android app. Battery powered automatic AgriBot will relieve the consumer from mowing their own field and will reduce both environmental and noise pollution. The past technology of weed cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work. Also, in old methods lack of uniformity was seen. And also due to the use of engine powered machines increases the air and noise pollution also this weed cutter requires high maintenance.

VII. CONCLUSION

Automation is especially needed in agriculture field for increasing yield of crops. Flexibility of automation system is higher than traditional system. This project is mainly based on minimizing man power as well as cost of the equipment. It is an Agricultural Automation Robot using Arduino. The advantage of this system is that it reduces the labor cost and time. In this the robot is built and established to carry out weed cutting and cutting & picking of fruits. The project presents a low cost, low power, and simple system for device control

VIII. ACKNOWLEDGMENT

The Completion of this project could not have been possible without the guidance and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. However, the group would like to express their deep appreciation and indebtedness particularly to the following

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Implementation of Automated Floor Cleaning Robot

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***Abstract*— The paper is concerned about the fact that in the present era, people have a very busy lifestyle and are dependent on robots. With the stride of the technology robots, can perform numerous tasks with precision as compared to that done by humans. People in metropolitan cities have irregular and long working hours, in such a situation people find it difficult to take out time for household chores, especially cleaning. A floor cleaning robot is a device that provides a helping hand to working people, that do not get enough time for cleaning purposes. It is also efficient for elderly people as cleaning becomes difficult for them due to health issues. The robot has been programmed using an algorithm in such a way that it makes the robot to carry out navigation activities. The robot is based on the concept of ultrasonic sensing. The ultrasonic sensors provide the system with input. The system undergoes navigation by detecting the obstacles and manipulating its directions with the help of the inputs given by the ultrasonic sensors. Thus, leading to cleaning of the floor with the help of the mops provided at the front end of the device. The device is not only confined to the cleaning of houses but also can be used at various places namely, hospitals, schools/colleges, offices, airports, railway stations, hotel, etc.**

Keywords— Ultrasonic Sensor, Arduino nano, L293D motor driver

I. INTRODUCTION

The ideal way of cleaning the floor is doing it manually. the standard floor cleaning procedure for a tiled flooring comprises sweeping away all the dust, trash and debris from the floor, followed by a warm, soapy wash and a rinse with clean water with this being an ideal way of cleaning the floor the problem associated with manual floor cleaning is, it takes plenty of time and requires human efforts. Therefore, it is essential to automate the procedure of cleaning.

People desire their houses to be clean and tidy but procuring the same is very tiresome as one has to do the sweeping and mopping manually which is time consuming and involves quite a lot of effort. Also, uniform cleaning becomes a challenge when doing it manually the floor cleaner overcomes these demerits thereby, leading to satisfactory results.

II. MOTIVATION

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis. Nowadays, all the devices are more dependent on digital technology rather than analog technology. So, people in their households can start using this robot in their day to day activities.
The robotic mop built is not limited to a single room. It can be placed in any room and it would do the cleaning. This reduces human effort. Operation of the robot is easy. Such robots already exist in the market but they are quite expensive which everybody can't buy. This project is cost effective.

III. PROBLEM DEFINITION

The process of cleaning if done manually requires a lot of human effort and time. The idea of this project is to automate the robot which indeed reduces human labor. The main aim is to design a robot which is helpful to society and it cost effective as compared to the models which are already available in the market.

IV. IMNPORTANCE OF PROJECT

Nowadays, robotics is becoming one of the most advanced technologies. This robot has mops at the front end, to which is connected the water supply. It cleans the untidy floor and at the rear end of the device is present a roller, which is used to dry the wet floor.

Most slip accidents happen when floors are contaminated. Effective cleaning should remove contamination and reduce the risk of slips. This robot makes the cleaning process easier. The unclean floor is cleaned by the wet mops. A smooth shiny floor will be slippery until it is completely dry. In order to overcome the accidents due to slippery floor, the roller dries the wet floor simultaneously. This makes the floor cleaner efficient. The operation of this device is very simple as it just needs to be switched 'ON" and it does the cleaning on its own.

The robot is programmed in such a way that it navigated through the entire room. It can detect any obstacle in its way.

V. OBJECTIVE

The main objective is to develop a machine that helps in easy and quick cleaning. This will not only reduce human efforts but save time as well.
It aims at reducing the overall cost thereby producing a cost effective model. It intends to prevent accidents due to tripping or slipping. The design of the model is such that it removes dirt stains and allergens, in particular dust effortlessly in order to make the environment sanitary.

VI. SCOPE OF PROJECT

Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing. It is a rapidly growing field. Robotics has played a major role in assisting human activities and reducing human efforts.

This robot has wide applications as it can be used in the following places:-

- At homes for domestic cleaning.
- At clinics and hospitals.
- At corporate offices.
- At schools and colleges.

On a large scale it can be used for cleaning at railway stations and airports.

VII. LITERATURE SURVEY

A detailed study of previous work was done. An FPGA based service robot for floor cleaning with autonomous navigation is able to navigate by detecting obstacles and manipulates its direction with the help of inputs from ultrasonic sensors various techniques are used for the purpose of smart obstacle avoidance.[1]

Sweep, the smart floor cleaner is both an autonomous and manually controlled cleaning machine used to simplify and achieve the task of cleaning. It has dry and wet modes of operation.[2]

Development of small robot for home floor cleaning deals with designing and manufacturing a cleaning robot and proposes a navigation algorithm for the robot to modify path.[3]

Mopping module design and experiments of a multifunction floor cleaning purpose a novel method of mopping and designing of a mopping module. The robot is multifunctional as it can be divided into vacuum cleaning robot mopping robot and so on.[4]

Complete coverage path planning describes a path planning algorithm which involves division of the entire cleaning area with each cell and provides a path plan among multiple robots to reduce the rate of energy consumption and time consumption.[5]

VIII. PROPOSED BLOCK DIAGRAM

The robot consists of Ultrasonic Sensors, one is used for detection of walls and the other is used for detection of objects. Arduino nano is the core controller of the system.
The system makes use of five motors, two motors are connected to the wheels, two are connected to the mops at the front end and one is the pump motor which supplies water to the mops.
The following figure is the proposed block diagram.

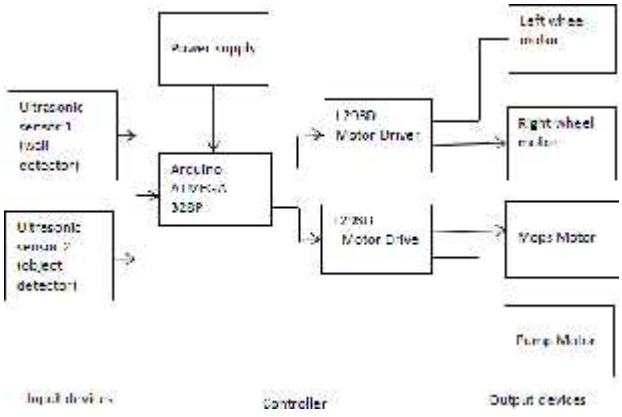

Fig.1. Block Diagram

Ultrasonic Sensor:

An Ultrasonic sensor measures the distance by using ultrasonic waves.



Fig.2. Ultrasonic sensor

The system comprises two ultrasonic sensors, one is used to detect the wall and other is used to detect the objects. These sensors provide inputs to the controller.

Arduino nano:

Arduino nano is a small board based on the ATMEGA328P.



Fig.3. Arduino Nano

It offers the same connectivity and specifications of the UNO board in a smaller form. Arduino is the core of the system as it controls the operation of the robot by making appropriate decisions. It is programmed using Arduino IDE.

L293D motor driver:

A typical motor driver which is used to drive a DC motor in either direction.



Fig.4. L293D motor driver

The system uses two motors that are provided with sufficient power for rotation. It is a 16-pin IC capable of controlling a set of two DC motors.

Pump motor:

It is a DC motor that moves fluids.



Fig.5. Pump Motor

It is used to supply water to the mops in order to enable mopping of the floor.

IX. DATA FLOW DIAGRAM

As soon as the robot is switched 'ON', the mops at the front end start rotating and the robot starts moving in the forward direction. the water pump supplies water to the mops at regular intervals.

If the robot comes across a wall or any obstacle in its path then it would detect the same using Ultrasonic Sensors and take the appropriate turns. It would then continue to move along its path until it has reached its destination.

The following is the flow diagram of the project i.e. automated floor cleaning robot.

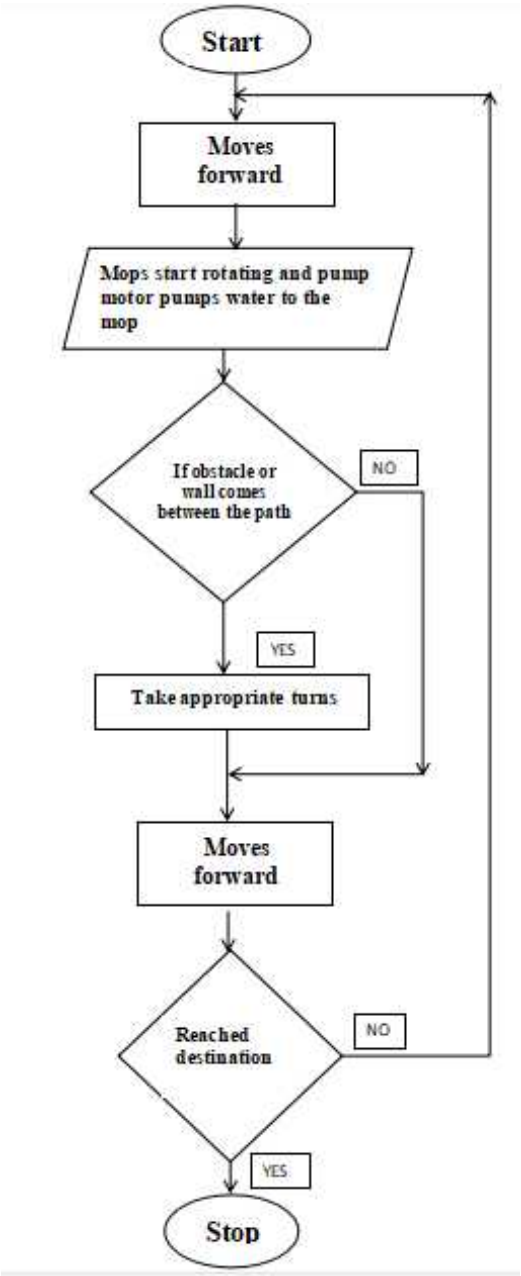

Fig.6. Data Flow Diagram

X. METHODOLOGY

There is a predefined path along which the robot moves when there are no obstacles. Whenever any sensor senses the presence of an obstacle, the path varies until it clears the collision course with the obstacle and returns to its original path. This path is repetitive. The dimensions of the room are predefined.

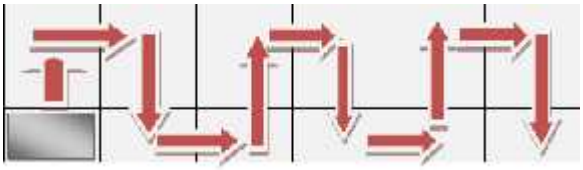

Fig.7. Path without obstacles

In this case the obstacle is on a path where the robot moves towards left for the next turn. Here the robot identifies the obstacle and avoids it depending on the length covered by the robot. If the square obstacle is present on the path where the robot moves next turn towards left, the ultrasonic sensors 'uf' becomes high. The robot moves towards left as soon as the obstacle is detected and goes forward until all the sensors become low.

After all the sensors become low the robot turns towards right until ul is high. Now the robot moves forwards until uf becomes high and tunes towards left until ub becomes high, hear after the robot traces its paths cover the remaining area.[1]

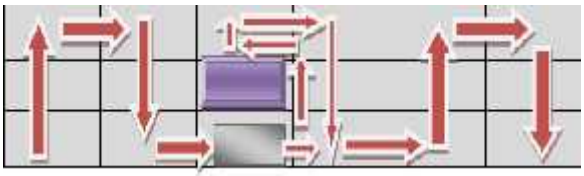

Fig.8. Path with obstacles

XI. RESULT

The main objective was to develop a navigation algorithm and inculcate the obstacle detection in the robot which would automate the operation of the floor cleaner.

In general, surveys are done to understand the need for a project for the society. The literature survey is done on automation of floor cleaning robots.After studying, the idea of the project is proposed.The proposed model is discussed in detail in a view to implement it practically. Flow diagram is made. Block diagram of the project is finalized and started working on code and hardware design as well.

There are various algorithms which are used for following different paths in order to cover the entire area that needs to be cleaned. Comparisons are made to get the desired output with maximum efficiency. The project will be an approach to try the zig-zag algorithm to get the desired output with minimum inconsistencies and errors.

XII. EXPECTED OUTCOMES

When the Robot is switched 'ON', it starts moving in the forward direction. As the robot reaches the wall it would detect the same using ultrasonic sensors, it takes a turn of 180 degrees and continues to move in a zig-zag pattern. If there is an obstacle in the robot's path, it would detect the obstacle using, ultrasonic sensor and avoid collision with the same. This is done by tracing the edges of the obstacle and continuing its original path.

The motors of mops and the wheels are connected to the motor drivers which gets the input from the arduino. Water supply is given to the mops using, mini pump motor. It releases water at certain time intervals to clean the dirty floor. The mops wipe the floor and the roller dries it simultaneously. At the end we get a clean floor.

XIII. CONCLUSION

The proposed service type floor cleaning algorithm is executed which carries out navigation by detecting the obstacles and manipulating its directions with the help of the inputs provided by the ultrasonic sensors. The cleaner is efficient as it cleans the floor uniformly and with accuracy. It is an ideal cleaner as it saves human efforts as well as time.

XIV. ACKNOWLEDGMENT

We are sincerely thankful to our project guide Mrs. Rupali Mane for her guidance and constant support by helping us through explaining us various concepts and advice needed for the project.We are thankful to the domain teachers for their useful insight and suggestions regarding the project.

We are also thankful to the project coordinators for arranging the necessary facilities to carry out the project work.We would like to thank HOD,Principal for their support.

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Implementation of Camouflage Spy Robot

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***Abstract*— This paper presents a camouflage spy Robot using Arduino, which can be controlled by Bluetooth application. According to the data provided by the application over the Bluetooth the car would move on the given direction. This type of robot is widely used in military application, industrial robotics and construction field. In such a field, it is very risky and complicated to handle the machines through switches or remote, sometimes operator may be confused. Here we are trying to achieve a system that can receive the data from the app and allowed the robot to move with the same proportional ratio. This can help with the movement of the robot with precise accuracy[7].**

This helps the operator to control the robot as the mobile game. With enough practice this can be used in the most efficient way than imaginable. This helps the operator to control the vehicle at an easier way.The main highlight of the project is the ability of the robot to change its color[9]. This helps the robot to hide itself on the plain sight and spy on the target. The use the 12v dc motor that provides high torque for heavy weight transport of equipment helps with the mobility. The replicating of the color on the robot is achieved by the color sensor below the robot that detects the surface and provides this data to the arduino and arduino uses this data to brighten the led at same color.

Keywords— ***Technology, gestures, sensors, arduino, surveillance and military, colour changing.***

I. INTRODUCTION

Bluetooth is the best and easy way to communicate with two devices. As the Bluetooth can be highly secure and encrypted. Nowadays, robotics is becoming one of the most advanced in the field of technology.[1]

It also gives the data regarding the color of the surface. So if the robot has to hide in the plain sight it will be able to do it by replicating the color on to the LEDs. It is not just that robots are used for military purpose or industrial work but it is also used in making handicap's life easy. This robot can be used for many purposes such as rescue during disaster, spy mission or just for the handicaps.It can easily use the data from the phone and move in the same direction. Here the robot will also send the data back to phone in this case it is the color values detected by the robot.

II. MOTIVATION

In general terms the robots are controlled by switches and potentiometers but these switches and potentiometers have their own limitations and restriction [2]. Even though they provide a large number of application and options but that doesn't define a good accurate control. There are many restrictions in using these methods, so that's why to overcome these problems we came up with a solution by using the mobile application. One specific application that we can point out is the use of this system for the handicap mobility which is other than the military application.

The one specific application for this project would be the rescue operation of the hostages during the military mission. The robot would be perfect for the stealth operation. It would make sure that minimum lives are at risk during the operations. In similar way, it could be used for the rescue operation during natural disasters. With the easy to use mobile application it would be a more simplified as compared to the traditional method. This mobile application has been designed in a way that any person with a basic mobile knowledge will be able to use it.

III. LITERATURE SURVEY

After detailed comparison with previous works many of projects used just robotic control. But here we are also using the color sensing technology to replicate the color of the surface. The previous method used the RGB color sensor that replicated only the RGB colors over to the LEDs.

The advance systems here provide the tech with the data repeater that repeats the data from the Bluetooth and sends it to the receiver. This helps with the longer range on the system and more versatility.

IV. SCOPE OF PROJECT

Nowadays robotic systems and control units are not limited to switches and joysticks. There are many ways like cameras, voice command, artificial intelligence, etc. In further development we can add ultrasonic and

motion sensors which will help our system with being active only when required. This will save the power for our system by being passive active for a longer period of time. Along with that we can add other sensors like light, gas detection, temperature and humidity sensors.

Additionally with improving technology we can say that there would be a color changing fabric on to our system instead of LED changing the color of the fabric. Furthermore we can use two arduino's provided with the RF communication to increase the range of our robot drastically over several kilometers. This can be implemented by receiving the signal from the mobile over Bluetooth and replicating this data and transmitting over RF and this RF signal would be received by the robot on the other side.

We can say that not only will this robot spy on the target but also save people in such situations and natural disasters. Depending on the application and the situation of the environment, the experts can modify the system. With enough computing power we can provide the robot with an AI system that can take its own decision at critical situation.

V. Problem Defination

Even though there are many other ways to control the vehicle system but method of controlling the vehicle through the Bluetooth application would be the most common way that the people are comfortable with.
The main problem with Bluetooth application in general terms is providing a robot with specific type of data that can help the robot to control the speed as well as the direction[5]. The issue here was to control the robot as well as provide the data for the speed. To solve this problem we provide the data to the robot itn terms of codes rather than specifying the actual speed to the robot.[1]
The logical problem that we had to face was the changing the color of the fabric in a non noticeable way but also having the flexibility to change the color without making it feel like an illumination of LEDs behind fabric.[7]
What we did here was replicate the color of the surface onto the LEDs of the system. The brightness of the LEDs would be determined by the brightness of the environment around the robot. This would help the robot with camouflage in the surrounding in the better way.[7]

VI. Block Diagram

In this project we are using components like Arduino uno, RGB colour sensor, DC Motor Driver (L298n), Bluetooth, LED Driver and NRF24L01.

Arduino uno**:** The arduino uno is the most important part of the entire system that will work as the computer system on our spy robot. It gathers the information from its connected devices and performs the required calculation on it. There are numerous techniques possible on this little piece of computer.

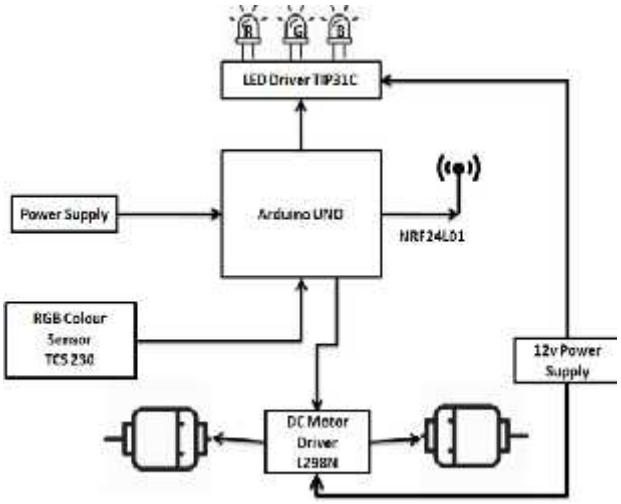


Fig.1. Block diagram of robot

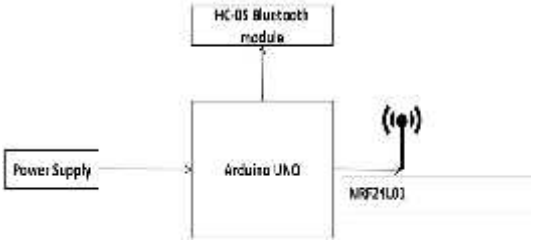


Fig 2. Block diagram of Repeater



Fig 3. Arduino Uno

RGB colour sensor**:** This sensor works on the principle of wavelength detection. It has three filters of Red Blue and Green. These filters are active one at a time and collect the data regarding their respective color. For e.g., for red color detection the red filter will be active and the mask on the red filter will detect the amount of red color that is available on the surface below.[7]



Fig 4. RGB colour sensor

DC Motor Driver (L298n):



Fig.5 DC Motor Driver,L298n

This motor driver ensures that the motors are provided with the enough power to rotate at their maximum potential as the common output from the arduino is not sufficient to provide enough power to the motor and keep the robot moving. This particular motor driver has 6 pins on it i.e. 4 input pins for direction and 2 pins for the speed.[1][4]

Bluetooth Module:



Fig 6.Bluetooth Module

The Bluetooth module that we use here is HC-05. This particular Bluetooth module is of low power and high range capability and is really cheap. The use of this particular module provides us the benefit of using the built in library for Bluetooth on the arduino and makes sure that the code is simple and easy to understand from a beginner's point of view.[1][6]

LED Driver:



Fig 7. .LED Driver

The LED Driver is just as same as motor driver. It makes sure that the LED strip has enough power to brighten them self at the maximum brightness. This driver consist of the YIP31c IC that provides the 12v supply to the LED strip and can also handle PWM signal from the arduino to vary the brightness at a proper rate than just generic power supply. [9]

NRF24L01:

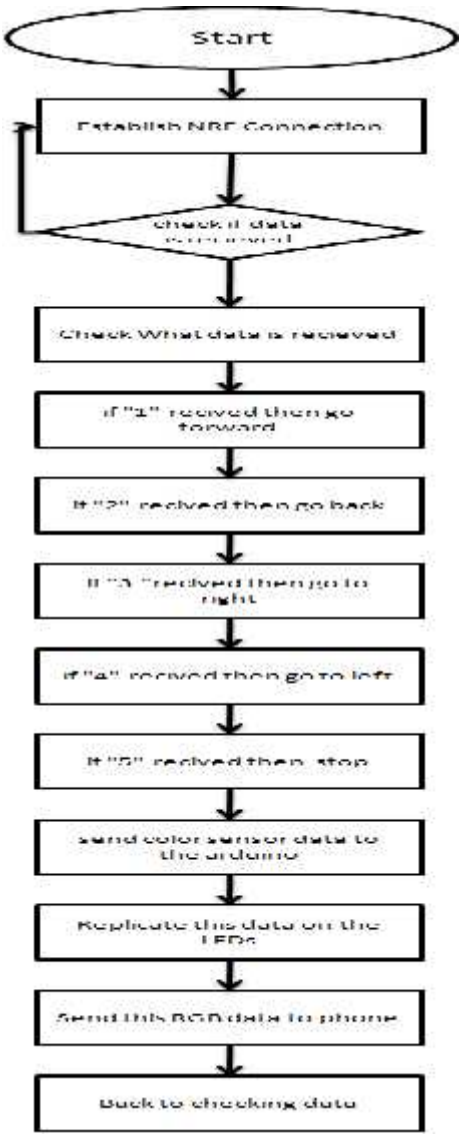
NRF24L01 is a single chip radio transceiver for the world wide 2.4 - 2.5 GHz ISM band. The transceiver consists of a fully integrated frequency synthesizer, a power amplifier, a crystal oscillator, a demodulator, and modulator.



Fig 8 .NRF24L01

Output power, frequency channels, and protocol setup are easily programmable through a SPI interface. Current consumption is very low, only 9.0mA at an output power of -6dBm and 12.3mA in RX mode. Built-in Power Down and Standby modes makes power saving easily realizable.[8][3]

VII. FLOWCHART



The program starts with the establishment of connection on the two nrf24l01 modules i.e. repeater and the actual

robot. Once the connection is established the robot checks if any data is received. If the received data is "1" then the robot is moved forward. If the received data is "2" then the robot is moved backward. If the received data is "3" then the robot is moved right.If the received data is "4" then the robot is moved left. If the received data is "5" then the robot is stopped. If the received data is "6" then the colour sensor is turned on. If the received data is "7" then the colour sensor is turned off. If the colour sensor is turned on then the colour sensor module picks up the colour value and then this value is applied to the led strips.This data for the colours are sent to the computer back.

VIII. Circuit Diagram

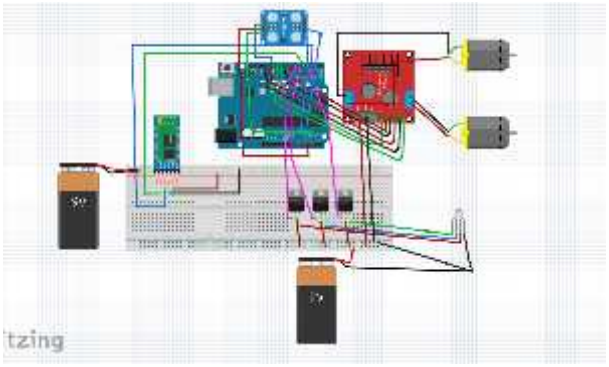


Fig 9..Circuit diagram of robot

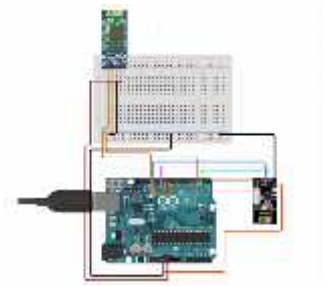
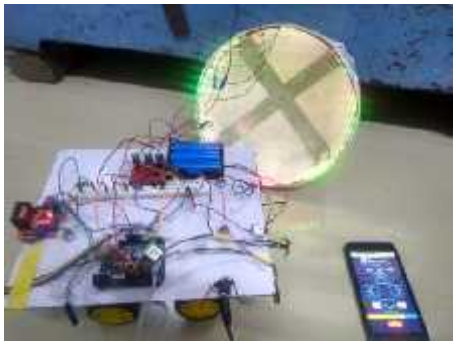


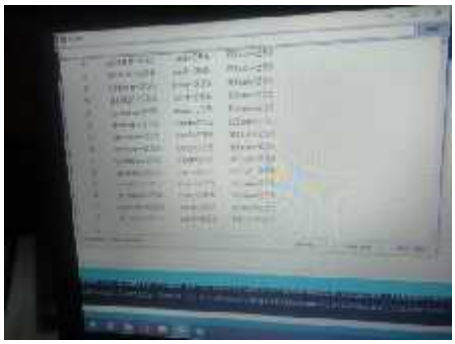
Fig (10).Circuit diagram of repeater

- Colour sensor (TCS230): It has 5 pins where S0 and S1 is connected to A0 and A1 also, S2and S3 are connected to A2 and A3 in the arduino.
- Similarly Sout pin is connected to D9 of arduino. This sensor is provided with 5v.
- NRF24l01 module: it has 5 pins that goes to D7, D8, D11, D12, D13.
- L298n: This has 6 pins where enable 1 is connected to D9 and enable 2 is connected to D10. M1and M2 is connected to D7 and D8 also M3 and M4 connected to D11 and D13. The motors are connected to output of motor drivers. The motor driver is provided with 12v.
- Led driver: It consists of 3 IC's where the base of the IC in RGB is connected to pin D3, D5 and D6 respectively. The collector to each IC is connected to positive side of 12v battery. The emitter of each IC is connected to RGB led.

IX. Expected Output

The application will be installed into the operator's phone. This application would send the data to the arduino. Using this data the arduino will command the robot to move in a certain direction. On other side the arduino will sense the data from the color sensor and provide is to the LEDs.
This data provided by the color sensor to the arduino is sent to the phone over the blue tooth. The camera mounted on the robot is a night vision camera that can see in the dark. This camera has the capability to connect to the3 internet and send that data to the operator in the real time.





X. Conclusion

Hence we conclude that with enough practice and suitable hardware it is possible to control a robot in a more accurate way than it was before. Also with the help of color changing ability provided to the robot we can hide the robot in plain sight of the suspect.

Along with the use of night vision camera the robot is added with strength of being more useful in such dangerous situation. Even though it is not the ultimate replacement of the human spy but it is surely a one step towards it.

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Implementation of Swarm Drones Using Near Field Radio Frequency for Fire Fighting

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***Abstract*—Since the dawn of time, mankind has used fire to improve and enrich our lives. However, fire is a two sided blade. Each year cities experience fire in buildings, forests, industries etc damaging property and risking life. Extinguishing this fire is also a risk to human life.**

If drones can perform such tasks there is no need for human's to risk their lives. Drones are unmanned aerial vehicles that have a widespread use in today's world. Despite the multiple advantages, one of the gruesome tasks is maneuvering multiple drones with separate control units as it becomes tedious and expensive and it requires a specialist. We could overcome this drawback by using a single control unit to maneuver multiple drones. This can be done using Swarming. UAVs can handle dangerous and risky tasks as well as their fast and efficient performance allows them to be used in fire related problems such as entering and exploring disastrous zones. An Auto Fire Off (AFO) ball is attached to each drone, which will be dropped at the location of the fire by each drone exactly at the same time as the master drone. This will avoid human casualties.

This project reduces labour as well as risk to human life thus bringing a change to society. We were inspired by the ease with which multiple drones can be controlled using a simple unit and how a simple AFO ball can be used to extinguish large fires, thus saving many human lives.

Keywords*: *Drones, Swarming, Fire Fighting

***Abbreviations*:**

AFO:-Auto Fire Off
UAV:-Unmanned Aerial Vehicles SI:-Swarm Intelligence
UART:-Universal Asynchronous Receiver-Transmitter
APM:-Ardupilot Mega
MAP:-Mono Ammonium Phosphate

I. INTRODUCTION

In the Year 2020 the Australian bushfire killed about 34 people and destroyed countless villages whilst an estimated one billion animals have also been killed and some endangered species may be driven to extinction. In the year 2019, the fire in Amazon Rainforest destroyed roughly 60% of the land and resulted in the death of nearly 2 million wild animals. Due to these disasters many lives were lost and this happened because help could not reach their location. This is where Swarm Intelligence (SI) can be used to rescue lives of people where help could not reach. The project aims at applying the applications of swarm intelligence in such disaster management that could help the community.

II. EASE OF USE

There is an increasing need to replace Humans by Machines in fields that pose a threat to Human Life and with the ability of drones to autonomously make decisions we are inching ever closer to seeing this potential unleashed.

Scientists estimate that wildfires emitted about 8 billion tons of carbon dioxide per year for the past 20 years. With the increasing problems of climate change in today's world, there is an extremely urgent need to figure out new ways and technologies that could help keep the disasters in control.

Besides the threats to Human life the biggest problem to extinguish wildfires is that large quantities of water would be required and according to the analysis 21 cities in India might run out of ground water by 2020.

The scope of this project is very wide as it would provide a solution to the above listed problems and the assistance required during the time of disaster can be altered by simply adding or reducing the number of slave drones.

III. METHODOLOGY

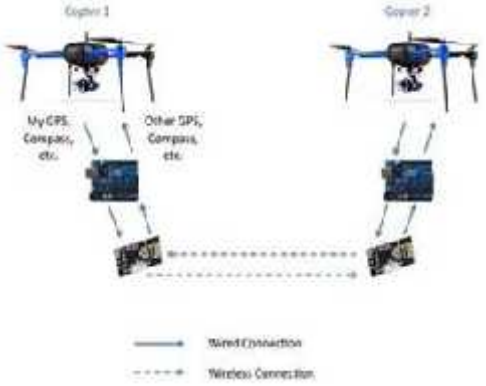
Swarming is a process in which honey bees move while following the queen bee. The same formation can be implemented using drones. An AFO ball is attached to all the drones in order to extinguish fire and help in disaster management.

A. Copter Communication:

The copters were communicating with each other via wireless transceivers of 2.4 GHz. One transceiver was added to each copter along with an Arduino, with the Arduino acting as the bridge of communication between the APM autopilot and the transceiver.

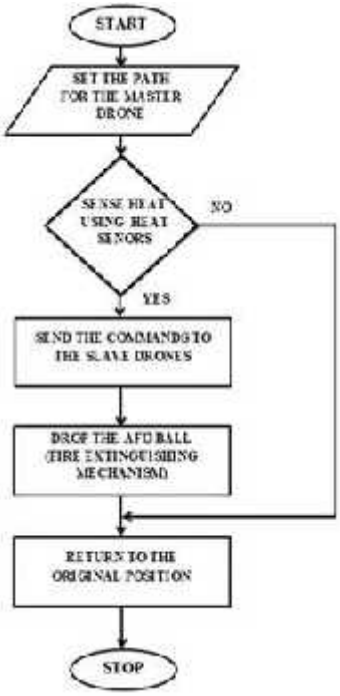
The APM sends data via UART to an Arduino, at 4 Hz. The Arduino takes the information it receives, and sends it via the 2.4 GHz transceiver to the other copter. On the other hand, once that information is obtained by

the other copter's Arduino, the Arduino must store the data and wait until it's APM is ready to read it.



B. Fire Fighting Mechanism:

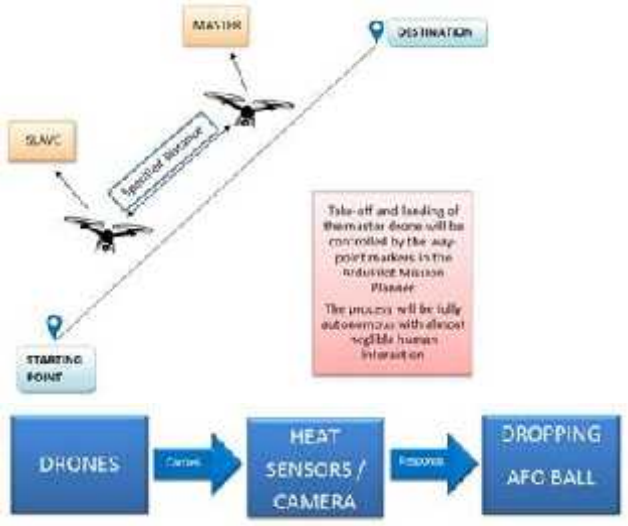
The path for the master drone is set. The master drone communicates with the slave drones. The slave drones then follow the master maintaining a specified distance. The heat sensor on the master drone senses the fire and sends the command to all the slave drones. Upon getting the command, all the drones drop the Auto Fire Off ball. The outer covering of the AFO ball in presence of fire, melts and releases Mono Ammonium Phosphate to extinguish the fire.



IV. RESULT AND DISCUSSION

a) Two drones, one master and slave are used. The path is only fed to the master drone. The slave replicates the movement of the master drone blindly. The position of the slave will be maintained with respect to the master at a specified distance.

b) On sensing fire from the heat sensor, the master and the slave will drop the AFO ball at the same time. When the AFO ball comes in contact with the fire, its outer plastic covering will melt thus releasing the chemical substance inside it and extinguishing the fire.



IV. CONCLUSION

The current state and scope of research offers substantial evidence supporting strategic investment in UAV technology to develop new and improve existing disaster management operational capabilities. The swarm of drones can also help save lives from disaster-affected areas by finding them and providing information to the rescue team by providing pathway and area information. According to the work proposed by previous research papers, fire extinguishing mechanism used was water pumps. Major drawback of this mechanism was the wastage of resources and high power consumption. As an alternative here we use AFO ball as an fire extinguishing mechanism as it is more efficient than the other mechanisms mentioned in other research papers. Using a dropping mechanism, the Auto Fire Off Ball will be dropped into the fire from all the drones in order to extinguish the fire. The agent used inside the ball is an active material of 94 percent MAP (mono ammonium phosphate)-dry chemical powder, one of the highest percentage of MAP found in dry chemical powder. It is healthy and environmentally friendly for humans, plants and animals.

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Design of Automatic driverless Metro Train

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***Abstract*— Nowadays modern technologies are helpful in all aspects of our life. Due to this lots of development is done in the field of transportation. In the previous years, with the use of regular metro trains, accidents used to occur due to various reasons like the fault of the driver, signal errors, etc. Another major problem is, the human-operated metro train has no control over time, which means inaccuracy in time which affects the railway network management system. To solve this problem, we have a new concept of the driverless metro train.**

Driverless metro train attempts to improve the management system of the railway network, reduce human errors, consume less power and provide comfort and safety to passengers during traveling.

***Keywords*— *Arduino, driverless, metro train*.**

I. INTRODUCTION

This project is developed to understand the technology used in the driverless metro train system which is mostly used by some other developed countries like German, Japan, and France [1]. It solves the problem of mass transportation as well as the high transportation cost in the metro train system. It also reduces energy consumption by 30% [2] of the metro train as it also uses the solar panels on the top for running the accessories of the train [5]. It also gives accurate timing control of the train on station arrivals and departures [4]. The operation of the driverless metro train is controlled by a central processor unit like the Arduino[6]. The train is programmed to run on a predefined path that has fixed distance of stations and the speed of the train is also predefined and it is controlled by the motor driver IC. The stoppage of the train on the stations is also predefined. The RFID sensors and RFID tags are used for stopping the train [1]. The whole operation of the train is controlled and performed by a controller so it does not require a driver or train attendant for the operation of the train [11]. This project uses Arduino mega as the main controller of the whole system. The operation and control of the train are performed by the Arduino. The different operation or functions of the train is carried out by fetching the programs in the Arduino by using the Arduino IDE software. GoA-4 is called fully driverless train operation or also called an unattended train operation (UTO). Hence in this operation, all the functions of the train are carried out automatically. So, there is no requirement of a driver or train attendant to perform operations of the train

II. LITERATURE SURVEY

• Thabit sultan Mohammed, Wisam Fahmi Al Azzo, Mohammed Ahmed Akaak and Mohammed Laheeb Suroor proposed a concept on “Full Automation in Driverless trains”. The system concept proposes a solution to some of the major challenges related in existing metro trains systems. They used PIC microcontroller as CPU and to stop the train automatically they used IR sensors.

• Judith M. Cohen, Alexander S. Barron, Richard J. Anderson, and Daniel J. Graham wrote the paper called “Impacts of unattended train operations on productivity and efficiency in metropolitan railways”. This paper gives the idea about the terminologies such as Grades of Operations (GoA), and the several types of it. GoA1 is a manually operated train, GoA2 is an automated train with a driver in it to perform crucial operations, GoA3 also has an automated train but it has a train attendant in the passenger car, GoA4 is a fully automatic train which doesn’t require any supervision.

• Yap Kwee Seng, Ng Hon Wai, Dr. Samuel Chan, Leong Kwok Weng wrote a paper which give the necessary steps to be taken to ensure the safety availability and, reliability of the metro trains.

III. BLOCK DIAGRAM

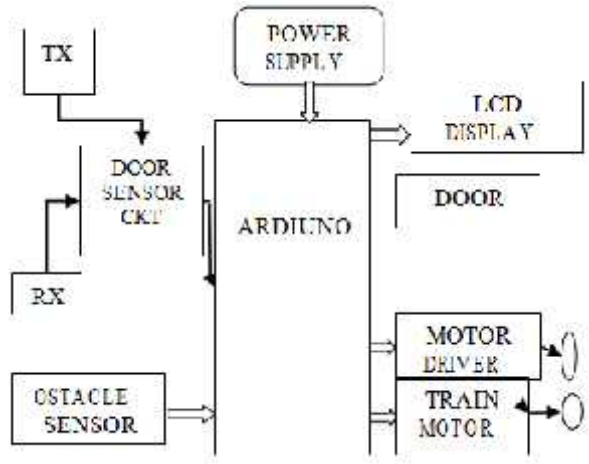

Fig.1: Block Diagram

IV. FLOWCHART

A. Description of System

Our project System decreases human interference by creating the train operation automatic, therefore, reduce the risk of safety and convenience. The automatic commuter tally allows to change the schedule, therefore, reducing the over occupancy and additionally preventing train delaying.

The obstacle detecting unit prevents any accidents by interference ahead of the train movement. The system will also display the necessary details about the stations with the help of LCD display. At the time of train arrival at the stations it reads the 8-bit data programmed in the train stops automatically. Two motor drivers are essential in this project, one for the train movement and the other one is for door operation. Power supply of 12V is necessary for operation.

B. Working

The circuit consists of Arduino mega 328, RFID technology, infra-red sensors, DC motors, motor drivers, buzzer, battery and LCD. The prominent part of this project is Arduino controller. It acts as CPU, the LCD, RFID, IR sensors and the motor drivers are interfaced to it. The fig 1 shows the block diagram if the circuit where the Arduino acts as the CPU and it takes input from RFID through YES al synchronous and asynchronous protocol (UART). The input from IR sensors are taken to count the passengers and also the controller is programmed to stop the train upon sensing the RFID tags and after stopping it is programmed to open and close the door automatically with the help of motor drivers L293D and L298H, after a prescribed time. Arduino takes the supply of 12V from the lead acid battery. The motion o

by the L298H motor driver interfaced with the Arduino Prototype moves by controlling the rotation of two motor. Details of each station is displayed in the LCD as the prototype stops after reading the RFID tags and the door opens, this operation is done by L293D motor driver which operates the door by controlling the rotation of a single motor.

The door closes when the prescribed time is reached or when the maximum occupancy is reached; the LCD also displays the opening and closing of door. The passenger counting operation is done with the help of two IR sensors placed at the door, one sensor counts the passengers entering and the other sensor counts the passenger leaving the train. The front of the train is mounted with an IR sensor which is interfaced to the Arduino. It acts as an obstacle detection unit along with the buzzer, when the sensor senses any object in front of the train, the train stops while the buzzer gives a warning sound.

IV. COMPONENTS

1. Arduino
2. 16x2 LCD display
3. L298H driver
4. L293D driver
5. DC motors
6. IR sensors
7. Buzzer

V. FLOW CHART

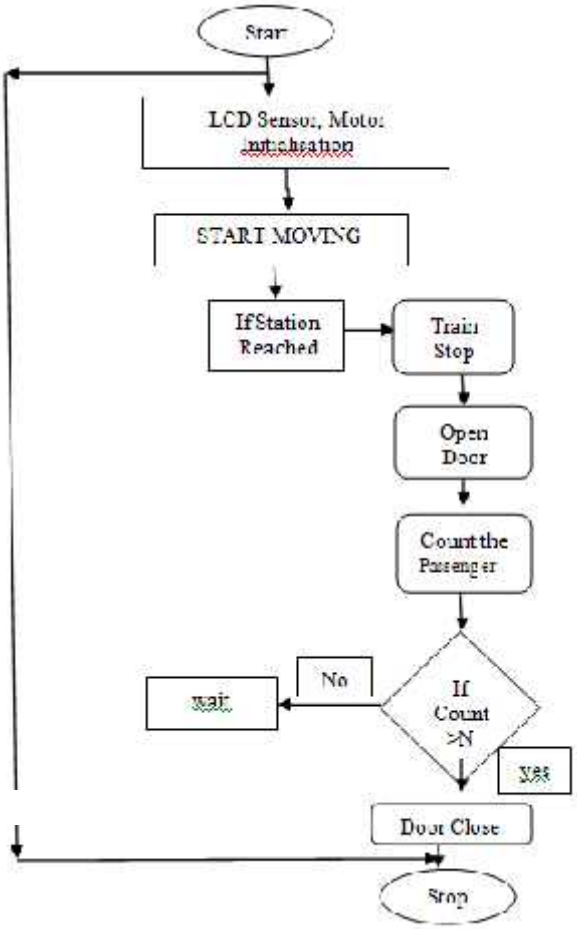

Fig.2 FLOWCHART

This system describes how metro train can be automated and after automatization, it shuttles between stations, mainly counting the number of passengers automatically as they enter the train and even buzzer alerts the passengers when the door opens and closes based on the station arrival. This helps the passengers and reduces their difficulty; this counting of people helps to reduce the overpopulation inside the train. The counting is displayed on 16x2 LCD display.

VI. RESULTS

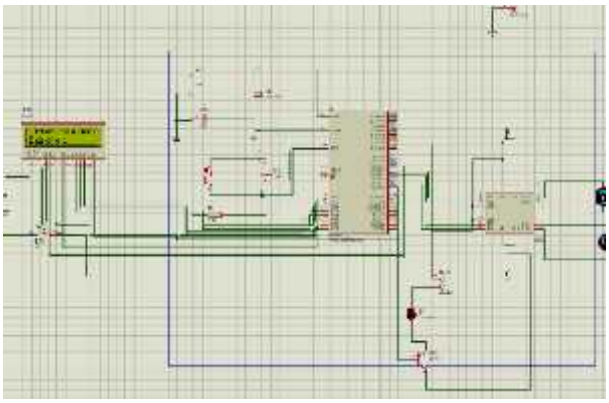

Fig.3 Software Implementation

Simulation process and adjustments are made to the design and operation activities. On the simulated LCD appearing in fig 3, a welcoming message is displayed, where the train is still stopping at the first station with its doors open for passengers to enter. At this situation, the actuator simulating the motion of the train is OFF, and the doors' control actuator is at OPEN state. Further train activities, while its departing a station and/or arriving at a station are considered in the simulation.

VII. EXPECTED OUTCOME

Our driverless metro train project provides the unique features like fully automatic driverless operation with less traveling time, less consumption of electricity etc. Driverless metro system provides better quality of services as well as exact timings of the train for arrival and departure. It reduces the overall running cost of the system. One advantage of this system is to transport more people than the normal metro train services. This system makes a better way to build smart cities as well as to provide better metro rail services to the society.

mainly based on minimizing man power as well as cost of the equipment. It is an Agricultural Automation Robot using Arduino. The advantage of this system is that it reduces the labor cost and time. In this the robot is built and established to carry out weed cutting and cutting & picking of fruits. The project presents a low cost, low power, and simple system for device control

VIII. CONCLUSION

The shuttling of metro train between stations is a framework presented and a general conclusion is that they are presenting to an open horizon of developments. As this system eliminates driver or reduces human effort it is also known as driverless metro train. Such proposed techniques and projects can represent a minor part of future and technology integration which mainly describes about the modernization of different service sectors including transport. Developing these kinds of prototypes improves self- confidence, Researching enhances and assures that it is possible to design a system and apply it for solving a particular problem by acquiring the necessary information. More over developing such prototype can serves advance form of control system and also serves as a basis of a far more sophisticated system such as a real driverless train system.

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SMART PARKING SYSTEM USING 430 MSP

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***Abstract*--In recent times the concept of smart cities have gained great popularity.Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure.One possible solution for the problem of congestion due to unavailability of parking spaces could be an IoT based cloud integrated smart parking system.The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space.A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the system in form of a use case that proves the correctness of the proposed model**

Keywords: IOT, smart parking system, mobile application, cloud -integrated.

I. INTRODUCTION

The smart parking system has been developed. Various approaches and researches are made to overcome the difficulties of parking area. The technologies of the parking system use wireless sensor network (WSN) for identification and communication process. In the WSN collection of nodes are deployed for various processes. It mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere

II. LITERATURE SURVEY

The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. Next paper explore the concept of the smart parking system and their categories. [2]The classifications of various existing systems are explained. The parking system handles various technologies, and the categories of those techniques are given. The functions of the nodes in wireless sensor networks are classified.

Generally people are facing problems on parking vehicles in parking slots in a city. In the paper [3] design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. It mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.

The paper [4] introduces a novel algorithm that increases the efficiency of the current cloud-based smart-parking system and develops a network architecture based on the Internet-of-Things technology. This paper proposed a system that helps users automatically find a free parking space at the least cost based on new performance metrics to calculate the user parking cost by considering the distance and the total number of free places in each car park. This cost will be used to offer a solution of finding an available parking space upon a request by the user and a solution of suggesting a new car park if the current car park is full. The simulation results show that the algorithm helps improve the probability of successful parking and minimizes the user waiting time. We also successfully implemented the proposed system in the real world.

III. BLOCK DIAGRAM

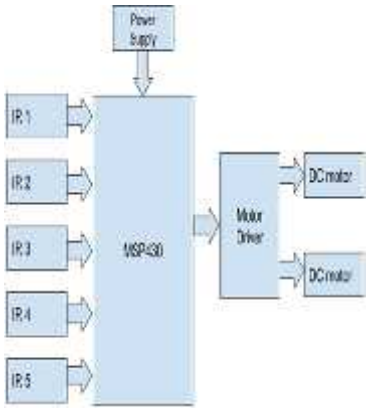

Fig.1 Block Diagram of Proposed Smart Parking System

IV. PROPOSED SYSTEM

The project consists of a MSP controller which is programmed for automatic parking system.The parking system consist of a MSP microcontroller, IR for detecting vehicle and Motor for on

and off gate.There are four parking lots designed using four in this project and on entry gate for incoming of vehicle.

The MSP is connected to Visual Basic and the presence of vehicle is detected through the microcontroller and the output can be seen on the Visual Basic side as well as android application. One IR is present in the entry of parking system when presence of vehicle is detected then the gate will open.

WORKING

Car enters through the barrier which usesSERVOmotor to move up down the barrier.
There are 8 parking slots each contain one ULTRASONIC SENSORS which detects obstacle and we get to know whether there is a car or not.
If there is an obstacle it gets detected with the help of ULTRASONIC SENSOR and a special time is allocated for a parking system if the time mail will be send and the ended time will be notified.
LCD will be used to display with the help of LED whether the parking slot is free or not.
An app will be used for the user whether the parking slot is full or not and he can do pre-booking and he can be notified whether his time is over or not.
This system can be used at a large scale in mall and various spaces
The payment application can be also done by using online system.

V. COMPONENTS USED

TABLE 1: COMPONENTS USED

Sr. No	COMPONENT	QUANTITY
1.	Motors	2
2.	TEXAS microcontroller MSP430	1
3.	Motor driver-L293D	1
4.	IR transmitters	6
5.	IR receivers	6
6.	Power Supply	1

VI. EXPECTED OUTCOME

The expected outcome of the proposed system is to make it possible to implement on a large scale practically in malls, buildings, etc.Monitoring system and we can also add GPS location system to its implementation and make it easy and comfortable to the common users. Also if the system if payment system is added to it can keep track of accounts of every customer entering parking slot.

The main connections for basic functioning of the microcontroller include a reset circuit, oscillator circuit and EA Pin. Reset circuit consists of a push button, 10KΩ resistoranda10µFcapacitor. External oscillator circuit consists of an 11.0592 MHz quartz crystal and two 33pF capacitors. Finally, a 10KΩ resistor is used with EA pin to pull it high.

The next hardware we need to connect is the 20 x 4 LCD. The pin configuration of a 20 x 4 LCD is similar to that of a 16 x 2 LCD. The only difference is that a 20 x 4 LCD has few extra segments. In order to access those extra segments, we need to program the microcontroller accordingly.P3.6, GND and P3.7 pins are connected to the three control pins of the 20 x 4 LCD i.e. RS, RW andE. The data pins of the 20 x 4 LCD are connected to Port 1 of the microcontroller.The next component we are going to connect is the RTC.

First we have to connect a 32.786 MHz crystal oscillator between the oscillator pins of the RTC IC.Then connect a 3V coin type Lithium battery to the VBAT terminal of the RTC IC. Finally the I2C terminals i.e. SCL and SDA of the RTC IC are connected to PORT0 pins.Hence, they must be pulled high with 1K resistors. Now you can connect SCL and SDA to P0.0 and P0.1 of the microcontroller.After connecting the RTC, now we are going to connect the EEPROM. First connect the SCL and SDA pins of the EEPROM IC to the P0.0 and P0.1 pins of the microcontroller. Then, connect the address input pins of the EEPROM to Ground.Finally, connect the RFID reader to the controller. Connect the TX pin of the RFID Reader to RXD pin (P3.0) of the Controller and RX of RFID is connected to TXD (P3.1) of microcontroller.

This will help in development of smart cities and will reduce the congestion of vehicles caused by unavailability of parking spaces.It will also reduce the carbon footprints caused by vehicles thus promoting healthier environment.

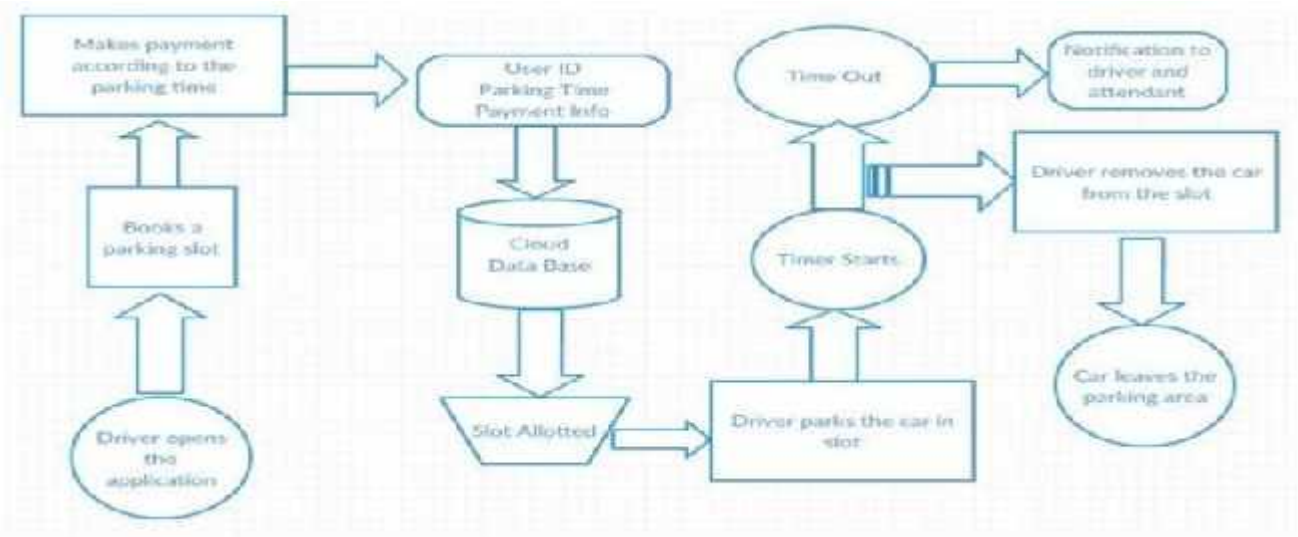

Fig.2 Flowchart of Proposed Smart Parking System

VIII. RESULT

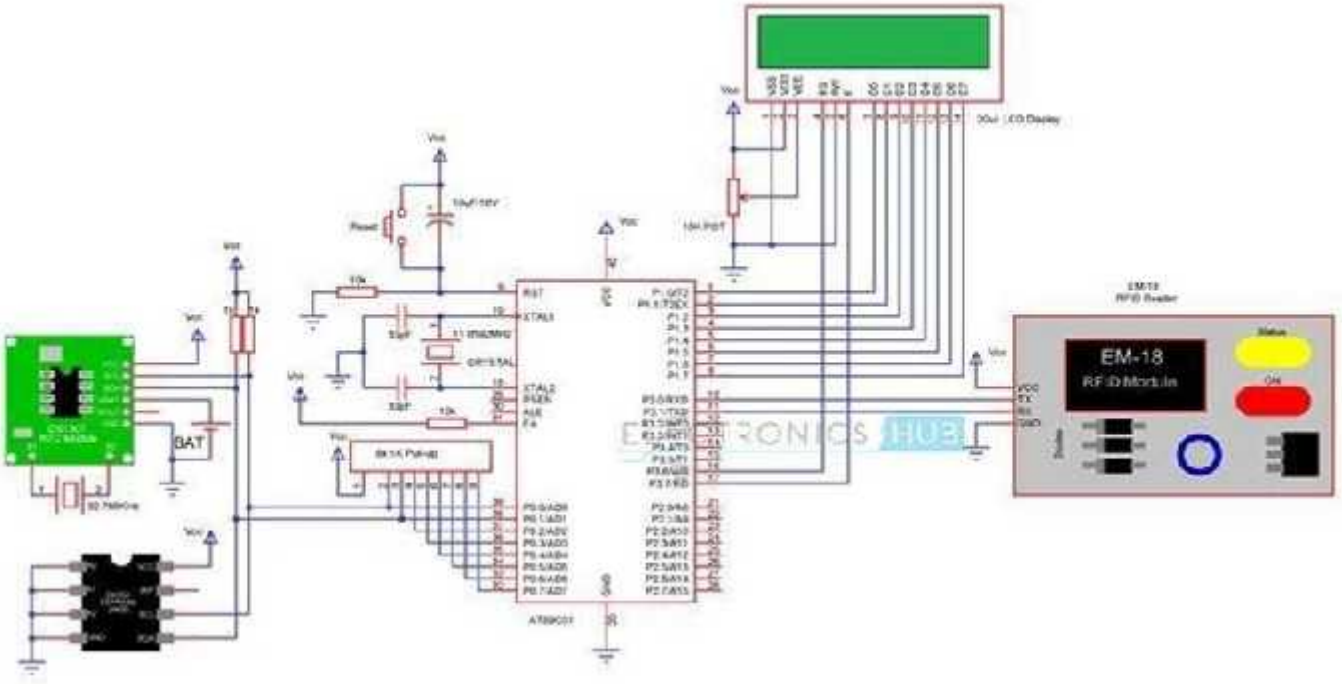

Fig .3 Circuit Diagram of Proposed Smart Parking System

IX.CONCLUSION

To summarize the proposed Smart Parking System using MSP430 aims to develop a convenient, feasible and efficient technological infrastructure to avoid the hassle of finding the parking space.The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have given rise to new possibilities in terms of smart cities.

Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this paper, we address the issue of parking and present an IoT based Cloud integrated smart parking system. The system that is proposed provides real time information regarding availability of parking slots in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this paper are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

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Implementation of Autonomous Drones using Robotic Claw for Search and Rescue Operations

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***Abstract*- The design of Unmanned Aerial Vehicle to work as a combined system in collaboration with an object grasping device refers to the concept of Aerial Manipulation. There have been tremendous discoveries in the past two decades with respect to the various methodologies used for aerial manipulation which yield the best results in terms of flight time, stability, object grasping and releasing. The Quadcopter is designed to serve as an aid in Search and Rescue Operations where the presence of the Drone will be able to help as a better alternative to human resources. The focus of the proposed work is to enable the Drone to have a simple claw type grasping mechanism which is specially designed keeping in mind important designing specifications of the UAV such as stability, payload lifting capability etc. which will be single handedly controlled via the Flight Controller which is an ARM Cortex M4 based Microcontroller and with the help of an open source Autopilot powered GUI to set the navigation points via the telemetry module.**

Keywords- UAV, Aerial Manipulation, Quadcopter, payload, Flight Controller, GUI.

I. INTRODUCTION

The Unmanned Aerial Vehicle or the Drone has been one of those technologies that has instilled enthusiasm amongst technology lovers of all generations for a long time now. Right from 1900's a tremendous growth in the drone sector has been observed [1]. Right from being used for military applications to the time now when it is effectively used in Power, Mining, Agriculture, Emergency Response, Search and Rescue, Advertising Sector etc. [2] the Drone has opened gates for various Entrepreneurial ventures and are Consumer friendly too. The focus of this paper is limited to the Drone being used vividly in the Search and Rescue Sector. The UAV is aimed to be designed to operate as an Emergency Network Aid for post disaster relief operations and monitoring of catastrophes . The aim of the UAV is to be able to deliver small payloads to the site of relief with the help of a robotic claw type gripper. The UAV is using the DJI F450 quadcopter frame which is composed of glass fibre material and is 45 cms in length and weighing 330gm. Also the DC Brushless Motors that are being used by the UAV have a 935KV rating. The KV rating of the motor plays a significant part here as when multiplied the voltage supplied by the DC Source gives the revolutions per minute by the motor. This value determines the speed of the motor without the propeller. The value of the KV decides the amount of torque produced by the motor. Low KV combined with high torque gives a slower but heavy-lifting multicopter while a motor with high KV would be better for a low weight racing drone due to the speed. Another important parameter considered while designing was the thrust to weight ratio. For stable lift of the drone it is considered the thrust of all the motors of the drone should be at least twice the weight of the drone [3]. Here we are using 4 EMAX MTT2213 DC Brushless motors who have a combined thrust of about 3440 gm which is more than double the weight of the frame. A 1045 propeller is used for the motors and 3000mAh 3S 40C/80C Lithium polymer battery is used which is 11.2V rated. The UAV is controlled with the help of Pixhawk 2.4.8 Flight Controller which is a 32 Bit ARM Cortex M4 which has on board sensors and controls the ESC's which are used to control the speed of the motor. The quadcopter is being used in combination with a custom made claw type gripper which is explained in the section further and is programmed using the same on board Flight Controller which is operated using waypoint navigation via a telemetry module. To enhance the abilities of the drone to be effectively used in Search and Rescue Operations thermal imaging is used on the drone with the help of the Seek Compact Camera for Android.

II. LITERATURE SURVEY

Unmanned Multicopters provide access to dangerous or humanly difficult to reach sites and can accomplish tasks which humans are generally incapable of. Manipulator tasks can include the transportation of objects such as first aid kits and emergency supplies, the manipulation of tools, or the retrieval of samples [4]. Aerial manipulation in this scenario could provide enhanced capabilities but there are a lot of factors to be considered to sustain the aerodynamic stability. [5] Broadly the research of aerial manipulation tends to fall

into three categories. The first is the suspension of a payload by cables, also called a "slung load." The cable offers several advantages mostly in the simplicity of design and requiring only active, intelligent control of the multicopter while carrying the load. We are primarily focused on active and precise interaction with the unmanned air vehicle's environment and hence seek a more active gripper mechanism which leads to the second type which is the use of manipulator arms; these arms can have two or more DOF and are generally fully actuated and actively compliant. However, such control comes with a relatively high computational cost and system complexity, regardless of which control method is used. Additionally, full actuation increases the weight of the system due to the need for an increased number of actuators. The desire to conserve weight and decrease torsion has led to the use of relatively small end effectors, greatly decreasing the versatility and grasping capabilities of the manipulators [4],[6]. The third and final approach to aerial manipulation is mounting a claw-like gripper system to a UAV to grasp objects. The comparison of the three generic methodologies for manipulation can be understood by Table 1. The device that we are trying to design here is underactuated and compliant, leading to limited but straightforward control and the ability to grip a decent variety of objects in a limited payload range [5]. Compared with other grippers, the compliance of our claw type gripper is that it will be made of fewer parts, and it comprises of only one actuator, reducing the complexity and cost significantly. The study of various types of commercial grippers and aerial manipulators is studied in [7]

TABLE 1: COMPARISON BETWEEN DIFFERENT MANIPULATING DEVICES

Manipulating device	Cost	Difficulty	Available range	Stability
Gripper	Low	Low	Low	High
Manipulator	High	High	High	Middle
Cable and tether	Low	Suitable	Middle	Middle

Therefore, the desirable characteristics of aerial manipulators include precise control for overcoming positional errors, versatility for performing a wide variety of missions, and a simple design that minimizes the computations needed to control the system. Meeting these objectives is complicated by the weight and size limitations of the platform, usually a lightweight multicopter. Multicopters are also highly susceptible to disturbances, noise, and inaccuracy in a hover and manipulator designs must be able to compensate for these inaccuracies [8].

III. DESIGNING

I. KINEMATICS IN AERIAL MANIPULATION

[9] The most important aspect of the quadcopter is its ability to fly. In order for it to have a stable flight, a simple force analysis along the vertical direction is taken in order to determine the minimum radius of a propeller needed to allow the quadcopter to fly.

$$\Sigma F_y = 4T - W$$

Where T is the thrust supplied by each individual motor and W is the overall weight of the quadcopter. This T when substituted in the following equation of R we get the ideal size of the propeller to be used in combination with the UAV.

$$R = \sqrt{\frac{T^2}{(\alpha)^2 * 2\pi}}$$

To be able to run the static simulations on the claw mechanism of the quadcopter, an understanding of the forces that will be acting upon various parts of the quadcopter must be obtained. Since it was determined that the object to be delivered at the site of relief was to be dropped from rest by the claw mechanism, the only relatively substantial forces acting upon the mechanism would be the forces used to maintain the object at static equilibrium. In this scenario, the sum of the forces acting within the y-axis direction should be zero at all times

$$\Sigma F_y = 4F_g - W = 0$$

In this case, Fg is the force exerted by each individual gripper on the object, and W is merely the weight of the object. Solving for Fg, an equation for the force acting upon each of the grippers is obtained:

$$F_g = 4W = 4mg$$

From the above calculations a quadcopter was designed for the given specifications of parts and the sensors were calibrated with the Flight Controller. In the initial stages a 2.4Ghz Transmitter and Receiver were used to test the stability, altitude and flight time of the drone. Refer Figure 1 to understand the basic construction and the interfacing of the quadcopter with the help of the Pixhawk FC. Various Flight tests using the FlySky FS-i6 2.4GHz 6CH AFHDS RC Transmitter With FS-iA6 Receiver which is interfaced to the Pixhawk Flight Controller through a PPM Encoder were done using the basic constructed model as demonstrated in Figure 2.

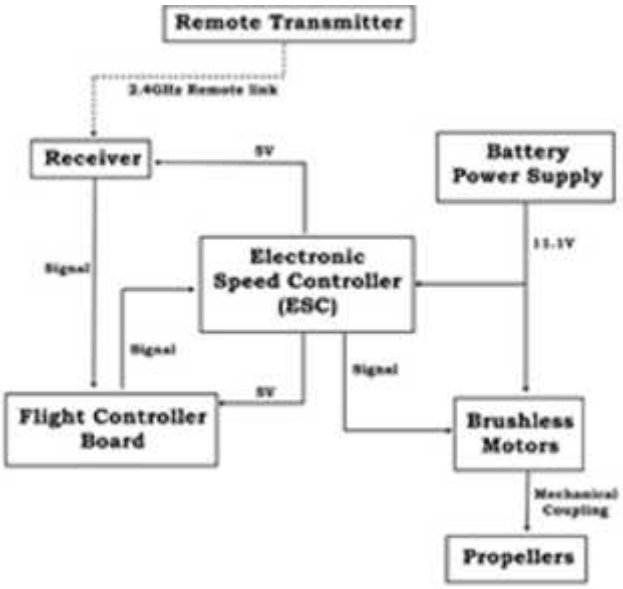

Figure 1: Basic Multirotor Connection Block Diagram



Figure 2: Basic Quadcopter Design

II. CLAW GRIPPER DESIGN

The gripper system in the proposed work is likewise designed to grasp objects despite positional errors. These gripper systems are all underactuated and compliant and are relatively computationally inexpensive. They also exhibit versatility in gripping objects with a decent variety of shapes and sizes. However, the grippers have limited reach due to the lack of an arm component. This poses a significant problem for grippers mounted on UAVs, as the UAV must hover and maintain position almost directly above an object to grasp it. The design of the gripper we are using in the proposed work is broadly classified into two parts as demonstrated in Figure 3 and Figure 4 which are the base mount and the claw.

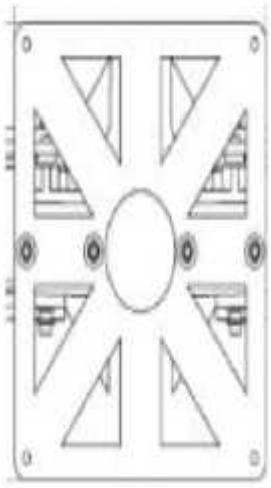

Fig 3: Base



Fig 4: Drone Claw

The simplified, lightweight design we propose is primarily targeted at small multicopters and offers versatility in grasping objects of all shapes and sizes. Each finger can be independently and precisely controlled, allowing the gripper system to manipulate various objects. claw-like gripper, as it is capable of grasping large, irregularly-shaped objects, a feat which is often beyond the capabilities of arm-like manipulators. In combination with the quadcopter the Drone Claw will be able to pick up a load of about 800gms. Our system is built from low-cost components, which can decrease the performance and capabilities of the gripper. However, the low cost of construction makes the gripper accessible for labs to build for rapid prototyping. The simple design also contributes to the ease of construction and repair. The Claw will be controlled with the help of Pixhawk Flight Controller and Servo Motors. The parts are easily 3D printable.

III. SERVO MOTORS:

A servo motor is a motor designed to have its rotation angle, speed and acceleration controlled. The term servo does not imply what type of motor is being controlled, just that it has position feedback. Basically the motor controller receives a feedback signal indicating the position of the motor shaft and determines how to alter the next control signal to be sent to the motor. Simpler servo motors consist of a DC motor which gets controlled by a microprocessor which in turn receives control signals in the form of PWM signals from an external computer. The motor control can be either analog or digital, one difference being that the digital control is more responsive and provides a greater torque. The

Servo motor which we will be employing in the proposed work is the MG960D Servo Motor demonstrated in Figure 5. It weighs 13gm and has an operating voltage of from 4.8-6.6V.



igure 5: MG960D Servo Motor

IV. Flight Controller

A flight controller is the brain of any aircraft. Be it a fixed wing or a multirotor aircraft Flight Controller is the one which holds grip on all the sensors, motors and motion of the aircraft. Communicating from the Base Station to the moving multirotor Quad is also achieved through the FC. It's basically a circuit board with integrated sensors that detects orientation changes of your drone. It also receives user commands, and controls the motors in order to keep the quadcopter stable in the air. We have used the Flight microcontroller manufactured by 3D Robotics as seen in Figure 6. It comes with a variety of accessories that include sensors like the ST Micro L3GD20 3-axis 16-bit gyroscope, the ST Micro LSM303D 3-axis14-bit accelerometer/magnetometer, the Invensense MPU 6000 3-axis accelerometer/gyroscope, and the MEAS MS5611 barometer. These sensors work with the Pixhawk flight controller to maintain stability and give relevant feedback to the user on specific conditions. The sensors and ability to program the Pixhawk to do a variety of auxiliary functions and tasks makes the Pixhawk FC any user's prime choice. It has five UART ports (one being high-power capable and two with HW flow control), two CAN ports, one Spektrum DX input port (only compatible with Spektrum RC transmitters up to and including DX8s), an Futaba SBUS compatible input and output, a PPM sum signal, an RSSI input, an SPI port, 3.3 volt and 6.6 volt ADC inputs, and an external microUSB port.



Figure 6 : Pixhawk 2.4.8 Flight Controller

CONNECTING SERVO TO PIXHAWK:

Understanding how to connect a Servo Motor to an Autopilot is demonstrated in Figure 6 and configure it for use as a gripper which is useful for delivery or payload drop applications. If using Copter we connect the servo to AUX OUT 1, 2, 3 or 4. MAIN OUT 1 ~ 8 should be avoided because these update at 400Hz. If the user is using a fixed wing Plane or Rover where all pins update at 50Hz, any unused MAIN OUT or AUX OUT 1 ~ 4 can be used. The Pixhawk Autopilot cannot provide power to the servos so an external BEC or ESC that can provide 5V should be used [10].



Figure 7: Pixhawk with Servo Motor

CONFIGURATION STEPS OF PIXHAWK :

● Set which RC output is used by setting SERVOx_FUNCTION (or RCX_FUNCTION) to 28 (i.e. if using AUX OUT 1 on a Pixhawk, set :ref:`SERVO9_FUNCTION <SERVO9_FUNCTION>` to 28).

● :ref:‘GRIP_ENABLE <GRIP_ENABLE>‘ to 1 to enable the gripper feature and then refetch parameters from the ground station in order to make other gripper parameters visible.

● :ref:‘GRIP_TYPE <GRIP_TYPE>‘ to 1 to enable the servo gripper and reboot the autopilot

● :ref:‘GRIP_GRAB <GRIP_GRAB>‘ to the pwm value (i.e. 1000 ~ 2000) for the gripper's closed position

● :ref:‘GRIP_RELEASE <GRIP_RELEASE>‘ to the pwm value for the gripper's open position

● :ref:‘GRIP_NEUTRAL <GRIP_NEUTRAL>‘ to the pwm value for the gripper's neutral position (often the same as it's closed position)

CONTROLLING DRONE CLAW FROM BASE STATION:

The gripper can be opened or closed in real-time scenarios during the flight from the ground station if the ground station sends a COMMAND_LONG with the command field set to DO_GRIPPER (i.e. 211) but there are no ground stations thatsupport doing this.

CONTROLLING DRONE CLAW DURING A MISSION:

The gripper position can be controlled during a mission in AUTO mode using the :ref:`DO_GRIPPER <common-mavlink-mission-command-messages-mav_cmd>`command. Set the "drop/grab" column to 0 to close thegripper, 1 to open the gripper which is conveyed via Figure 8.



Figure 8: Mission Planner Settings

V. END PRODUCT EXPECTATIONS:

With the above mentioned specifications of the Quadcopter and the Drone Claw the Drone is expected to have a minimum flight time of about 12 minutes with the payload to be carried at the required destination for the rescue operation with the help of the LiPo Battery with satisfactory stability. The Claw will be able to carry light weighing objects like Water Bottles in Figure 9, Emergency medicines or First aid, Blood bags or any other small object for testing or research purpose which can weigh upto 800 gms effectively via the claw itself or with the help of a bag attached to the claw as in Figure 10.



Fig 9: Claw carrying Bottle Fig 10: Claw carrying a Bag

VI. CONCLUSION

We have designed and manufactured a lightweight, low-cost claw for aerial manipulation gripper system for search and rescue missions that exhibit both precise control and versatility – competing objectives typically traded off by traditional manipulators for aerial manipulation. The gripper is robust against various environmental effects. As a result, it can manipulate offset objects as well as irregularly shaped objects. The gripper is fully actuated and actively compliant, leading to precise control and its two-finger design makes it easy to grasp small objects and bags and many other such objects which traditional manipulators cannot effectively lift. In future systems, the gripper should be integrated with a system to autonomously identify and localize a

target for the gripper's controller and the gripper should beable to adjust its opening and grip on the object via various object recognition techniques. Such a system could also compensate for alttitude and position drift of the vehicle. Improved end effector design with more compliance would increase the success of grasping irregular objects, and higher-quality servos would improve lifting capacity.

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Implementation of Autonomous Drone using Thermal Camera for Search and Rescue Operations

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***Abstract*— There is flexibility in case of assisting emergency management, in addition to the military and commercial drone uses. This paper focuses on an operational and tactical drone using a thermal camera that makes it even better for search and rescue operations. There is no need for human beings to risk their lives if drones can perform these tasks. Drones are unmanned aerial vehicles which are commonly used in today's world. The name "drone" is the common name of the unmanned aerial systems, more or less; the abbreviation is UAS. Other features occur in many situations, such as UAV (Unmanned Aerial Vehicle). A drone having a thermal camera feature makes it one of the most powerful tool, which can be used in many sectors from construction, mining, electrical, surveillance, firefighting, search and rescue. Thermal drones which use vision imaging cameras have so many positive uses by detecting heat coming from almost all objects and materials turning them into images and video. Thermal vision cameras are use as a night vision as well. This project reduces labor as well as risk to human life thus bringing a change to society. There is an ease with which a drone can be controlled using a simple unit and how a thermal camera can help detect living beings, objects which cannot be seen by naked eye.**

I. IMPORTANCE OF THE PROJECT

This paper aims at studying a prototype of an unmanned aerial vehicle that Primarily consists of a Master drone and a Thermal Camera which detects heat radiations radiated out of any human being, animal. This can further be used in various fields of Applications, Disaster Management being the Prime target of our project.

The project attempts to provide an upper hand to the existing search and rescue teams like NDRF by helping them throughout their search and helping them cover areas which is tough for a human to go through water quality levels is essential for societal and economic development.

II. METHODOLOGY FLOWCHART

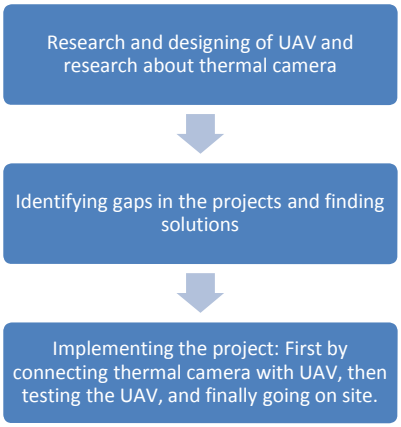

Fig 1. Methodology flow

Separately there was work on thermal imaging and autonomous drones. Research on thermal imaging in an eye-tracking system[1] helped explain and monitor the fundamentals of thermal images. A work on circuit reliability[2] introduced the distinction of different images by temperature.A thermography study[3] helped to investigate the impact of physiology. Work on the telemetry system[4] and on autonomous drones[5] was also undertaken to better understand the design and deployment of the UAV. Holes were found in the research done above. The aim is to merge these two parts into a single paper. An autonomous UAV with a search and rescue thermal camera is required. An autonomous Drone is required for two reasons. Range and Avoiding Manual control by using a telemetry system.

III. PROPOSED DIAGRAM

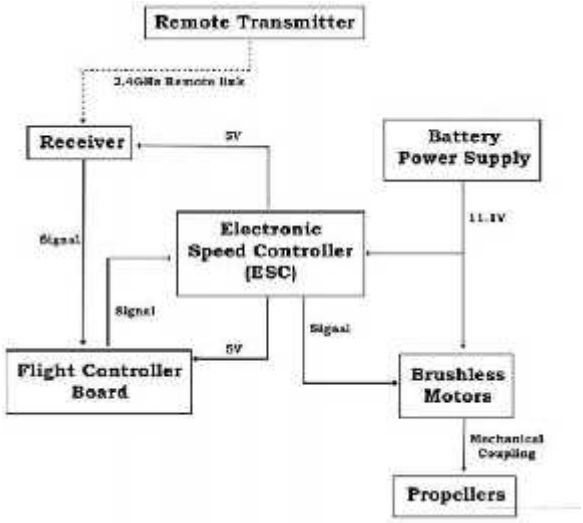

Fig 2. Block Diagram

The next step of the research is to start practical implementation of the on-the-job research. The drone must be assembled first, and a thermal camera mounted on it. You then have to incorporate a functional telemetry program. The next move would be to autotomize the drone through software. After the drone is fully set up, it is finally to be tested at a remote location.

Designing:

KINEMATICS IN AERIAL MANIPULATION:

$$\Sigma F_v = 4T \quad W$$

The most important aspect of the quadcopter is its ability to fly. In order for it to have a stable flight, a simple force analysis along the vertical direction is taken in order to determine the minimum radius of a propeller needed to allow the quadcopter to fly.Where T is the thrust supplied by each individual motor and W is the overall weight of the quadcopter. This T when substituted in the following equation of R we get the ideal size of the propeller to be used in combination with the UAV.

$$R - \sqrt{\frac{t^{3}}{(aP)^{2}\times 2P\Pi}}$$



SERVO MOTORS:

A servo motor is a motor designed to have its rotation angle, speed and acceleration controlled. The term servo does not imply what type of motor is being controlled, just that it has position feedback. Basically the motor controller receives a feedback signal indicating the position of the motor shaft and determines how to alter the next control signal to be sent to the motor. Simpler servo motors consist of a DC motor which gets controlled by a microprocessor which in turn receives control signals in the form of PWM signals from an external computer. The motor control can be either analog or digital, one difference being that the digital control is more responsive and provides a greater torque. The Servo motor which we will be employing in our project is the MG960D Servo Motor demonstrated in



Figure 3. It weighs 13gm and has an operating voltage of from 4.8-6.6V. Figure 3: MG960D Servo Motor



A flight controller (a.k.a FC) is the brain of the aircraft. It's basically a circuit board with sensors that detects orientation changes of your drone. It also receives user commands, and controls the motors in order to keep the quadcopter in the air. Flight microcontroller manufactured by 3D Robotics as seen in Figure 4. It comes with a variety of accessories that include sensors like the ST Micro L3GD20 3-axis 16-bit gyroscope, the ST Micro LSM303D 3-axis14-bit accelerometer / magnetometer, the Invensense MPU 6000 3-axis accelerometer / gyroscope, and the MEAS MS5611 barometer. These sensors work with the Pixhawk flight controller to maintain stability and give relevant feedback to the user on specific conditions. Because of the sensors and ability to program the Pixhawk to do a variety of auxiliary functions and tasks, interfaces are needed within the Pixhawk. These include five UART ports (one being high-power capable and two with HW flow control), two CAN ports, one Spektrum DX input port (only compatible with Spektrum RC transmitters up to and including DX8s), an Futaba SBUS compatible input and output, a PPM sum signal, an RSSI input, an SPI port, 3.3 volt and 6.6 volt ADC inputs.



Figure 4 : Pixhawk 2.4.8 Flight Controller

CONNECTING SERVO TO PIXHAWK

Understanding how to connect a servo to an autopilot Figure 5 and configure it for use as a gripper which is useful for delivery or payload drop applications. If using Copter we connect the servo to AUX OUT 1, 2, 3 or 4.

MAIN OUT 1 ~ 8 should be avoided because these update at 400hz. If using Plane or Rover where all pins update at 50hz, any unused MAIN OUT or AUX OUT 1 ~ 4 may be used. The Pixhawk autopilot cannot provide power to the servos so an external BEC or ESC that can provide 5V should be used.

Figure 5: Pixhawk with Servo Motor

III. EXPECTED OUTCOME

A disaster-stricken area's coordinates would be fed to the drone. The drone would use a thermal camera to fly into those coordinates and take pictures of the area. Such pictures would be obtained and studied in order to find any forms of life which need rescue. The drone would then have an arm in order to provide any relief measures.

IV. RESULT

Autonomous Drones

Search and rescue operations are one of the applications. Search and rescue operations include natural disaster monitoring, search for missing persons and post-disaster relief activities. A UAV is used in this application to search a given area and to send the Region status back.

Thermal ImagingBy studying the following research papers, we have learned about the various thermal

imaging applications such as evaluation of eye tracking, device and circuit reliability research, and human skin thermal imaging. We have discussed how a thermal camera operates, as well as the scientific dimension of thermal imaging. We have also learned about its Search and Rescue Operations applications.

V. CONCLUSION

The main purpose of this paper is to learn the importance of a UAV in search and rescue operation and to develop a quadcopter with all design limitations and cinematic laws in mind. We are able to understand the function of the Thermal Camera and its search and rescue operation applications. We also understood how the drone could be used in

ACKNOWLEDGMENT

Our project manager, Mrs Sonia Behra, is deeply grateful for her encouragement and continuous support by helping us explain various projects concepts and advices. The domain teachers are grateful for their helpful feedback and suggestions for the project.
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Implementation of Smart Floor Cleaning Robot

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***Abstract*——** **The purpose of this project is to clean the floors in colleges, hospitals, auditoriums, malls and workshops. The aim of this project work is to design and develop process for cleaning the floor having wet and dry surfaces. It is very useful for cleaning the wet as well as dry floors. In modern days‟ interior decorations are becoming an important in our life cleaning of floor is very important for our health and this floor cleaning machine reduces the effort required for cleaning. Hence this project is very useful in our day to day life. It is very simple in construction and easy to operate, anybody can operate this machine easily. This floor cleaning machine consist of moisture cotton mop, swiping brushes, wipers for reducing the cleaning time. The overall cost of this machine is also cheap. Such type of machines is widely used for this purpose but they are working under different principles and the cost is very high. In recent years, floor cleaning machines are getting more popular for cleaning large floor area in minimum time. However, in India, which is a developing country requires large type of such machines to satisfy the cleaning needs.**

I. INTRODUCTION

The purpose of this project is to clean the floors in colleges, hospitals, auditoriums, malls and workshops. The aim of this project work is to design and develop process for cleaning the floor having wet and dry surfaces. It is very useful for cleaning the wet as well as dry floors. In modern days‟ interior decorations are becoming an important in our life cleaning of floor is very important for our health and this floor cleaning machine reduces the effort required for cleaning. Hence this project is very useful in our day to day life. It is very simple in our life. Its construction is easy and easy to operate, anybody can operate this machine easily. This floor cleaning machine consist of moisture cotton mop, swiping brushes, wipers for reducing the cleaning time. The overall cost of this machine is also cheap. Such type of machines is widely used for this purpose but they are working under different principles and the cost is very high. In recent years, floor cleaning machines are getting more popular for cleaning large floor area in minimum time. However, in India, which is a developing country requires large type of such machines to satisfy the cleaning needs.

It is a smartphone-controlled robot that will clean the house's floor. The rotating mops on the front of the robot along with a foam roller at the back can do the job perfectly There's also a water pump and water reservoir which can be switched on when required to throw water on the floor and make the mops moist for a proper clean. The foam roller is movable, which means you can lift it when not in use. I've also added speed controls for the driver motors.

The project uses Wi-Fi communication via HC-05 Wi-Fi module to send the commands to the most commonly used microcontroller- Arduino UNO. The robot is powered on a 12V lead acid battery. The driver motor pair are 100rpm ones while for the mops I've used 75rpm plastic ones.

The best part is that the mops used were homemade, from old CDs and rags and they clean just perfectly. This is a smaller version so might not be suitable for a large area. There can be tons of other features added, like making it completely autonomous

II. EASE OF USE

Smart floor cleaning robot is used to clean the floor automatically without any human’s effort, this robot basically reduces human’s work load by operating it with the help of wifi. It is very cheap and is useful in cleaning a small place in efficient amount of time by reducing the work load of humans.

III. METHODOLOGY

For smart floor cleaning, Robot needs mechanical arrangement of chassis. Arrange the chassis and connect the two wheels of the robotic vehicle to the motors which are in turn connected to the microcontroller. For mechanical arrangement we used Motor driver IC (L293N), dc Motors, wheels because the output of the microcontroller is maximum 5V only which cannot drive dc motor hence we used motor driver module which amplify voltage up to 36V. Then, we had used four Ultrasonic sensors for object detection. In our robot we are using four ultrasonic sensors in which three ultrasonic sensors are placed on left, Right and front part of the Robot and if an object detects by the robot, it changes its route according to the condition of the algorithm. The fourth ultrasonic sensor is used at bottom of front part which is used for stairs detection and then move backward. It is controlled by Bluetooth module and Wi-Fi module. It works in both manual and automatic modes. Utilizing esp8266 module we can control robot and furthermore track the area of robot with no GPS module. There is an arrangement of progression conditions that can be used to program the ESP8266. The social order ESP8266 is added to the

Adriano IDE that empowers you to program the ESP8266 using the Adriano IDE and its programming vernacular. The complete working and flow of the project can be compiled in short as this flowchart. The basic flowchart of the project is as shown below:

Flow chart:

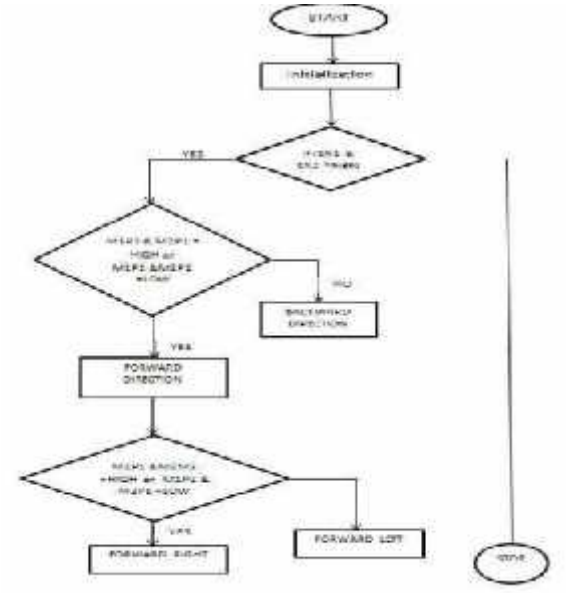

Fig 1:Flow chart

In this diagram the mobile application is connected to the main motherboard which is the Master.. The master is the main control board of the system.

The slaves are controlled by the master as per the given task. Master and the slaves are interfaced through a bluetooth module(HC-05). The commands from the user are fed to the master, not to the slaves directly. Hence there is no communication between the user and the slave.

IV. RESULTS AND DISCUSSION

After studying the various research papers of floor cleaning machines we have concluded that there are certain limitations in floor cleaning machines which can be worked upon. For example, cleaning machines are made with an aim to clean only dry surface of the floor. This means that they are only sufficient in the summer and winter season but not in rainy season this is the major issue for cleaning the floor surface but during the rainy season floor cleaning machines are required which can perform the tasks when the surface contain moisture or little amount of water on the surface of floor. So we are developing the machine which can work in both dry and wet conditions. This machine called as dry and wet floor cleaning machine. This machine can remove the dust in summer season and also it can remove and clean



Fig 5

V. CONCLUSIONS

We have done the literature survey of various papers to collect ideas for this project. After studying we have proposed our ideas to our project guide. We also discussed the ideas which we needed to work on this project. Then we completed the final block diagram and started working on code. As per the growing need of society the void between the past products and modified products is that it will decrease labour. It spares time of consumer as this robot which is automatically operated by human with the help of mobile phone using wifi. It will have no human interference. We will fill the void by our project is that it will comprise both the features of wet floor cleaning and vaccum cleaning. Unlike other floor cleaner robots this is not a vacuum cleaner robot. It performs sweeping and mopping operation. Detachable mop will be used for wet mopping. It is operated with the help of mobile phone through an app with the help of wifi. It is an IOT module.

Till now we have done all the motor driver and mechanical assembly and currently we are working on the app which will control the robot and simultaneously we are working on sensor based applications.

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Implementation of Car Monitoring System

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Abstract--***The reason for this venture is to create vehicle impact counteraction by strategy for liquor finder with an end goal to decrease car crash cases brought about by driving affected by liquor. This framework is planned for making vehicle driving more secure than previously and is actualized utilizing ARM7. We have inferred the driver's condition progressively condition and we propose the location of liquor utilizing liquor locator associated with ARM to such an extent that when the degree of liquor crosses a passable farthest point, the vehicle won't begin. Additionally, safety belt checker and safety belt update is utilized wherein, the previous is utilized to check whether the individual who is going to drive the vehicle has put on the safety belt before turning over the motor and reminds the driver to put on the safety belt in the event that on the off chance that it has been evacuated halfway while driving the vehicle. Here an additional application is presented wherein with a motivation behind getting the drivers to comprehend the significance of path discipline, in this way a path keeping help framework is utilized to screen the path framework. Dozing cautioning framework is actualized so as to keep the driver from drowsing off while driving the vehicle and make the excursion much progressively free from any potential harm. Right now are utilizing Vibration Sensor to recognize the Accident and utilizing GSM and GPS message and correct area of the mishap is send to his/her relevant individua*l.**

Keywords: LPC2148, MQ3 Sensor, IR Sensor, GSM, GPS.

I. INTRODUCTION

With increment in populace it increments of the vehicles on street, security and congested road have become three gigantic issues. Street traffic wounds (RTIs) and setback have developed as a significant general wellbeing worry, with RTIs having gotten one of the main sources of passings, handicaps and hospitalizations which force extreme financial expenses over the world.[3] Affixed mishaps in thruway bring about various misfortunes of lives and properties. Then again, now and then a minor mishap in downtown triggers traffic clog, this circumstance is a lot of more regrettable in metro city during the overwhelming traffic. World Health Statistics 2008 referred to in Global Status Report on Road Safety expresses that RTIs in 2004 were the ninth driving reason for death and at current rates by 2030 are relied upon to be the fifth driving reason for death, overwhelming diabetes and HIV/AIDS. Auto crashes are one of the main sources of death right now India. In 2005 close around 1 lakh of passing came about because of 4.4 lakh of car crash. A successful methodology for decreasing traffic fatalities, thusly, is to lessen the time between when a mishap happens and when specialists on call, for example, medicinal staff, are dispatched to the area of the mishap and the important assistance is given to the person in question.[5]

II. LITERATURE SURVEY

A. Wireless sensor arrange correspondence 'Following System' terminal dependent on WAMP Servers Right now, applications are built up that are connected to one another. Initial one is utilized to get the underlying situation of the vehicle (beginning stage) and as framework will get the diverse co-ordinates (longitude and scope) changing to the following one will be done to get the separation voyaged b/w the two positions. The application will run on WAMP server and will run just if the web is being used.[5]

B.SBR System (Seat belt indicator)

A SBR system for the driver seat involves a seat strap pointer wired to an electronic control unit (ECU). This paper proposes the usage of inductive associations for seat inhabitance and belt ID in removable vehicle seats. The fundamental and discretionary frameworks may be put separately the vehicle floor and at the base of the removable seat.[3]

C. Remote following framework

This paper proposes and executes a straightforwardness object following structure using GPS and GPRS. The system examines the current circumstance of the article using GPS, the data is sent by methods for GPRS organization from the GSM mastermind towards a web server using the POST strategy for the HTTP show. The current live after systems that are available now a day's use SMS for the correspondence to the server which wound up being exorbitant. (SMS are used for correspondence to contraption). We have used the GPRS organization which put forth our structure a negligible attempt following response for restricting a thing position and status.[7]

III. PROPOSED WORK

It consists of a Sensors, Ignition Relay, Engine control, power supply, GSM and GPS, LPC2148 microcontroller. Here, ARM 7LPC 2148 is used due its

functions of low power consumption and high efficiency.



Fig 3.1: LPC 2148

Firstly, an alcohol sensor is used in order to detect whether the driver has consumed alcohol and in case he has consumed beyond a threshold quantity then the engine of the car does not start in order to prevent the driver from driving in drunken state. Here the alcohol sensor that is used in is MQ-7 sensor which is a noncontact gas sensor which has high sentivity to alcohol and has good resistance to disturb of gasoline, smoke and vapour. IR sensor is used here in order to check whether the driver has inserted his seatbelt before starting the car, even in this case if the seat-belt is not inserted the engine of the car does not start. Here, the vibration sensor is used to sense the magnitude of the accident the car has undergone and if it is more the threshold value then with the help of GSM and GPS the message and location is sent to the respective person in order to take the necessary steps to prevent furtherdamages. As shown in figure 3.1

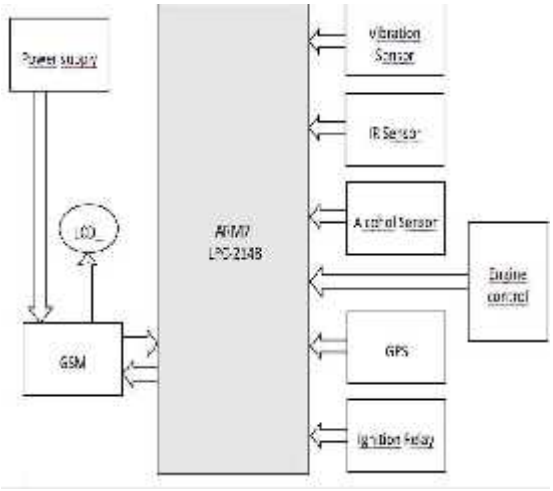
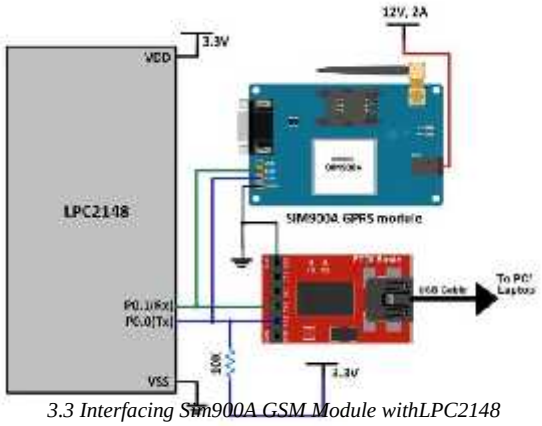


Fig 3.2:Block Diagram of car monitoring system

Sim900A GSM module interfacing with ARM LPC2148:

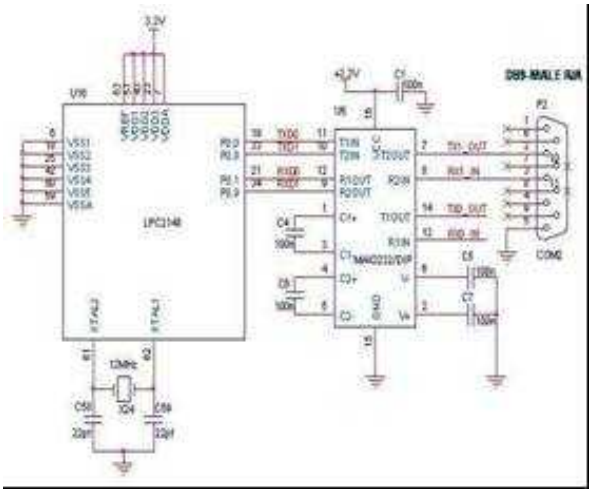
The Interfacing GSM module with LPC2148 as shown in figure 3.2 program is very simple and straight forward, which send a message to mobiles from LPC2148 Development Board through GSM module by using UART0. Some delay is occurring when a single data is sent to mobile through UART. C programs are written in Keil software. The baud rate of microcontroller is 9600.



3.3 Interfacing Sim900A GSM Module withLPC2148

Interface GPS with LPC2148 ARM7 Development board (figure 3.3):

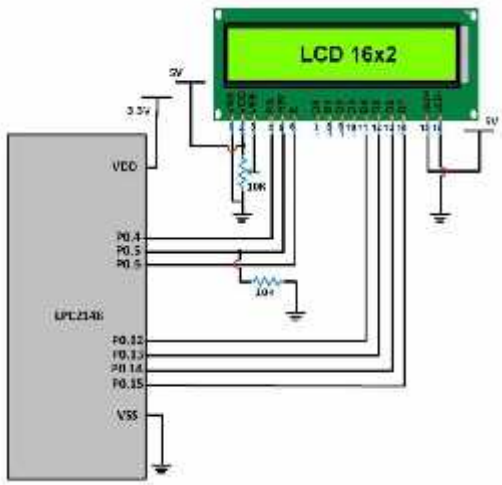
Get information from satellite to LPC2148 Development Board by utilizing GPS module through UART0. The sequential information is taken from the GPS module through MAX232 into the SBUF register of LPC2148 microcontroller (allude sequential interfacing with LPC2148). The sequential information from the GPS recipient is taken by utilizing the Serial Interrupt of the controller. This information comprises of an arrangement of NMEA sentences from which GPGGA sentence is distinguished and handled



3.4 Circuit Diagram to Interface GPS withLPC2148

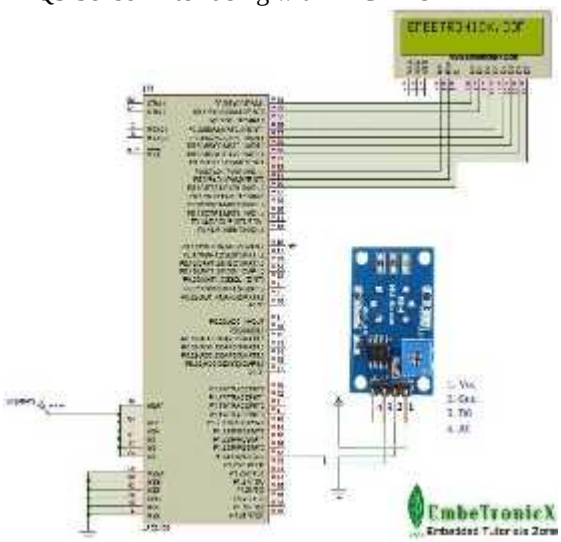
Since we are utilizing LCD in 4-piece mode, we require just 4 Data pins. LCD Data pins D4-D7 are associated with pins P0.12-P0.15 of Port 0. LCD control pins RS, RW and EN are associated with P0.4, P0.5 P0.6

individually. As shown in figure 3.4, 3.5, 3.6



3.5 LCD 16x2 interfacing with LPC2148

MQ3 Sensor Interfacing with LPC2148



3.6 MQ3 Sensor Interfacing with LPC2148

IV. EXPECTED OUTCOME

The framework will utilize a WAMP servers to interface the vehicle modules with the cell phone or the PC which will at that point help with getting the continuous area of the vehicles , all the sensors utilized here assistance in security of the driver and his vehicle and inputs are given to the cell phone or PC through the assistance of WAMP server utilized for the undertaking additionally the SBR framework guarantees the driver has his safety belt flawless and subsequently guarantees wellbeing likewise the fuel blockers on work wont aloow the vehicle burglary to occur as it would likewise give the ongoing area of the vehicle.

V. CONCLUSION

The reason for this undertaking is to limit the quantity of mishaps that occur. This framework is created by utilizing LPC2148 microcontroller, liquor sensor, safety belt sensor, vibration sensor, GPS, GSM, LCD, LED. Assume the individual devours liquor or don't put on the safety belt utilizing the sensors ARM 7 LPC 2148 won't let the vehicle to begin. The GPS is utilized to follow the situation of the vehicle and GSM sends the message when the vibration is recognized.

VI. ACKNOWLEDGMENT

The Completion of this task couldn't have been conceivable without the direction and help of such a large number of individuals whose names may not all be counted. Their commitments are earnestly valued and appreciatively recognized. Nonetheless, the gathering might want to communicate their profound thankfulness and obligation especially to the accompanying We are extremely appreciative to Prof Ms. Kalawati Patil, Prof. Manoj Chavan, HOD Dr. Vinitkumar Dongre, Dean Dr. Lochan Jolly and Principal Dr. B K Mishra for their perpetual help, kind and understanding soul during the arrangements of this task. To all the Professors, lab partners, companions and our folks who in a way or other shared their help ethically, monetarily and truly.

VII. RESULTS

The motivation behind this task is to limit the quantity of mishaps that occur. This framework is created by utilizing LPC2148 microcontroller, liquor sensor, safety belt sensor, vibration sensor, GPS, GSM, LCD, LED. Assume the individual expends liquor or don't put on the safety belt utilizing the sensors ARM 7 LPC 2148 won't let the vehicle to start. The GPS is utilized to follow the situation of the vehicle and GSM sends the message when the vibration is recognized..

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Smart Door Using Raspberry Pi

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***Abstract*—In modern world, the IoT is at its peak. The world is becoming smarter, the home automation is emerging. Smart Door control system is a latest technology in home automation. The main purpose of smart Door technology is to provide a complete security to the door, ease and comfort for users. The main aim of this project is to enlarge the door automation technique using Raspberry pi and android phone. Raspberry pi controls PIR sensor, camera module used in detecting the motion of a arrival of a person, capturing an image of and sends the still image to the android device through telegram app and alerts the owner about the person standing at the door. The entire systems programming has been established in python 3.5 domains for raspberry pi operations.**

I. INTRODUCTION

In today's era every "thing" has its unique identity that is what IoT (Internet of Things) is. It enables the connectivity with physical devices and allows user to transfer the data across the world through the networks. The technology is playing a vital role in day-to-days life. The main objective of this project is to build a system that will control the door using a smart phone. This system includes various components like a Raspberry Pi model B3 (Inbuilt-Wi-Fi), PIR Sensor, Camera Module and a Telegram App for getting the notification on an Android Device. The Purpose of this system is that whenever the person arrives in front of the door , the person's motion is been detected by a PIR sensor and the camera captures the image and the still image is sent on a telegram app of an android device. The components are connected via raspberry Pi which has an internet connection through Wi-Fi. Now a day's security plays a foremost role as per as high-tech things are taken into the consideration "more the technology, higher the security"[1]. This project procures the security to the raspberry pi, to secure it from getting hacked. SSH keys (asymmetric cryptography) network security is being used in this project. User can also use a FAIL2BAN method to secure your raspberry pi.

II. INTERFACING DIAGRAM

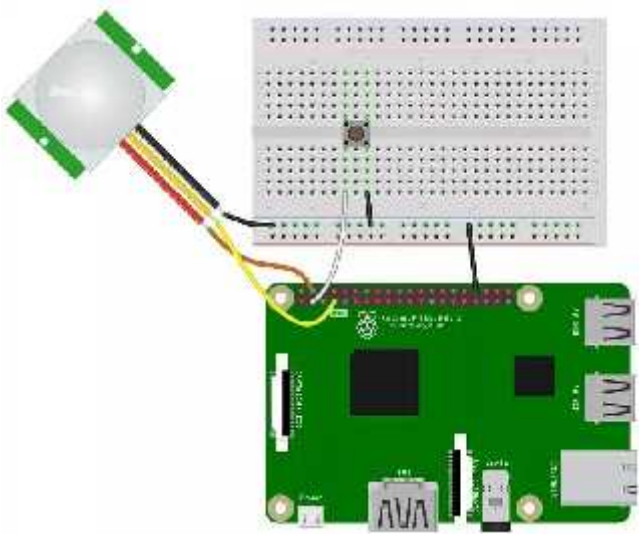

Fig. 1.Interfacing of raspberry pi with PIR sensor

III. COMPONENTS USED

- Raspberry pi B3
- PIR Sensor
- Camera Module
- Wi-Fi Module
- Telegram App
- Putty and VNC Viewer
- Male-Female Jumper Wires

Raspberry Pi:
Raspberry Pi-3 Model B: Fig-2 Raspberry pi-3 ModelB Raspberry pi is a small credit card size computer, which acts as a heart of the whole system.[3]. Its a BCM2837 processor, System on chip (SoC) With an ARM having a CPU and GPU. The CPU consist of Quad core ARM-Cortex A53, 64 bit.Consisting of 1GB RAM. The RPI include a wireless connectivity with802.11 wireless LAN (Wi-Fi) and Bluetooth 4.1, 4*USB 2.0 ports, a set of GPIO (2*20 pins) header. It also has an audio jack, a camera interface, display interface, HDMI port. It requires a power supply of min 2.5 A for glowing up the repositioned Led's. It has a small

SD card slot at its back, inserting the OS, other files import it in the card and then export all the files and get started .Changes can be made as per the requirements.

PIR Sensor:

PIR (Passive Infrared sensor) is an electronic component that measures any kind of object (person / animal in the field. The window behind the lens is made up of IR transmissive material. The Fresnel lens condenses light up to some 6-7 meters and its highly sensitive. It has a pins consisting of VCC, Ground and the Output. The output is given to GPIO pins of Raspberry pi through 5V of power supply to the VCC.



Fig. 3.Camera Module[4]



FIG.2.RASPBERRY PI[2]

Camera Module:

The camera module is a 5MP customized designed camera for a raspberry pi. It has a small socket at the board named as 'Camera Interface' situated between HDMI port and Ethernet. Insert the camera module into its slot, designed for interfacing a camera. This module allows the user to capture the still images and also to record a video in full HD. When the picture is taken its camera preview is opened for few seconds, using python coding adjust the resolution and send the image to an android app. "Sudo raspi-config" is the command which allows you to enable the camera module on raspberry pi.

Wifi Module:

Wi-Fi is a wireless technology that provides high speed connectivity. It is trademarked as IEEE 802.11x. It is supported by many applications such as video games , home networks , mobile phone etc. The Wi-Fi is the most favorable choice for IoT now days which will increase the speed of connecting the network worldwide. In this system the Raspberry pi has a in-built Wi-Fi, hence accessing it from anywhere, controlling the raspberry pi.



FIG. 4.SCREENSHOT OF THE TELEGRAM APP

Telegram app on Android phone:
The telegram app is heavily encrypted app. It delivers the messages, images, documents, files faster than other apps. It is highly secured from attackers, as it has end – to end encryption and it is a cloud based app. It can be accessed from he system allows the user to select any files or folders to be copied from the source drive to the user selected destination drive. The USB drive generally uses four pins. Pin no 1 and Pin no 4 are used as supply signals to the device. Pin no 2(D+) and Pin no 3(D-) are data lines used for data transfer. Pin no 2 and 3 are bidirectional, which uses TDM approach to execute data transfer operation .

IV. WORKING

When the person arrives at a home and stands in the front on the door, he/she will get detected by PIR motion detector. The PIR sensor is connected to raspberry pi, it has three pins. The GND pin is connected to GND of RPI, VCC is connected to 5V and the output is connected with GPIO-17 pin. As soon as the person is detected the image is captured with the help of a camera module. The PIR is inserted in a breadboard, one wire is connected with GND and other is connected to some GPIO pin. The image of a person is captured and stored in a RPI and immediately send on an android phone. The Telegram is used on an mobile phone, Linux commands are used for the installation process, since telegram is highly secured app, has various features like Secret chat, has end to end encryption and also can send data and files up to 1.5 GB.User need to add the contact details while installation process , the data will be save in the script call tg.sh and the photos will be saved in a script tg_photo.sh , these scripts are saved in home/pi/tg. The requirement of this projects include a Raspberry pi model 3B having a SD card which has a Raspbian OS , a switch , a camera module of 5Mp , a PIR sensor and an android phone with installation of an telegram app in it. It also requires a power supply of 1.5A to even 2A, a USB cable. The coding is done in python having a python IDLE version 3.6. The necessary modules and libraries are also imported. The Network security is playing a Vital role, the PUTTY and PUTTY GEN are used for SSH (secure shell) The SSH key is generated using a asymmetric cipher i.e. generation one public and private key. The public key can be shared amongusers, while a private key remains with the owner.

V. RESULTS

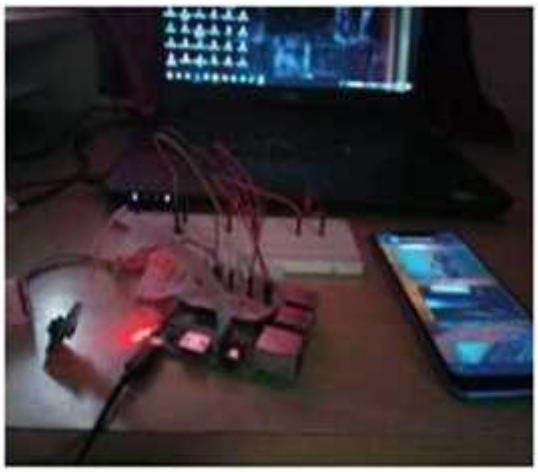

Fig. 5.Setup Of Project

VI. CONCLUSION

The USB to USB Bridge concept helps us in studying the various USB protocols and the working of the ARM11 with the USB host. The user-friendly interface and portability make it a powerful and a unique tool to transfer data. The Graphic User Interface is created such that the user can browse and select specific files or entire folders to transfer data between the source and destination devices. The fact that the device is battery operated renders the need for a power supply useless. Also there is a need for rapid data transfer which is fulfilled using the USB Bridge[4]. This technology is a novel way to transfer data as data transfer is possible without the use of a computer which is unheard of. If mass produced, this device will be relatively inexpensive and can be used on a large scale.

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“Con-wheel”- A convertible Smart Wheelchair for Disables

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Abstract **– This paper deals with various features that are implemented on the advance version of wheelchair. The advance wheelchair is electrically powered and is controlled by the use of a joystick and panel for a better movement of the chair. As observed that moving the patients from wheelchair to stretcher or to the medical bed is always a problematic issue for the caretaker. There is a revolution of wheelchairs available today driven by needs and desire of man. The “Convertible Smart Wheelchair for Patients” facilitates the disabled patient’s mobility .The purpose of this design is to convert wheel chair into reclining bed and also reduce the effort of the caretaker. It will provide a safer transfer of the patients in hospitals as well in places depending upon the need. The aim is to make a wheelchair which is light in weight, low cost of maintenance and durable. For example using of ABS plastic or optical fiber can be a good option as both are durable, less weight and requires low cost of maintenance. The smart features of this system are Ultrasonic Sensors, Diabetic Sensor, Body pulse rate sensor, Blood pressure sensor, Biometric sensor to start the vehicle, Thermo gun, Lipid sensor, and Vitamin level sensor. This will facilitate medical aide to patient and can communicate also with medical professional.**

Keywords— ABS plastic(3D printing material) , HaWCos - Hands- free Wheelchair Control System., ADC – Analog to digital.

I. INTRODUCTION

Several studies and surveys have shown beneficial results in use of smart wheelchair, this helps in increase of independent mobility of both children and adults. The human which cannot physically transport himself from one destination to another always require the need of a helping hand. The use of smart wheelchair helps in reduction of dependence of caregivers or family officials and helps in promotion of feeling of self-reliance. For young adults this independent mobility helps in creation a base for early learning. This smart wheelchair helps in increase opportunities of being self-dependent.

The main part of this paper is concerned with the newest version of the “Hands- free Wheelchair Control System” (HaWCoS), which is based on the detection of intentional muscle contractions. Unlike its predecessor, the new (extended and enhanced) implementation of HaWCoS has been realized as a stand-alone device which does not depend on the use of a laptop computer. After a basic reiteration of the muscle-based control principle the hardware of the stand-alone device as well as the underlying software are Presented in thorough detail. To make a copy of the prototypical device readily available to, for instance, the wheelchair manufacturer, the system has also been implement edasa Windows executable with identical program behavior (running on any standard laptop) – a short description of this simulator follows the introduction of the stand-alone device [1].

Wheel chair is a mechanical equipment which is used for travelling of the person from one place to another. This facilities was made for the person who can’t walk due to some injuries/physical disabilities.



Fig 1: Ordinary Wheelchair [2]

The ordinary wheelchair needs manpower to drive as per need. The ordinary wheelchair ranges from 8k to 44k. Though there are many development in science and technology the biomedical field is lacking behind in some sectors for example for the people who are physically challenged or due to some injuries or illness.

Smart Wheel Chair is mechanically controlled devices designed to have the ability to move or be moved freely and easily with the help of the user command. This reduces the user’s human attempt and force to drive the wheels for wheelchair .Furthermore it also provides an opportunity for visually or physically impaired persons to move from one place to another. The wheelchair is also provided with obstacle detection system which reduces the chance of collision while on the journey. As it has gained a lot of interests in the recent times. The machines can also be used in old age homes where the old age persons have difficulty in their movements. The devices serve as a boon for those who have lost their mobility (Injury or physically

Challenged). Different types of smart wheelchair have been developed in the past but the new generations of wheelchairs are being developed.

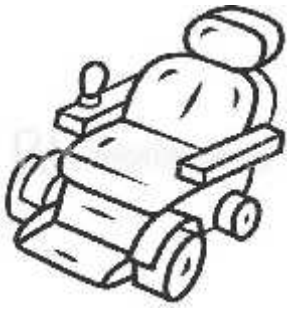

Fig 2: Modified Wheelchair (Smart Wheelchair) [3]

TABLE 1: COST OF WHEELCHAIR

Sr No.	Ordinary Wheelchair	Modified Wheelchair	Future Modification
1	8k – 44k	50k – 75k	85k – 1.5lakhs

The above table shows the cost of the Wheelchair varying from ordinary wheelchair to future wheelchair. These are the estimated cost.

Use of the Wheelchair (Flow of the application)

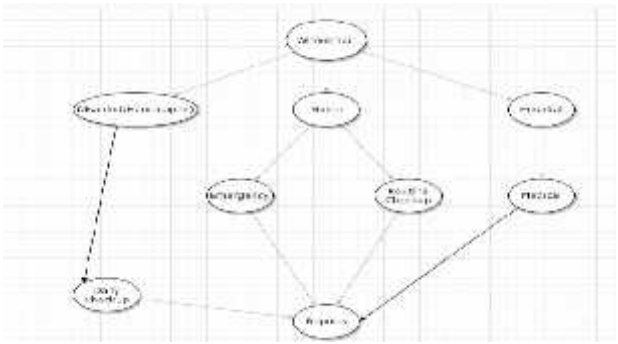

Fig 3: Flow of the application

Wheelchair can be mainly used for medical purpose in hospital,home,disabled people for emergency purpose and routine checkup the daily checkup of the disabled people and the reports will be sent to the doctor using gsm model. If any emergency case is occurred then the sms will be sent to the hospital.

II. THEORETICAL FRAMEWORK

Smart wheelchair is electrically powered so the wheelchair is started by placing our palm on the biometric sensor. This wheelchair also has alternating way of starting by entering the default pin on the keypad. Staring from the top section it has a head rest which provide the comfort and a better posture for the person operating it. The smart wheelchair also has a convertible bed it is also called as smart bed for patients. This bed is introduced since all the people cannot be transferred from bed to chair or vice-versa. Coming to the operating part there are two ways of operation; one is ordinary joystick and other is the keypad. This is placed on the hand rest. The right-hand side of the chair consist of joystick. The left-hand side of the chair will contain the touch pad which will be having the buttons which will work according to the commands. The sensors such has heart rate sensors, pulse detecting sensors, blood pressure, measuring sensors, diabetic sensor, lipid sensor will be connected on the wheelchair. The touch pad will be assigned with the buttons which will help to scan each body part of the patient. The records will be stored and using GSM model the message will be sent to the mobile of the family members of the respected patient. The ultrasonic sensor will be connected on the front of the chair to detect the obstacle if any. The hub motors and wheels will be used to move the chair. When the chair is in moving the battery is attached which will help the motors to move the plug will be an added when the chair is in rest mode or sleeping mode the plug connection is used to work all the sensors To save the battery. The laser scanning will be connected behind which will scan the body when the buttons are pressed. The daily routine check of the patient is taken and the body of the patient is under scan 24/7 if any emergency is found the SOS text is directly sent to the ambulance and the help is called, with the details what the patient is suffering from to make the equipment ready in the hospital.

III. CIRCUIT IMPLEMENTATION

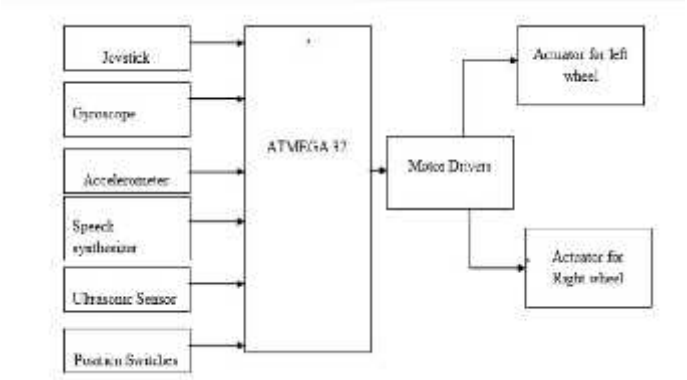

Fig 4: Proposed Block diagram of System

The above block diagram describes the circuit implementation of software and hardware circuit implementation of the system.
The inputs to the Atmega 32 are as follows:

Accelerometers:
The accelerometer Sensors are mounted on headphone and they transducer change in acceleration of
Head movement to voltage signal which is sent to ADC input of microcontroller.

Joystick:
The outputs of the two variable Resistor of the joystick are connected with the two channels of ADC.
Accelerometer

Speech Synthesizer:
Speech synthesizer Module works by giving user input voice command and send signal to actuators.

Ultrasonic Ranging Module:
It is used to detect the obstacle. It is use to halt the wheel chair.

Gyroscope (L3G4200D):
Gyroscope compares input demand from a joystick, accelerometer source with the direction that the wheelchair is tracking. When the system detects that the wheelchair is deviating from the intended course of direction it automatically corrects the path of travel.

Position Switches:
These switches are attached at chair, to switch the input control unit as Speech or
Joystick or Accelerometer.

Microcontroller:
It is the main computational and processing part of the Smart Wheel Chair that takes input from the sensor, processes it and gives output. It operates at high frequency of 12 MHz and acts as control center for the robot.

Relay Switch:
A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically. It is used to switch on or off electrical circuits operating at high voltage using a low DC control voltage.

Motor Drivers:
Motor Drivers amplify the TTL output of the microcontroller such that it can drive the respective actuators. L293D IC is used for the switching the relay driver

IV. FUTURE SCOPE

The future advancement of the wheelchair are possible by increasing the battery size and automatic charging of the battery by the motion of the wheels. The system can also be operated with the help of phones or other device. Optical sensors can also be used for the movement of the wheelchair. Extra sensors can be added such has heartbeat sensors,line follwers can also be used inorder to move the system in the particular area.

V. CONCLUSION

Con-wheel is not just an ordinary wheelchair but a wheelchair with advance features implemented on it .This system is designed with the help of electronic components controlling the actual movement of the wheelchair rather than ordinary wheelchair which requires strong manpower to operate. The main focus of developing of this system is to help the disables to be self-reliable as in this busy world waiting for assistance is making a person fully dependent on them and this system tries to avoid such circumstances. The con-wheel introduction to world will be a great advancement in medical support facilities and will make the ordinary wheelchair to a wheelchair making a person self-dependent and help them to overcome the curse of disability.

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RFID Based Attendance System

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Abstract **- RFID Technology means the Radio Frequency Identification Technology is widely used to make a smart system that can be used to monitor and secure the data using the radio waves. This technology can be used in security systems in Banks, Library Management Systems, Smart Attendance System and many more .The proposed system involves the use of an RFID tag and a reader, a microcontroller and a power supply to setup a Smart RFID based Attendance System. With an idea to eradicate the typical traditional attendance mechanism involving the paper and pen, this project is designed under the principle of Radio Frequency Technology.**

Keywords—RFID reader, Arduino board, attendance, charge pump circuit.

I.INTRODUCTION

Attendance in musters has been a traditional method for years, which had its own disadvantages. The problems faced were the data maintenance by the organization also the musters require physical space to store which was another issue. The money investment in registers was a financial drawback. Also, manual labour was one of the main issues and data accessing was not easy. It was time consuming and reports production was one of the difficult parts, information sharing and customer services were not as effective as expected.

After this the other way was to mark the attendance online which had the same issue of manual labour. And we cannot ignore the fact that manual labour leads to human error which was a major issue as far as the data accuracy is concerned. Focusing on the point of data security, it was not possible to maintain the security of data. Also, data redundancy can easily take place as probability of data replication was very high.

This problem was observed in many schools, colleges, other institutions, offices and almost everywhere because attendance is an important part of each small and large organization.

So, Radio Frequency Identification (RFID) based attendance system is one of the solutions to overcome this problem. It's ability to uniquely identify each person based on their RFID tag or type of ID makes it more accurate, efficient, fast and easily accessible. Manual labour reduces to a great extent and in terms of financial investment it is onetime investment, there are maintenance charges and also the cost of hiring a technical expert but the total investment is much less than the money invested in the traditional method.

The ultimate objective and expected outcome of this project is to:

- Decrease the manual labour
- Increase the data efficiency
- Decrease the data redundancy
- Make the process fast
- Make the data easily accessible
- Increasing data security
- Increase communication by increasing information sharing
- Ease the process of consumer's query solving
- Decrease the financial investment
- Reduction of paper use as it is an eco-friendly technology

There are many other applications of RFID such as now-a-days they are used in item level tagging in retail stores, malls etc. Along with this they also provide inventory control, theft by customers and employees. RFID is also being used as a tracking technology that uses small tags or chips to transmit a signal to remote scanners. They are also used in large construction sites where this RFID tracking device is clipped to worker's belts and helps to ensure that managers can contact them when needed. Also used in airlines for baggage tracking. Most exciting use of RFID is Waltonchain, named after RFID inventor Charlie Walton, in this technology RFID and blockchain is combined together to power the secure exchange of bitcoin and other crypto currencies to make devices much safer to use. Today we are using sites such as amazon, flipkart, snapdeal and many more for online shopping. The shipments to be delivered are tracked by customers and also deliveryman so that he can locate the shipment. The list of applications of RFID is very large, the above mentioned were some of them.

II. THEORY

Frequency from 20 KHz to 300 GHz is considered as radio frequency. This frequency lies between the upper limit of audio frequencies and lower limit of infrared frequencies. A Radio Frequency module is a small electronic device used to transmit or/and receive signal between the two devices which desire to communicate for the sake of exchanging information. There are various types and ranges of RF module. Some can even transmit to 500 feet. RF CMOS technology is typically followed for RF module fabrication.

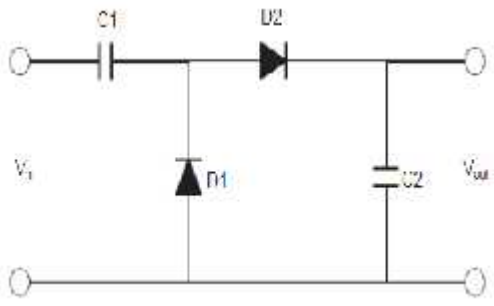


RF module (figure 2.1)



RF tag reader(figure 2.2)

Radio Frequency CMOS is a Metal Oxide Semiconductor (MOS) Integrated circuit (IC) technology that integrates Radio frequency. This technology is widely used in wireless communications such as Bluetooth, Wi-Fi, GPS, Wi-max and many more. So, from the above discussion we can say that RFID IC is powered by RF signals, which is transmitted by reader. Then it is necessary for RFID to have a capability of converting this RF signals into DC voltages so that it can power the rest of the digital state machine in the IC and also to level up this voltage according to the demand of the different parts within the IC. This directly indicates that we need to perform rectification for incoming signals and potential step-up to level up the voltage. These two tasks are combined and performed by charge pump circuit (diagram shown below).



Charge pump circuit (figure 2.3)

The circuit consists of two capacitors and two forward biased diodes. The connection is made in such a way that the circuit allows flow of charge in only one direction. The function of this whole circuit is just to 'pump' (transfer) the charge it receives at input side capacitor C1 from an input device to the output side capacitor C2, where we can connect a desired output device to receive the charge. The operation takes place in the way as follows:

When the RFID tag is waiting for any type of signal, the RFID reader will transmit an RF signal. If this signal is negative with respect to the input side, diode D1 will become forward biased and capacitor C1 will start charging. Let's consider the maximum peak voltage at input side as Vpk and turn-on voltage as Von, so when Vin =-Von, the voltage across capacitor C1 will be -Vpk + Von. As soon as input terminal becomes positive from negative, diode D1 will turn off. When positive input voltage is high enough diode D2 will turn on, and the charge stored in capacitor C1 is pumped to capacitor C2. If Vin =Vpk , then output voltage can be calculated as

$$Vout = Vpk - Vc1 - VD2$$

$$= Vpk + Vpk - Von - Von$$

$$= 2(Vpk - Von)$$

So, it shows that the output voltage during this condition is roughly double of input voltage. We can add multiple such capacitor-diode combinations, but there is a limitation to this because it will require all diodes to be forward biased in the circuit.

III. PROJECT WORK

As observed in many Educational Institutions like schools, coaching firms and various colleges across the universities, the attendance mechanism mainly involves the traditional way of calling out the names of the students involving the paper and pen. This method though being reliable causes the time wastage during lecture time and can also help the students to mark fake attendance. Moreover, the attendance registers carrying the huge chunk of data needs to be maintained for a longer period of time. Also, the severe attendance calculations make the method much more hectic. It becomes an immense problem in the colleges across the universities where there are large number of students.

The Student Attendance System using Radio Frequency Identification Technology will significantly improvise the current manual process of student attendance recording and tracking system involving the pen and the paper. Moreover, this system is user friendly, reliable, secure and accurate. The attendance can be stored in the designed databases and then can be retrieved for further use.

RFID Technology involves the use of Radio Frequency Waves and basically acts as a bridge to identify the person or the object using the Radio Frequency Transmission. It mainly consists of a RFID Tag, a Reader

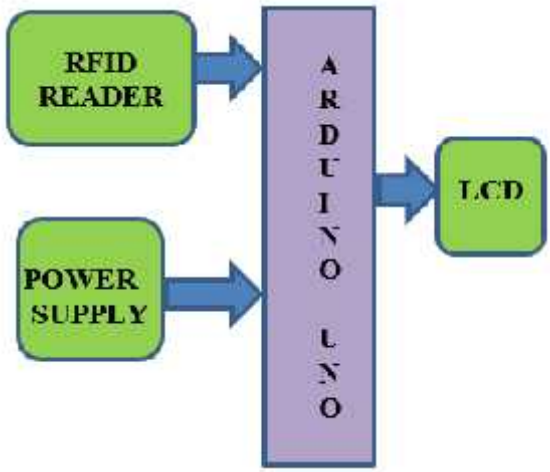
and different subsidiary elements can be added to make the system more reliable.

ARCHITECTURE:

The proposed system consists of:

- RFID module.
- LCD Display.
- Arduino Uno Microcontroller Board.
- Power Supply.

The block diagram drawn below explains the basic flow of the entire operation of the system. Power supply is used to provide power to the Arduino board and hence the entire system. Here, a semi-active RFID tag is used. The reader consists of a battery which needs to be charged timely, so as to provide an energy to the microchip inside the tag. The microchip contains the unique serial number of the different authenticated user. As soon as the authenticated user swipes his or her RFID card in the system the RFID reader will detect it and it will transmit a signal to the Arduino board. Since the RFID reader is of semi-active type, which means that it will not need a specific power supply to provide power to it, it will power itself . The signal which has been transmitted to Arduino through RFID reader is of certain frequency depending upon the power supplied and the application it is used for. Arduino board after receiving the signal starts searching for the similar ID in its memory, which has been swiped in the system. If the Arduino finds the similar ID in its system pre-registered it increases the count of that ID from initial count by one, indicating that the user is an authorized user and also the presence of user for that particular day and time. LCD will be active after this process and will display a message as 'successful'. The other and only possible case is if the Arduino is unable to find the similar ID registered in its system, which indicates that the user is an unauthorized user. So, it will not grant the access to the user which also means that counter will not be affected. In this case LCD will display a message as 'Invalid user'.



Block diagram of the system (figure 3.1)

RFID Module: The RFID Module uses the radio waves for capturing, storing and synthesizing the data which is stored on the tag wore by the student or attached on the object. The tag mainly consists of two parts viz. a Microchip and an Antenna. The microchip is used to store the information obtained from the object and the antenna also called as an Interrogator is used to transmit and receive the signals for better communication. Every tag associated with different objects have a unique serial number for identifying the object. The information stored on the tags is obtained by transmitting signals through the antenna by the reader. The tag responds to the issued signals with the information which is stored in its memory by matching the serial number associated with it. RFID modules are smaller in size and can be integrated with various objects for various other purposes.



RFID module (figure 3.2)

LCD Display (16×2): LCD Display which is an abbreviation for Liquid Crystal Display is an electronic device which displays the data which is fed to it. It is very commonly used in Embedded System Projects for its low price and being programmer friendly. Power needed to turn on the LCD is of 5 volts. A 16×2 LCD has 16

columns and 2 rows. Here, each and every character being displayed on the screen is of has a pixel matrix of 5x7.



LCD Display (figure 3.3)

Arduino Uno Microcontroller Board: An Arduino board is meant to make an application associated with any object, more interactive and accessible. It consists of 14 digital I/O pins, 6 analog pins and an USB interface. The USB on the Board easily plugs in the USB Port of the computer as a virtual serial port. This helps in easy serial communication as serial communication is a time-tested easy protocol. It also provides a 16 MHZ clock which is extremely enough for most of the applications. Also being an open source design provides an advantage for a large community of people using it and also helping to troubleshoot the different problems associated with it.



Arduino UNO (figure 3.4)

IV. CONCLUSION

The main objective is to build a smart attendance system which will provide a less complicated and more accurate way by using an RFID module and a microcontroller. This project will provide an educational institute with more efficiency and better performance as compared to the traditional method of taking attendance by calling out the names of the students. Also, the system is very user-friendly. So, we can conclude that till now RFID system is efficient enough to perform the job of recording, maintaining and securing the attendance and its record. We can also use biometric system for the same purpose but the problem of financial investment is one of the major issues and hence cannot be afforded by every small-scale organization or institute. Also maintaining the system with such important details of a user is a huge responsibility and hence a small bit or mechanical error can lead to information leak causing great consequences to take place. This biometric system is good enough for the organizations with good turnover. So, RFID can be afforded by each and every one by small amount of investment.

V. FUTURE SCOPE

This project will help any institute to manage their attendance's data and we can improve this project by adding some new options and components like we can add the GSM and send SMS to the parent of the student whenever his or her card is scanned for the attendance and we may also add many other things according to our requirement but keeping the limitations in the mind as we cannot overload the devices which are major part of the system. We can link this attendance system's database with college website in such a way that it can be shared and monitored by the student's parents. We can also send this data through internet to the user. So that user can access it remotely via internet to view his or her attendance record. We can assign each student a password, if necessary, which they will have to enter after placing their RFID card which will make our system more authenticated.

The range of the RFID reader can be increased, so the reader can detect the tag from a far distance. RF trans receiver module can be used for long-distance communication to transfer data in order to increase the communication range. The transferred data can be saved and store in the computer as a database using specific software such as MySQL, Oracle, DB2 and many more. Timely attendance can be monitored i.e. time in and time out can be recorded using RTC (real-time clock) and can be stored in the database, which will be assembled with college/school/organization's gate in such a way that without swiping the card the gate will neither open not close, it will be very useful in tracking the students trying to bunk and also will ensure the entry of only authorized people in the premises of the concerned location.

VI. APPLICATIONS

- It can be used for tagging animals.
- ATM machines.
- To make things environmentally friendly.
- Library management system
- Toll road payments
- Product tracking

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SMART CAR PARKING SYSTEM

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Abstract: - Due to increasing population in today's time, the traffic problem has increased to a great extent. The main problem of traffic is mostly because of increasing use of private vehicles. It has been observed that most of the time people park their cars on road to complete their work and this leads to traffic congestion. To overcome this problem, we have come up with the solution of 'Smart Car Parking System'. In this project, we have proposed a solution that every parking lot should have an RFID module installed inside it. This will help the user to have their own reserved slot inside a parking lot or he can directly book the slot by registering its RFID ID number once the user reaches the desired parking lot.

Keywords: -Arduino, Parking Lot, RFID, IR Sensors, Arduino IDE.

I. INTRODUCTION

As we know the economy is growing very fast and due to the availability of affordable price cars in the market, every average middle-class individual can afford a car, which is good thing, but this is leading to problems like heavy traffic jams, pollution and parking of vehicles. One of the important concerns, which is to be taken in accounting, is problem of parking of vehicles .Though, if there is space for parking the vehicle but so much time is squandered in finding that exact parking slot resulting in more fuel intake which is not environment friendly and also waste of time. It will be great if somehow, we get to know the available parking slots nearby our current location and we can reserve it before arriving at spot so in meantime someone else won't be able to park over there. This will save time. Hence to provide solution to this lot of technologies and new concepts are getting introduced.

So, from our side we also have tried to find a solution to this by introducing concept of "SMART CAR PARKING SYSTEM". This will help user to find nearby empty parking slot with low prices. In this instead of going into parking area and searching for slots user will be already having information about engaged and available slots right on the entrance of the parking area. Which will save their time of getting into parking area and searching and if in case no slots are available, they will have to come out and search for another parking area.

EXPECTED OUTCOME:

As we are trying to implement this project on very small scale, we have taken limited numbers of cars, slots and cases into consideration.

- We are expecting status of slots to be displayed on screen constantly and should be updating it every time.
- User should only be allowed if they are authenticated.
- Gates of entrance will be open only when these two conditions are satisfied which is (1) At least one slot should be available. (2) User 's identity is verified.

II. THEORY

The aim of this project is to move more towards automation rather than manual system. The whole system is based on embedded system. The approach of this project is to design a system which helps the user to get a membership in their desired parking lot, so that the user doesn't have to park their car on roads and can directly park it in the parking lots. This will help to reduce the traffic jam and the manual system will replaced by automation.

So, we have used Arduino UNO, RFID, IR Sensors, Servo Motor, LCD Screen and also Arduino IDE (for programming purpose)

Arduino UNO:



Fig 2.1

In this project, Arduino Uno is the brain of the whole system. It is a microcontroller based on Microchip ATmega328p microcontroller. Arduino is used for the purpose of interfacing having both analog and digital input and output pins. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB plug, external power supply, reset pin and a reset button. It is operated on 5V and input voltage should

be given in range of 7-20V.DC current for input/output pin is 20mA and for 3.3V pin it is 50mA. It has flash memory of 32Kb out of which 0.5Kb is used for booting process.

PIN Configuration: there are two kinds of pins general purpose pins and special purpose pins.

General pin functions

• LED: there is a built in LED is present at pin 13. When its pin value is high LED is ON, when pin value is low LED is OFF.

• VIN: when we are using external power source Input voltage to Arduino board is given by this pin.

• 5V: the output of any external device like servo motor which requires 5V for operation is connected to this pin.

• 3V3: Extra supply voltage for external devices which requires less than 5V.

• GND: Ground pins.

• IOREF: it is used to provide voltage reference to Arduino UNO.

• Reset: used to add a reset button to shields that block the one on the board.[7]

Special pin functions

Functions like pinMode(), digitalWrite(), and digitalRead() are used while writing program on Arduino IDE. The Uno has 6 analog inputs, labelled A0 through A5; each provides 10 bits of resolution (i.e. 1024 different values).

Some pins have specialized functions:

• Serial / UART: pins 0 (RX) &1 (TX). Used to receive and transmit TTL serial data.

• External interrupts: pins 2 and 3 pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

• Pulse-width modulation (PWM): pins 3, 5, 6, 9, 10, and 11. It is used to provide Pulse Width Modulation output with the help of function used in Arduino IDE called as analogWrite().

• Serial Peripheral Interface (SPI): pins 10 (SS), 11 (MOSI), 12 (MISO), and 13 (SCK).

• Two-wire interface (TWI)/ I²C: pin SDA (A4) and pin SCL (A5). Support TWI communication using the Wire library.

• Analog reference (AREF): Reference voltage for the analog inputs.



Fig 2.2

IR Sensor:

Infrared Obstacle Detector consists of three pins that are VCC, Ground, Out. It also consists of a distance adjust which can be used to vary the range of IR Emitter according to the requirement of user. When the VCC of IR sensor is connected to 5V, the power led in IR sensor glows. As soon as IR sensor detects any obstacle after receiving reflected energy at IR receiver, the obstacle led glows. The out pin is connected to the any device which is interfaced with IR sensor (for example Arduino). It operates at a 3V-5V and detection range is of 2cm-30cm which can be varied using potentiometer.

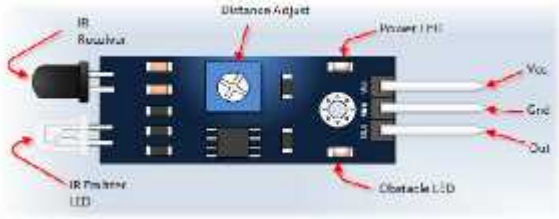

Fig 2.3

Servo Motor:

Servo Motor is a electrical device which consist of both linear or rotary actuator. It is used to rotate an object on the basis of angular position provided to it. It consists of three pins which are already attached to three jump wires of red, black and yellow color. The red color jump wire is connected to VCC of servo motor, brown color jumper wire is connected to ground and yellow color jumper wire is connected to one of the digital pins of Arduino (or any other device).It's operating voltage is 4.8V-6V.Its operating speed is 0.12sec/degree. Servo motor used in this project is 9g SG90.



Fig 2.4

RFID:

The RC522 RFID sensor operates a frequency of 13.56 MHz. It creates a electromagnetic field around it. Inside this field, RFID tags perform contactless communication. RFID sensor has Serial Peripheral Interfacing (SPI). The maximum data transfer rate is about 10Mbits/sec. It can detect RFID tag up to a distance of 5cm.It consist of 8 pins that is VCC,RST(reset pin),GND(Ground),IRQ(Interrupt pin),MISO(Master-In-Slave-Out),MOSI(Master-Out-Slave-In),SCK(Serial Clock),SS(single input)/SDA(Serial Data)/Rx(Serial Data Input).

When Reset pin is high, it resets the RFID sensor and when it is low it disconnects the all the input pins if connected to any external device. Interrupt pin is active when it sees RFID tag inside the electromagnetic field and it sends the signal to microcontroller. When the RFID sensor is connected to microcontroller as input pin, the MISO pin is active. When SPI input of microcontroller is given to RFID sensor, the MOSI pin is active. Serial Clock is used to receive clock pulses from microcontroller (Arduino). In case of SS ,RFID sensor acts as single input because SPI is active, serial data when I2C is active and acts a serial data input when UART is active.



Fig 2.5

LCD:



Fig 2.6

This is 16x2 LCD screen is used for display purpose. I2C is an updated version with only four pins for connection with Arduino which makes it easy to use. All connectors are standard XCH2.54.

Setup of Components:

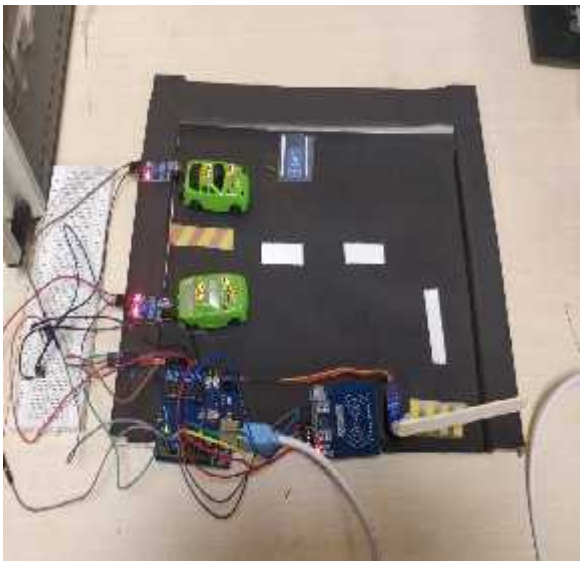

Fig 2.7

III. PROJECT WORK

Working Principle

In this project, Arduino Uno is the brain of the whole system. The whole system consists of Arduino which is interfaced with Infrared sensors, Servo motor, RFID sensor, RFID tag. LCD display, Breadboard. All these components are connected to Arduino UNO through programming written on Arduino IDE.

Infrared obstacle sensors are placed in the parking slots to indicate the presence of car parked in a particular slot. Infrared sensors have already built-in IR transmitter and IR receiver.IR transmitter sends out IR energy and if a car is present in the parking slot, it gets reflected back and the obstacle led glows. Once the sensor detects a car it sends a signal to Arduino chip about the available slots which updates the number of slots available and occupied in the parking lot. LCD (Liquid Crystal Display) is connected at the entrance of parking lot. It displays, ”WELCOME!”, along with the status of slots according to the signal send by the Arduino Chip.
RFID sensor is placed at the entrance of parking lot and is connected to Servo motor using Arduino through programming. RFID sensors uses electromagnetic field to track objects which have RFID tags attached to it.

When it receives any electromagnetic pulse from RFID sensor, the tag transmits the ID number which is in the digital form to the RFID sensor.

RFID tags are attached to cars which already have membership of that particular parking lot. These tags have ID number which is installed in RFID sensors. Once the RFID sensors detects the ID number and it

matches with the already installed ID, it sends signal to Arduino chip to open the gate and the allow the car to enter. If it does not match then it displays on LCD screen, "Access Denied". Arduino chip first checks the status of available slots with the Infrared sensor and if the slots are available it will send a signal to servo motor to open the gate. Once the car occupies a slot, Infrared sensor will detect the car and will again a send a signal to Arudino chip. Arduino chip will update the information and it will be displayed on the LCD screen.

Pin Connection-

• In this we interfaced RFID, IR Sensors, and Servo Motor with Arduino.
• RFID is interfaced with UNO through Pins 9-13 that are known as digital pins.
• IR sensors are interfaced on pins 5 & 4.
• Servo Motor is connected on pin 3.
• Also, IR sensors are connected to Servo Motor.
• Servo motor is programmed to make a 180-degree angle while rotating.
• Current status of slots available will be displayed on LCD screen which is kept on entrance of the gate. Customers will only be allowed to enter only when slots are available.
• When driver comes looking for slot, they first have to go with process of authentication which will be done through RFID tag reader.
• Once it is assured that they are authenticated users they will allow to enter and status will be updates on screen right away.
Block Diagram:

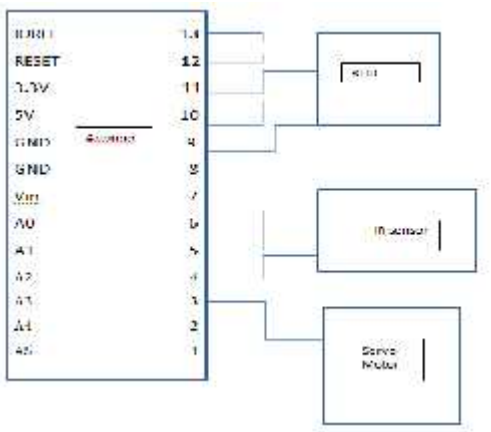

Fig 3.1

IV. RESULT

This was implemented on very small scale where we are working only with two parking slots. This can be increased as one wants according to their agenda.

Since the programming was done using c language on Arduino IDE. For implementation we used two toy cars and handmade parking structure where as soon as we loaded the program slots availability status was displayed on screen.

The moment one of the cars entered enter in the parking area after getting his tag verified by RFID reader no of slots available was decreased by 1.

After both cars were in the slots the message "no slots available" was appeared on screen.

When we tried getting third car into slots servo motor didn't open the gate as we had functioned it in such a way that until and unless it doesn't get command from Arduino.

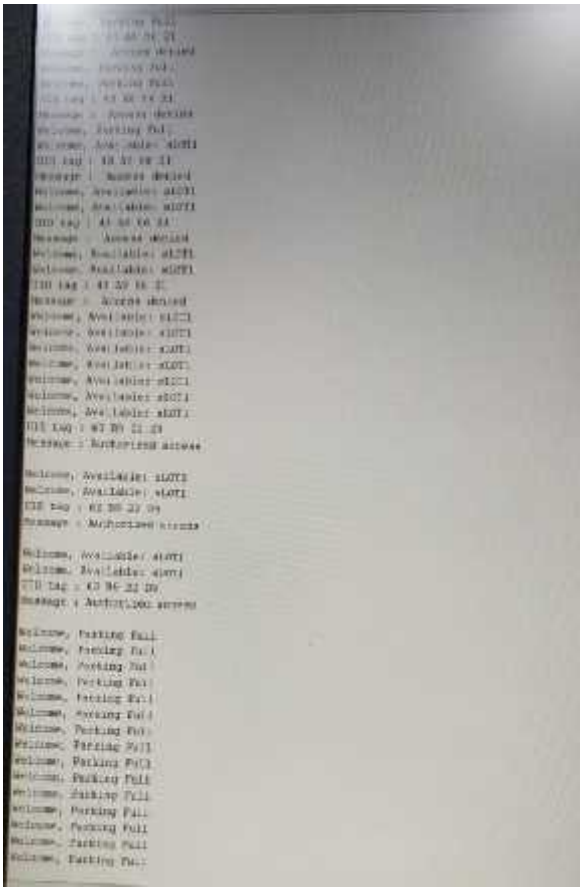

Fig 4.1

V. CONCLUSION

After doing successful implementation of this project we came to conclusion that this system can be introduced in our country and it will be beneficial in the context of our country. The adoption of this project will lead to reduction of pollution which is one of the objectives of our project. This will help user in saving time and money that gets consumed due to fuel.

VI. FUTURE SCOPE

The future scope of this project is to make it a cloud-based project. To make an application through which the user can search for nearby parking lots using a GSM module. Once the user finds a empty parking lot it can directly book its slot through application and do the required online payment. This could be done only if the user has an already attached RFID tag to its car, so that the Id number of the tag can be send to the

RFID sensor of the parking lot which the user has booked using a Wi-Fi Module.

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MOTION SENSOR SECURITY ALARM

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***ABSTRACT*- The main use of the security alarm is from the point of view of safety. Whenever a person enters a restricted area this security alarm will alert the person concerned.**

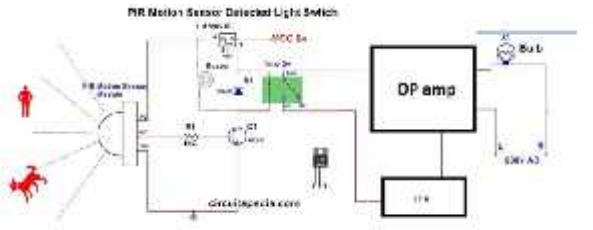
I. INTRODUCTION

A motion sensor security alarm system is designed to detect an unauthorized entry into a house or area. motion sensor security alarm systems can be used in residential buildings, commercial buildings, offices, industries ,educational institutes and even in military locations. Many security alarms were designed and published in Electronics hub. Here is the simple and efficient motion sensor security alarm using PIR sensor. Most of the security systems are very expensive. With the help of this project, an inexpensive security alarm system can be implemented.

II. LITERATURE SURVEY

Alarm systems are designed to provide cues to make operators aware of an operational problem, so that mitigation actions can be taken. New technologies are enabling innovative designs of alarm systems for safety-critical systems. To help better design alarm systems in advanced control rooms of nuclear power plants (NPPs), recent researches on alarm system design in the NPP domain are reviewed from the following aspects: (1) functions of an alarm system and opportunities and challenges of new technologies; (2) effects of alarm floods and different alarm management methods; (3) visual presentation of alarm information; (4) evaluation criteria for alarm systems. Through the comprehensive literature review, sensor. Most of the security systems are very expensive. With the help of this project, an inexpensive security alarm system can be implemented. This article proposes research topics related to human factors and ergonomics that are worth studying in advanced alarm systems of NPPs.

III. CIRCUIT DIAGRAM



IV. METHODOLOGY

The design of the motion sensor security alarm system is easy to understand. There are different components used to design a motion sensor security alarm system. They are namely

- PIR sensor
- LM 7805 siren IC
- Relay 9V
- Transistor NPN BC547
- Resistors R1(1K ohm)
- Buzzer – 1s

V. WORKING

(Passive Infrared Radial) sensors are used in this circuit. The sensor is basically a pyroelectric device. When the device is exposed to infrared radiation, it generates an electric charge. The device is made of crystalline material. According to the change in the amount of infrared striking the element, there will be a change in the voltages generated, which is measured by an on-board amplifier. The infrared light explained here refers to the light radiating from all objects in its field of view. The reason for not having a transmitter and receiver is that the device does not emit one, but only accepts the energy emitted from objects above absolute zero in the form of radiations. Thus the temperature will be different for a human working past a sensor, and that of a wall right in front of it. Thus the word “passive” is used in PIR to explain that it does not emit a radiation and receive it, but instead accepts the incoming infrared radiation passively. When any human is detected, this PIR sensor outputs a logic high value i.e. voltage of

3.5v to 5v. This voltage is applied as input to the siren generator IC. The siren generator has an oscillator internally, to produce the sound. Thus oscillations along with selected tone are sent to the address counter. The address counter then sends the data to the ROM. ROM then sends the tone on the output pin 3. The output is given to the NPN transistor to amplify the siren. Thus sound produced can be heard from the speaker when human is detected.

VI. RESULT

Whenever anyone enters the restricted area the IR rays released by the person is sensed by the PIR sensor and it triggers the system and alarm starts buzzing. This indicates the concerned person that there is someone in the concerned place.

VII. APPLICATIONS

A security alarm is a system designed to detect intrusion– unauthorized entry – into a building or other area. Security alarms are used in residential, commercial, industrial, and military properties for protection against burglary, as well as personal protection against intruders. Security alarms in residential areas show a correlation with decreased theft. Car alarms likewise help protect vehicles and their contents. Prisons also use security systems for control of inmates Some alarm systems serve a single purpose of burglary protection; combination systems provide both fire and intrusion protection. Intrusion alarm systems may also be combined with closed-circuit television surveillance (CCTV) systems to automatically record the activities of intruders, and may interface to access control systems for electrically locked doors. Systems range from small, self-contained noisemakers, to complicated, multirally systems with computer monitoring and control. It may even include two- way voice, which allows communication between the panel and Monitoring station.

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Evaluation of Potential Performance of High Dielectric Oxides in Exciton Scaling in CNFET Photodetector

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***Abstract* — In recent infrared photodetectors, novel 1D single wall carbon nano tubes (SWCNTs) based FET phototransistors (CNFET) have demonstrated remarkable optoelectronics properties. Due to high leakage currents and trap densities at interface, thin and low dielectrics oxides are considered to be one of the major challenges in CNFET at 10 nm technology node. Also due to strong Columbic forces in low dimensional SWCNT, under photo illumination high energy excitons (~150 meV) are formed which can be disassociated further by making use of high dielectric material in the surrounding of SWCNT. This paper presents the analytical as well as TCAD modeling and simulation results for predicting the role of high dielectric gate oxides materials in scaling the strong bound photo excited excitons energy and improving the photo current in CNFET photodetector. It is observed that use of high dielectric oxides; HfO2 and ZrO2 shows the improvement in quantum capacitance and exciton dissociation rate as compared to low dielectric SiO2 and hence in enhanced performance of CNFET photo transistor. The analytical model developed considers only intra tube physics for excitons but inter tube excitons can also be explored for further performance improvement in CNFET photo detectors.**

Keywords - SWCNT, CNFET photo detector, Excitons , High-Dielectrics,Quantum Capacitance, photo current.

I. INTRODUCTION

Emerging needs for high speed infrared photodetectors, has motivated researchers to discover, develop and assemble graphene/carbon nano tube like nano materials in conventional photodetector architecture [1]. In recent years SWCNT based photodetectors have attracted strong interest due to their excellent opto electronics properties. Many researchers have demonstrated that SWCNT field effect transistors (CNFETs) outperform state-of-the-art silicon FETs due to their sustained electronic properties when integrated into conventional MOSFET structures. Three crucial factors that govern the performance of CNFET phototransistors are SWCNT's chemical nature, structural qualities and thickness of the gate oxide. The integration of high dielectric oxides into CNFET promises to push the performance limit at nanometer scales because of reduced leakage current and trap densities. Another performance limiting parameter in low dimensional CNFET photodetector is the presence of strong bound optical excitons due to strong Coulomb interactions. It has been predicted that large exciton binding energies of 300-400 meV are present due to the strong spatial confinement of the 1D structure of SWCNTs with diameters on the order of 1-2 nm. Hence to obtain substantial photo current in SWCNT, excitons should be separated in free charge carriers by an external or internal built- in electric field, before they relax to the ground state. Also, the photo generated carriers should be transported to the external electrodes minimizing the recombination and trapping processes. Due to SWCNT's one-dimensionality and the limited number of allowed electronic states, conduction in SWCNTs is quantized. Hence electrons travel through the nanotubes channel without experiencing scattering causing nearly ballistic conduction. SWCNTs having small diameters (up to 1 nm) shows near ballistic mechanism for channel lengths (~ 200 nm) [2, 3].

In this proposed Sentaurus TCAD based CNFET simulation approach; modeling is based on the principles of calculation of SWCNT charge, which is responsible for the current transportation. This charge developed on the SWCNT surface is due to the potential across SWCNT. Also the SWCNT potential is responsible for channel band alterations [1, 2]. The relatively low of SiO2 (at 3.9) limits its use in CNFETs as gate lengths scales down to tens of nano meter scales. High gate insulators afford high capacitance without relying on small thickness films, thus allowing for efficient charge injection into transistor channel reducing direct tunneling leakage effect. This has further motivated to explore about the integration of high -

films ~ (20– 30) as gate insulator. Therefore in the above CNTFET model, simulations carried out are

considering the integration of thin film HfO2 with high dielectrics (~ 30) into CNFET [4]. The model developed here is for a CNTFET which is integrated with semiconducting, zig-zag (n, 0) types of SWCNTs with different diameters and channel lengths. Also the model is valid as long as the SWCNT is behaving as semiconducting.

This paper is organized as follows: The structure and basic characteristics for CNFETs are discussed in Section 2. Section

3 describes the effect of all design parameters on the performance of CNFETs. Section 4 and 5 gives the results and discussion. Finally, a concluding remark is given.

II. DEVICE STRUCTURE

Schematic for proposed back gated CNFET photo detector is shown in fig. 1. Field-effect transistor (FET) configuration incorporating a single semiconducting SWCNT as the channel. The substrate is high doped silicon with a high dielectric oxide layer (10 to 100 nm thickness) as gate insulator. The spacing between the drain and the source electrodes can vary from 50 nm up to 200 nm.

III. THEORY

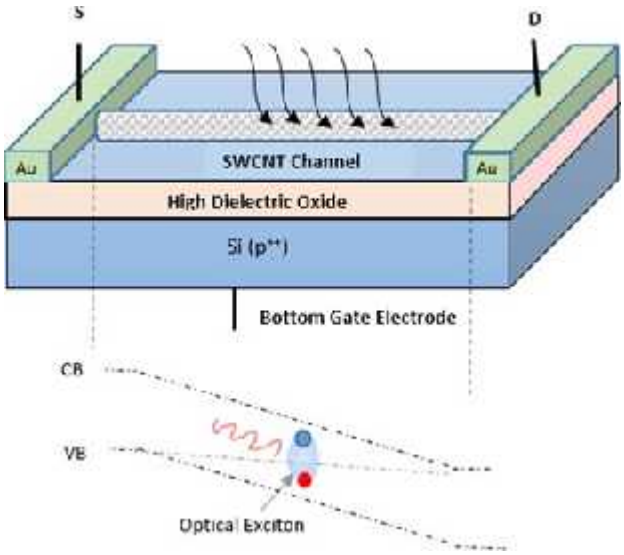

Fig. 1 Back Gated Structure of CNFET with high dielectric gate oxide.

The back gate (body) is at gate bias and all the potentials are taken with respect to the body (substrate). Transport characteristics are studied by applying a combination of drain– source bias (Vds) and gate voltage (Vgs) and measuring the current (Ids) flowing through the channel. In SWCNT based photo detectors, their opto electronics properties dictates the photo generation. In next section structural properties of SWCNTs are discussed in order to select appropriate SWCNTs in CNFET photo detector.

Density of States in s-SWCNTs:

Charge transport through SWCNT-based devices is often dominated by chirality of tubes. Thus, information about the structural properties of SWCNTs is vital for modeling the nanotube-based electronic devices. The density of states for SWCNT can be calculated using the equation in [5, 6].

$$D(E) = \frac{a\sqrt{3}}{\pi^2 R V_{ppπ}} \sum_q^{\infty} \frac{|E|}{\sqrt{E^2 - E_{qmin}^2}} \qquad (1)$$

Where Vppπ is the carbon-carbon (C-C) tight binding overlap energy, (3.033eV)

a is lattice vector magnitude (0.246 nm) R is the radius of nano tube.

Figure 2 indicate, nanotubes are unique materials in this aspect because all of the bands have a direct bandgap. Thus, for a single nanotube, there are multiple bands that can participate in direct opto-electronic events, spanning a wide range of energies.Further advantage in SWCNTs comes from its reduced dimensionality which results in low non radiative recombinations

Each SWCNT (n, m) has a unique set of interband transition. energies Eii denoting the energy differences between the i-th conduction and valence bands and optical transitions can only occur between these mirror sub-bands [5, 6]. These singularities are unique feature of nanotubes and also primarily responsible for many distinguished electronic and optical properties of SWCNTs. Many optical applications of semiconducting SWCNT require prior information of these optical transition energies.

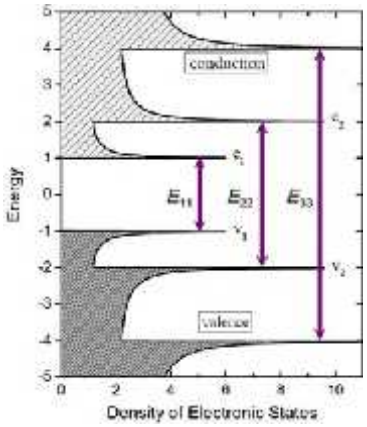

Fig.2 Schematic density of states diagram for s-SWCNTs, in a simple band theory model. Allowed optical transitions are illustrated as vertical arrows. [Ref .2]

Tight binding model with the nearest-neighbor approximation provides following simple expression

to calculate optical transitions of a semiconducting nanotubes.

$$E_{ii} = \frac{2ja_{cc}\gamma_0}{d}$$

Where,
γ0 is the nearest-neighbor hopping parameter, acc =1.44 Å is carbon-carbon bond length,

d is SWCNT diameter in nm, and j is an integer.

Eii corresponds to different interband transitions (E11 , E22 , E33 , E44….) of semiconducting SWCNT. Here, the first optical transition (E11) is the bandgap of semiconducting SWCNTs andthe second optical transition (E22) facilitates various opticaltransitions as it falls within visible energy range. Hence, forphoto absorption, first two optical transitions are mainlyconsidered. So, E11 and E22 of semiconducting SWCNTs are

more significant than other transitions and are of more interest [6,7].

Exciton Scaling:

For materials at reduced dimensionality many-body effects dominate the optical properties; carbon nanotubes are no more exception. The most important signature of many-body effects in optical properties are excitons, which are electron–hole pairs bound by the Coulomb interaction. Following sectionexplains that how exciton properties in SWCNTs can be scaled to enhance photo absorption.

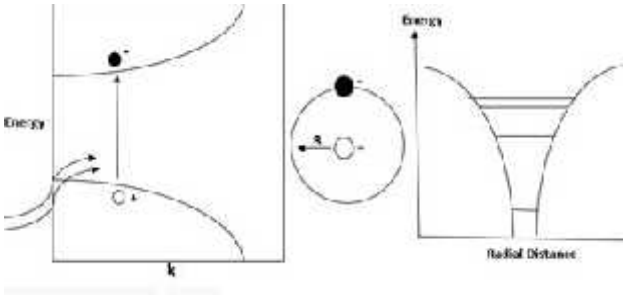

Fig 3 Illustration of exciton formation.

As shown in this figure 3, the excitation of an electron across the bandgap by the absorption of a photon leaves behind a positively charged hole. The attractive Coulomb interaction between the electron and the hole leads to a hydrogen-like bound state where the electron and hole are separated by the exciton radius. Much like the hydrogen atom, the attractive potential can lead to quantized energy levels, and the difference between the free electron energy and the energylevels is called the exciton binding energy. The lowest-energy excitons coming from the different band-to-band peakscorresponds to exciton binding energies of about 0.3-0.4 eV. In the exciton picture, an external electric field opposes the Coulomb attractive interaction between the electrons and the holes, and may cause dissociation of the exciton. Thus, understanding the impact of electric fields on excitons is important for device design, and to evaluate when the single particle, band-to-band picture is appropriate [8].

$$E_b = A_5(r/a_g)^{\alpha-2}(m/m_e)^{\alpha-1}\varepsilon^{-\alpha} \qquad (3)$$

Exciton binding energy Eb scales with the SWCNT radius r, effective mass m, and dielectric constant as shown in equation3. After optical excitation in SWCNT, electrons and holes remain in an excitonic state with high binding energies ofabout 0.3-0.4 eV depending on the tube diameter. Hence, charge separation into free carriers can be only achieved through an external bias, appropriate dielectric environment or an internal electrical field via Schottky-barrier.

Exciton dissociation rate decides the photocurrent generation rate in SWCNT based photodetector and is given by an expression.

$$\Gamma_0 = \alpha E_b \frac{E_0}{E} Exp\left(\frac{E_0}{E}\right) \qquad (4)$$

Where Eb is the binding energy, E is the applied field, E0 is the critical field, and α = 4.1 is a constant.

In optoelectronic devices such as photodetectors, electric fieldsin the form of applied voltages or band-bending due to dopingare usually utilized to separate the charge carriers. In the exciton picture, these electric fields oppose the Coulomb attractive interaction between the electrons and the holes, and may cause dissociation of the exciton. Thus, understanding the impact of electric fields on excitons is important for device design, and to evaluate when the single particle, band-to-band

picture might be appropriate. Thus, the dissociation rate increases exponentially with increase in the electric field [9,10].ANALYTICAL MODEEL OF CNFET

The SWCNT is defined by the chiral number (n, m) which is responsible for its electronic properties. Circumferential vector Ch is the linear combination of a1 and a2 with n and m as integers.

$$C_h = na_1 + ma_2$$

a1 and a2 are the unit vectors along the unit cell in graphene lattice.The diameter of the carbon nanotube is directly dependent onchirality and is given as [11].

$$d = \frac{\sqrt{3}a}{\pi}\sqrt{n^2 + m^2 + 2nm}$$

Where a is the inter-atomic distance between carbon atoms and its value is 0.142 nm [11].

Tunable energy bandgap in the SWCNTs is the basis for all its remarkable opto electronics properties and becomes fundamental for photo detection applications of SWCNTs as channel in field effect transistors. The value of bandgap in SWCNT is dependent on its diameter [12] and is given as

$$E_g = \frac{2a V_{pp\pi}}{\sqrt{3}d} \quad (7)$$

Where Vppπ is the carbon π–π bond energy and its value is

3.033 eV [13].The value for conduction band minima for first subband (Ec = Ecmin = Δ1) can be given as 0.45/d. It is observed that for a large diameter the bandgap is very small and hence there will be considerably large Ioff. Due to this the preferred range of diameter is 1–3 nm.The other important aspect is the consideration of other subbands for the calculation of charge and current because totalcurrent is the sum of all conduction band minima. Thecalculation of pth conduction band minima (Δp) is given as

$$\Delta_p = \Delta_1 \frac{(6p - 3 - (-1)^p)}{4}$$

For nanotube of diameter 1 nm, their first two subbands will be

0.45 and 0.9 respectively. Here higher subbands are ignored because the higher subbands have negligible contribution in current due to vanishing exponential behavior of the fermi distribution.

The transport mechanism in SWCNT which is dependent on the intrinsic charge carrier concentration [11] can be calculated as:

$$n_{SWCNT} = \int_{E_C}^{\infty} D(E) f(E) dE \quad (9)$$

D(E), f(E) represents the density of states, Fermi–Dirac distribution in SWCNT respectively. D(E) and f(E) values are calculated as:

$$D(E)dE = 2\sum_{1}^{All\ Bands} \frac{4}{\pi V_{pp\pi} a\sqrt{3}} \frac{E}{\sqrt{E^2 - E_c}} dE \quad (10)$$

EC is the conduction band energy. The density of states value is calculated for the first sub band only since in SWCNTs the contributions of next level sub bands is negligible.

$$f(E) = \frac{1}{1 - exp\frac{E - E_f}{KT}} \quad (11)$$

T is the operating temperature, K is the Boltzmann constant, and EF is the first sub band Fermi level value in SWCNT.

Where

$$N_C = \frac{8KT}{\pi V_{pp\pi} a\sqrt{3}} \quad (12)$$

And

$$I = \frac{1}{\sqrt{KT}} \int_0^{\frac{qE_C}{T}} \frac{(KT_X + E_C)}{\sqrt{x(KT_X + 2E_C)}} exp(-x) dx \quad (13)$$

Channel current calculation [12] is done using an expression in equation 13. Potential developed across SWCNT due to gate voltage (VGS). The value for the required gate voltage can be calculated as:

$$V_{SWCNT} = V_{GS} - \frac{Q_{SWCNT}}{C} \quad (14)$$

Where qSWCNT is charge developed across SWCNT interface

with oxide layer and C is equivalent capacitance.

The capacitance model includes all the contributing capacitances. There will be induced potential developed across the SWCNT and oxide interface due to the applied gate voltage. Figure 4 illustrates the role of various capacitances in the development of potential across the SWCNT (VSWCNT). In the ballistic limit, the quantum capacitance limit arises due to relatively large oxide capacitance [13].

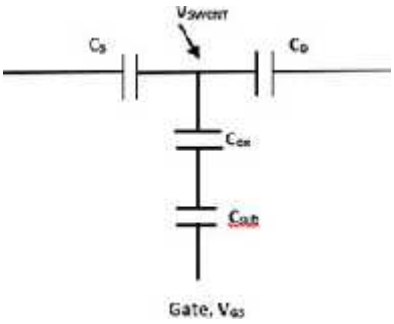

Figure 4. Capacitance model with surface potential VSWCNT The value of source capacitance Cs and drain capacitance CD are given as Cs = 0.097Cox

and CD = 0.040Cox. The value of Cox and Csub depends on dielectric constant value of the material used along with thickness and radius of carbon nanotube and given as:

$$C_{ox} = \frac{2\pi\epsilon_0\epsilon_{r1}}{ln\frac{t_{ox}+r}{r}} \quad (15)$$

$$C_{sub} = \frac{2\pi\epsilon_0\epsilon_{r2}}{ln\frac{2t_{sub}}{r}} \quad (16)$$

where ϵr1 and ϵr2 are dielectric constant of oxide and substrate material, tox and tsub are thickness of oxide and substrate respectively.

The value of qSWCNT is given as:

$$q_{SWCNT} = \frac{s}{2} n_{SWCNT} exp\left(\frac{V_{channel}}{k_B T}\right)\left[1 + exp\left(\frac{-V_{DS}}{k_B T}\right)\right] \quad (17)$$

The calculated values of Cox, Csub and qSWCNT are multiplied by the length of the SWCNT for further calculations.

Effective gate bias (Veff) that is to be applied at gate terminal can be calculated as:

$$V_{eff} = V_{GS} + V_{FB} \quad (18)$$

The final step is to calculate drain current [12] which can be calculated as:

$$I_{DS} = \frac{4ek_B T}{h}\sum_p \{ln[1 + exp(\xi_S)] - ln[1 + exp(\xi_D)]\} \quad (19)$$

where h is Plank's constant and the value of S and D is given by:

$$\xi_t = \frac{V_{SWCNT} - \Delta_p + F_t}{k_B T} \qquad t = S, D \quad (20)$$

where FS and FD are the fermi level of source and drain. The source fermi level may be assumed to be at reference potential

as FS = 0. The value of FD will be eVDS (eV) lower than the FS.It may be written as FD = FS - eVDS, where e is electronic charge [14]

IV OPTIMUM S-SWCNT PARAMETERS

4.1 SWCNT structural and electronics parameters

This section presents analytical calculated parameters of s- SWCNTs to optimize the design of the CNFET. It is designed in terms of optimum structural device parameters such as SWCNT diameter, bandgap energy in addition to the selection of operating supply voltage. Further the cut off wavelength is also calculated to decide the operating wavelength range for CNFET optical detector. The values calculated are tabulated in table 1.

Table 1: Diameter, bandgap and upper cut off wavelength in different chiral SWCNTs

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Table 1: Diameter, bandgap and upper cut off wavelength in different chiral SWCNTs

Chiral Indices (n,m)	**Diameter (nm)**	**Bandgap (eV)**	**Cutoff wavelength λc** $\lambda_c(\mu m) = \frac{E_g}{E_g(eV)}$
(5,0)	0.39	2.20	0.5635
(7,0)	0.55	1.57	0.7889
(9,0)	0.70	1.22	1.0143
(11,0)	0.86	1.00	1.2397
(13,0)	1.02	0.85	1.4651
(15,0)	1.17	0.73	1.6905
(17,0)	1.33	0.65	1.9159
(19,0)	1.49	0.58	2.1413
(21,0)	1.64	0.52	2.3667
(23,0)	1.80	0.48	2.5921

4.2 High Dielectric Material:

To improve the optical absorption with exciton energy scaling, a thinner gate insulator with a higher dielectric constant can be used. Recently, high dielectric materials such as ZrO2 and HfO2 thin films have also been employed as the insulator in CNFETs [15]. The high dielectric materials that are generally employed in CNFET are listed in Table 2 along with their dielectric constants (κox)

Table 2: Exciton energy for different dielectric materials.

Dielectric Materia	**Kox**	**Eb(eV)**

l		
SiO2	3.9	1.827
HfO2	15.6	0.262
ZrO2	19	0.199

4.3 Contact Material.

The contact between semiconducting SWCNT and metal is generally modeled as a Schottky barrier (SB), resulting from the Fermi level mismatch between semiconducting SWCNT and metal electrode [14] For a typical n-type SWCNT transistor, the metal with high work function forms small SB height contact, schematically, where the Fermi level of the metal aligns well with the valence band of the SWCNT. By eliminating the Schottky barrier between the source contact and source material, the transistor will be capable of delivering more on-current. Palladium (Pd) and gold (Au), are noble metals with high work function and good wetting interactions with SWCNT, has been found with good electrical contact to s-SWCNTs. As shown in figure 1, the contact metal Au is used at the source and drain electrodes in the CNFET photo detector.

V. RESULTS AND DISCUSSION

Analytical model is developed by investigating the electronic structure and corresponding analytical expressions provided insection IV. Complete understanding of the surrounding dielectric effects on transition energies in SWCNTs is necessary to understand the optical absorption properties of SWNTs. In this section, the effects of the dielectric screening, with different chiral nano tubes are discussed.

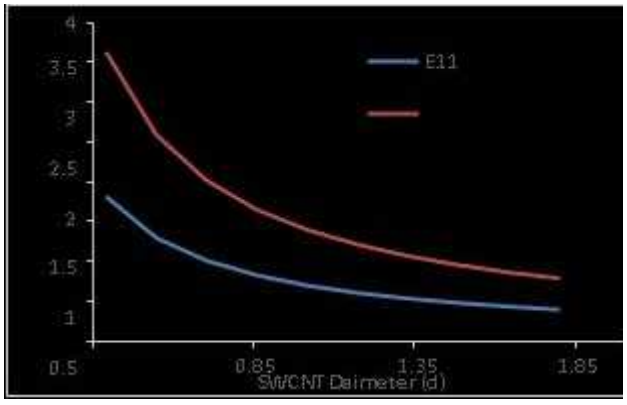

Fig. 5 Optical transition energies, E11 and E22 in s-SWCNT

As seen in figure 5, corresponding optical transition energies to the first two subbands (E11 and E22) shows a linear dependence with nanotube diameter and hence selecting an appropriate chiral nanotube as an active channel in CNFET is very important.

With the dielectric constant increases, the energies of both electron-electron and electron hole interactions are decreased and results in the reduction of the exciton binding energy. Scaling in exciton binding energy causes a shift in the optical transition energy because of the negative energy as shown in

figure 6.

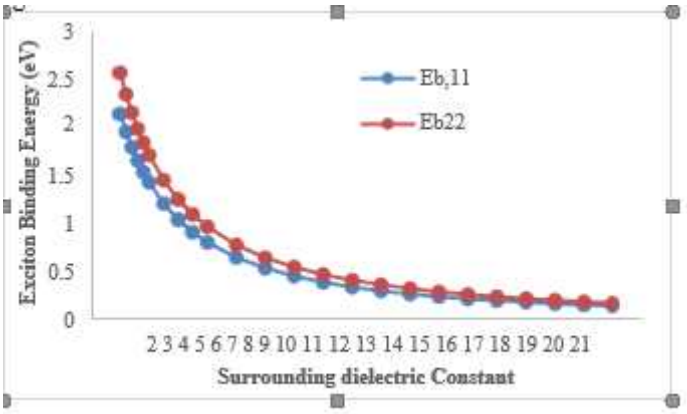

Fig 6. Scaling relationships for excitons binding energy as a function of surrounding dielectric constant

This is due to the fact that the repulsion energy is larger in magnitude than the exciton binding energy.

5.1.1 Carrier Mobility

Carrier Mobility (μ) in SWCNT is affected by its length as well as diameter. An empirical expression in equation 21 is used to model μ

$$\mu = \mu_0 \frac{L_g}{L_g + \lambda_\mu} (d^{c_\mu}) \qquad (21)$$

Where

d SWCNT diameter (nm)

μ0= 1350 cm2/V·s,

λμ = 66.2 nm, and cμ = 1.5 are empirical parameters.

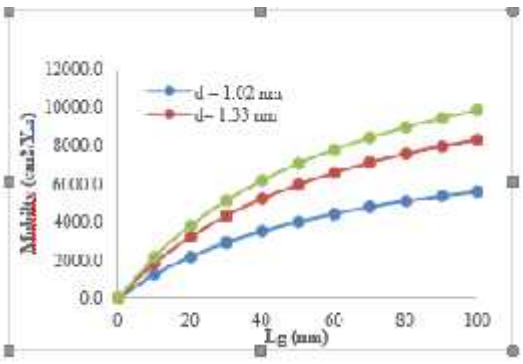

Fig.7. Variation in Low field mobility in s-SWCNT with

nanotube length at different diameter.

Threshold Voltage:

Threshold voltage of a CNFET in terms of the diameter of SWCNT is given by equation 22.

$$V_{th} = \frac{a(V_\pi)}{\sqrt{3}qD_{CNT}} \qquad (22)$$

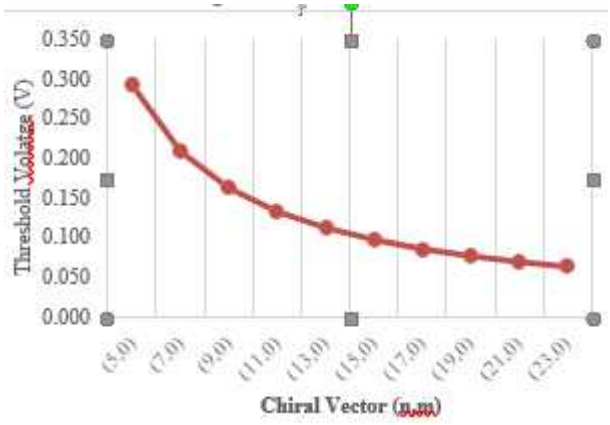

Fig. 8 Threshold voltage variation with increasing chirality

Chirality based change in threshold voltage can be observed in figure 8. Thus, CNTFETs provide a unique opportunity to control threshold voltage by changing the chirality vector, or the diameter of the SWCNT.

After selecting the best design parameters and ensuring by the analytical results that high performance is obtained for the CNFET device, these parameters are then applied in CNFET photodetector TCAD simulation.

5.2 CNFET Simulation

2D simulation of CNFET is carried out in Sentaurus TCAD to calculate opto electrical parameters. There are several physical models available in TCAD software to design semiconductor devices. Simulator makes use of the Poisson's and drift diffusion formulation discretized over a multidimensional numerical mesh [14]. The Coupled and Quasistationary commands are used to solve a set of equations and to ramp a solution from one boundary condition to another respectively. The Coupled command activates a Newton-like solver over a set of equations includes the Poisson equation, continuity and the different thermal and energy equations [14]. With very small dimensions of CNFET; some quantum modifications are added to the simulation for results to be closer to the real condition [15, 16]. Optical generation is computed using the transfer matrix method (TMM) which is based on the propagation of plane waves through layered media in CNFET. The use of appropriate model and material parameters is necessary for the simulation of devices in Sentaurus TCAD. Table 1 lists models used for simulation of CNFET phototransistor.

Table 3: Models used for CNFET Simulation [14]

Sr. No.	Models	Function
1.	Drift-Diffusion model	Carrier photo generation
2.	Doping Dependent Mobility model	Mobility of Carriers
3.	Shockley-Read-Hall (SRH)	Defect recombination
4.	Transfer Matrix Method (TMM)	Reflection, transmission and absorption in each layer
5.	Poisson and continuity equations	Current-Voltage characteristics

The parameters tabulated in table 2 are defined for n-SWCNT during CNFET simulation.

Table 4. n-SWCNT Material Parameters [3, 4, 6, 8, 10, 18]

Parameter	**Description**	**Value**
ε_r	Relative Permittivity	(10-15)
$\mu n(cm^2/V\text{-}s)$	Electron mobility	10000
$\mu p(cm^2/V\text{-}s)$	Hole mobility	10000
$\chi 0$ (eV)	Electron Affinity	4.07
λint (nm)	Mean free path: Intrinsic SWCNT	200
$\lambda doped$(nm)	Mean free path: Doped n-SWCNT	15
$\mathcal{W}$(eV)	Work function (Al Contact & n-SWCNT)	4.15

In these simulation experiments, the channel length of the CNFET is adjusted at 32 nm to be identical with that of Si- MOSFET for a fair comparison.

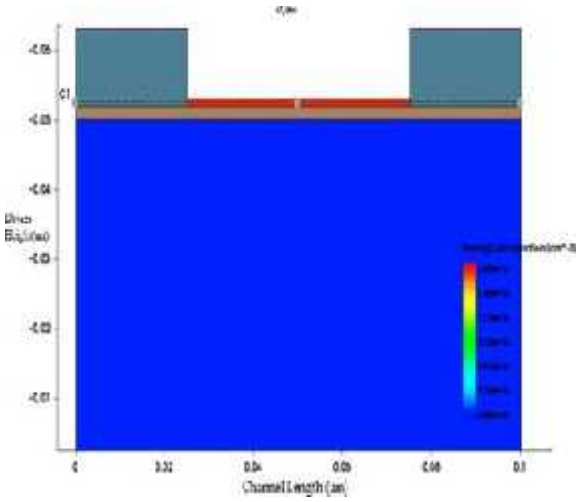

Fig. 9. CNFET structure: (sde_dvs.cmd)

Optical generation in CNFET is activated by illuminating from top using a monochromatic light

source whose spectral range varied from 600 nm to 1550 nm. The TMM optical solver requires the use of the complex refractive index model,and various excitation variables, all such excitation variables specified in TMM are listed in table 5

Table 5. Excitation Variables used for Optical Generation [17

Optical Intensity [W/cm^2]	500
Wavelength [nm]	600 - 1550
Theta [deg]	0 (Normal Incidence)
Polarization Angle [deg]	1 (Unpolarized light)

Figure 10 presents the photocurrent in CNFET at different biasing under dark and illumination. It can be observed that drain current increases with the illumination. This is because with the illumination a forward biasing potential is developed across the SWCNT active layer which increases the channel potential. Also, the photosensitivity of CNFET is highly dependent on the bias voltage, from the plot it can be seen that both photocurrent and dark current are increasing with the increasing bias voltage

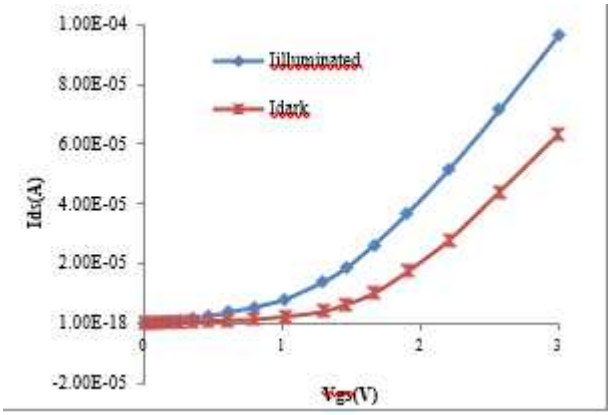

Fig. 10. Ids -Vgs under dark and illumination. (Vds =0.01 V)

Transfer characteristics are derived for constant Vds = 0.01 V.

The simulation results for CNFET's with 100 nm channel length is shown in figure 11. Drain current is increasing with the input voltage Vgs. It is observed from the above plot that SWCNT provides the high channel mobility so automatically current increases with increasing bias.

4.3 Gate Oxide Dependence

The relatively low dielectric oxide such as SiO2 brings limitations for its use as gate oxide in scaled CNFETs due to high leakage current. With high dielectric gate oxides small thickness deposition is possible and hence allows efficient charge injection into an active channel reducing leakage current. This has further motivated to explore about the integration of high- films (~20-30) as gate oxide. The dielectric materials considered for gate oxide during the simulation are listed in the table 2. Gate oxide dielectric material dependent output characteristics of CNFET are shown in Figure 11, where the thickness of the gate insulator is kept 50 nm.

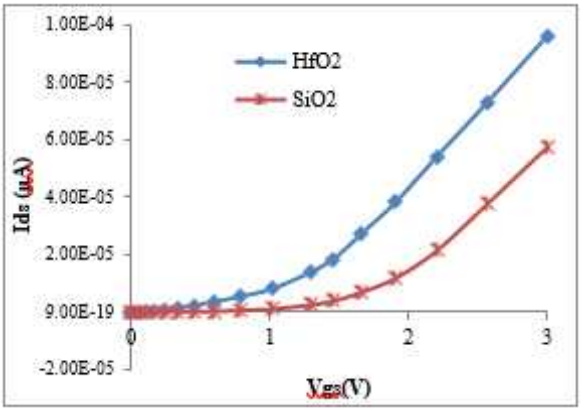

Fig. 11. Ids–Vgs curves of CNFET with SiO2 and HfO2 gate oxides.

The results are obtained for the ramping gate bias Vgs from 0 to 3 V, with drain bias Vds fixed at 0.01 V. For the low dielectric constant of SiO2 (3.9), the channel current in CNFET is 0.574 µA at Vgs = 3V. But with the high dielectric constant, the drain current increases to 0.962 µA. This rise in the drain current is because of high dielectric HfO2 oxide. Sheikh Ziauddin Ahmed et al found that with more than 50 % rise in ON current when HfO2 is used as the gate dielectric [16]. This justifies our results obtained by Sentaurus TCAD simulation software.

4.4 Verification and Validation

Table 6 shows the comparative study of the channel current, Ids for the analytical, TCAD simulation model with the experimental data form reference models. It shows that the optically generated current for the model developed is comparable to the reference model.

Table 6: Comparison of Ids for the model developed with [17, 18]

Vgs (V)	Ids (A) Simulated Chirality (11,0) &Eg=1.0eV, Lg=100nm	Ids (A) Analytical Chirality (11,0) &Eg=1.0eV, Lg=100nm	Ids (A) Reference [27] Chirality(25,0)&, Lg=100 nm	Ids (A) Reference [31] Chirality(13, 0) &Eg=0.85eV, Lg= 50nm
0	7.80E-09	2.03E-09	3.02E-08	1.7E-08
0.5	2.34E-06	3.92E-08	2.9E-06	2.71E-08
1	7.99E-06	9.84E-07	8.3E-06	5.12E-07

1.5	1.84E-05	4.57E-06	1.23E-05	3.21E-06
2	3.68E-05	9.91E-06	---	7.56E-06

VI. CONCLUSION

Based on the SWCNT optical exciton binding energy scaling relations with tube's radius and surrounding dielectric constant ε, for the exciton and optical transition energies, the absorption properties of s-SWCNTs are studied. Through the analytical model, it is observed that exciton energy, E11 andE22 optical transition energy and quantum capacitance decreases with increasing surrounding dielectric oxide strength. TCAD simulation model of CNFET photo detector shows an improvement in photo current at scaled exciton energy

Use of high dielectric oxide material shows exciton energy scaling and improvement in CNFET optical absorption. Role of an external electric field can also be accounted in this study to scale of exciton energy further which could lead to even greater performance enhancements of CNFET photo detector,

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Characterization of GaAs OPFET Models for Switching Applications

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***Abstract*—Visible-Light Communication (VLC) application such as traffic lighting requires high speed data transmission wherein at the receiving end, a fast response photo detector should decode the sent data. High speed detection is achievable through a photo FET such as Optical Field Effect Transistor (OPFET) while maintaining very high photocurrent gain or sensitivity. In this paper, we analyze the switching responses of various GaAs OPFET models (buried-gate, generalized, and front-illuminated models). The effect of structural parameters on the switching responses of the buried-gate OPFET models has been studied. The switching parameters-dependence upon the optical power has been analyzed. The attained responses suggest that the devices will serve good purpose in switching applications. To estimate the robustness of the investigated devices towards electro migration failure at the gate metallization contact we calculated the reliability of the devices and found the least Mean- Time-to-Failure (MTTF) of 5.1×105 hours in the generalized model even at a high flux density of 1024 /m2-s. Thus, the devices show reliable operation.**

Index Terms— Visible-Light Communication (VLC), traffic lighting, Optical Field Effect Transistor (OPFET), generalized model, buried-gate model, front-illuminated model, switching, reliability.

I. INTRODUCTION

Visible-Light Communication (VLC) has potential applications including Li-Fi (Light-Fidelity) Networks, vehicle to vehicle communication, robots in hospitals, underwater communication, and information displayed on sign boards [1]. Out of these, automotive applications such as traffic lighting should possess fast switching, and high gain-bandwidth product photo detectors. The present state-of-art involving the p-i-n and the avalanche photodiodes (APDs) exhibit low gain-bandwidth product and reasonably fast response [2]-[7]. Other proposed photo detectors in the visible region have response times in milliseconds to seconds range [8]-[10]. To enhance the gain- bandwidth product while maintaining fast switching response, we propose a FET based photo detector viz. Optical Field Effect Transistor (OPFET) or optically-controlled Metal- Semiconductor Field Effect Transistor. This device has been extensively investigated over the years for its potential applications as photo detectors, optically-controlled amplifiers, oscillators, and switches, and has so far delivered very high gain, moderately high bandwidth, and fast switching in the nanoseconds to picoseconds range [11]-[18]. The most widely investigated material system for this device has been GaAs. GaAs possesses high electron mobility, high carrier saturation velocity, moderately high absorption coefficient in the visible region, short hole lifetime in n-type material and long electron lifetime. In the research on the GaAs OPFET till now, there has been lack of analysis of the switching performance of the GaAs OPFET considering different illumination models viz. the buried-gate, generalized, and front-illuminated models except [15] in the case of front-illuminated OPFET. Thus, in this paper, we carry out the switching performance analysis of the GaAs OPFET illumination models and study the effect of the structural parameters on the switching responses of the buried-gate OPFET. To the best of the authors' knowledge, there have been no reports on the reliability of the OPFET detectors although the reliability of MESFET device has been widely investigated [19]-[20]. In this work, the Mean-Time-to- Failure (MTTF) of the gate metallization contact in the studied OPFET detectors has been computed to indicate their reliability under normal operating bias conditions and at various radiation flux densities.

We perform a semi-analytical simulation to obtain the switching characteristics of the OPFET device. Analytical method is applied for the solution of the photogene rated electron-hole continuity equations in the channel and the depletion regions. The charge components have been computed by numerical integration using Trapezoidal method. The total drain-to-source current is estimated following the model presented in [21]. Trap effects are neglected in this work.

We begin with a brief theory of the OPFET device followed by the results and the corresponding analysis, and conclude with the summary of the work done.

II. THEORY

The structure of the buried-gate OPFET device with front illumination is presented in Fig. 1. The gate is shorted to source for a reduction in the number of power supplies. The substrate material is p-type semi-insulating (SI) whereas the active layer is n-type. The channel and substrate regions are uniformly moderately doped. In the buried-gate front- illuminated model, the radiation enters the device through the active layer. Illumination is followed by absorption in the semiconductor material with subsequent generation of electron-hole pairs in the neutral channel and the space charge regions. The photogenerated holes travel toward the Schottky junction while the electrons move in the direction of the channel. The electrons contribute to the drain-to-source current by increasing the conductivity of the channel. The holes crossing the junction develop a photovoltage which reduces the depletion width and boosts the drain-to-source current. The series resistances present in the gate-to- source/drain spacings limit the total current through the voltage drop developed across these resistances. The gate is considered opaque, hence, there is no substrate effect. The modeling of the front-illuminated buried-gate OPFET has been described in [17]. The other two models considered in this work (front-illuminated OPFET and generalized model of OPFET) have similar overall structure as shown in Fig. 1 with the difference that the gate is in contact with semiconductor surface. In the 1st case, only the transparent Au gate is illuminated whereas in the 2nd case, the spacings between the gate and source, and the gate and drain are illuminated in addition to the gate area. The absorption of photons with energy greater than the bandgap of GaN in the regions below the gate (1st case and 2nd case) and the sidewalls of the gate depletion region (2nd case) creates electron-hole pairs in the respective regions. The modeling of the above two device is provided in [16], [18].

The total drain-to-source current is given by [21]:

$$I_{ds} = I_{dso}(1+\lambda V_{DS})\tanh(\eta V_{DS}) \quad (1)$$

Where the symbols have the same meaning as stated in [21]. The modelling of series resistances has been referred from [22].

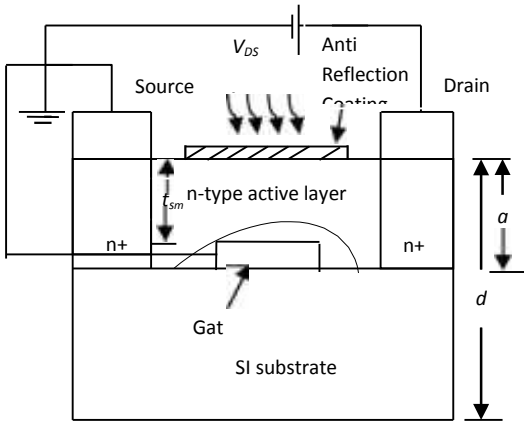

Fig. 1. The schematic structure of the front-illuminated buried-gate OPFET

III. RESULTS AND DISCUSSION

A. Simulation Set-up and Representation of Results:

MATLAB software with MEX coding feature has been utilized for the OPFET device simulations. The gate-to-source voltage is set to 0 V whereas the drain-to-source voltage is variable. The specific device parameters are obtained with the device biased in the deep saturation region for higher sensitivity and larger amplification bandwidth. The operating wavelength is 600 nm. The photon flux densities of 1012, 1015, 1018, 1021, and 1024 /m2-s used in these simulations correspond to optical power densities of 33 pW/cm2, 33 nW/cm2, 33 µW/cm2, 33 mW/cm2, and 33 W/cm2 respectively. Structural optimization of the switching response is carried out over a wide range of dimensions with gate length from 3 µm to 8 µm; the structural parameters being chosen from the scaling rules [23]. Only the most relevant four sets are provided here for comparison. Refer to Table I for the comparative switching performance results of the OPFET models. Parameters used in the calculation are given in Table II.

B. Series Resistance and Photo voltage:

Compared to the surface gate devices, such as the generalized and the front-illuminated devices, the buried-gate structures exhibit lower series source and drain resistances [24]. On account of the lower series resistances, the dark current is higher in the buried-gate device. The buried-gate device exhibits high photo voltages of (0.28 V, 0.46 V, 0.64 V,0.82 V, and 0.98 V) which are significantly lower than the generalized model (0.697 V, 1.23 V, 1.77 V, 2.3 V, and 2.79V) but same as that in the front-illuminated OPFET. The high photo voltages developed in the buried-gate and the front- illuminated models are owing

to their inherent structure and the significantly large number of carriers being generated in the depletion region that are transported by the built-in electric field enabling them to cross the Schottky junction. There is no difference between the photo voltages generated in the two structures since GaAs possesse moderate absorption coefficient (4×106 /m) which signifies that the absorption depth is 0.25 µm, large enough to create significant number of holes in the depletion region no matter how the device is illuminated. The generalized model shows much higher photo voltages than these two structures due to the additional contribution from the sidewalls of the gate depletion region. The change in dimensions has no effect on the photovoltage developed in the buried-gate OPFET again due to the moderate absorption coefficient of GaAs with the corresponding absorption depth large enough for the carrier generation in the depletion region.

C. Switching time and drain-to-source current in the buried-gate OPFET at the gate length of 3 µm:

The switching time is defined as the ratio of the total space charge in the gate depletion region and its sidewalls to the total drain-to-source current and is the average of the rise and fall times of the pulse response. This corresponds to how fast the device responds to transition between light off to light on and vice versa. Considering the buried-gate device with the gate length of 3 µm, the space charge created is the lowest among all the sets (0.63 pC/m, 0.6 pC/m, 0.58 pC/m, 0.55 pC/m, 0.56 pC/m, and 0.046 pC/m) owing to the reduced overall dimensions and the higher doping concentration. This higher doping concentration reduces the depletion width and thus the space charge slightly since the major portion of the channel area is depleted, device being deeply biased in the saturation region. The overall result is the lower space charge superseding the effect of the higher doping induced charge. The total drain-to-source current obtained is also the lowest among all the sets (10.1 mA, 12.5 mA, 14 mA, 15.8 mA, 18.9 mA, and 254.5 mA) again due to the reduced dimensions surpassing the effect of higher doping concentration and doping induced charge. But the decrease of space charge is of greater magnitude than that of the drain-to-source current resulting in the lowest switching times (62 ps, 48 ps, 41 ps, 35ps, 29.5 ps, and 0.18 ps). One more factor which favours the existence of the lowest space charge and current is that at a fixed photovoltage, the depletion width sensitivity to applied illumination is lower at higher doping concentration. The space charge is almost insensitive to the applied optical power except at the flux density of 1024 /m2-s since the developed photovoltage is not high enough to significantly reduce the overall depletion width, device being deeply biased in the saturation region. At the flux density of 1024 /m2-s, due to the high optical power involved, the photogenerated carrier density in the depletion region is high and comparable to the doping induced charge thus de-ionizing the space charge ions significantly and consequently causing a fall in the space charge.

In contrast to the space charge, the drain current shows significant sensitivity to illumination. This is because, the current depends upon the charge in the effective undepleted channel area at the source end of the device in the presence and absence of series resistances [21]. Referring to (1), the total drain-to-source current is constituted by two quantities: the saturation current and the drain-to-source conductance evaluated at VDS=0 V. The saturation current is estimated from the said charge in the presence of source series resistance. The drain-to-source conductance depends upon the channel conductance evaluated at VDS=0 V limited by the source and drain series resistances. The channel conductance is computed from the charge in the absence of series resistances. Thus from (1), the total current is directly proportional to the calculated saturation current and also to the quantity ηVDS through the hyberbolic tangent expression where η is given by the ratio of the drain-to-source conductance and the saturation current. Hence, the saturation current also limits the total current. The significant sensitivity to illumination in the case of current is owing to the significant photovoltaic effect at the lower intensities which considerably affects the saturation and the conductance components of

GaAs front-illuminated model of OPFET with Au gate (v_{gs}=0 V, V_{ds}=16.4 V, λ=600 nm (visible))
(L=4 µm, Z=150 µm, t_{sm}=0.3 µm, N_{dr}=4×10^{22}/m^3)

Photon Flux Density (/m^2-s)	Photo-voltage (V)	Drain-to-source current (A)	Switching Time (s)	Trans-con-ductance (S)	Gate-to-source capacitance (F)	f_T (Hz)	RC Time Constant (s)	Space Charge (C/m)
0	0	10.2 mA	0.11 ns	7.6 mS	0.135 pF	9.02 GHz	17.6 ps	1.1 pC/m
10^{12}	0.28 V	12.9 mA	85 ps	9.4 mS	0.16 pF	9.3 GHz	17 ps	1.09 pC/m
10^{15}	0.46 V	14.5 mA	73 ps	10.9 mS	0.18 pF	9.61 GHz	16.5 ps	1.06 pC/m
10^{18}	0.64 V	16.4 mA	63 ps	12.3 mS	0.23 pF	8.6 GHz	18.5 ps	1.03 pC/m
10^{21}	0.82 V	21.4 mA	44.5 ps	15.7 mS	0.24 pF	10.3 GHz	15.4 ps	0.95 pC/m
10^{24}	0.98 V	269.8 mA	0.25 ps	99.3 mS	0 pF	------	-----	0.07 pC/m

Table 1 Comparative Studies of GaAs

Photon Flux Density ($/m^2$-s)	**Photo-voltage (V)**	**Drain-to-source current (A)**	**Switching Time (s)**	**Trans-conductance (S)**	**Gate-to-source capacitance (F)**	**f_T (Hz)**	**RC Time Constant (s)**	**Space Charge (C/m)**
GaAs buried-gate front-illuminated OPFET with Au gate (v_{gs}=0 V, V_{ds}=10 V, λ=600 nm (visible)) **1st Set** (L=3 μm, Z=100 μm, t_{sm}=0.27 μm, N_{dr}=5×10^{22}/m^3)								
0	0	10.1 mA	62 ps	7.6 mS	0.095 pF	12.7 GHz	12.5 ps	0.63 pC/m
10^{12}	0.28 V	12.5 mA	48 ps	7.4 mS	0.11 pF	10.7 GHz	15 ps	0.6 pC/m
10^{15}	0.46 V	14 mA	41 ps	8.4 mS	0.13 pF	10.4 GHz	15.3 ps	0.58 pC/m
10^{18}	0.64 V	15.8 mA	35 ps	9.4 mS	0.16 pF	9.4 GHz	17 ps	0.55 pC/m
10^{21}	0.82 V	18.9 mA	29.5 ps	14.3 mS	0.24 pF	9.5 GHz	16.6 ps	0.56 pC/m
10^{24}	0.98 V	254.5 mA	0.18 ps	0 mS	0 pF	------	-----	0.04 pC/m
GaAs buried-gate front-illuminated OPFET with Au gate (v_{gs}=0 V, V_{ds}=16.4 V, λ=600 nm (visible)) **2nd Set** (L=4 μm, Z=150 μm, t_{sm}=0.3 μm, N_{dr}=4×10^{22}/m^3)								
Photon Flux Density ($/m^2$-s)	**Photo-voltage (V)**	**Drain-to-source current (A)**	**Switching Time (s)**	**Trans-conductance (S)**	**Gate-to-source capacitance (F)**	**f_T (Hz)**	**RC Time Constant (s)**	**Space Charge (C/m)**
0	0	12.9 mA	88 ps	9.7 mS	0.135 pF	11.5 GHz	14 ps	1.1 pC/m
10^{12}	0.28 V	15.9 mA	68.8 ps	9.4 mS	0.16 pF	9.41 GHz	17 ps	1.09 pC/m
10^{15}	0.46 V	17.9 mA	59.4 ps	10.6 mS	0.18 pF	9.46 GHz	17 ps	1.06 pC/m
10^{18}	0.64 V	20.1 mA	51 ps	12 mS	0.23 pF	8.4 GHz	19 ps	1.03 pC/m
10^{21}	0.82 V	24.8 mA	40.7 ps	14.8 mS	0.24 pF	9.8 GHz	16 ps	1.01 pC/m
10^{24}	0.98 V	445 mA	0.15 ps	0 mS	0 pF	------	-----	0.07 pC/m
GaAs buried-gate front-illuminated OPFET with Au gate (v_{gs}=0 V, V_{ds}=20 V, λ=600 nm (visible)) **3rd Set** (L=5 μm, Z=200 μm, t_{sm}=0.4 μm, N_{dr}=3.2×10^{22}/m^3)								
Photon Flux Density ($/m^2$-s)	**Photo-voltage (V)**	**Drain-to-source current (A)**	**Switching Time (s)**	**Trans-conductance (S)**	**Gate-to-source capacitance (F)**	**f_T (Hz)**	**RC Time Constant (s)**	**Space Charge (C/m)**
0	0	22.7 mA	86 ps	10 mS	0.2 pF	7.68 GHz	21 ps	1.9 pC/m
10^{12}	0.28 V	25.6 mA	73.6 ps	11.6 mS	0.236 pF	7.82 GHz	20 ps	1.88 pC/m
10^{15}	0.46 V	28 mA	66 ps	12.7 mS	0.265 pF	7.63 GHz	21 ps	1.8 pC/m
10^{18}	0.64 V	30.6 mA	58 ps	13.9 mS	0.33 pF	6.69 GHz	24 ps	1.78 pC/m
10^{21}	0.82 V	37.7 mA	47 ps	16.6 mS	0.5 pF	5.26 GHz	30 ps	1.77 pC/m
10^{24}	0.98 V	617 mA	0.21 ps	0 mS	0 pF	------	-----	0.13 pC/m
GaAs buried-gate front-illuminated OPFET with Au gate (v_{gs}=0 V, V_{ds}=20 V, λ=600 nm (visible)) **4th Set** (L=8 μm, Z=350 μm, t_{sm}=0.45 μm, N_{dr}=2×10^{22}/m^3)								
Photon Flux Density ($/m^2$-s)	**Photo-voltage (V)**	**Drain-to-source current (A)**	**Switching Time (s)**	**Trans-conductance (S)**	**Gate-to-source capacitance (F)**	**f_T (Hz)**	**RC Time Constant (s)**	**Space Charge (C/m)**
0	0	23.4 mA	0.16 ns	13.9 mS	0.43 pF	5.12 GHz	31 ps	3.84 pC/m
10^{12}	0.28 V	28 mA	0.13 ns	16.7 mS	0.5 pF	5.25 GHz	30 ps	3.7 pC/m
10^{15}	0.46 V	30.6 mA	0.117 ns	18.3 mS	0.6 pF	4.9 GHz	32 ps	3.6 pC/m
10^{18}	0.64 V	34.4 mA	0.1 ns	15.2 mS	0.7 pF	3.3 GHz	48 ps	3.5 pC/m
10^{21}	0.82 V	43.7 mA	76 ps	19.3 mS	1.2 pF	2.62 GHz	61 ps	3.3 pC/m
10^{24}	0.98 V	500.5 mA	0.4 ps	0 mS	0 pF	------	-----	0.18 pC/m
GaAs generalized model of OPFET with Au gate (v_{gs}=0 V, V_{ds}=16.4 V, λ=600 nm (visible)) (L=4 μm, Z=150 μm, t_{sm}=0.3 μm, N_{dr}=4×10^{22}/m^3)								
Photon Flux Density ($/m^2$-s)	**Photo-voltage (V)**	**Drain-to-source current (A)**	**Switching Time (s)**	**Trans-conductance (S)**	**Gate-to-source capacitance (F)**	**f_T (Hz)**	**RC Time Constant (s)**	**Space Charge (C/m)**
0	0	10.2 mA	0.11 ns	7.6 mS	0.135 pF	9.02 GHz	17.6 ps	1.13 pC/m
10^{12}	0.69 V	17.4 mA	58 ps	15.5 mS	0.264 pF	9.34 GHz	17 ps	1.01 pC/m
10^{15}	1.23 V	24.8 mA	37 ps	18.8 mS	0.141 pF	21.1 GHz	7.53 ps	0.91 pC/m
10^{18}	1.77 V	33.4 mA	25 ps	0.36 nS	0.113 pF	0.51 kHz	0.31 ms	0.84 pC/m
10^{21}	2.3 V	37.7 mA	20 ps	1.1 nS	0.106 pF	1.63 kHz	97.4 μs	0.76 pC/m
10^{24}	2.79 V	317.5 mA	0.214 ps	1.3 mS	0 pF	------	-----	0.07 pC/m

OPFET detectors.

Table 2 Parameters employed in calculation.

Parameter	**Name**	**Value (GaAs)**	**Unit**
μ	Low field electron mobility	(~ 0.5)	(m^2/V.s)
Φ_B	Schottky Barrier Height (Au-GaAs)	(~ 0.86)	(eV)
v_{yn}	Saturated electron velocity	~1.2×10^5	(m/s)
v_{yp}	Saturated hole velocity	~9×10^4	(m/s)
τ_p	Lifetime of holes	1×10^{-8}	(s)
τ_n	Lifetime of electrons	1×10^{-6}	(s)
ε	Permittivity	1.14×10^{-10}	(F/m)

α	Absorption Coefficient @ 600 nm	4×10^{6}	(/m)

current. At the highest intensity, the current is substantially raised due to the very high contribution from the photoconductive effect wherein the channel is totally depleted owing to the large voltage drop across the series resistance. At this intensity, the device exhibits negative sensitivity i.e. increase in depletion width with illumination. The saturation component grows without bounds since the photoconductive contribution is from the totally depleted channel region and hence unaffected by the presence of series resistances. This results in a large value of the saturation current. The internal conductance is large due to the photoconductive contribution from the neutral channel region since this conductance is evaluated in the absence of series resistances. However, the external conductance is limited by the series resistances and results in reduced net conductance. Thus, the large saturation current is limited by the reduced conductance as well as the saturation current itself leading to reduced but still high photoconductive current. Although almost constant space charge is maintained, the significant increase of the drain-to-source current with illumination results in the decrease in the switching time as the optical power is increased.

D. Unity-gain cut-off frequency (fT) in buried-gate OPFET:

An important parameter which shapes the amplification bandwidth of the switching response is the unity-gain cut-off frequency (fT). It is defined as the highest frequency at which amplification can be attained. It is expressed as the ratio of the transconductance to 2π times the gate-to-source capacitance. The transconductances obtained in buried-gate OPFET with 3 µm gate length are (7.6 mS, 7.4 mS, 8.4 mS, 9.4 mS, 14.3 mS, and 0 mS) which are the lowest among all the sets due to the reduced dimensions as well as the reduced depletion width sensitivity at higher doping concentrations [25]. The transconductance increases with illumination since at constant doping concentration, the depletion width sensitivity is greater at higher photovoltages. At the highest flux density, zero transconductance is observed owing to the large photoconductive contribution which renders the channel totally depleted as discussed earlier thus, registering no sensitivity to the applied gate-to-source voltage. The gate-to- source capacitances attained are (0.0956 pF, 0.11 pF, 0.13 pF, 0.16 pF, 0.24 pF, and 0 pF). The observed values of the capacitances which are also the lowest among all the sets follow the similar explanation as that of the transconductances but here, the space charge replaces the drain-to-source current. At the highest flux density, again zero capacitance is recorded due to the large photoconductive electrons in the depletion region completely de-ionizing the space charge ions as described earlier. As such, the unity-gain cut-off frequencies achieved are (12.71 GHz, 10.68 GHz, 10.41 GHz, 9.37 GHz, 9.56 GHz, 0 GHz) which are the highest among all the sets. The unity-gain cut-off frequency decreases with illumination since the rate of rise of capacitance with illumination is greater than that of the transconductance. Another parameter related to switching is the RC time constant which is the time constant associated with the switching process. It is the ratio of the gate-to-source capacitance and the transconductance. The RC time constants attained are (12.5 ps, 15 ps, 15.3 ps, 17 ps, 16.6 ps, and 0 ps) and follow the inverse explanation as that of the unity-gain cut-off frequency.

E. Switching time and other parameters at higher gate lengths:

As the gate length is elongated to 4 µm, then to 5 µm and so on to 8 µm, the switching time is correspondingly increased. This is because as the dimensions increase and owing to the other factors as mentioned earlier, the space charge as well as the drain-to-source current is correspondingly boosted surpassing the effect of lower doping induced charge. But the rate of rise of space charge is higher than that of the drain-to- source current resulting in the rise of the switching time. The transconductances, the capacitances, and the RC time constants are also increased. The unity-gain cut-off frequency is reduced. Refer to Table 1 for the parameter values. The unity-gain cut-off frequency is the highest at the lowest gate length and decreases with the elongation of the gate length since both the transconductances and the capacitances rise with gate length but the rate of increase of capacitance is higher than that of the transconductance.

F. Comparison of Buried-gate OPFET with the Generalized Model:

At a gate length of 4 µm, we recorded the following observations: The switching time under dark is larger in the generalized model owing to the fact that the dark current is lesser in this model owing to the higher series resistances as discussed earlier. However, under illumination except at the highest flux density, the switching response is substantially enhanced in the generalized model as compared to the buried- gate

OPFET due to the very high photovoltages produced which significantly boosts the drain-to-source currents (10.2 mA, 17.4 mA, 24.8 mA, 33.4 mA, 37.7 mA, and 317.5 mA) as well as reduces the space charges (1.13 pC/m, 1.016 pC/m, 0.91 pC/m, 0.84 pC/m, 0.76 pC/m, and 0.068 pC/m) resulting in switching times of (0.11 ns, 58 ps, 37 ps, 25 ps, 20 ps, and 0.21 ps). At the highest flux density of 1024 /m2-s, the buried- gate device shows superior response (0.15 ps) since in this case, the major photoconductive contribution emanates from the neutral channel region the device being illuminated from the active-layer side resulting in higher current (445 mA). In the generalized model, the illumination begins from the gate contact side and has to traverse the depletion region before it reaches the neutral channel region. Note that for uniform photogeneration throughout the device, the photoconductive contribution from the neutral channel region is higher than that from the depletion region. The device exhibits transconductances of (7.6 mS, 15.5 mS, 18.8 mS, 0.36 nS, 1.1 nS, and 1.3 mS). At the lower two intensities, the transconductances are higher as compared to the buried-gate OPFET due to the significantly higher photovoltaic effect and increase with optical power due to the boosting of the depletion width sensitivity. At the higher two intensities, there is severe degradation of the transconductance to almost zero mS. This can be explained as follows: Since the photo voltages induced at these intensities are very high (1.77 V and 2.3 V), the depletion width is considerably reduced. Hence, any change in the conducting channel charge with the applied gate-to-source voltage is a negligible fraction of the large conducting charge from the wide effective active layer thickness. At the highest flux density, some reasonable transconductance is recorded (1.3 mS) owing to the large photoconductive effect maintaining wider depletion region through the voltage drop developed across the series resistance thus, registering some sensitivity. The gate-to-source capacitances observed are (0.135 pF, 0.264 pF, 0.141 pF, 0.113 pF, 0.106 pF, and 0 pF). At first, the capacitance increases with the optical power due to the enhancement of the depletion width sensitivity from the photovoltaic effect (0.69 V). Later on, there is a consistent fall in the capacitance owing to the much larger photovoltaic effects (1.23 V, 1.77 V, 2.3 V, and 2.79 V) which greatly reduce the depletion width beyond the zero point, thus, lowering the sensitivity. At the highest flux density, there is additional effect of de-ionization of the space charge ions by the photoconductive electrons in the depletion region. With the above attained values of the transconductances and the capacitances, the unity-gain cut-off frequencies registered are (9.02 GHz, 9.34 GHz, 21.1 GHz, 0.51 kHz, and 1.63 kHz). The corresponding RC time constants are (17.6 ps, 17 ps, 7.53 ps, 0.31 ms, and 97.4 µs).

G. Comparison of Buried-gate OPFET with the Front- illuminated Model:

We observe that although the photovoltages are equal in both the models as described earlier, the drain-to-source currents are enhanced in the buried-gate OPFET owing to the wider effective channel thickness due to the lower series resistances while the space charge is maintained almost constant. With this, the switching time is higher in the front- illuminated model (0.11 ns, 85 ps, 73 ps, 63 ps, 44.5 ps, and 0.25 ps). Since the photovoltages are equal, the depletion width sensitivity is nearly equal in both the cases leading to almost equal transconductances at the lower intensities (9.4 mS, 10.9 mS, and 12.3 mS). At the next higher intensity, there is a fall in the transconductance in the buried-gate OPFET (14.8 mS) as compared to the front-illuminated OPFET (15.7 mS) due to the limitation of the series resistance. At the highest flux density, the buried-gate OPFET shows zero transconductance owing to the completely depleted channel from the large photoconductive effect as stated earlier whereas the front-illuminated OPFET exhibits high transconductance (99.3 mS). This is due to the fact that the photoconductive effect is not large enough to completely deplete the channel due to the illumination from the gate contact side neither the photovoltaic effect is sufficiently large to fully reduce the depletion width to zero. But yet it is large enough (0.98 V) to register high depletion width sensitivity and hence, the high transconductance. The gate-to-source capacitance is almost constant in both the cases due to the similar photovoltaic effect. With this, the fT values recorded in the front- illuminated OPFET are (9.02 GHz, 9.3 GHz, 9.61 GHz, 8.6 GHz, and 10.3 GHz) with the corresponding RC time constants as (17.6 ps, 17 ps, 16.5 ps, 18.5 ps, and 15.4 ps).

H. Reliability Analysis:

One of the primary factors responsible for the device failure is the electromigration at the gate Schottky contact [26]. The Mean-Time-to-Failure (MTTF) is governed by well known Arrhenius equation:

$$MTTF = AJ^{-n} \exp\left(\frac{E_A}{kT}\right) \qquad (2)$$

where A is the proportionality constant, J is the current density, n is a constant, EA is the activation energy, k is the Boltzmann constant and T is the absolute

temperature. At zero gate and drain bias, and under dark, the activation energy is the same as barrier height [27] which is 0.865 eV and the current density is the reverse saturation current density (2.06×10-5 A/m2). At room temperature, assuming A and n to be unity, the above values correspond to a Mean-Time-to- Failure (MTTF) of 1.3×1019 hours which is a very large value. When the device is illuminated, with zero gate bias and 16.4 V drain bias, the activation energy tends to decrease significantly by the forward photovoltage developed in all the devices. But due to the substantial voltage drop across the source series resistance as also the voltage drop across the channel with the device biased in the deep saturation region, this reduction is nullified. Specifically, most of the regions of the gate-semiconductor contact are experiencing large barrier in the form of reverse bias. As a result, the activation energy never deteriorates if not enhanced. In the regions of gate- semiconductor contact close to the source end of the channel wherein the barrier experiences considerable reduction through photovoltaic effect, the current densities are larger and flow in the forward direction. In contrast, small current densities flow in the regions farther from the source end emanating from the reverse drift-diffusion currents. Since the total current is an integration of the individual current densities through the contact area under consideration, the total current is dominated by the photovoltaic current itself. Considering the above facts and the least value of activation energy, the MTTF under the operating conditions stated earlier and at different radiation flux densities are plotted in Figure 2 for all the three models. The current densities exhibited by the models are depicted in Figure 3. It can be seen from the above figures that the current densities and the MTTFs of the buried- gate and the front-illuminated models are almost the same due to similar photo voltages. They exhibit large MTTFs since the current densities involved are of lesser magnitude. In contrast, in the generalized model, on account of the very high photo voltages, the current densities are greatly boosted which correspondingly decrease the MTTFs. The current densities and the MTTFs saturate at higher intensities due to the effect of series resistance. The significant reduction of barrier at the source end of the channel along with increase in current density would have caused electro-migration. But since the larger portion of the contact is under high reverse bias, the flux created by the forward current densities is overcompensated. On the whole, all the devices show substantially high MTTFs and thus, reliable operation. flux created by the forward current densities is overcompensated. On the whole, all the devices show substantially high MTTFs and thus, reliable operation.

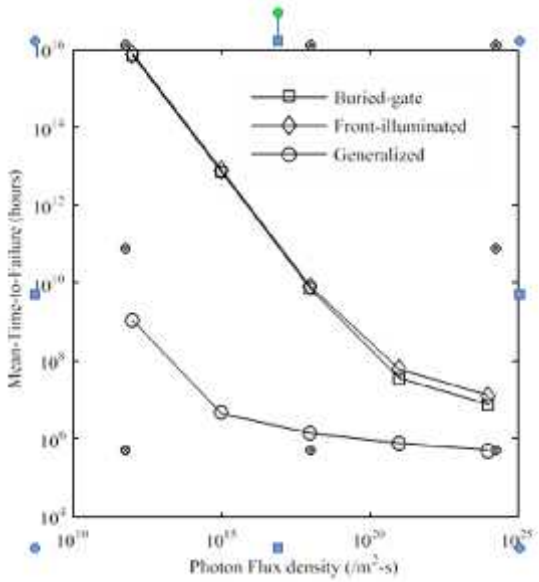

Fig. 2. Mean-Time-to-Failure (MTTF) versus photon flux density in the 3 models.

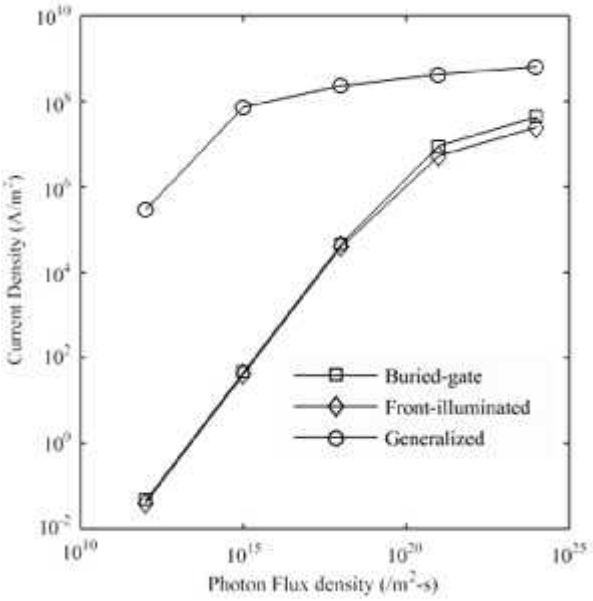

Fig.3. Current densities at the gate junction versus photon flux density in the 3 models.

IV. CONCLUSION

We studied the switching responses of the buried-gate, the generalized, and the front-illuminated OPFET models for VLC applications. The switching parameters such as drain-to- source current, switching time, transconductance, gate-to- source capacitance, unity-gain cut-off frequency, and RC

time constant were calculated. Further, the effect of structural parameters on the switching performance of the buried-gate OPFET was examined. Also, the dependence of the switching parameters on the optical power was studied. The results show that the generalized model exhibits the lowest overall switching times followed by the buried-gate and the front- illuminated model but with degraded amplification bandwidths at higher intensities. The structural optimization of the switching responses of the buried-gate OPFET signify that the device with the lowest dimensions show superior performance in terms of both the switching time and the amplification bandwidth. It was observed that the switching time considerably decreased with illumination exhibiting values in the range of nanoseconds to picoseconds. These values were found to be comparable or enhanced as compared to the various other detectors reported in the literature. The devices show great potential for VLC applications such as traffic lighting. The reliability of the gate metallization contact in the 3 models was also estimated and the MTTFs showed above par values depicting reliable operation.

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Enhanced Surface Passivation with P3HT and Additional Interfacial layer for MIS Solar Cells

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***Abstract*- Graphene/Silicon (Gr/Si) Schottky junction solar cells are widely studied for the harvesting of solar energy for applications like wireless sensor networks (WSN). But high efficiency is limited due to surface defects and dangling bonds. High carrier recombination at the Silicon surface restricts enhancement w.r.t. open circuit voltage (*Voc*) and minority carrier lifetime (τ_{eff}). In this study, a solution processable poly(3-hexylthiophene-2,5-diyl) (P3HT) thin film is employed as electron blocking layer. The novelty of the work is the addition of the oxide layer between P3HT and Silicon. This work simulates and verify experimentally, the passivation ability of P3HT along with oxidation of Silicon surface. In this work, band alignment between P3HT and Silicon, increases the Schottky barrier height (SBH) which prevents electron transfer from n-Si to the graphene anode. Additional oxide layer saturates most of the dangling bonds at the Silicon surface. Carrier recombination at the interface is suppressed due to formation of oxide bonds, which minimizes the leakage current. The average open circuit voltage (*Voc*) of the MIS silicon solar cell with combination of P3HT and oxide layer increases by ~5% as compared with that of only P3HT layer. The minority carrier lifetime also enhances by ~9%. The work can be extended to study performance enhancement of these solar cells w.r.t. power conversion efficiency (PCE). These solar cells can be manufactured with low temperature and safe chemical oxide passivation process. This process shows a new route for the production of high efficiency and low cost, MIS solar cells for WSN applications.**

Keywords - Surface Passivation, electron blocking Layer, poly(3-hexylthiophene-2,5-diyl) (P3HT), RCA oxide, NCPRE oxide, Open Circuit Voltage, Minority Carrier Lifetime.

I. INTRODUCTION

The emerging applications of polymers in Gr/Si Schottky junction solar cells have shown a promising potential for the next generation high efficiency, cost-effective solar cells. Silicon based photovoltaic devices, specifically solar cells, have much higher efficiencies from an industrial perspective. But they require complicated processes like ion implantation and high temperature diffusion to form junctions. In order to find alternative materials, growing interest has developed in Gr/Si Schottky junction solar cell with electron blocking layer as interfacial layer. These solar cells possess simple device architecture and can be readily fabricated by depositing thin layers of polymer between Graphene andSilicon wafer. However, the surface defect and dangling bonds in Si materialincreases recombination and restricts further increase in efficiency. One of the major concerns is the lowSchottky barrier height(SBH). Although the electron blocking ability ofP3HTcan enhance SBH[1],it is still low andresponsible for a large current leakage, leading to inferiordevice performance [2,3]. The other issue is the Gr/Si interface that is occupied by a large number of the Si dangling bonds and surfacetrap states. This causeshigh carrier recombination and leads to the Fermi pinning which makes SBH being even lower than the ideal condition [4,5]. A lot of development takes place in controlling the surface recombination using advanced surface passivation techniques [6,7].Therefore, appropriate surface modification is critical to achieve high-efficiency Gr/Si Schottky junction solar cells.

Few researchers have reported, use of P3HT as electron blocking layer in MIS solar cells [8–10]. But these do not include the study of combined effect of, P3HT with oxide layer,on Silicon surface. After oxidation, most interface states are saturated with oxygen bonds, which accomplishes surface modification. Surface modification can be achieved by ultrathin SiO_2 that can be grown using several methods such as low temperature thermal oxidation [11], National Centre for Photovoltaic Research and Education oxide (NCPRE-oxide) method [12,13] and Radio Corporation of America (RCA) standard clean-2 (RCA-2) method.

In this study,the main objective is to study the combined effect of,RCA and NCPRE oxide layer along with P3HT, on Silicon surface.The work analyses the impact of this modified interfacial layer,on open circuit voltage (*Voc*) and minority carrier lifetime (τ_{eff}) of the Solar Cell. The role of oxide layer, at the interface of Silicon and P3HT, is systematically investigated through simulation technique and experimental processes. This work is dedicated for investigation of surface modification with suitable oxide and electron blocking layer, in MIS solar cell.This investigation will providelow cost, high efficiency solar cells for WSN applications.

The proposed device structure and it's working is explained in next section.

II. THEORY

The structure of the device under considerationis shown below.

A. Device Structure

Fig. 1 shows the device structure with only P3HT as electron blocking layer.

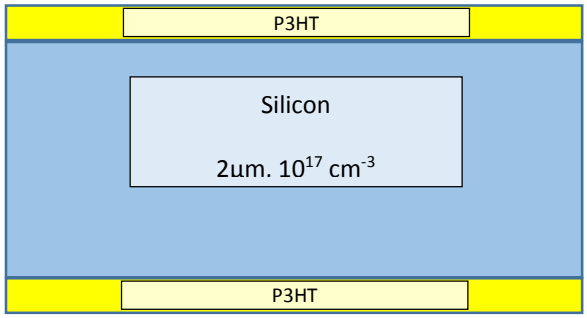

Fig. 1. Device structure with only P3HT

Fig. 2 shows the proposed device structure with RCA and NCPRE oxide between P3HT and Silicon.

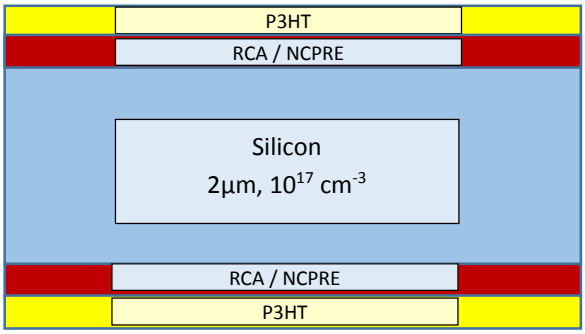

Fig. 2. Proposed device structure with RCA and NCPRE oxide

The device physics and its working with effect of surface passivation is discussed in next section.

B. Device Physics

The passivation effect of P3HT layer is investigated with the help of energy band diagram. Fig.3 shows the energy band diagrams and the corresponding charge transportation under light irradiation of the Gr/Si solar cells with P3HT. The conduction band minimum (E_C) and valence band maximum (E_V) of n-Si are 4.05 eV and 5.17 eV, respectively, compared to 3.2 eV and 5.1 eV for the lowest unoccupied molecular orbital (LUMO) and highest occupied molecular orbital (HOMO) of P3HT [14]. The E_C–LUMO offset (0.8 eV) presents a large barrier for electron transportation from Si to graphene, minimizing recombination in the graphene side by confining the electrons in Si. Meanwhile, the small E_V–HOMO offset allows the efficient transport of holes from Si to graphene.

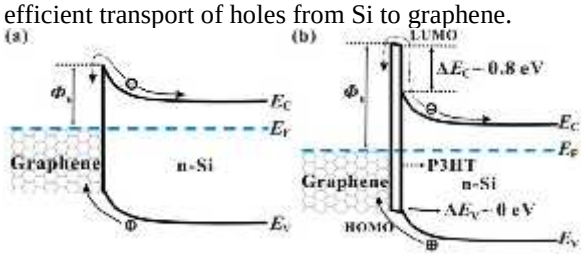

Fig.3 Energy band diagrams of the Gr/Si solar cell without and with a P3HT electron blocking layer

In this study for surface modification RCA oxide and NCPRE Oxide are used. Due to RCA and NCPRE oxide a linearly varying electric field is generated at the surface of Silicon wafer. It saturates the dandling bonds at the surface of Silicon with formation of oxide bonds. This controls the recombination within the Silicon wafer close to the front surface[15].Due to reduced recombination Minority carrier lifetime increases and hence open circuit voltage increases. As there is no prolonged air moisture exposure as in case of thermal SiO_2 deposition, there is no degradation of surface passivation by RCA and NCPRE oxide.

The above defined device structure is simulated and the results are verified as per the process defined for fabrication and characterization. The simulation and fabrication processes are defined in the next section.

III. PROPOSED MODEL FOR SIMULATION,FABRICATION AND CHARACTERIZATION

A. Simulation

For the simulation of above device, a polychromatic light Air Mass 1.5 global (AM 1.5G) is used as the solar spectrum [16]. Carrier photogeneration is calculated using transfer matrix method (TMM) model and the drift-diffusion model. To calculate mobility, doping dependent mobility and electric field dependent mobility modelsare used. To consider recombination, SRH model and to consider electron tunneling effect, direct tunneling model is used. The current densities for electrons and holes are calculated using drift diffusion model. The bimolecular recombination model describes the interaction of electron–hole pairs and singlet excitons. To obtain current-voltage characteristics, the Poisson and continuity equations model is used. Besides this the singlet exciton equation is introduced to account for optical properties of polymer materials related to Frenkel excitons.

B. Fabrication

To verify the results obtained with simulation, the device is fabricated in NCPRE lab at IIT Bombay. In this work a range of Czochralski (Cz) grown phosphorus-doped silicon wafers with ‹100› crystal orientation, double (DSP) side polished, with resistivities between 1 and 5 Ω·cm, and thicknesses of 2 µm have been used to study the passivation effect of interfacial layer. Most of the measurements were carried out in cut samples of 2.5×2.5 cm^2 which were subjected to the standard cleaning “RCA- 2” procedure as described in Ref. [17].

To enhance passivation of the silicon surface, hydrophilicity on the surface needs to be improved. Next plasma ashing is performed on cleaned wafer for 10 minutes. Plasma ashing is the process of removing the photoresist (light sensitive coating) from an etched wafer and make the surface hydrophilic.

Next section describes the steps involved in the fabrication processes.

C. Passivation of Silicon surface with P3HT and RCA/NCPRE oxide

A P3HT solution is prepared in inert atmosphere by adding P3HT powder of 0.5/1/2.5/5mg weight in 1ml Dichlorobenzene and stirring the mixture at 70^0C, 300RPM overnight. Each of this solution is spin coated on Silicon substrate in inert atmosphere at 800/1000/1500/2000RPM speed for 1 min. After that, the substrate was baked in a nitrogen atmosphere at 150 ^{0}C for 10 min. The thickness of the P3HT layer was controlled by adjusting the solution concentration and spin speed. In order to clarify the effects of surface modification, in this work, P3HT–RCA/NCPRE–Si structure is constructed. Fig. 4 demonstrates process of deposition of RCA oxide on Silicon before deposition of P3HT. Fig. 5 below shows modified deposition steps including NCPRE oxide.

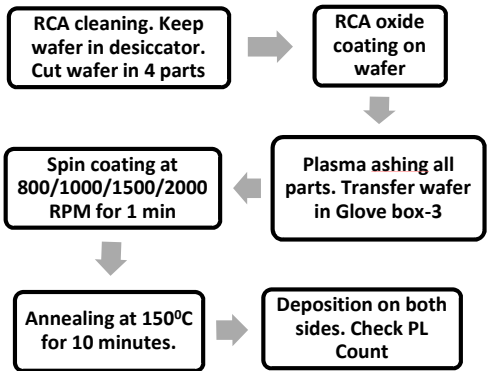

Fig.4.P3HT deposition process with RCA oxide

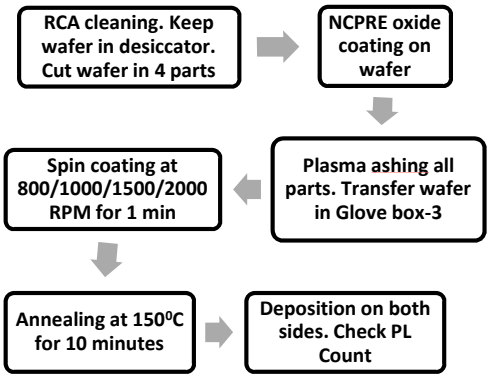

Fig.5.P3HT deposition process with NCPRE oxide

D. Characterization

To measure values for different parameters following characterization tools are used. The thickness of interfacial layer was measured using a spectroscopic ellipsometer (Sentech SE800).The level of passivation achieved by different layers was tested using lifetime tester (Sinton Instruments, WCT-120) for the measurement of effective minority carrier lifetime (τ_{eff}) of the symmetric lifetime samples, with the assumption that both sides of each sample were equally passivated. Photoluminescence (PL) imaging was performed on lifetime samples with a custom-made PL setup with a bank of red LEDs of wavelength of 630 nm illumination source and images were processed using a MATLAB based tool [18].

Time-resolved photoluminescence (TRPL) technique is useful for measuring the minority carrier lifetime.

IV. RESULTS AND DISCUSSION

The device is simulated using Sentaurus TCAD. The proposed device structure with optimium dimensions, simulation model and fabrication processes are explained in above sections. In this section simulation and experimental results are presented and discussed.

A. Defining P3HT

While the Si and SiO_2 material parameters are readily available within Sentaurus, it is necessary to create a model for P3HT, based on literature values. Table I lists the parameter values considered to define P3HT.

TABLE I: P3HT PARAMETERS[19]

Sr. No.	Parameter	Value
1.	Work Function	5.27
2.	Epsilon	4.58
3.	Complex Refractive Index	2.156
4.	Thermal Conductivity	0.158 w/mk
5.	Effective Mass	1.62
6.	Nc and Nv	1
7.	Constant mobility	0.1 cm^2 /V s
8.	Interatomic Distance	0.34nm
9.	hole concentration	6.2 x 10^{18} cm^{-3}
10.	Electrical conductivity	1.8 x 10^{-5} $\Omega^{-1}cm^{-1}$
11.	Absorption Coefficient	1.07 × 10^4
12.	Dielectric constant	3.53

B. Simulation- passivation with P3HT

As a first step the defined device is simulated and effect of thickness of interfacial layer on *Voc* and minority carrier lifetime is investigated. Fig. 6 shows the variation of *Voc* with thickness of interfacial layer. For interfacial layer comprising only P3HT, the optimum thickness is verified to be 15nm giving highest *Voc* as 0.56 V. With the addition of RCA and NCPRE oxide with P3HT, the optimum thickness is verified to be 16.5nm (15nm + 1.5nm) giving highest *Voc* as 0.582 V.

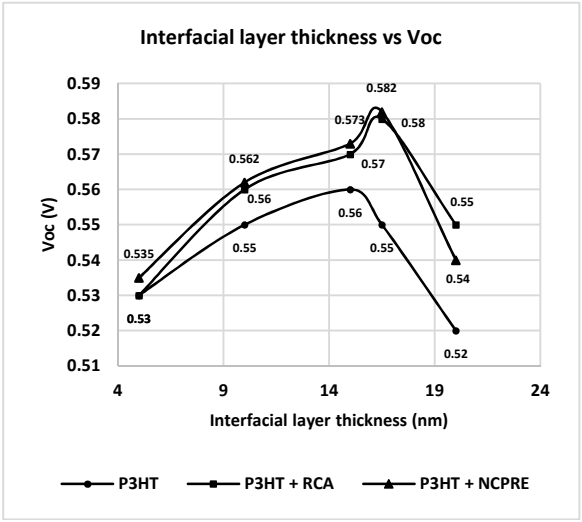

Fig.6. Interfacial layer thickness vs *Voc* (Simulated)

Fig. 7 shows that as the P3HT thickness increases minority carrier lifetime also increases till the P3HT thickness of 15nm. The τ_{eff}value obtained at 15nm thickness is 142µs. With addition of RCA and NCPRE oxide along with P3HT, the maximum value of τ_{eff} , obtained is 151µs and 152µs at 16.5nm thickness.

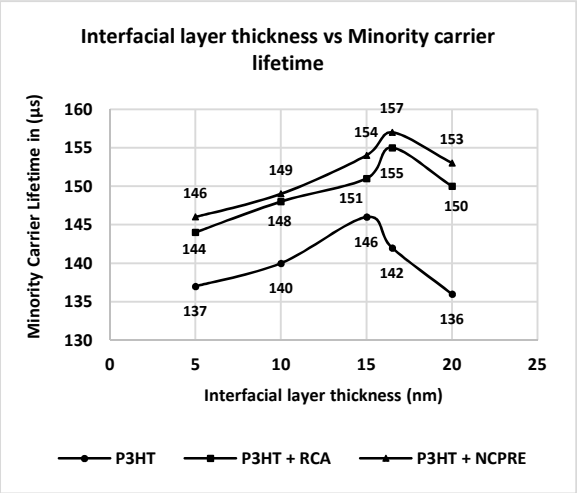

Fig.7. Interfacial layer thickness vs Minority Carrier Lifetime (Simulated)

TABLE II: COMPARISON OF PASSIVATION LAYERS WITH SIMULATION

Passivation Layer	Minority Carrier Lifetime (µs)	*Voc* (V)
P3HT	τ_{eff} = 146	0.56
P3HT+RCA	τ_{eff}= 155	0.58
P3HT+NCPRE	τ_{eff}= 157	0.582

These results are verified with experimentation.

C. Experimentation: P3HT Passivation

P3HT solution concentration is kept constant at 2.5 mg/ml. Fig.8 shows the photoluminescence images for four different spin speeds.

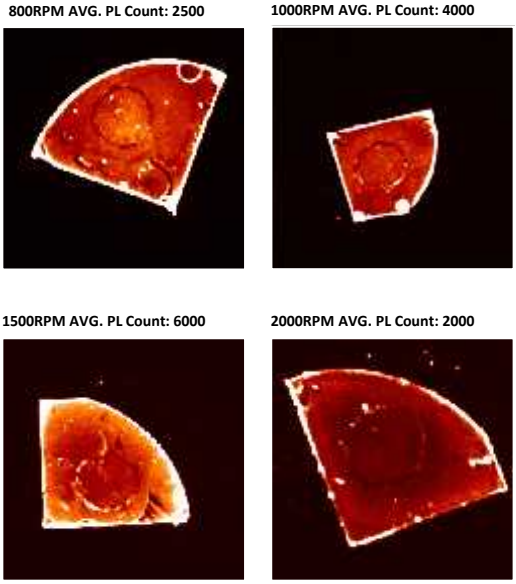

Fig.8. PL for Si/P3HT (different spin speeds)

From Fig.8 it is evident that P3HT deposition on Silicon is proper and it gives maximum PL count at 1500 RPM and 15nm thickness.

There is a trade-off between P3HT thickness and device performance. The best device performance is expected to be achieved at such a P3HT thickness that is equal or close to its carrier diffusion length (15 nm)[14],which is in good agreement with the optimized value obtained in this work.

From Fig.8 it is clear that for 2.5mg/ml at 1500 RPM and 15nm thickness maximum PL count of 6000 is obtained. For this PL count, minority carrier lifetime obtained is 135µs and *Voc* = 0.52 V.

Fig. 9 shows the photoluminescence image for Si/RCA/P3HT. Spin coating is done at 1500RPM with 2.5 mg/ml concentration. Average PL count is 6500.

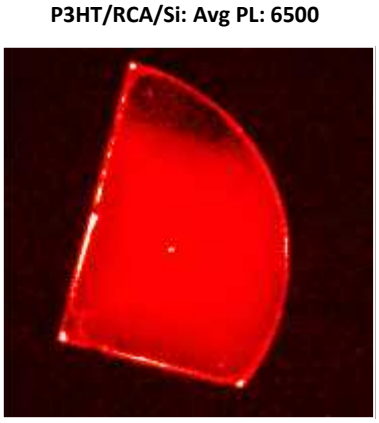

Fig. 9. PL of Si/RCA/P3HT

With this PL count minority carrier lifetime obtained is 145µs and *Voc*=0.54 V.

The NCPRE-oxide process resulted in a similar improvement in passivation and cell efficiency as other oxide processes. Fig. 10 shows the photoluminescence image for Si/NCPRE/P3HT.

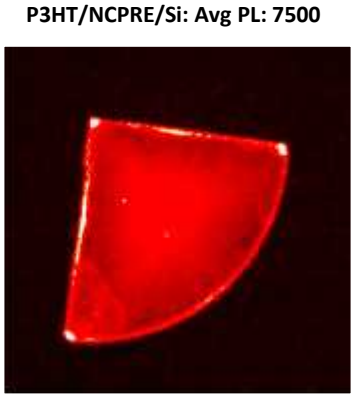

Fig. 10. PL of Si/NCPRE/P3HT

Spin coating is done at 2000RPM and annealing is done at 300^0C. Average PL count is 7500. With this PL count minority carrier lifetime obtained is 148µs and *Voc* = 0.545 V.

Fig.11 indicates that as P3HT concentration increases, *Voc* increases till 2.5mg/ml, but after that *Voc* decreases. The reason behind that is, as the concentration increases the thickness of the layer also increases. On reaching the optimum thickness of P3HT, absorption would become more pronounced with a thick P3HT layer; the strong carrier recombination in P3HT could lead to degradation of the device performance. Hence increase in concentration shows decrease in *Voc*.

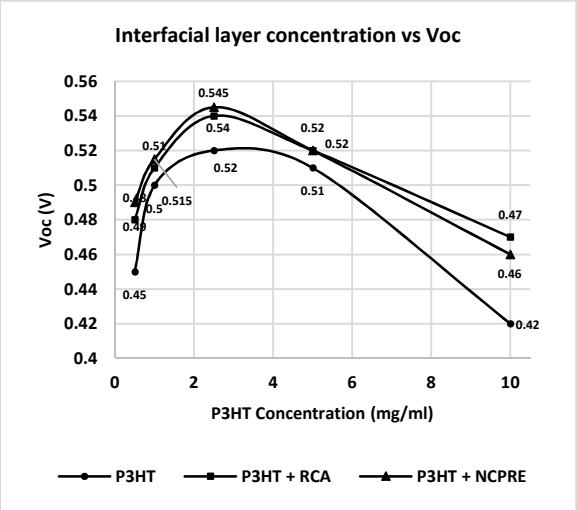

Fig.11.P3HT concentration vs *Voc* (Experimental)

Fig.12 shows that *Voc* increases until thickness of P3HT is 15nm. After which increase in thickness decreases *Voc*.To enhance *Voc* further, RCA oxide is spin coated on Si surface. After oxidation, most interface states are saturated with oxygen bonds. It reduces number of recombination and hence increases *Voc*. At optimum thickness of 16.5nm, for P3HT + RCA interfacial layer, the obtained *Voc* value is 0.54V. In the next step, RCA oxide is replaced by NCPRE oxide. A similar effect is observed which gives *Voc* of 0.545V at optimum thickness of 16.5nm. This shows enhancement in *Voc* with surface modification of Si with oxide layer.

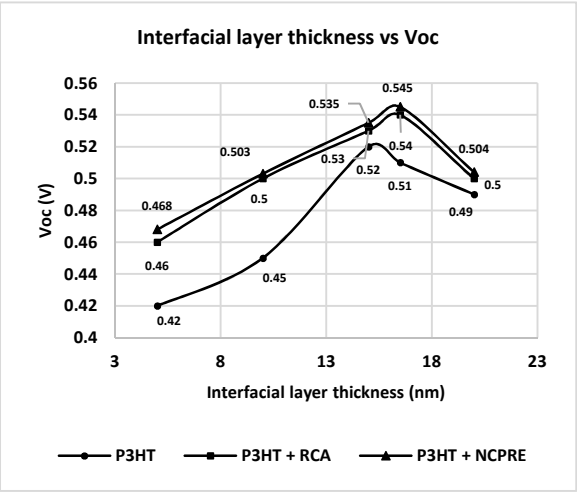

Fig.12.Interfacial layer thickness vs *Voc* (Experimental)

Fig. 13 shows that as the P3HT thickness increases minority carrier lifetime also increases till the P3HT thickness of 15nm. The τ_{eff} value obtained at 15nm thickness is 135µs. With addition of RCA oxide along with P3HT, the maximum value of $\tau_{eff,}$ obtained is 145 µs at 16.5nm thickness. Here addition of NCPRE oxide instead of RCA oxide enhances the τ_{eff} further to 148 µs at 16.5nm optimum thickness.

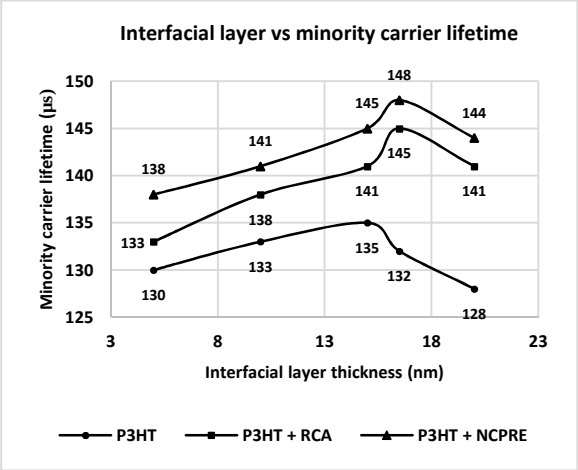

Fig. 13. Interfacial layer thickness vs Minority Carrier Lifetime (Experimental)

Table III below shows comparison of passivation effect of P3HT, P3HT+RCA and P3HT+NCPRE interfacial layer. To measure minority carrier lifetime lifetime tester (Sinton Instruments, WCT-120) is used.

TABLE III: COMPARISON OF PASSIVATION LAYERS WITH EXPERIMENTATION

Passivation Layer	**PL Count**	**Joe (recombination current) (A/cm^2)**	**Minority Carrier Lifetime (µs)**	***Voc* (V)**
P3HT	6000	539 X 10^{-15}	τ_{eff}= 135	0.52
P3HT+RCA	6500	520 X 10^{-15}	τ_{eff}= 145	0.54
P3HT+NCPRE	7500	510 X 10^{-15}	τ_{eff}= 148	0.545

D. Verification and Validation

The results obtained by simulation of the device are verified by experimentation process. These results are further validated with the results obtained by other researchers in previous work.

Table IV below compares the results obtained by experimental setup and TCAD simulation.

TABLE IV. VERIFICATION AND VALIDATION

Passivation Layer	**Simulated results**		**Experimental results**		**% Error**		**Results in literature**	
	τ_{eff} **(µs)**	***Voc* (V)**	τ_{eff}**(µs)**	***Voc* (V)**	τ_{eff}**(µs)**	***Voc* (V)**	τ_{eff} **(µs)**	***Voc* (V)**
P3HT	146	0.56	135	0.52	7.53	7.14	115	0.5 [14]
P3HT+RCA	155	0.58	145	0.54	6.45	6.89		
P3HT+NCPRE	157	0.582	148	0.545	5.73	7.75		

It is evident that simulation results and experimental results are confirmatory with only 6 % average

percentage error. This table also compares the experimental results of this work with experimental results of similar work in literature. It is observed additional oxide layer of RCA and NCPRE gives better *Voc* values as 0.54V and 0.545V resp. which are higher than *Voc* values obtained in similar work in literature [14]. The average open circuit voltage (*Voc*) of the MIS silicon solar cell with combination of P3HT and oxide layer increases by ~5% as compared with that of only P3HT layer. The minority carrier lifetime also enhances by ~9%.The addition of oxide layer reduces the percentage error between simulation results and experimental results which is reduced from 7.14% to 6.89%.

V. CONCLUSION

This work demonstrates the important role of P3HT as surface passivation layer and electron blocking layer in enhancing the device performance of Gr/Si Schottky junction solar cells. It is found that high-efficiency solar cells could be achieved by modifying the Si surface with RCA and NCPRE oxide to suppress carrier recombination. The effects of Si surface modifications and electron blocking layer are systematically studied with proposed simulation model and experimental process. It is observed that the experimental processes validate the simulation results.

The optimum thickness of interfacial layer, comprising P3HT and oxide layer, provides with enhanced *Voc* and minority carrier lifetime. The PL technique confirms this observation through experimentation.

TheseGr/Si solar cells can be produced using low cost processes with smaller dimensions.They are implementable for large scale production for WSN applications.

ACKNOWLEDGEMENTS

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DECLARATION OF INTEREST

Authors declare that there are no knownconflicts of interest associated with this publication.

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Analysis & Performance Verification of Photovoltaic Power Generation system

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***Abstract* - This paper exhibits the Photovoltaic (PV) power age framework for family unit applications. This proposed framework contains solar panels shaped by cells. Right now cell working standard and its equal circuit is exhibited. Scientific demonstrating of PV framework is exhibited and current-voltage attributes watched. Right now, arrangement and shunt obstruction are determined by proficient emphasis technique utilizing open circuit voltage. This additionally gives the hypothetical investigation of PV cell. The proposed architecture is displayed in MATLAB/SIMULINK condition. The reenactment results show the proposed architecture is solid.**

Keywords – P-V Characteristics, Modeling of PV system

I. INTRODUCTION

Nomenclature:

Rs	Series resistance (Ω)
Rsh	Shunt resistance (Ω)
G	Irradiance (W/m^2)
I0	Saturation current (A)
Iph	Photoelectric current (A)
VP	PV voltage (V)
n	Number of cells in series
k	Boltzmann's constant
T	Temperature (K)
q	Electric charge (C)
Isco	Short circuit current (A)
G	Irradiation (W/m^2)
T	Temperature (°C)
I1	Current generated by panel (A)
Im	Current generated by all panels (A)
Pa	Power produced by the array (P)
L	Inductor (H)
C	Capacitor (F)
RL	Load resistor (Ω)
V0	Output voltage of the converter (V)
Vdc	Input voltage at the converter (V)
IL	Inductor current (A)
D	Duty ratio of the converter

Right now, one can't accept existence without electric force. Total populace expanding everyday, and to fulfill the expanded populace's need, it is hard to deliver capacity to them from customary force age framework. Right now vitality assumes a significant job to satisfy electrical force need. PV frameworks can ingest the sun powered force. PV framework is one of the most financially savvy, condition well disposed common hotspot for some applications. In detached zones, it is best appropriate for power age strategy. The sustainable force age units for the majority of the parts have particular in structure, they can be introduced straightforwardly at load focuses. This kind of age lessens the weight and cost of the force framework. The contamination created by the show framework is additionally diminishes by utilizing the Power from PV frameworks.

Right now, fundamental blend of PV exhibit and diverse yield mixes dependent on the light change, temperature change are illustrated. Displaying of PV cell depends on the "Schockely" diode conditions. The current-voltage and force voltage bends are discovered right to fulfill the sunlight based cell conditions. The Detailed model of PV framework is talked about right now.

II. BASICS OF PV CELL

A) Operating Guidelines

A PV cell produces current, when sunlight based radiation falls on it, as it is a doped material it assimilates the Photon vitality. This vitality energizes the electrons to frame as electron opening pair. The recombination of electron gap sets comprises the present stream in the shut circuit. This procedure proceeds in sun based cell to changes over the photon vitality into sun oriented vitality.

B) Equivalent Circuit

The solar cell is represented in its acceptable modes as shown in Fig.1.

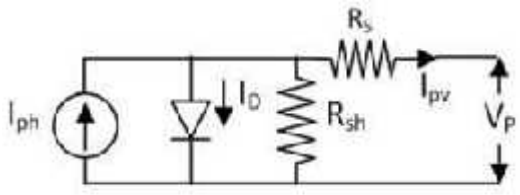

Fig 1: *Solar cell in its acceptable mode*

Equal circuit comprises of a present source in corresponding with the Diode. A shunt and arrangement protections associated with this model to control the spillage current. The current creates from this model is the resultant of Photon and diode flows. This procedure is like the PN intersection diode.

Daylight falls on the sun oriented cell, photon vitality from the sun radiation is gathered by the cell. This outcome in direct current streams thought it and shifts straightly with the radiation. Without an outer obstruction the photon current is zero. To build up the current in the circuit, it must be shut circle. The expansion in current stream relies upon the measure of radiation, temperature of the cell, outside obstruction and so forth. By including impacts of the shunt and arrangement opposition the model can be improved. The examination of the comparable circuit is finished by the Kirchhoff's present law. As the law of preservation of charge, vitality change happens. This examination is to build up the present condition for the PV model. The photon current and module current conditions created in numerical model.

III. MATHEMATICAL MODEL

The strategy to aggregate the sun's vitality is by photovoltaic transformation; this change of sun oriented vitality into electrical vitality done by a gadget called sun based cell. A sun based cell is doped with a few contaminations of other compound components, and independently they can create the current from 2 to 4 Amps, at a voltage of 0.46 to 0.48 V. The all out immediate and diffuse radiation falls on the sunlight based, a portion of the vitality reflects, direct radiation consumed by the cell changes over to electrical vitality. The cells are masterminded in sequential and equal associations in the sun oriented module.

The sun based cell is a current producing source, which creates the current Im. The diode current ID streams inverse way and is brought about by a potential contrast between the + and - terminals. In sun based cell one opposition is in arrangement (Rs) and one in equal (Rsh), which are spoken to in the proportional circuit outline appeared in Fig. 1. The arrangement obstruction is brought about by the way that a sun based cell is anything but an ideal conductor. The equal opposition is brought about by spillage of current from one terminal to the next because of poor protection. For a perfect sun based cell, Rs =0 and Rsh = ∞. The condition depicts the model, where the relating yield current and voltage of a PV module at irradiance 'G' can be given as

$$Im = I_{ph} - I_o\left[\exp\left(\frac{Vp + RsIm}{A}\right) - 1\right] - \left[\frac{Vp + RsIm}{Rsh}\right] \quad (1)$$

.

$$A = \frac{nKT}{q} \quad (2)$$

The photovoltaic current is obtained as

$$Im = I_{sco}\left(\frac{G}{G_o}\right)(1 + \alpha_1(T - T_0))\left[\frac{Rs + Rp}{Rsh}\right] \quad (3)$$

The specification of module at standard test conditions are given in Table-1.

Table - 1: PV Specifications at 1000W/m2 and 25°C

PV Power	160 W
Open Circuit Voltage	43.2 V
Short Circuit Current	8.21A
Nominal Voltage	39.3 V
Nominal Current	4.4 A

IV. CREATION OF SOLAR PANEL

Sun powered board comprises of sun oriented cells associated in arrangement or equal so as to accomplish the necessary rating of the board.

In sequential associations the voltage is summarize, and in equal associations flows gets included. The kind of associations may increment or diminishing the appraisals of V and I without changing the force rating of the board. The game plan of sunlight based cells in the sun powered force framework is as per the following: Group of Solar cells shapes the sun powered board and these boards associated with become a module. All modules are associated in such a manner to frame a variety of the sun oriented force framework.

The sun based board shaped by the essential associations of the cells, which notwithstanding increment the rating of the board. In little force applications we utilize sunlight based board introduced at our advantageous spots. For DC power applications straightforwardly utilizes the sun oriented boards in houses. The plan of sun based boards in a force

framework made to expand the rating of the force framework.

Fig.2. shows the development of a solitary sun powered PV Panel from modules and modules from sun based cells. Sunlight based cells with open circuit voltage of 0.6V and short out current of 1A is considered. Six quantities of sun oriented cells of each 0.6V are associated in arrangement to shape a sunlight based module. Presently, this module is with rating of 3.6V and 1A. The appraised voltage is 43.2V, so as to accomplish this evaluated voltage, 12 modules are associated in arrangement to get the necessary determinations. Here in the beneath figure, 2 modules are appearing, in each module again there are two lots of every 6 cells associated in arrangement.

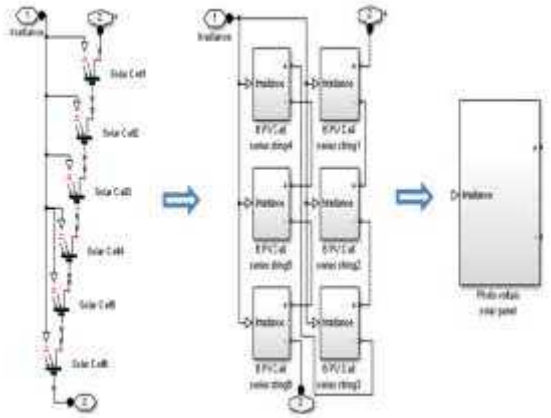

Fig.2.Formation of Solar panel

V. PERFORMANCE CHARACTERISTICS

The exhibition qualities are of sunlight based board is of current-voltage and force - voltage bends. This was chive by the recreation of board in Matlab/Simulink programming. Presently, the sunlight based board got in Fig.3 is utilized for reenactment.

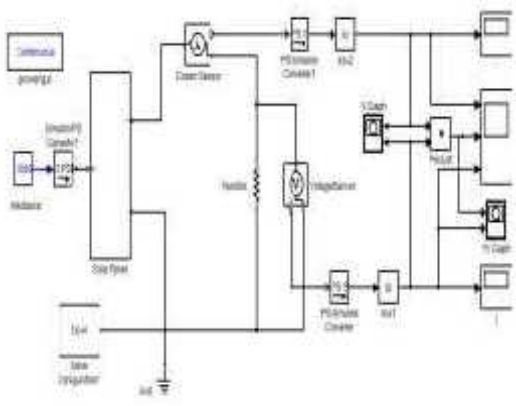

Fig. 3 Simulation Model of PV Cell

The all out sun powered board is exposed to various illuminations and diverse temperature, so as to know its exhibition qualities. Fig.3. shows the recreation model of the Solar PV board. All the cells are associated in sequential mane to build up the 43.2V of the framework. There are 72 cells of each having open circuit voltage of 0.6V.

To get the I-V bends of the framework, current and voltage estimations associated with the board. These estimations are of Simscape library models, to associate with the simulink condition PS-S square is required. PS-S squares coverts Physical signs to Simulink, S-PS square the other way around. From the estimations, it was seen that the sun based board current voltage relations were discovered palatable with the created conditions. Force voltage bends likewise checked with the product.

Right now created force might be utilized for DC power applications or to store in battery for additional use. This framework is best appropriate for little DC power applications.

A. Simulation results

The exhibition qualities of Solar PV board are finished by utilizing MATLAB/Simulink for various light and various temperatures. The reenactment of the PV board is accomplished for light of 1000Watts/m2 and temperature of 25 degree Celsius. The yield bends as appeared in the underneath Fig. 4.

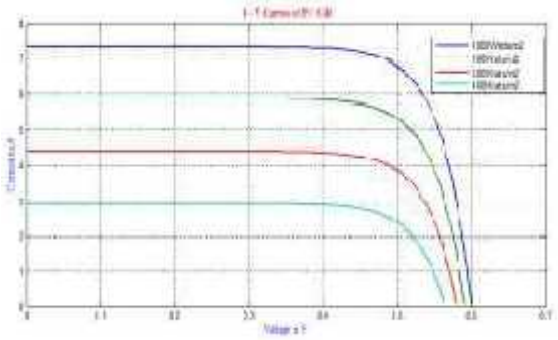

Fig .4.Output waveforms of I-V and P-V curves for Temperature 25 degree Celsius and irradiance of 1000Watts /m2

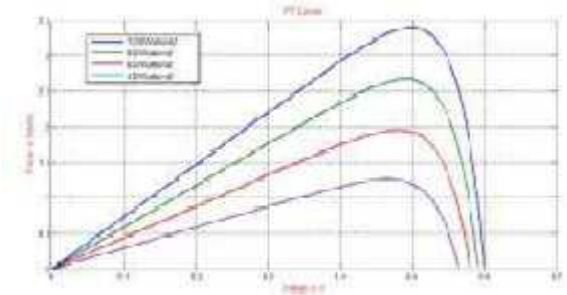

Fig. 5. I-V and P-V curves for Temperature 250 C and irradiance of 800Watts /m2

From Fig.4. it is seen that with no present streaming in the board there is voltage called open circuit voltage. Additionally for zero voltage condition, there exists a Short circuit current. Fig.5. and Fig.6.are obtained with same temperature for various illuminations of 1000 Watts/m2 and 800 watts/m2. It is seen that as the illumination builds the force change proficiency of the board increments. For more light we will get more force. So also there is a temperature impact is likewise considered on the board.

B. Energy Storage

Solar System utilizes the battery for capacity of vitality. Capacity components improve the framework unwavering quality. The rating of the battery relies upon our heap. All the DC power worked gadgets associated this battery straightforwardly. It is best practice to use for disconnected PV creating frameworks.

C. Inverter

PV frameworks produce DC power. On the off chance that the heap is an AC power worked load, it is important to utilize an Inverter to supply the heap.

VI. RESULT AND DISCUSSION

It is planned to introduce the top of sunlight based boards along the Roads of Highway as appeared in the fig. 6. The power Generated will be move by GRID nor important to store in the battery .It likewise utilizes for E-charging to electrical vehicles in the coming edge by giving E-charging focuses at Highway Roads .The length of Roads at parkway is 23.5meters Hence for 1KM the territory of rooftop will be 23500Sq. Meter &electricity Generated will be 1.45 MWatts.



Fig.6 Roof model for Solar panel along Roads of Highway

VII. CONCLUSION

Right now, the idea of solar board is recreated and it is discovered acceptable. The hypothetical clarification of PV board arrangement is additionally introduced. Current-Voltage attributes of the PV board discovered agreeable with the plan. The structure depends on the scientific conditions with fluctuating illumination and temperature is exhibited. For the difference in light there is a comparing change in its yield. The PV framework is best reasonable for little DC power applications. The exhibition qualities of PV board were tried through Matlab/Simulink programming

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Simulation of DC/DC Converter Based on an Integrated Boost-C´uk Topology

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***Abstract*—A new non-isolated DC-DC converter for photovoltaic systems is proposed in this paper. This converter topology is characterized by an integration of the classical Boost and Cuk DC-DC converters. The proposed topology requires only a single power semiconductor switch, reduces voltage stress across diodes and power semiconductor switch while providing a continuous input current. Further, this topology allows extending the voltage static gain when compared with the conventional Boost converter. The new converter is regulated by a PWM technique at constant frequency that can be associated to a maximum power point tracking algorithm. Herein, the design considerations of this power converter are presented, and the characteristics of the proposed topology are confirmed by simulations and experiment results from a laboratory prototype.**

Keywords—boost, CUK, high step up converter, simulation

I. INTRODUCTION

Nowadays , consumption of electricity is increasing day by day and hence its demand is increased. Power generation by conventional energy sources such as oil and coal results in production of greenhouse gases such as CO_2, N_2, etc. which creates pollution and these sources are limited in nature. These problems make the researchers to work on renewable energy sources such as photovoltaic system because of its several advantages such as absence of noise, longer life, less time of installation, absence of pollution and noise, high mobility and portability of parts, simplicity and output power capability to reach load requirements. PV based grid connected and standalone system are fast developing in recent days all over world [1]. Main disadvantage of photovoltaic systems is their low conversion efficiency which makes it expensive technology. So researchers are working on this field to improve efficiency. In PV System algorithms of maximum power tracking are used to increase energy harvesting which results increase of efficiency. The design of PV cell for study is considered as P_{MPP} =100W and V_{MPP} = 15 volts and to increase the performance of system high step up DC-DC converters are used to convert the low voltage into high voltage as required for application. In grid connected system input of DC-AC inverter must be $\sqrt{3}$ times of grid voltage needed, so DC-DC converters are used to convert PV low voltage level to high voltage level which is needed. Renewable energy plays a fundamental role in the actual energy context Among the renewable sources, electricity generation from photovoltaic (PV) solar panels is growing rapidly despite the fact that PV panels have relatively low output voltage characteristics, regarding the load network needs. Therefore, many PV applications require a high step-up voltage gain and high efficiency DC-DC converter in order to increase and regulate the low PV DC voltage into a suitable utilization voltage. Besides the interconnection between the PV panels and the load, the DC-DC converter also performs the critical task of maximizing the photovoltaic system power output. In fact, the DC-DC converter, besides stepping-up the voltage is also controlled by a maximum power point tracking (MPPT) algorithm in order to continuously ensure that the PV panels are in their maximum power point (MPP) of their voltage-current electrical characteristics. In order to increase the output voltage of PV panels a simple step-up converter with high duty-cycle can be used. One of the classical DC-DC converters that can be used in this kind of applications is the boost converter However, there is some limitation on the voltage gain,mainly due to parasitic elements associated to components such as inductors and power semiconductors. Moreover, there are somepenalties due to high voltage stress across the power semiconductors. This will affect, for example Metal Oxide Semiconductor Field Effect Transistors MOSFET (or Insulated Gate Bipolar Transistors, IGBT) and diodes. Regarding diodes, proposed in which several multiplier stages are used. Another class of topologies allowing high voltage gains is the quadratic converter. These topologies can be synthesized by cascading two converters in series while eliminating the redundant switches and controllers.

when operated at high current and voltage levels their relatively high reverse recovery current originates switching losses that reduce the efficiency of the converter. One of the solutions to overcome this problem is to use a converter with a set-up transformer, such as the flyback converter. However, the use of a step-up transformer presents some problems like limitations in the operating frequency and the increase of problems associated of switching transients and leakage energy. Thus, new topologies in which the voltage gain is increased and the voltage stress across the power semiconductors is comparatively reduced had been

II. DC-DC CONVERTER

The converter is used to convert DC voltage from one level to another level as needed on output. The main advantage of high step up converters is generation of high voltage at output which can be up to ten times of input voltage by using a single semiconductor switch.

The boost converter is a conventional high step up converter which is used in high voltage applications. Boost converter is based on the step up principle which means output voltage will be always greater than the input voltage and its circuit model is as shown in fig 1. To improve the efficiency it is connected with both switched capacitor and coupled inductor. Boost converter is further upgraded to conventional interleaved boost converter for improving efficiency [3].

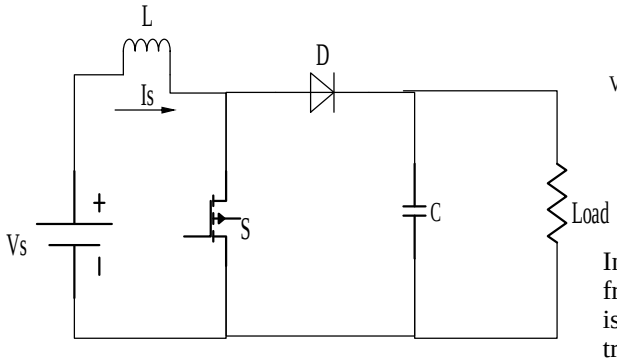

Fig.1 Boost converter

CUK converter, the conduction losses and switching losses are reduced, for smooth transition of current and voltage at output and input, switching techniques are provided. So due to CUK converter the conversion efficiency of PV system is improved and load meeting the dynamic energy requirement is done in efficient manner [4].

The advantages of CUK converter are-

- Power flows continuously via capacitor and this type of switch has minimum EMI radiation
- It has low voltage ripple on both the output and input sides of converter
- In CUK converter energy is transferred in bidirectional way by adding a diode and a switch

The circuit diagram of CUK converter is derived from duality principle of Buck-Boost converter as shown in fig3.The output of CUK converter has an inverted output. In this converter the output current passes through C_o. So C_o is made with large electrolytic with low Equivalent Series Resistance and high ripple current rating for minimizing the losses.

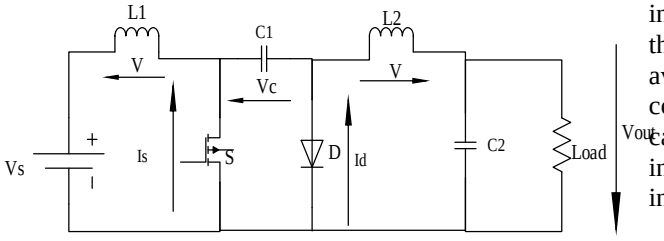

Fig.2 CUK converter

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III. OPERATION OF CUK CONVERTER

Fig 5 shows the ON state operation of CUK converter, In this circuit when switch S is turned on current flows through inductor L_1 and MOSFET. It stores the energy in inductor L_1. As the switch is turned off, the voltage across inductor is reversed to maintain the current flow.

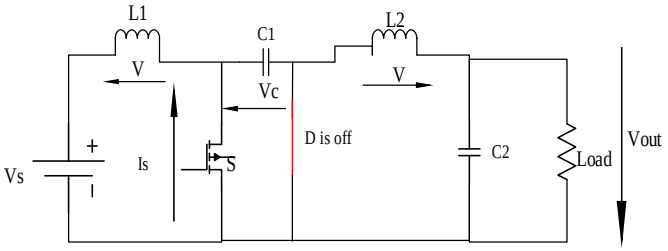


Fig.3. Mode 1 operation of CUK converter

In the off state period as shown in fig 6, current floes from input through inductor and diode, the capacitor C_o is charged to a voltage which is higher than V_i and transfer that energy to source. When MOSFET is turned on again capacitor completely discharge through inductor L_2 into load. Here L_2 and C_o acts as a smoothing filter.

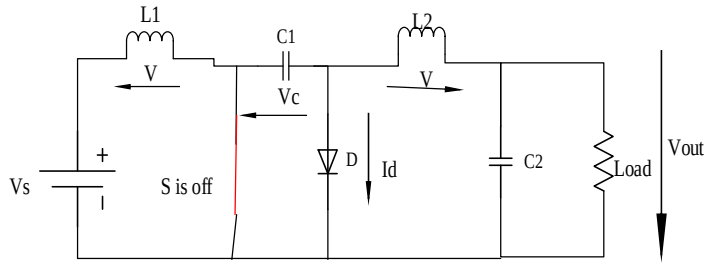


Fig.4 Mode 2 operation of CUK converter

A. Continuous Conduction Mode

In continuous conduction mode of operation, at the beginning and at the end of the cycle, the energy stored in the inductor will be kept same. The energy stored is given by-

$$E = \frac{1}{2} LI^2$$

(1)

This equation shows that the current through the inductors is kept same at the beginning and the end of the cycle. To satisfy the steady-state requirements, the average value of the inductor voltages over a commutation period is kept as zero. If the values of capacitors C and C_o are designed with large values, the inductor voltages become higher [5]. The voltage across inductor is given by [6],

$$V_L = L\frac{di}{dt}$$

(2)

In the off state period of operation, inductor is connected in series with input voltage and capacitor so voltage across inductor can also be given as-

$$V_{L1} = V_i - V_c$$
(3)

Now, diode D is forward biased and inductor L_2 is directly connected to the capacitor. Therefore-

$$V_{L2} = V_o$$
(4)

In on state inductor L_1 is connected directly the input source, therefore-

$$V_{L1} = V_i$$
(5)

In the circuit diagram of CUK converter, the source side and load side components are separated by the capacitor. Due to this arrangement, energy transfer from the source side to load side occurs only through capacitor, which makes lesser ripple current at the source and load side.

B. Discontinuous Conduction Mode

The current will be discontinuous if the value of inductor is too small or below the critical inductance value [7]. The minimum inductance value is calculated by the formula-

$$L_{1\min} = \frac{1 - D^2 R}{2 D f_s}$$
(6)

Where f_s is switching frequency, D is duty cycle and R is load resistance

IV. INTEGRATED BOOST-C´UK CONVERTER

The circuit diagrams of two classical DC-DC converters with voltage step-up characteristics are presented in Fig. 1. Fig. 1 circuit is related with the boost converter, while Fig. 2 represents the C´ uk converter. Both have been used alone in photovoltaic applications , despite their described voltage gain limitation. Analyzing these circuits it is possible to verify that both converters have similar parts, namely the boost inductor and the power MOSFET switch S in the input stage. Therefore, a hybrid Boost-C´ uk converter is proposed by merging their input stages, as can be seen by Fig. 5. This new converter is characterized by the use of a single switch S and an extended voltage static gain when compared with the classical Boost or C´ uk converters.[6]

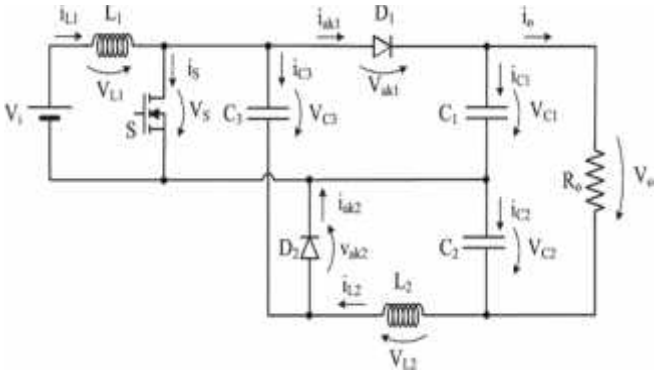


Fig.5 Proposed hybrid DC-DC converter with extended voltage ratio

Fig. 6 shows the voltage conversion ratio as a function of the duty-cycle d, for the converters presented in Fig. 1 and 2 and for the proposed hybrid converter in Fig. 5. It can be seen that the hybrid converter provides a substantial voltage gain, mainly for d > 0.5.[7]

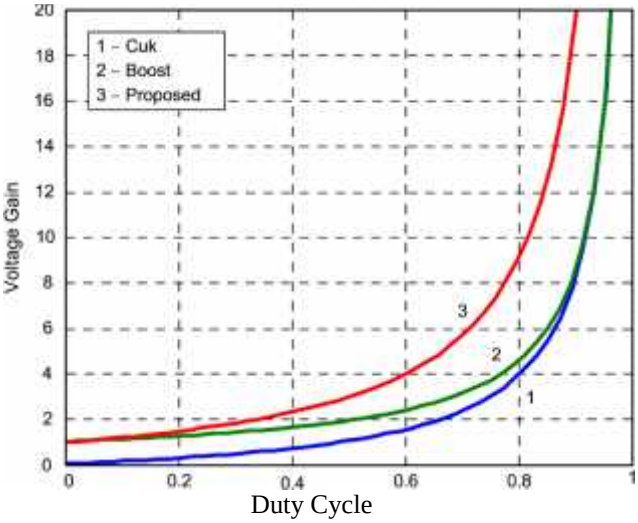


Fig. 6. Static voltage conversion ratio as a function of duty-cycle.

Table I. Parameters of Boost and SEPIC Converter

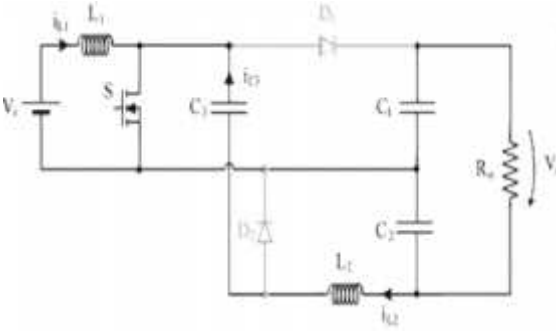
Parameters	Boost Converter	CUK Converter
Duty Cycle	$D = 1 - \frac{V_{in}}{V_{out}}$	$D = \frac{V_{out}}{V_{out} + V_{in}}$
Inductance	$L_1 = \frac{V_{out} D}{\Delta i_L f}$	$L_1 = \frac{V_{out} D}{\Delta i_{L1} f}$ $L_2 = \frac{V_{out} D}{\Delta i_{L2} f}$
Capacitance	$C_o = \frac{D}{R(\Delta V_{out} / V_{in})}$	$C_o = \frac{D}{R(\Delta V_{out} / V_{in}) f}$ $C_1 = \frac{D}{R(\Delta V_{C1} / V_{out}) f}$

The proposed hybrid topology Fig.5 is analyzed based on the assumption that the converter operates in continuous conduction mode and all components are ideal. According to this, the following three operating modes can described:

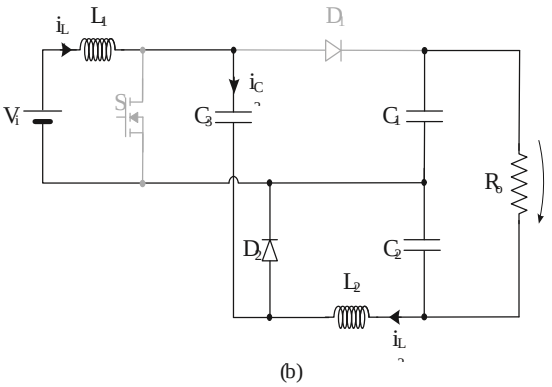
(1) Operating mode A [t_1–t_2] Fig.6(a): This operating mode is effective when the power switch S is ON. The inductors L_1 and L_2 are in charging mode while capacitor C_3 is discharging. Diodes D_1 and D_2 are blocked respectively by the negative voltages V_{C1} and V_{C3}.

(2) Operating mode B [t_2–t_3] Fig.6(b): When the power switch S is turned OFF this operating mode can occurs if the voltage across the capacitor C_3 is smaller than the voltage across the capacitor C_1. During this period capacitor C_3 will be charged (the voltage across this capacitor will increase) and the energy of inductors L_1 and L_2 is decreasing. Diode D_1 will stay blocked but diode D_2 will be ON.

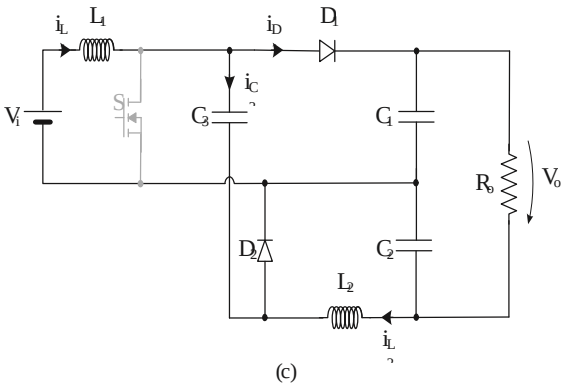
(3) Operating mode C [t_3–t_4] Fig.7(c): This operating mode occurs when the power switch S is turned OFF and voltage across capacitor C_1 is equal or smaller than voltage across capacitor C_3. Both inductors are in discharging mode and capacitors C_1 and C_3 are being charged by the current that flows through the inductor L_1. Both diodes are turned ON.[8]



(a)



(b)



(c)

Fig. 7. Converter operating modes

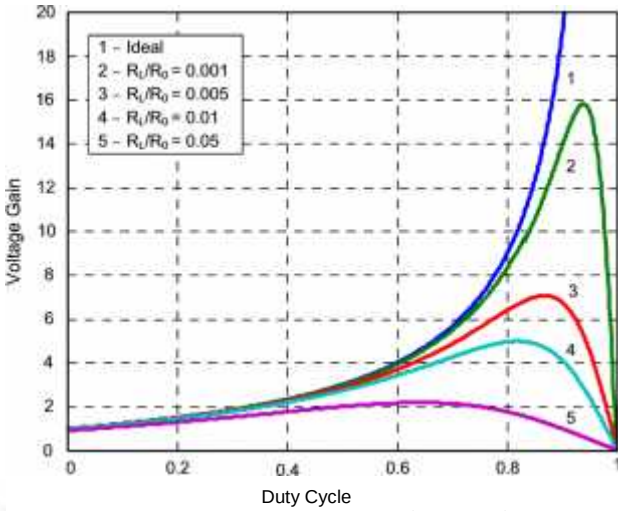


Fig. 8. Static voltage conversion ratio as a function of duty cycle considering inductor losses.

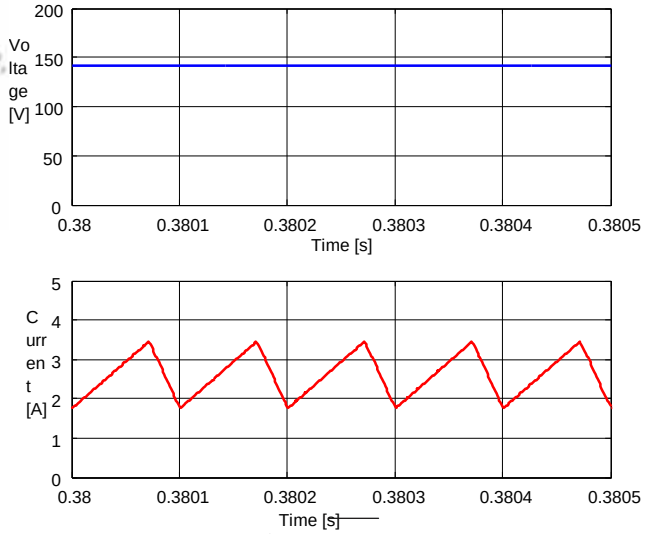


Fig. 9. Simulation results of the input current and output voltage.

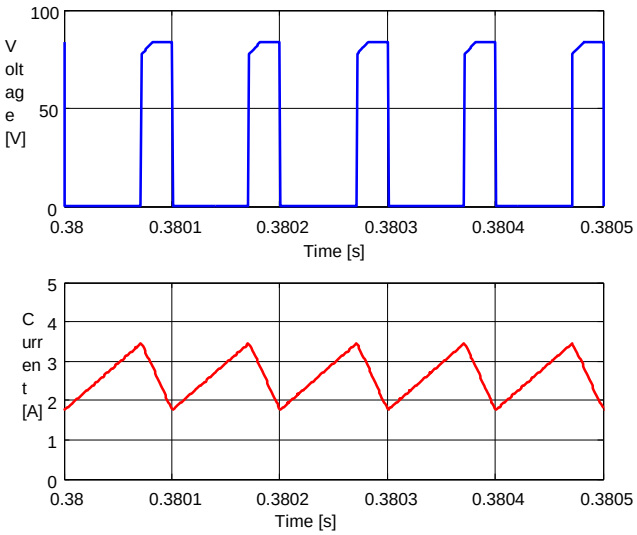


Fig. 10. Simulation results of the input current and voltage across the power switch S.

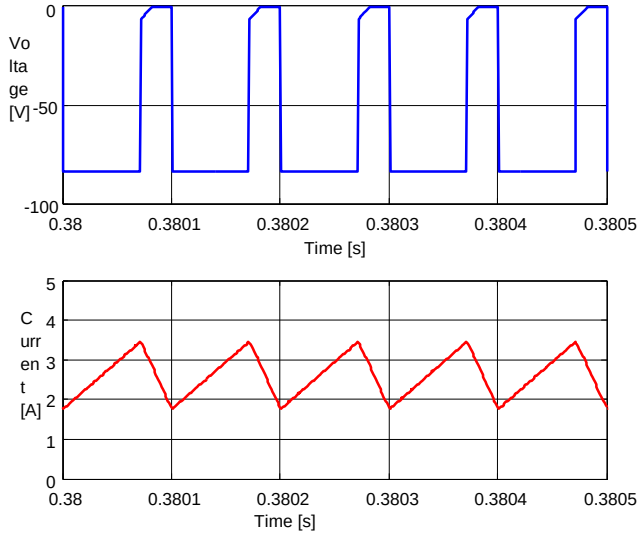


Fig. 11. Simulation results of the input current and voltage across the diode D_1.

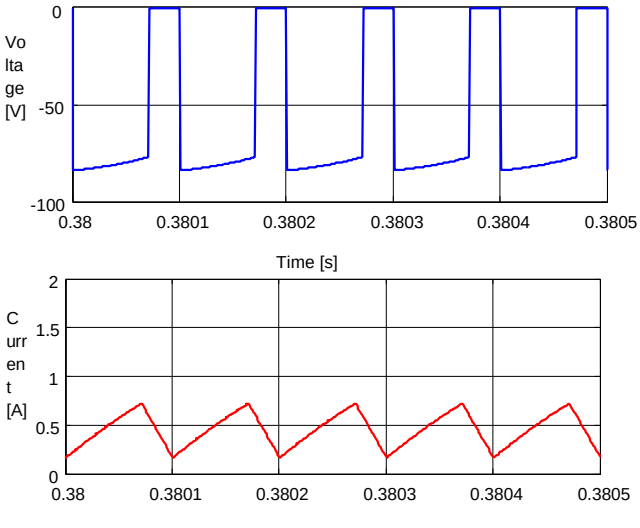


Fig. 12. Simulation results of the output current inductor (i_{L2}) and voltage across the diode D_2.

Table 2. Parameters of the PV array.

Peak power	200w
Maximum power Current (Impp)	7.61A
Maximum power Voltage (Vmpp)	26.3V
Short-circuit current	8.21A
Open circuit voltage	32.9V
I_{cc} temperature coefficient	3.18mA/k
V_{ca} temperature coefficient	123mV/k
Number of cells in series	54

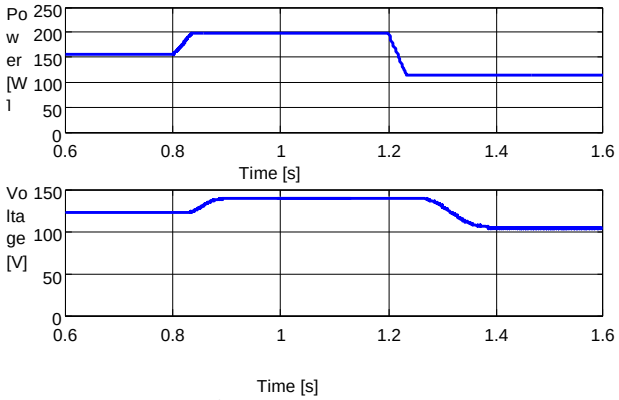


Fig. 13. Time evolution of the irradiance and power supplied by the solar panel.

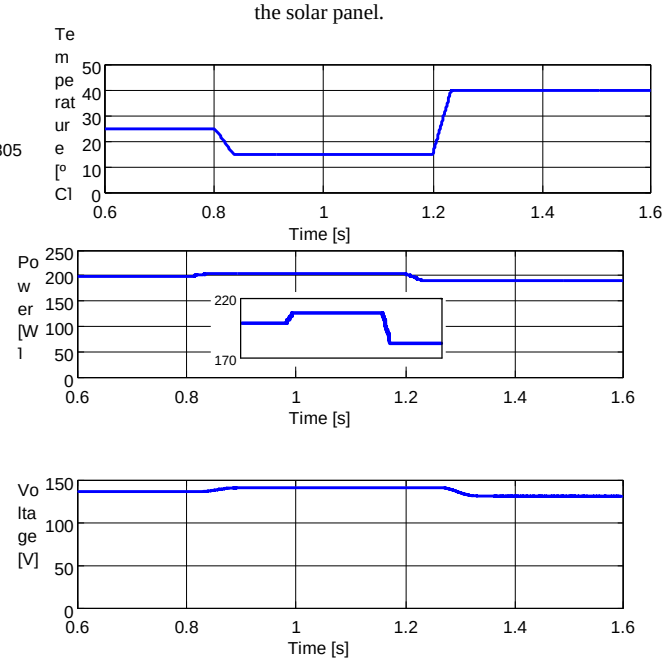


Fig. 14. Time evolution of the ambient temperature and power supplied by the solar panel

V. RESULTS AND CONCLUSION

. Tests of the proposed power converter in steady state and in dynamic mode using the program Matlab/Simulink and Power System Toolbox were

made. In these simulations the parameters that were used for the proposed power converter were the following: inductors L1 = 1 mH and L2 = 1 mH, capacitors C1 = 100 lF, C2 = 100 lF and C3 = 2 lF and switching frequency of 10 kHz.[9]

Figs. 9–12 show the simulated waveforms for the converter in steady-state and for a 24 V input voltage and a duty-cycle of 0.7. From these results it is possible to confirm that the output voltage is 5.6 times higher than the input voltage (since an output voltage of 136 V is obtained), confirming the theoretical voltage static gain. The continuous conduction mode of the current through the inductor L1 is also verified by these results. The reduced voltage across the semiconductors can also be noted, since the maximum voltages across the power switch S and diodes are 80 V.

The proposed DC/DC converter is also tested in dynamic operation through the use of a photovoltaic module (PV) as the power source. For simulations, a model of the commercial PV module Kyocera KC200GT was obtained from the main data of its datasheet (Table 1). The chosen model is based on the one diode equivalent since is the most important and gives good enough results. A first test was made considering a change in the solar irradiation. Fig. 10 shows the profile that was used in this test. The system was initially operated at 800 W/m2 and at time 0.8 s changed gradually to 1000 W/m2. At time 1.2 s the solar irradiation dropped to 600 W/m^2. This test was made for a fixed temperature of 25 C. This figure also shows the power supplied by the solar panel and the output voltage of the converter. Through the analysis of this figure is possible to confirm that the proposed converter associated to the MPPT algorithm responds in accordance with the changes in the irradiation.

Another test was made, but in this case to illustrate the system dynamic behavior under variable temperature. The profile of the ambient temperature that was used in this test is presented in Fig. 14, using the irradiance level of 1000 W/m^2. As can be seen by this figure, the system was initially operated at 25 C and at 0.8 s changed gradually to 15 C. Finally, at 1.2 s the temperature increased to 40 C. Although, real world temperature profiles will not change this fast, this profile was chosen to accommodate the small step times (1 ls) needed to describe the switching action of the power devices, which prevent long simulation times due to computer processing power and memory limitations. The time behavior of the PV power in the referred conditions (Fig. 14), shows that the MPPT incremental conductance algorithm extracts the maximum power available at each temperature. The bottom graph of this figure shows the output voltage of the power converter. From the simulations presented in this figure is possible to conclude that the behavior of the variables is in accordance with the expected.

In this paper a new high-gain single-switch non-isolated DC-DC converter is proposed. Thistopology is characterized by the integration of a Boost and C´ uk DC-DC converters, using only one controlled power switch, and is suitable for photovoltaic applications, where low voltage solar panels are used to provide high DC voltages to inverters. The topology enables an extended voltage static gain, when compared with the classical boost converter, while reducing the voltage stress across the power switch and diodes, being smaller than the output voltage of the converter, and therefore lower than on an equivalent boost converter. The presented steady-state operating analysis considering nonideality of some components concluded that a gain slightly lower than 6 can be obtained for duty-cycles near 0.7. An MPPT algorithm was presented to be applied to conventional PWM modulators to control the proposed converter. Simulation and experimental results were presented in order to confirm the characteristics of the proposed topology (5.6 gain) as well as its capability to track the maximum power point of a photovoltaic panel.

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TRANSFORM MODEL OF DOUBLE GATE CARBON NANOTUBE DEVICE

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***Abstract*—CNTFET-based devices offer high mobility for near ballistic transport, high carrier velocity for fast switching, as well as better electrostatic control due to the quasi one-dimensional structure of carbon nano tube (CNT). The proposed Double Gate CNFET device that has better control over gate and it is simulated using NanoTCAD Vides. The designed model is based on self-consistent solution of 3-D Poisson–Schrodinger equation considering open boundary conditions, for non-equilibrium Green function methodology. The simulation results are compared on the basis of several parameters i.e. Ion/Ioff ratio, transconductance, threshold voltage, sub threshold slope with the variation of the diameter, Dielectric medium and Channel length. It has been observed that the proposed model shows higher Ion/Ioff ratio (6.63×108), lowest threshold voltage (0.0651V), and satisfies the ideal condition for the sub threshold slope (10.04mV/decade) which is approximately achieved with transconductance (7.34S). By achieving and studying the above results, it can be concluded that the model is capable for low-power and high-speed applications.**

Keywords: ***Ballistic transport, carbon nanotubes (CNTs), double gate carbon nano tube field effect transistor (DG-CNTFET), non-equilibrium Green's function (NEGF), technology computer aided design (TCAD).***

I. INTRODUCTION

According to ITRS roadmap [1], Silicon based Technology will reach its fundamental limit by 2018, as technology scaling reaches nanometer regime. The scaling limit is expected to be 5nm [12]. At this limit, Short Channel Effects (SCE) such as degradation in mobility, threshold voltage variation, increase in leakage current and difficulty in increasing of ON current (ION) become dominant in Complementary Metal Oxide Semiconductor (CMOS) technology. Due to this reason, electronic industry has been searching for novel devices to overcome these problems. Several novel devices have gained attention in recent years i.e. Single-Electron Tunneling (SET), Quantum Cellular

Automata (QCA) and Carbon Nanotube Field Effect Transistors (CNTFET). CNTFETs are promising devices among all due to their operating principles and device structures are similar to Si-based CMOS transistors; therefore, the CMOS design infrastructure could be reused. Carbon Nanotubes (CNTs) form the backbone of CNTFET, as CNTs act as the channel which is responsible for transport mechanism. CNTs are cylindrical tubes formed by rolling 1-D graphene sheets around an axis. Depending on the ways to roll a sheet into a cylinder, CNTs can be of different diameters and microscopic structures. Chirality [3] defines the basic properties of CNT like diameter, band gap and threshold voltage. The most important characteristic of CNTs is that they can behave metallic as well as semiconducting. Chiral numbers (n, m) that define the orientation of graphene sheets decides its conducting nature. If (n-m) is divisible by 3, the tube is metallic else semiconducting. The structures of CNTFET may be grouped into two major categories: planer and coaxial. Most of the CNTFETs fabricated are of planer type due to their relative simplicity and moderate compatibility with existing manufacturing technologies. In planer technology the top gate geometry gives the best performance [4]. But coaxial is most preferred because it maximizes the capacitive coupling between the gate and CNT surface, thereby inducing more charge in channel at a given gate potential than other geometries. For our simulations we are using double gate planer geometry. We have simulated double gate CNTFETs for channel length (L) 30-80nm and diameter (d) 0.5-1nm for different dielectric medium to analyze the best device morphology.We have analyzed and compared different structure on the basis of different parameters i.e. ION/IOFF ratio, transconductance (gm), inverse sub threshold slope (S) and threshold voltage (Vth). Simulations have been performed in NanoTCAD ViDES.Double Gate CNT FETs have been observed, where the three-dimensional Poisson equation of the electrostatic potential, and transport is evaluated through the Landauer formalism. The structure is been adopted for the Poisson equation that is simultaneously involved with the non equilibrium Green's function (NEGF) formalism using the mode space approach, which empower the computation of transport for a small number of electron sub bands with a less computational cost.

In this paper, the focus is on morphological and empirically relevant Double gate CNT-FETs with doped wells extensions, and evaluates their performance with the need of the ITRS. In this case code is developed that is able to calculate full band Schrodinger equations with

open boundary conditions. The code is referred in NANOTCAD ViDES [6], which can be used for general structures, since it does not take prevalence of particular symmetries and can consider structures in which both CNTs and traditional semiconductors are as one presented. Our sane replica spectacle that Double gate CNT-FETs are pleasant for 1) driving high ON currents per unit length; 2) providing Ion/Ioff ratio for the 20-nm gate length.

II. BASICS OF DOUBLE GATE CARBON NANOTUBES

The Carbon nanotubes were discovered by S. Ijiima in1991 while performing some experiments on $D_C = \frac{\sqrt{3}\,a_0}{\pi}\sqrt{n^2 + m^2 + m^0}$ (1)

Where a 0 = 0.142 nm is the inter-atomic distance between each carbon atom and its neighbour.Most single walled nanotube (SWNT) have a diameter of close to 1 nanometer, with a tube length that can be many millions of times longer. The structure of a SWNT can be conceptualized by wrapping a one-atom-thick layer of graphite called graphene into a seamless cylinder [2].

III. SIMULATION APPROACH

The Simulation performed in 3-D obeys Poisson equation

$$\nabla\left[\epsilon\left(\vec{r}\right)\nabla\emptyset\left(\vec{r}\right)\right] = -q\left[p\left(\vec{r}\right) - n\left(\vec{r}\right) + N_D^+\left(\vec{r}\right) - N_A^-\left(\vec{r}\right) + \rho f_\epsilon\right]$$ (2)

Where Ø(□(→r)) electrostatic potential, ϵ(□(→r)) dielectric constant, N_D^+ (□(→r)) and 〖 N〗 _A^- (□(→r)) are the concentrations of ionized donors and acceptors, respectively, and ρf_ix is the fixed charge. The electron and hole concentrations (n and p, respectively) are classified by dealing with the Schrodinger equation and its open boundary conditions by virtue of the NEGF formalism [7].A closed binded Hamiltonian with an atomistic (pz orbital's) real-space basis [8] applied with a hopping parameter t =2.7 eV.

The Green's function is described as

$$G(E) = [E - H - \sum S - \sum D]^{-1}$$ (3)

Where E is energy, I identity matrix, H Hamiltonian of the CNT, and ∑ S and ∑ D are the self-energies of the source and drain, respectively. As exhibits complete ballistic transist is assumed as working bellow 200nm.

The considered CNTs are all zigzag nanotubes, but the contemplated approach can be easily derive to nanotubes with a generic Chirality since the required changes associate only the Hamiltonian matrix. As the length and Chirality of the tube is known then the co-ordinates of the individual carbon atom can be figure out [9]. After that, the 3-D domain is discretized so that a grid point is defined in correspondence with each atom, while a user-specified grid is defined in area not including the CNT.layers into carbon cylinders and may be composed of a single shell–single wall nanotube (SWNTs), or of several shells-multi-wall nanotube (MWNTs) as shown in fig.1. Depending on the folding angle and the diameter, nanotubes can be metallic or semiconducting. Based on the chiral vector, the circular vector that is perpendicular to the axis of the tube [1].

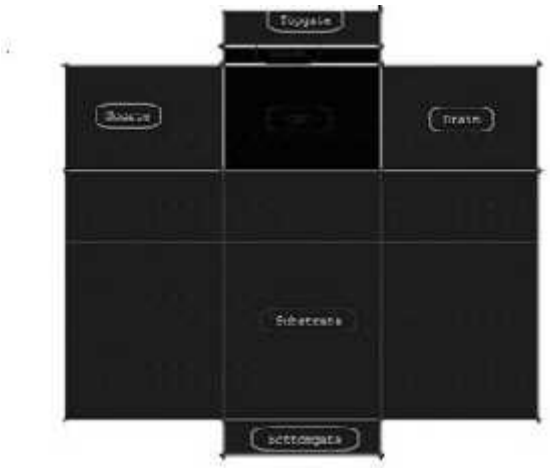


Figure 1 :Structural view of Double gate Carbon Nanotube field effect transistor

An SWCNT can act as either a conductor or a semiconductor, depending on the angle of the atom arrangement along the tube. This is referred to as the Chirality vector and is represented by the integer pair (n, m). A simple method to determine if a CNT is metallic or semiconducting is to consider its indexes (n, m). The Nanotube is metallic if n =m or n − m = 3i, where i is an integer. Otherwise, the tube is semiconducting. The diameter of the CNT can be calculated based on the following.

Let us consider the point charge approximation i.e., all free charge around each carbon atom are spread equally in each elementary cell along with atom. Assume that chemical potential of the reservoirs is co-ordinated at equilibrium state of Fermi level in CNT. The CNT is inclined with no confined states, where the electron concentration is given by the following equation:

$$n\left(\vec{r}\right) = 2\int_{E(\Gamma)}^{+\infty} d\ [|\varphi_S\left(E,\vec{r}\right)|^2 f\left(E - E_{F_S}\right) + |\varphi_S\left(E,\vec{r}\right)|^2 f\left(E - E_{F_D}\right)]$$ (4)

The hole Concentration is given by:

$$p\left(\rightarrow_{r}\right) = \left\{2\int_{-\infty}^{E(i)} d\ [|\varphi_S\left(E, \rightarrow_{r}\right)|^2[1 - f\left(E - E_{F_S}\right)] + |\varphi_S\left(E, \rightarrow_{r}\right)|^2[1 - f\left(E - E_{F_D}\right)]\right\} \quad (5)$$

Where $\rightarrow_{\top}$r is coordinate of the carbon site, f is Fermi–Dirac occupation factor, $|\varphi_S|^2(|\varphi_D|^2)$ is probability that states implant by the source (drain) reach the carbon site$\left(\rightarrow_{i}\right)$, and E_{F_S} ($E_{F_D}$are the Fermi level of the source (drain).

The current has been enumerate as

$$I = \frac{2q}{h}\int_{-\infty}^{+\infty} d\ (E)[f\left(E - E_{F_S}\right) - f\left(E - E_{F_D}\right)] \quad (6)$$

Where q is electron charge, h is Planck's constant, and T (E) is transmission coefficient computed as [7].

$$T = -Tr\ [(\sum_S - \sum_S^+))\ G\ (\sum_L - \sum_L^+))\ G^+] \quad (7)$$

Where Tr is trace operator. We have to point out that with current model, the one-dimensional (1-D) transit between sources and drain reservoirs, although leakage gate current is not considered. On considering the devices with channel length of minor nanometers, it can be shown that the gate current is negligible with respect to the drain current. From a mathematical point of view, Green's function is computed using the recursive Green's function (RGF) technique [10], [11]. To articulate and explain the context of self-energy matrix, which can be interpreted as a boundary condition of the Schrodinger equation. In particular, the simulation analysis depicts about a self-energy for semi infinite edge tested for boundary conditions that results to consider CNT to be connected for infinite length at its ends.

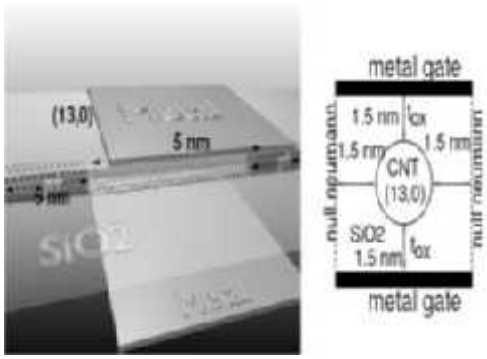


Figure 2: the defined DG-CNTFET in the input deck CNT file.

III. SIMULATION ANALYSIS AND RESULT

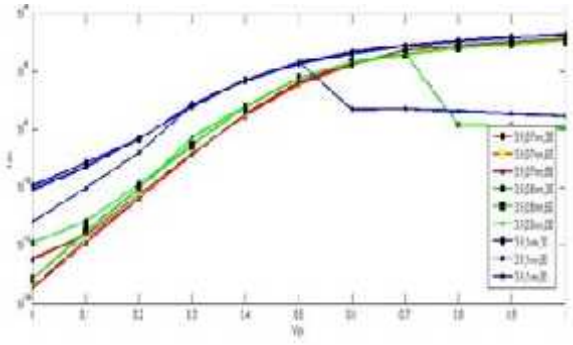


Figure 2 :Id-Vgs characteristics of the proposed DG-CNT TFET as a function of Silicon dioxide at Tox= 1.5nm.

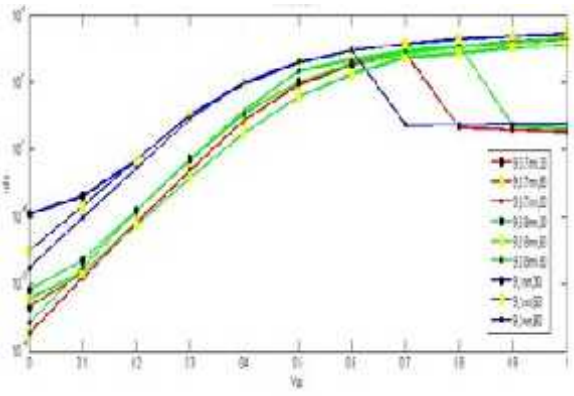


Figure 3 :Id-Vgs characteristics of the proposed DG-CNT TFET as a function of Aluminium oxide at Tox= 1.5nm.

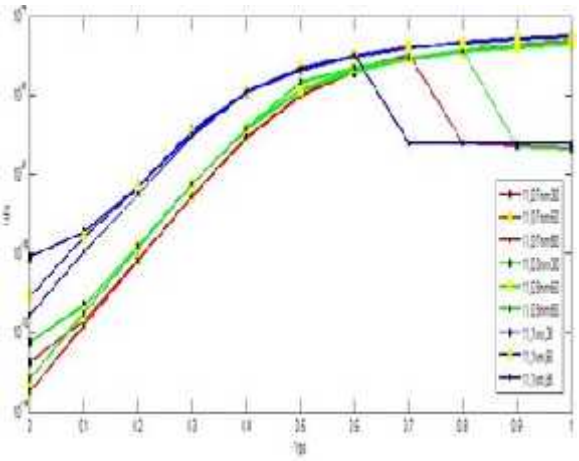


Figure 4 :Id-Vgs characteristics of the proposed DG-CNT TFET as a function of Hafnium Silicate at Tox= 1.5nm.

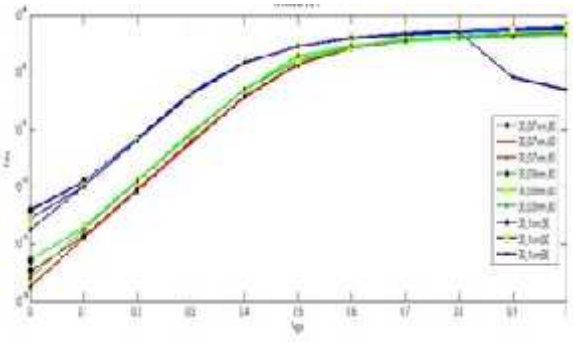


Figure 5 : Id-Vgs characteristics of the proposed DG-CNT TFET as a function of Lanthanum oxide at Tox= 1.5nm.

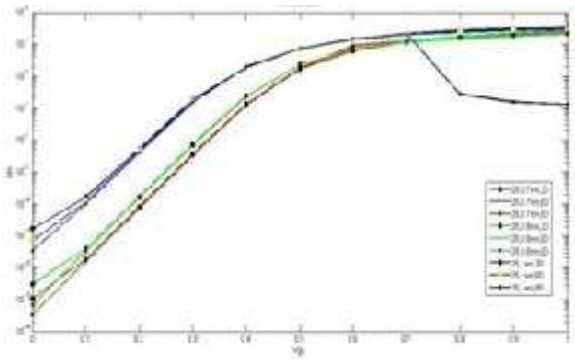


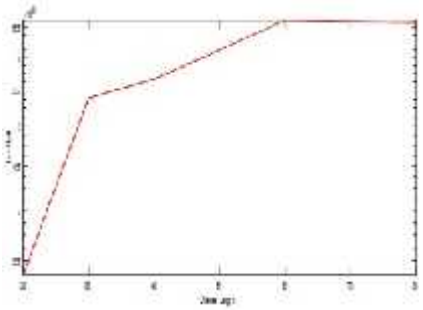
Figure 6 : Id-Vgs characteristics of the proposed DG-CNT TFET as a function of Zirconium oxide at Tox= 1.5nm.

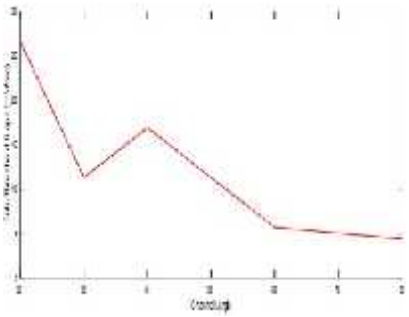
The dielectric materials used in our study are listed in "Table. I" along with their dielectric constants:

Table 1: LISTS OF DIELECTRIC MATERIALS WITH THEIR DIELECTRIC

DIELECTRIC MATRERIAL	DIELECTRIC STRENGTH
SILICON DIOXIDE(SiO2)	3.6
ALUMINIUMOXIDE(Al2O3)	9
HAFNIUM SILICATE(HfSi)	11
LANTHANUMOXIDE(La2O3)	25
ZIRCORNIUM OXIDE(ZrO3)	30

The gate oxide dielectric constants dependent transfer characteristics of Double gate CNT TFET is shown in "Fig.3," where thickness of the oxide is kept constant at 1.5 nm. The results are evaluated varying the gate bias from 0 to 1 V while keeping the drain bias Vds fixed at 0.5 V. The curves are plotted in logarithmic as well as in linear scale in the y-axis (in micro amperes/micro meter) to realize the difference between ION and IOFF clearly. Here it is seen that the ON current is highest for smallest dielectric constant and gradually decreased with increasing the dielectric constants. This result can be explained from its respective curve and distribution of electric field shown in "Fig.3, Fig.4, Fig.5," and "Fig.6," From the ON state band it is seen that the gate oxide with lowest dielectric constant offer the lowest tunneling distance that is the barrier width, W. As a result the tunneling probability becomes maximum. Hence highest current is obtained. As a result tunneling probability reduces, which in turns results in gradually fall of ON state currents. This falling nature of ION can also be explained from the distribution of electric field at the tunneling junction (source channel junction). The peak amplitude of electric field at the tunneling junction is found to be reduced significantly with gate oxide dielectric constants. This electric field related with the transmission coefficient of the tunneling Similarly IOFF of the device is found to have falling characteristics with increase in dielectric constants, which can be explained from the respective OFF state above curve. It is seen that the tunneling distance increases gradually with increase in dielectric constant. As a result the OFF state current reduces gradually. The ratio of currents between the ON state and OFF state is known as on/off current (ION/IOFF) ratio, which have a rising characteristics with the oxide dielectric constants shown in "Fig.6," in spite of falling characteristics of ION and IOFF shown in "Fig.6(a)," and "Fig.6(b),". This is because the reduction of IOFF happens more drastically than the ION in their individual scale. So ION/IOFF is found to be increased gradually with increasing dielectric constants. From the transfer characteristics we also found that the sub threshold slop of the DG- CNTTFET decreases with increasing dielectric constant. This demonstrates that if the oxide dielectric constant of the gate is increased, smaller voltage will be required to obtain certain ON state current. That smaller voltage will results in, reduction of the dynamic power consumption. Finally from the study presented here we see that the increase in oxide's dielectric strength has two paradoxical effects on the DG-CNTTFET performance. Increasing dielectric constants offers improved ION/IOFF ratio and better sub threshold slop but it reduces the ON state currents. Therefore the choice of gate oxide dielectric constants should be done on the basis of tradeoff between sub threshold slop and ON state current for optimization of practical devices.





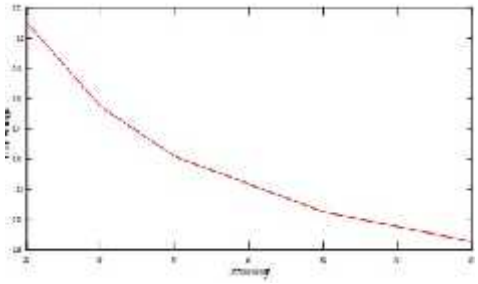


Fig 7 :Channel Length dependent (a) ION/IOFF ratio (b) Subthreshold slope (c)Gate Voltage

CONCLUSION

In this paper, the proposed double gate CNTFET device have simulated for 30-80nm channel length and 0.5-1nm diameter for different dielectric medium to analyze the morphology. Comparison has been done on the basis of various performance parameters viz. Ion/Ioff ratio, transconductance, threshold voltage and inverse sub threshold slope. It has been found that oxide dielectric strength dependent performance of double gate CNTFET. It is seen that the performance of the DGCNTFET improves in terms of ION/IOFF ratio and subthreshold slop but deteriorates in terms of ON state currents with increase in gate oxide dielectric constants. Therefore tradeoff is needed between the ION/IOFF ratio, subthreshold slop and ON state currents for the optimization of practical devices when choosing the gate oxide .The proposed device acts contrary for model bellow 0.5nm of diameter which leads violating of boundary condition of structure. Our future work will focus on the influence of these parameters on Inverter, and examine its potential for digital circuits.

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GaN HEMT as Voltage Controlled Oscillator

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***Abstract*— The microwave characteristics of any device include its unity gain bandwidth and the maximum frequency of oscillation. To achieve these parameters the current characteristics and the capacitance – voltage(C-V) characteristics are the most important. This paper presents the detailed equivalent model of submicron GaN HEMT to develop C-V characteristics. The model is developed for uniformly doped channel HEMT. The technique used for modeling is based on charge distribution model at different regions in the channel. The model makes use of the current equations for the determination of the capacitance which has not been considered by earlier works for intrinsic capacitance calculation and hence is the highlight of this paper. In this paper an attempt is made to investigate the effect of biasing voltage on the C-V characteristics of GaN HEMT and thus on the current cut-off frequency.**

Keywords—Gallium Nitride, Capacitance Modeling, charge distribution, Resistance Modeling, Microwave characteristics, current cut-off frequency, maximum frequency of oscillation, Voltage controlled oscillators (VCO)

I. INTRODUCTION

Oscillators are used in many systems along with mixers to perform frequency conversion of desired signals. Early solid-state microwave oscillators often used transferred electron devices. Recently MESFET and HEMT have found wide applications in this area due to its high DC to RF conversion efficiency. As GaAs oscillators have low output power, a power amplifier at the output of the oscillator is required to generate high power signals.

AlGaN/GaN HEMTs are capable of amplifying and delivering significantly larger power density signals than the currently used MMIC technologies [1]. The wide band gap and absence of ionized impurities in the undoped hetero-structure are expected to have a positive effect on the oscillator noise properties. These fundamental physical factors make AlGaN/GaN HEMTs an attractive option for microwave sources [2]-[6]. The structure the break down voltage of GaN HEMT is lower, which reduces the collisions and scattering in the structure thus causing increase in the carrier saturation velocity which could improve the device performance at higher frequencies [7].

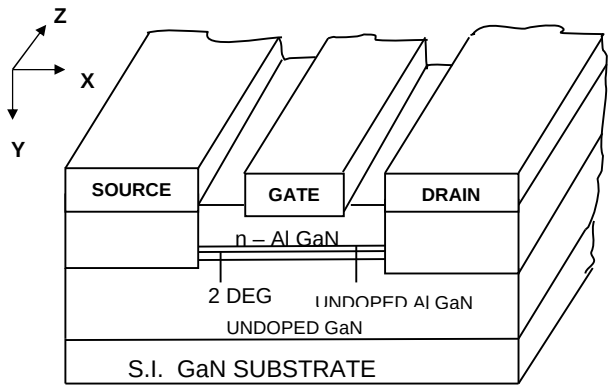


Figure 1: Structure of GaN HEMT

The structure under consideration is a conventional GaN HEMT [4]-[5]. The metallic gate is made of gold. This metal gate and the n-type channel region forms a Schottky barrier. The Schottky barrier depletion region under the gate which extends into the active region controls the cross section of the conduction channel under the gate, modulating the

channel conductivity and hence the drain to source current.

II. THEORY

Capacitances for any junction devices can be divided into two groups i.e. intrinsic and extrinsic capacitances [8]. In case of GaN HEMT extrinsic capacitances are related to metallurgical source and drain region while intrinsic are related to device capacitance, based on charge distribution [2], [9].

The equivalent circuit of a submicron GaN HEMT is dependent upon the physical construction of the device [3], [4], [9]. In Figure 2, circuit elements inside the box represent intrinsic elements of the device, whereas the other components are called extrinsic device components.

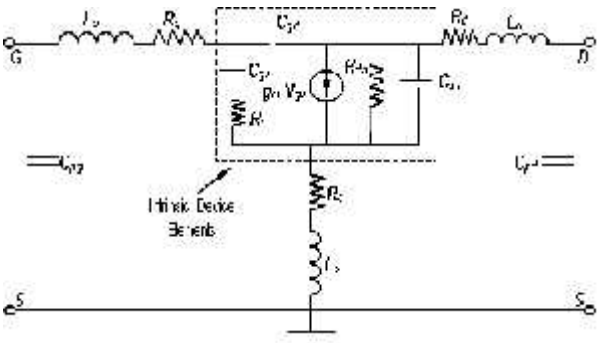


Figure 2: Small signal equivalent of GaN HEMT

III. DEVICE MODELING

CAPACITANCE MODELING

The depletion region extends beyond the gate region on both the source side and the drain side. The depletion region is divided into three parts as shown in figure 3, if the gate voltage (V_{GS}) is increased in the negative sense while keeping the gate-drain voltage (V_{DS}) constant, the depletion layer changes. In region II the depletion layer expands; the electrons which are depleted are transported first through the resistive region i.e. region I, then through region II and III and finally through the drain [10]-[12]. Thus, extra positive ionic charge is uncovered in the depletion edge in region II in response to the increase in the gate voltage, i.e. the depletion layer exhibits charge storage properties which can be described as capacitance in electrical term.

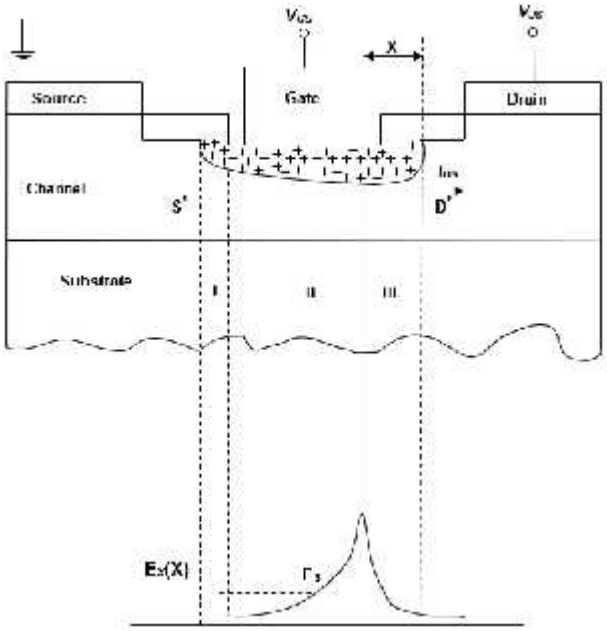


Figure 3: A Cross-sectional view of an operating HEMT showing the scattering of carriers under intense electric field.

a. GATE TO SOURCE CAPACITANCE (C_{gs}):

A reasonable approximation is that region II occupies most of the gate, the total charge in the depletion layer in region II is

$$Q_2 = qN_dL_GWh_d \quad (1)$$

Where,

Q_2 = Charge in depletion layer in region II

q = Charge of an electron

N_d = Doping Concentration

L_G = Length of the gate

W = Width of the gate

h_d= Depletion depth

And

$$h_d^2 = \frac{2\varepsilon(\varphi_b - V_{GS'} + V_{D'S})}{qN_d} \quad (2)$$

Where,

$\emptyset_b$ = Height of Schottky barrier

ε = Permittivity of semiconductor

By definition of capacitor

$$C_2 = \frac{\partial Q_2}{\partial V_{S'G}} \tag{3}$$

Therefore,

$$C_2 = \frac{\partial q N_d L_G W h_d}{\partial V_{S'G}} \tag{4}$$

$$C_2 = q N_d L_G W \frac{\partial h_d}{\partial V_{S'G}} \tag{5}$$

From equation 2

$$\frac{\partial h_d}{\partial V_{S'G}} = \frac{\varepsilon}{q N_d h} \tag{6}$$

Substituting the above in equation 5

$$C_2 = \frac{L_G W \varepsilon}{h_d} \tag{7}$$

In the submicron HEMT, current saturation in the channel arises when the electrons reach their drift velocity in region II and III, thus as suggested by [10]

$$I_{DS} = q N_d \vartheta_{sat} (d - h_d) W \tag{8}$$

Where,

I_{DS} = Drain -to-Source current

d = Epilayer thickness

The open channel current I_F is the current when the width of the depletion region is very much less than the channel thickness.

Hence from equation 8

$$I_F = q N_d \vartheta_{sat} d \tag{9}$$

Where,

I_F = Open channel current

ϑ_{sat} = Saturation velocity

$$\therefore h_d = d\left(1 - \left(\frac{I_{DS}}{q N_d \vartheta_{sat} d W}\right)\right) \tag{10}$$

Next, consider the two-dimensional effect. The excess surface charges in Regions I and III are Q_I and Q_{III} respectively.

Taking a quarter-circle shape into account and, then the total charge in this region is [10], [13]

$$Q_T = Q_I + Q_{III} = 2\left(\frac{\pi}{2} q N_d W h_d^2\right) \tag{11}$$

Therefore, capacitor in this region is

$$C_1 = \frac{\partial Q_T}{\partial V_{S'G}} \tag{12}$$

Therefore,

$$C_1 = \frac{\pi}{2} \varepsilon W \tag{13}$$

From Figure 3

$$C_{gs} = C_1 + C_2 \tag{14}$$

$$C_{gs} = \frac{\pi}{2} \varepsilon W + \frac{L_G W \varepsilon}{h_d} \tag{15}$$

$$C_{gs} = \varepsilon W \left(\frac{\pi}{2} + \frac{L_G}{h_d}\right) \tag{16}$$

Therefore,

$$C_{gs} = \frac{q N_d \vartheta_{sat} W^2 \varepsilon L_G}{d\, q N_d \vartheta_{sat} W - I_{DS}} \tag{17}$$

b. GATE TO DRAIN CAPACITANCE (C_{gd}):

If the gate-source voltage is held constant and the drain- source (or drain-gate) voltage is increased positively, the depletion extension X increases slightly. Electrons deplete from the extreme edge of the space-charge layer to uncover more positive ionic charge, resulting in charge storage. Thus, the total charge is

$$Q = \frac{\pi}{2} q N_d W h_d^2 X \tag{18}$$

Where,

X= Depletion extension into the gate-drain space

This charge storage can be represented by a capacitance which is associated with the electron's inflow at the extreme right edge of the space-charge layer and is represented as C_{gd}.

Therefore,

$$C_{gd} = \frac{\partial Q}{\partial V_{D'G}} \tag{19}$$

$$C_{gd} = \frac{\pi}{2} q N_d W h_d^2 \frac{\partial X}{\partial V_{D'G}} \tag{20}$$

The expression involves the extension X of the depletion layer into the gate-drain space.

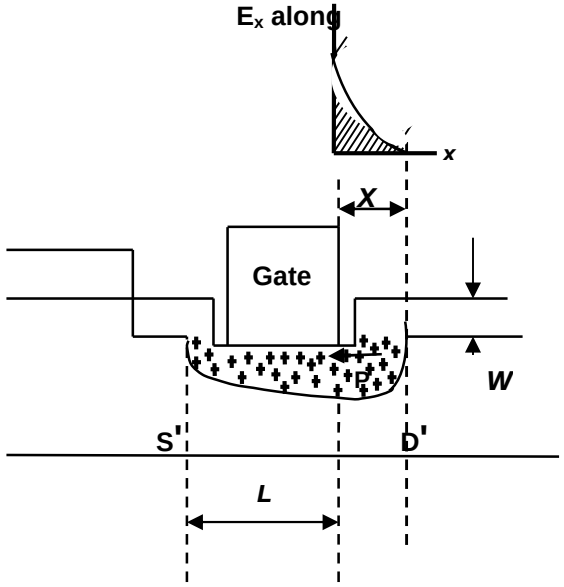


Figure 4: X-directed field along a path P

An approximation yields

$$X \leq \frac{\varepsilon(V_{D'G} + \emptyset_b)}{q N_d h_d} \tag{21}$$

Therefore,

$$\frac{\partial X}{\partial V_{D'G}} = \frac{\varepsilon}{q N_d h_d} \tag{22}$$

Therefore,

$$h_d = I_{DS} A \sqrt{\frac{2\varepsilon}{q N_d}} \tag{23}$$

Where,

$$A = \sqrt{\frac{V_{DS} - V_{GS} + \emptyset_b}{I_{DS}}} - (R_D + R_S) \tag{24}$$

Therefore

$$\frac{\partial X}{\partial V_{D'G}} = \frac{1}{I_{DS} A} \sqrt{\frac{\varepsilon}{2 q N_d}} \tag{25}$$

Substituting

$$C_{gd} = \frac{\pi}{2} q N_d W h_d^2 \frac{1}{I_{DS} A} \sqrt{\frac{\varepsilon}{2 q N_d}} \tag{26}$$

Therefore,

$$C_{gd} = \frac{\varepsilon \pi}{2 I_{DS} A} W \sqrt{\emptyset_b} \tag{27}$$

c. DRAIN TO SOURCE CAPACITANCE (C_{ds}):

Considering the quarter circle approximation at the two edges of the Schottky depletion, the charge along the gate is found to be non-uniform toward the drain end of the gate [10]. Thus, the total charge is

$$Q_c = 2\left(\frac{\pi}{2} q N_d W h_d^2 \frac{X}{L_G}\right) \tag{28}$$

This charge storage can be represented by a capacitance is represented as C_{ds}

$$C_{ds} = \frac{\partial Q_c}{\partial V_{D'G}} \tag{29}$$

$$C_{ds} = \frac{\pi q N_d W h_d^2}{L_G} \frac{\partial X}{\partial V_{D'G}} \tag{30}$$

Thus,

$$C_{ds} = \frac{\pi \varepsilon W I_{DS} A}{L_G} \sqrt{\frac{2\varepsilon}{q N_d}} \tag{31}$$

MICROWAVE CHARACTERISTICS MODELING

a. CURRENT CUT-OFF FREQUENCY (f_T) :

Increasing the frequency of oscillation at the gate, a point reaches where the gate signal cannot be further amplified due to high leakage from gate Miller capacitors. This is a point called unity gain and its associated frequency f_T *[14]*. The model for high frequency is shown in figure5.

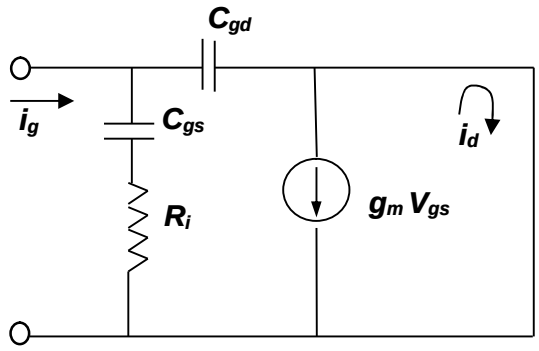


Figure 5III: Drain source short circuit model of HEMT

R_i very less hence the circuit is modified as

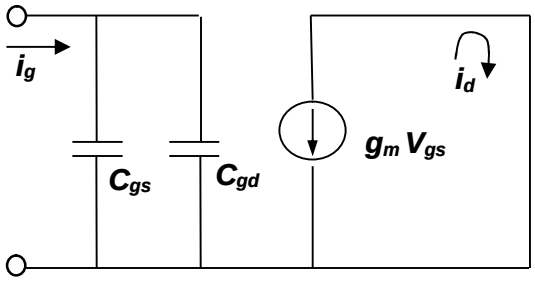


Figure 6: Modified Drain source short circuit model of HEMT

From the Figure 6

$$f_T = \frac{gm}{2\pi(C_{gs}+C_{gd})} \qquad (32)$$

IV. Results and Discussions

The simulation to calculate gate capacitance (*Cgd* and *Cgs*) under dark condition for various V_{GS} and V_{DS} was carried out in MATLAB using the model equations to represent the system.

The relevant dimensions and material properties used in the analysis are as given Table 1. The simulation has been carried out in MATLAB using the model equations to represent the system.

Table 1: Constants used for Simulation

Parameter	Symbol	Value
Doping concentration	N_d	5×10^{24}
Charge of an electron	q	1.6×10^{-19} Coulomb
Boltzmann's constant	K	1.3806504×10^{-23} JK^{-1}
Planck's constant	h	$6.6\ 606\times10^{-34}$ Js
Intrinsic carrier ıcentration	n_i	$10^{16}cm^{-3}$
Height of Schottky barrier	¤$_b$	0.9eV
Width of the gate	W	100 μm
Length of the gate	L_G	0.23 μm
Epilayer thickness	d	110nm
Mobility of electrons	μ_e	$1.4\ 4\ m^2/Vs$
Saturation velocity	υ_{sat}	1.5×10^7 cm/s
Permeability of free space	μ_0	3000 cm^2/Vs
The source gate separation	L_{SG}	$1\mu m$
The gate Drain separation	L_{GD}	$1\mu m$
Resistivity of the gate metal	ρ	2.44×10^{-8} (Ω m)

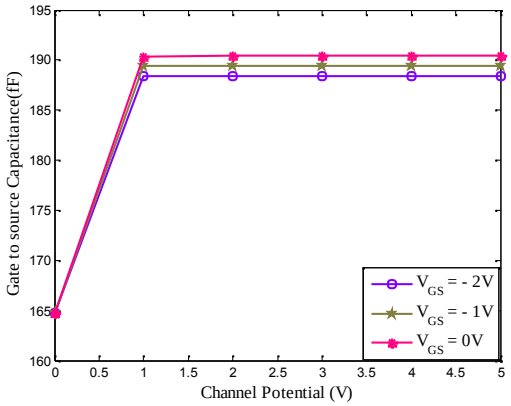


Figure 7: Cgs Vs Channel potential for different V_{GS}

Figure 7 shows the variation of *Cgs Vs* V_{DS} for varying V_{GS}. It is observed from the result that C_{gs} increases with increase in V_{DS}. This is because; as V_{DS} increases the drain depletion region increases and starts to spread towards the source side. This will result in increase of the depletion region at the source end and will reduce equivalent source voltage. Hence the net charge in depletion region under the source

increases and the net voltage at the source reduces resulting in increase in C_{gs} capacitance with increase in V_{GS} and finally saturates when the device saturates.

Figure 8 shows the variation of *Cgs Vs* V_{GS} for varying V_{DS}. The results show that as V_{GS} becomes more and more positive the value of *Cgs* increases. As V_{GS} becomes more positive the source side depletion region decreases and hence capacitance *Cgs* increases with increase in V_{GS}.

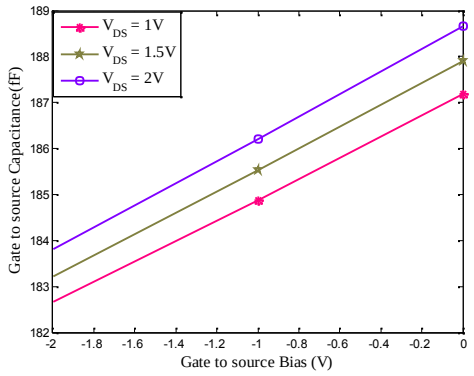


Figure 8: Cgs Vs V_{GS} *for different* V_{DS}

Figure 9 shows the variation of *Cgd Vs* V_{DS} for varying V_{GS}. It is observed from the result that *Cgd* decreases with increase in V_{DS}. This is because, as V_{DS} increases the drain side depletion region increases and therefore capacitance decreases with increase in V_{DS}.

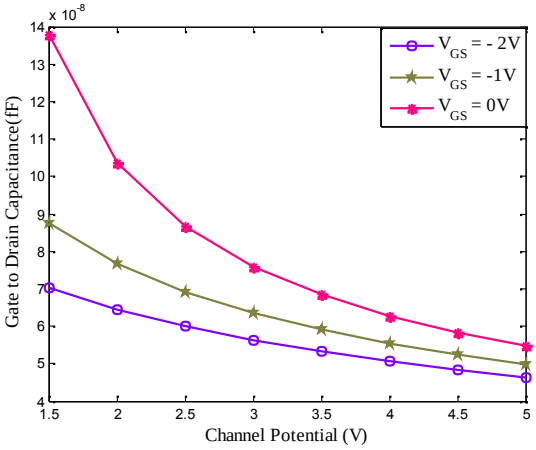


Figure 9: Cgd Vs Channel Potential for different V_{GS}

Figure 10 shows the variation of *Cgd Vs* V_{GS} for varying V_{DS}. The results show that as V_{GS} increases the drain gate capacitance (*Cgd*) increases. This is due to the fact that as V_{GS} increases, the drain side depletion region decreases and hence capacitance (*Cgd*) increases with increase in V_{GS}.

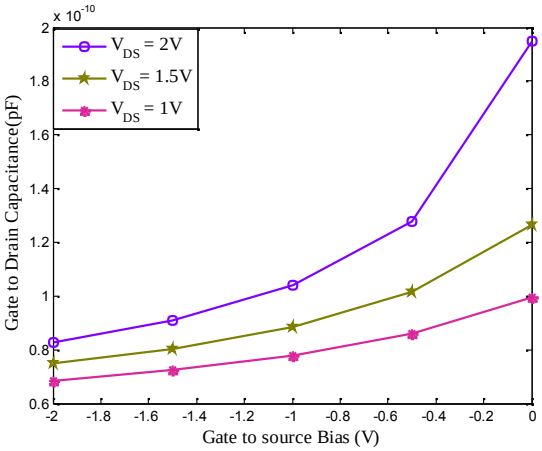
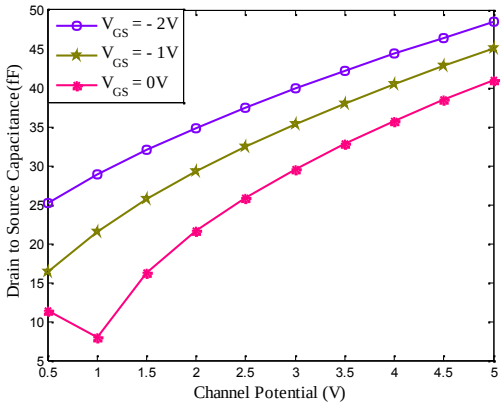


Figure 10: Cgd Vs V_{GS} *for different* V_{DS}

Figure 11 shows the variation of *Cds Vs* V_{DS} for varying V_{GS}. It is observed from the result that *Cds* increases with increase in V_{DS}. This is because; as V_{DS} increases the drain depletion region increases. This will result in increase of the depletion region at the drain end and will reduce equivalent drain voltage. Hence the net charge in depletion region under the drain increases and the net voltage at the drain reduces resulting in increase in *Cds*.



11: Cds Vs V_{DS} *for different* V_{GS}

Figure 12 shows the variation of *Cds Vs* V_{GS} for varying V_{DS}. The results show that as V_{GS} increases the drain source capacitance (*Cds*) decreases. This happens because as V_{GS} increases, the depletion region on the source side decreases resulting in the

increase of the channel width and hence capacitance (*Cds*) decreases with increase in V_{GS}.

Figure 13 shows the variation of f_T *Vs* V_{GS} for varying V_{DS}. The results show that as V_{GS} becomes more and more Positive the unity gain frequency increases

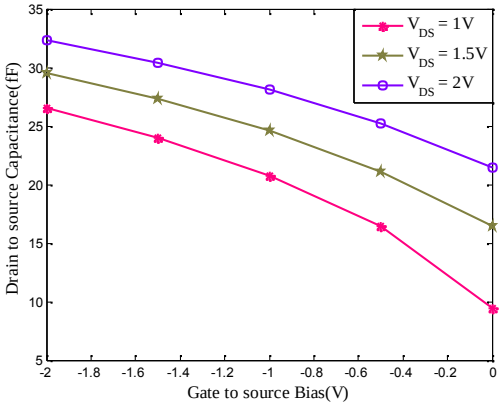


Figure 12: Cds Vs V_{GS} for different V_{DS}

due to its proportionality with g_m and it achieves a maximum value of 35.5 GHz at the maximum channel bias and gate bias which is depicted in Figure 14.

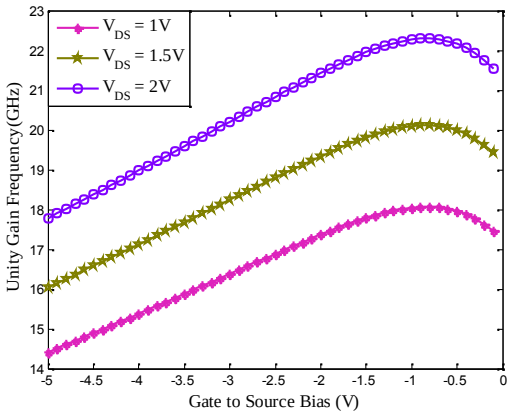


Figure 13: f_T Vs V_{GS} for different V_{DS}

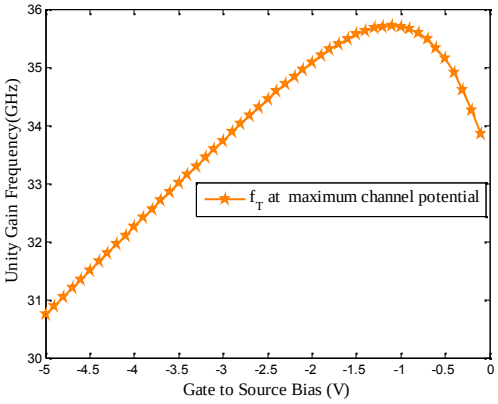


Figure 14: f_T Vs V_{GS} for maximum V_{DS}

V. CONCLUSION

The proposed technique is a comprehensive one and capable to simulate HEMT's intrinsic AC parameter with reasonable accuracy for changing Schottky barrier conditions. The modeling technique is based on charge distribution model for different regions in the channel. The model makes use of the current equations for the determination of the capacitance. The study reveals that the device capacitance can be controlled by the biasing voltages which in turn controls unity gain frequency which helps in deciding the bandwidth which controls the frequency of oscillation. The maximum bandwidth obtained is 35.5 GHz.

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Design and Implementation of Printed Circuit Board (PCB) UV Exposure, Etchant Spraying and Cleaning Machine

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***Abstract*—Printed Circuit Boards also known as PCBs are at the heart of any electronic or electrical devices, right from something trivial such as a television remote to compressors, computers, machinery and many such devices. Despite the fast development of the electronics and electrical industry, the main idea behind the production of PCB remains the same. The most commonly utilized method is, that the required application circuits are etched on these PCBs so as to give a bare copper board meaning, and the processes involved are UV radiation and photo-printing, etching and cleaning, soldering, etc. out of which the first two are very crucial and can very well determine the standard of the end product. Together these processes - UV exposure and etching can prove to be tedious and daunting without the presence of the required knowledge and tools and are automated to the highest level possible in manufacturing industries. But machinery, capital, and space required to successfully accomplish these procedures is sky-high and unbearable for hobbyists and SMEs alike.**

Keywords—PCB, UV light, Etching, Etchant, $FeCl_3$, Sprinklers, Solenoid Valves, Ball Valves, Pump, Copper-clad.

I. INTRODUCTION

During the innovation of phone and radio, the communication circuit engaged with both of these gadgets was made on a wooden board. The wires were nailed on the wooden sheets, tracks were made utilizing thumb-stack and afterwards the necessary part was soldered to the wires. Also, the circuit connection was drawn on the paper and was fixed on the wooden board and as per the outline the wires were nailed and components were soldered on the wooden board. This technique of making electrical and electronic gadgets circuits was overwhelming. Around the late '70s, an alternative technique was made in which a wooden board was taken and gaps were made into that board and the soldering of the interior connections were at that point done prior to connecting the components [1]. These wooden sheets were finished and accessible in the market as solderless breadboards in which components should be only be embedded. These solderless breadboards are these days generally alluded to as "breadboards". These sheets are prominently known for making circuits that can be utilized for various things at an alternate point in the circuit. The downside with these breadboards is they experience the ill effects of parasitic capacitances because of which prototyping of high-frequency circuits is absurd [2]. In PCB prototyping there also exist parasitic capacitances, however, the value of the capacitances is known to the producer. Thus, this permits the producer to limit the impact of these unavoidable parameters.

Besides, PCBs have the extra advantage that breadboards can't accomplish. At last, PCBs can be copied effortlessly, permitting equal testing of numerous, almost indistinguishable models. Notwithstanding their various favorable circumstances in the prototyping period of electronic structure forms, the use of PCBs outside expert situations and top of the line scholarly research bunches is underestimated. With the ongoing acquaintance of expert yet simple with utilization and reasonable plan suites, the structure of a PCB is never again a restrictive factor. Interestingly, generation forms for PCBs have gotten progressively unpredictable because of ecological impediments and progressing electrical prerequisites [1].

Prototyping a PCB is one significant errand in the making of electronic projects. Concentrating on a pre-sensitized PCB, the prototyping procedure incorporates structuring and presenting the design to the PCB with light, developing, and etching [3]. The entire image of the procedure may not be completely comprehended by a novice understudy or undertaking producer who had no past involvement with the scratching procedure. Additionally, an absence of wellbeing safety measures may initiate unsafe impacts of acids utilized during the procedure to the understudy. As one of the normally utilized synthetic mixes for scratching, introduction to ferric chloride, a non-oxidizing mineral corrosive can disturb eyes, nose, respiratory tract, and throat, and may cause serious skin burns and eye harm which when breathed in can breathing trouble. As far as time, the etching procedure can last from an approximate time of 20 to 30 minutes [3]. Concerning understudies and specialists who are doing their research, this may take a period where they could be doing different errands. In conclusion, the manual etching process is inclined to blunder. For instance, the underexposed board will have a yield with unsuccessful attempts. Greater exposure of board may cause the copper clad to twist, in this manner delivering a yield with misalignments. With these

discoveries, we will fuse the said procedures into a solitary machine [4].

II. Solution Available

A. Creating your PCB schematic using a software

Utilizing an appropriate PCB Design software can spare a great deal of time while structuring the format of your PCB. Software's such as Eagle and EasyEDA permit you to plan your schematic at that point construct legitimately from this schematic. This guarantees part sizes and connections are exact and represented on the PCB. Another timesaver of this product is the auto-router apparatus. This will format all paths in its way that just meddle with parts and different paths that are associated. After the PCB has been spread out and the circuit associations have followed, confirm the circuit one last time before printing. Try to print utilizing a 1:1 scale so the format measurements are exact.

B. Transfer your schematic on the copper clad

To guarantee a precise copy of the schematic, tape this printout over the copper-clad overlay PCB. Locate a carbon copier beneath the print and utilizing something pointed follow down your circuit with the goal that your schematic can be appropriately followed on the board [5]. This procedure is daunting if your schematic is excessively huge. After the entire circuit is traced on the board remove the copier and check whether the trace is visible or not. Utilizing a marker trace the paths between every component referencing the printed PCB design. Presently over the paths of the schematic stick cello-tape or adhesive that won't permit copper to expel from that spot [1].

C. The etching and cleaning process

When the second layer of cello-tape or other material is totally dry, the time has come to place the board in a shower of ferric chloride. Ferric chloride is a destructive, acidic chemical aggravate that will consume all copper on the board that isn't covered by the cello-tape [1]. Pour an unobtrusive measure of ferric chloride into a plastic holder with a top; sufficiently only to cover the board totally. Let the board douse for 10 minutes [6], ensure the top is appropriately verified and foment it like clockwork by shaking the holder to and fro. Following 10 minutes examine the board and if no copper is noticeable, remove the board while wearing a glove. Pat the board dry with an expendable cloth to expel all ferric chloride from the board. Flush the board with water that will make brisk work of the marker ink to uncover your safe tracks. The etching procedure is finished.

III. Project Survey

An institute level survey was undertaken with the focus on the knowledge of designing and usage of PCBs. Questionnaire used was centred around the use of copper clad boards, etchants and the etching process. Statistics obtained from the survey are summarized as follows [7]:

- 74.5% of the responses out of the total responses were acquainted with the process of PCB making.
- Out of the total responses, 41.9% state that etching time was more than 20 minutes for their projects, 46.5% stated the time between 10 – 20 minutes, 9.3% stated the time required as between 5 – 10 minutes and only 2.3% of the total indicated the etching time as less than 5 minutes.
- 42.9% of the total responses state that they were not satisfied with their etching results
- About 72% of the total responses stated that they were unaware of the use of UV lights for the process of imprinting of circuits on copper clad boards.

IV. Experimental Observation

TABLE 1 : Experimental Observation

Sr. No	Board Dimensions (cm)	Approx. Etchant Quantity (gm)	Application of Heat	Observed Results (min:sec)
1	5x5	10	No	30:02
2	5x5	20	Yes	03:40
3	2.5x5	10	Yes	10:25
4	2.5x5	20	No	04:40

Etching time is a factor of the amount of copper on the board, board dimensions, amount of etchant and whether heat is applied or not. Through the above experimental findings, it was observed that etching time reduces when a substantial amount of etchant is used along with the application of heat for a particular board size.

V. Solution Implemented

The machine can be divided into four blocks as per its construction. The four blocks are the tank, base, control panel and UV chamber. The tank is made from acrylic sheets and it houses three chambers for water, etchant and main tank. In the main tank there is a sprayer assembly which sprays etchant and water on the board placed on a rack. Etchant and water are supplied to the main tank through respective drain outs present in the etchant and water tank and their flow is controlled by ball valves and solenoid valves. The pressure flow of the etchant and water in the main tank is increased with the help of pump assembly in the base section of the machine [8]. Also, the base section comprises of the required plumbing and electrical connection to solenoid and pump. The UV chamber houses of UV tube lights and rack assembly wherein the board along with the circuit layout on it is placed and the layout gets imprinted on the board once the UV light is passed through [9]. The fourth block called as control panel is responsible for all the operations of pump, solenoid valves, UV lights with the help of individual switches and can be controlled manually.The detailed process is explained as follows:

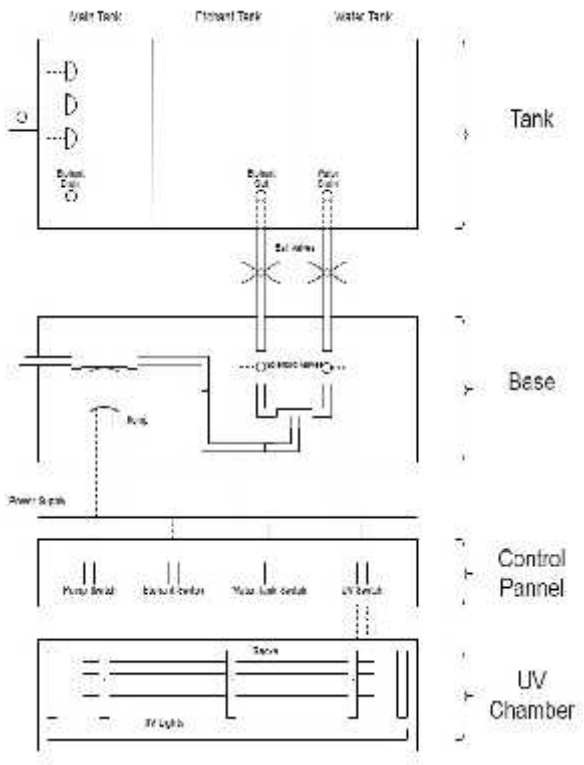

Fig 1. Diagrammatic Representation

A. Imprinting of PCB layout through UV Chamber

In this chamber your circuit design would be transferred to the PCB. The procedure of transferring the circuit from photo-resist to PCB is done using UV lights [9]. The circuit must be printed on a transparent sheet of paper, this paper is to be stuck upside down on the PCB. The UV lights are then turned on, the circuit from the paper would be transferred to the PCB.

B. Spraying of etchant on PCB

This procedure includes the sprinkling of the etchant solution on the PCB utilizing sprinklers. The commonly utilized etchant is ferric chloride yet in addition different etchants could be used. The etchant is sprinkled with high pressure which is accomplished with the assistance of a pump that delivers a pressure of 115psi approximately. The etchant flows through the pump assembly under the control of a solenoid valve whose activity is controlled utilizing the switch situated in the control panel. Likewise, to expand the pace of response between the etchant and the PCB the temperature of the etchant is increased with the assistance of a heater. The main tank houses different outlets to expel the utilized etchant after the procedure.

C. Cleansing of PCB with water

After etching, the water is supplied through the inlet and then sprayed on the PCB through sprinklers. Water is being sprinkled on the PCB in order to clean the PCB from unwanted etchant stuck on the PCB, instead of water, other chemicals can be used so that along with the procedure of cleaning the photo-resist stuck on the PCB also gets peeled off [5].

D. Control of different blocks with help of control panel

The operations and control of different elements like UV lights, solenoid valve, pump, heater, etc. are controlled by various switches and buttons placed on the control panel. Each of these elements can be manually operated with the help of switches.

VI. APPLICATIONS

A. Production of single layer PCB

When students start to study electronics related subjects, they learn about different circuits such as amplifiers, oscillators, counters, pattern detectors, etc. All these circuits can be implemented by students using a single layer printed circuit board. So, the student trying to implement these electronic circuits can utilize the machine to reduce the time involved in creating the circuit.

B. Small – Medium Enterprises

There exist small – medium level enterprises or industries which manufacture small circuits which are used by students to develop their project. For example, an industry manufacturing a circuit to connect DC motor with any microcontroller or microprocessor requires the use of a motor driver [8]. These circuit having the motor driver has two - three components on it which can be easily made using the machine. Hence reducing the time for etching and making a greater number of etched PCB in less time.

C. Educational Institutes

Educational institutes which can't afford as well as accommodate big machines to do the process of etching can use this machine. Institutes may also use this machine to show their students how a PCB is created [9]. The steps involved in creation in PCB and let students create a small circuit on their own to develop an interest in the field of electronics.

D. Hobbyist's and Students

Students studying in any course can the our machine to create a simple electronic circuit in a trivial amount of time and see the working of the circuit they made on their own, this will lead to a boost in interest for electronics among the students. Students can create circuits that are expensive or not available in their region by scratch for their mini or major project. Hobbyists who use various circuits frequently and uses some other sources to get their PCB etched which cost them their expensive time and money can use this machine to save both these parameters and increase their efficiencies [4].

E. Chemical Engineers

The procedure of etching involves one major chemical reaction which is displacement reaction. Using our machine, a chemical engineer in the initial year of engineering can observe the procedure of displacement reaction. Students doing masters in this course can use our machine to perform analysis regarding which chemical must be used in place of ferric chloride to make the process even faster [6].

VII. Results

With the implementation of the machine described in this paper, the aim is to efficiently reduce the hassle that goes into the process of PCB making with the prime objective being reduction in the time that takes for a circuit board to etch and clean.

VIII. Future Scope

This paper outlines the implementation of a fixture using which circuit boards can be developed with ease and in no time. As it presently stands, the machine that this paper describes is devoid of any form of automation. With that being said, with the inculcation of Internet of Things (IOT) and any of the web technologies, the entire fixture could be controlled with the help of a mobile application replacing the necessity of manual switches.

Acknowledgment

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Elimination of Fire using Acoustic Soundwaves

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***Abstract*— The fire extinguishing procedures utilized these days are having different disadvantages. The requirement for new fire smothering systems is significant as fire mishaps causes harms. Conventional fire quenchers, for example, concoction froth or water, are utilized effectively however represent the risk of seriously harming indoor gear, while an acoustic wave fire douser would shield them from further harm brought about by the fire. The low recurrence acoustic waves delivered from a subwoofer will in general stifle the blazes. This task shows a thought of a creating gadget which can douse fire utilizing sound. This undertaking expects to break down the impact of various frequencies of sound waves on flares and furthermore to contemplate the conduct of acoustic wave engendering in the collimator and encompassing condition. To discover the scope of frequencies inside which fire quenchers. The met collimator used to expand the air speed yield when contrasted with a conventional collimator structure. The variety of high and low weight which is then combined with high stream air speed, causes unsettling influences in air-fuel proportion at the fire limit, is one reason prompting fire elimination.**

Keywords— collimator, flame extinction, wave propagation, Sound fire extinguisher.

I. INTRODUCTION

The Fire Extinguisher are attempting to eliminate one of the components in the pyramid (fire tetrahedron) so as to wipe out the fire. Putting out fires in an encased space has consistently been an issue, other than the availability for the fireman to get to the spot, getting to the water, carbon dioxide (CO2) or other fire douser innovation to the shut space is a significant test. A smaller free and solid fire douser is required so as to conquer this issue. Space station and submarine are the principle instances of the application that profoundly required new fire quencher innovation that will have the option to be utilised in a kept and restricted space. Fire control utilising sound was not another method. The associations among sound and blazes was first announced by John Le conte in 1858, who noted flares inside an instrumental react to beats inside music. Our proposed framework will function as follows. By hitting fire with the low-recurrence sound waves in the 30 to 60 hertz extend, the gadget isolates oxygen from fuel and in this manner the low recurrence acoustic waves delivered from a subwoofer will in general quench the flares.

This will protect prevent harm to human being and environment which will not be in the case of existing system. Fire hazards cause major threats not only to the human and structures but also to the global ecosystem. Current method of firefighting using has significant drawbacks such as toxic to humans and leaves residue (for dry chemical base fire extinguisher) while water-based fire extinguishing techniques freezes in cold climates and conduct electricity. Using sound waves with certain frequency as a fire extinguisher will have significant advantages such as leaving no residues and non-toxic. The existing system can extinguish only alcohol fueled fires.



Fig.1. The Fire Tetrahedron [2]

Our proposed arrangement expects to extinguish various kinds of flames, for example that from, solid, fluid, gas. Our proposed framework has a bit of leeway over the current framework in viewpoints, for example, size, cost, power, wide degree to progression since we are utilizing sound waves rather than water and concoction froth. The progression towards sound waves is the wide degree as it gives wellbeing to people. It is a convenient gadget and directs no power just as it spares water and leaves no buildup and non-dangerous. It helps make our work basic and furthermore, we can connect to it different peripherals according to our desire to alter like we are giving office of append it to an automaton and quench the fire around there where people can't reach.

Two types of wave can be used they are 1. Longitudinal wave 2. Transverse wave

Longitudinal wave- Longitudinal waves, otherwise called "l waves", will be waves in which the relocation of the medium is a similar way as, or the other way to, the bearing of movement of the wave.Mechanical longitudinal called pressure waves, pressure and rarefaction waves are

additionally on the grounds that they produce when going through a medium.

Transverse wave- A transverse wave is a moving wave that comprises of motions happening opposite (or right calculated) to the heading of vitality move. On the off chance that a transverse wave is moving in the positive x-heading, its motions are in here and there bearings that lie in the y–z plane. Light is a case of a transverse wave. With respect to transverse waves in issue, the relocation of the medium is opposite to the course of engendering of the wave. A wave in a lake and a wave on a string are effectively pictured as transverse waves.



Fig.2. The Transverse wave particle

II. Current Scenario

A fire outbreak shows no discrimination and has the same amount of risk in industries as that in domestic households. According to a survey done in 2018, 7483 cases of fire outbreaks were reported. This showed a 100% increase with respect to the previous year. Out of these greatest number of cases were household fires. These types of fires can be initiated from a short circuit, gas leak or some other reason. But the point to be noted is that it can be prevented if it is treated at the very initial stage of outbreak. The major reason that a domestic fire causes a large-scale destruction is because the fire is not treated immediately. The Indian government has passed a law which states that every residential building should have fire extinguisher installed on every floor of the building and a fully functioning alarm system. This surely is a step forward in preventing fire hazards but a major problem comes into the picture yet another time.

Firstly, the extinguishers are of four different types namely Class A, Class B, Class C, Class D and Class K. Each class has a specific area of use, for instance, Class A is used for eliminating fires due to ordinary combustibles namely wood and paper.

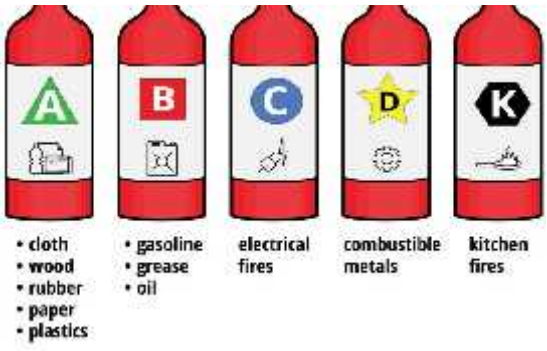

Fig.3. The classA,B,C,D,K Fire extinguisher[1]

Such inflexibility can cause confusion in a state of panic and chaos. Secondly, chemicals such as chlorofluorocarbons are used which are greenhouse substances and are extremely harmful for the environment. Moreover, conventional fire extinguishers are a bit complicated to use. In case of emergencies it becomes extremely difficult to operate it. Lastly, people use water to extinguish fire. The scarcity of water is already a huge issue we are trying to fight. In conclusion, the current scenario shows us that fire hazard is a major problem we are facing on a daily basis. But in addition to this the way these hazards are treated can harm to humankind. The more we look into the conventional ways to fight fire the more we start looking at the bigger picture. Saving lives by using the conventional methods may seem like a good idea but ultimately the main objective is hampered.



Fig.4. Foam based fire extinguisher [2]

III. Proposed Solution

Our proposed solution is such that the tone generator will generate a frequency in the range 20-60 Hz. These sine waves will be converted to vibrations. The main objective of the device is to produce the right amount of sound energy. Sound energy is a mechanical wave which has an oscillatory motion. It alters the pressure of the air profile around the flame upon which it is bombarded. The compressions and rarefactions occur when a sound travels through a medium. As here the medium is air, it will compress and make variations in the air profile near the flame. Compressions produce an area of low pressure whereas rarefactions create an area of high pressure. This change will help to strip the oxygen component of the flame. The chain reaction is what keeps the fire burning, but as soon as the oxygen component is removed, than the fire ceases to exist.

The user will switch on the extinguisher. Sound waves of a particular frequency will be generated and transmission starts from the subwoofer.The waves pass through a vortex tube which has a collimator that converges the beam. Now

user has to aim it on the fire.The fire gets separated from the source of emission and thus is extinguished.

IV. Block Diagram & Design

The designing of the block diagram plays a very important role as it visually describes the system as a whole by displaying the significant elements of the system. The figure below is the block diagram of the project. It also represents model design of extinguisher.

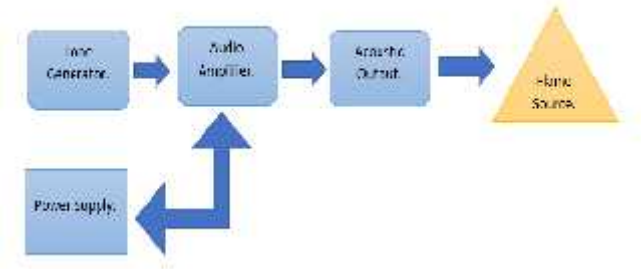

Fig.5. Block Diagram of the System

Phase I: Initially, we got the components of our project and tested them and as our project demanded to perform theoretical calculations to determine the distance up to which our fire extinguisher would extinguish the fire and to study about the behaviour of our fire extinguisher on different fuels and substances as well as the time taken to extinguish it. We went through some calculations and we tested different sine wave frequencies using IC 555.

Phase II: We will be implementing all the hardware components together. Firstly, the signal generator will produce a pure sine wave. Then an audio amplifier will be used to amplify the low frequency wave generated to our desired frequency. After this the subwoofer would come into play and it will translate the frequency into vibrations or sound to be focused on the fire source using a vortex cannon. After performing the calculations to choose the frequency suitable to extinguish a particular source of fire, we would be choosing particular frequency in order to extinguishfire.

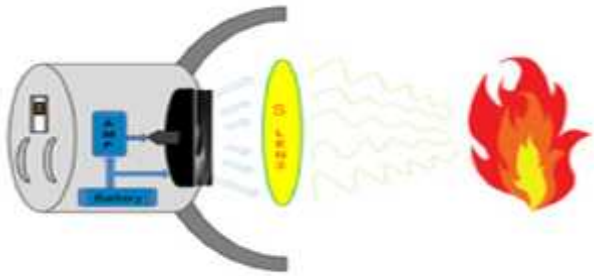

Fig .6. Design of Sound wave fire extinguisher.[2]

In order to design the model, we would need a signal generator, audio amplifier, subwoofer, vortex canon and a power supply.

Firstly, the signal generator will produce a pure sine wave. Then we will use an audio amplifier which will be used to amplify the low frequency wave generated to our desired frequency. I.e. The frequency should range from 30hz-60hz.

After this the subwoofer would come into play and it will translate the frequency into vibrations or sound, which will be focused on the fire source using a vortex canon and causes the fire to be extinguished from its main source.

Experimental Results Expected.

TABEL1. FREQUENCY VS TIME TAKEN [4]

Fuel Type	***Time take***	***Frequency***
Gas	1sec	30-60Hz

V. Design of System

Amplification block-The circuit contains an Ic lm386 Which is a sound enhancer and can produce a sine wave according to the prerequisite of the speaker. The LM386 is a force enhancer intended for the utilisation in low voltage purchaser applications. The increase is of course set to 20 and can be expanded to limit of 200 by the expansion of outside resistor and capacitor at pins 1 and 8. These block complete the principle activity of the gadget by controlling the increase and force of sound. These block builds the wave which can be bolstered to the speaker as yield.

The last square is a speaker which chips away at the Flemings left hand rule. The magnet in the speaker is encompassed by a voice curl which is injured copper, both in an opposite heading. The electric sign is gone through the voice loop where it is instigated by an attractive field which makes a power to occur in the third heading. We are related with the principle the force with which the drum vibrates is directly proportional to the number of molecules vibrated in the atmosphere. The sound recurrence for this design is identified with the weight which it is making in the climate. The sound recurrence introduced must have the ability to vibrate the fire atoms in a vibrate example to such an extent that they ought.

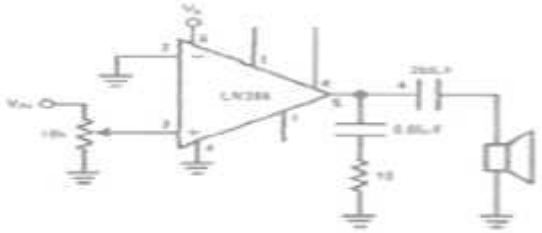

Fig.8.The block diagram fed to the speaker as output[5]

Signal generator- Signal generator or recurrence generator, which can produce rehashing or non-rehashing electronic signals. We need a solitary tone recurrence generator in light of the fact that tone single recurrence signal are equipped for producing the bigger vibrations than other numerous tone recurrence. There are various kinds of signal generators, with various purposes and applications. As a rule, no gadget is reasonable for every single imaginable application. To have great signal with less commotion I have making a circuit with a BC547b transistor to create a straightforward sine waves

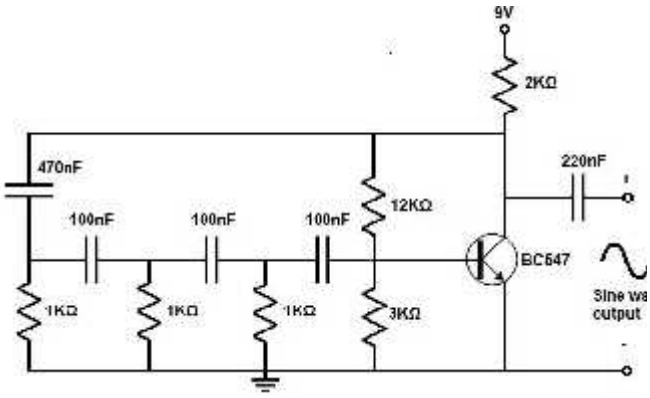

Fig.9. The internal circuit diagram of signal generator[5]

Vortex ring/Collimator- In collimator air particles moves around the centre core in circle.This type of mold or shape carries further than a jet of particle.This allow particle to travel far with little loss of mass and kinetic energy while size and shape remains unchanged.

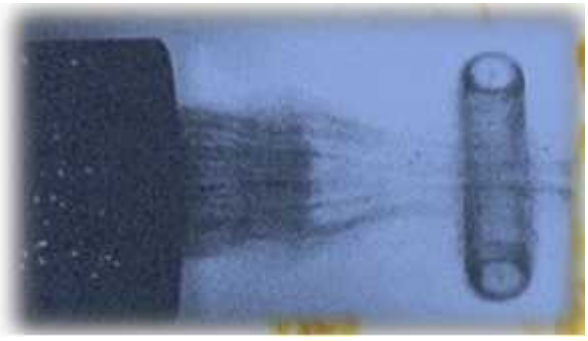

Fig.10. Vortex ring/Collimator

VI. Application

The thought could be formed into a compelling firefighting instrument used by "swarm mechanical technology" and automatons on bigger scale fire fields, similar to woodland fires, to forestall placing firemen in danger whenever the situation allows. An extra use case for the sound wave quencher could be space, where fire represents an enormous issue. Since conventional quenchers utilised in zero gravity splash substance every which way, it's unfathomably hard to focus on a fire. Be that as it may, since sound waves can be coordinated without gravity, utilising the bass frequencies could be a perfect arrangement.As of today there are a lot of fire hazards that use up a lot of water, which already is a depleting natural resource, or leave a residue that harms the environment and negates the whole purpose of saving human lives. Our project has a completely different take on this problem. The instrument will eliminate fire by using sound waves of a particular frequency. The concept is being used on smaller-scale settings, like in a kitchen on the stove-top.

VII. Results and Discussion

From the consequences of past trials done by past specialists from DARPA. It was expressed that the ideal sound recurrence for fire elimination is 60 Hz. Eryn Beisner's acoustic fire concealment microgravity condition was expressed that the ideal sound recurrence for fire elimination is 30.6 Hz. According to sound lens for a sound fire extinguisher a sound fire extinguisher need to produce sound frequency less than 100Hz. This analysis will concentrate on the perception in the recurrence scope of 30–100 Hz so as to affirm the outcomes from past inquires about [1] [4] [7] [10]. So the principal phase of the analysis is led to affirm the recurrence found in past examines. A light fire was first tried to start the investigation. The sound wave had the option to stifle the flame between 48 Hz and 60Hz. The second phase of the investigation is directed to discover ideal recurrence from the above frequencies (between 48 Hz and 60Hz) found in the main stage. A light fire was utilised in the examination. An ideal separation, 30cm, is accepted by experimentation strategy and the light fire is smothered by utilising all the above frequencies and the time expected to quench the fire. A chart is plotted by utilising this information. The result obtained is plotted and shown below. The obtain results are for 48-60Hz. The graph below shows the relations between time and frequency of sound waves.

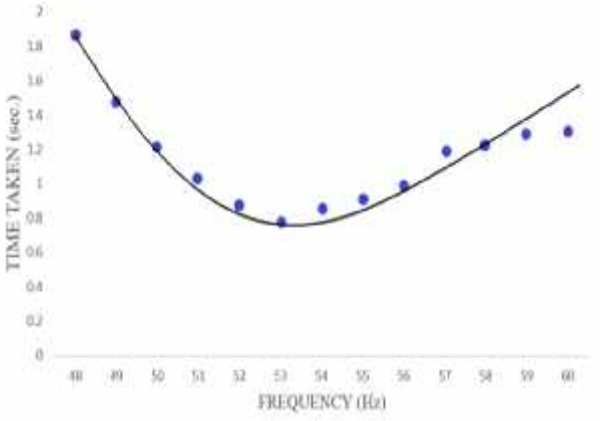

Fig.11. Expected Graph of frequency vs time taken [9]

The below graph show the relation between distance and frequency of sound wave .It is seen that upto the frequency of 10Hz no fire is eliminated but as frequency goes on increasing the distance to which it extinguished start increasing and for articular frequency it was highest and after that it starts decreasing as shown in graph.

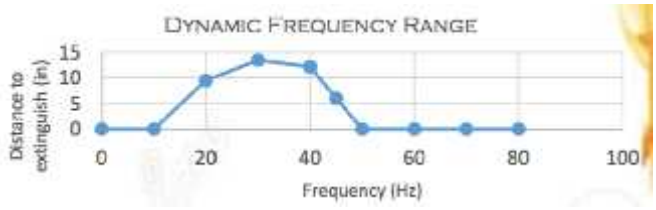

Fig.12. Expected Graph of Distance vs frequency [18]

VIII. CONCLUSION

Utilising sound waves with certain recurrence as a fire extinguisher will have noteworthy preferences, for example, leaving no deposits and non-dangerous in nature.The existing framework can douse just liquor powered fires. Our proposed arrangement expects to douse various sorts of flames, for example, strong, fluid, gas. Our proposed framework has a bit of leeway over the current framework in viewpoints, for example, size, cost, power, wide degree to headway since we are utilising sound waves rather than water and substance froth. The progression towards sound waves is the wide extension as it gives security to people. These systems will definitely bring revolution in fire system in near future. In a structure fire, a conduit domain containing a lift, a correspondence line, or an electric wire can make a fire spread everywhere throughout the structure. In any case, the offices and lines housed in the channel condition are lacking to apply the current fire quenching offices. Right now, attempted to affirm whether sound fire quencher is effectively being concentrated in sound building research foundation as fire stifling office in pipe condition.

ACKNOWLEDGEMENT

This project cannot be entirely created by an individual. The timely completion of the project ‘Elimination of fire using acoustic soundwaves’ has been possible because of our teacher and project guide Mrs. Sujata Alegavi who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge. Finally, we would thank our college ‘Thakur College of Engineering and Technology’ for providing us with a platform and the necessary facilities to make this project.

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Specific Band EEG Signal Acquisition Using Active Electrode

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***Abstract*— Between the two types i.e. Dry Ag/AgCl electrodes and Wet Ag/AgCl electrodes, the latter finds its use mainly in clinical diagnosis but is still not appropriate for expanding applications of wearable biopotential recording systems which are used repeatedly and for a long time. Here, the event of a low-cost and low-noise active dry electrode is presented. The performance of typical gel-based electrodes was compared with the performance of these new electrodes to determine electrocardiogram (ECG) and electroencephalogram (EEG) via long-term recording experiments. The ECG signal recorded by these new electrodes was well tantamount normal Ag/AgCl electrodes with a relationship up to 99.5% and mean power cable noise underneath 6.0 µVRMS. The active electrodes were also not able to measure alpha rhythm and steady-state visual electric potential by recording EEG.**

The quality of the signals was comparable with signals recorded by standard gel electrodes. The results suggested that the designed electrodes were able to employ in EEG-based rehabilitation systems. Also, they can be used in brain-computer interface applications. The mean power cable noise in EEG signals recorded by the active electrodes (1.3 µVRMS) was statistically less than when conventional gold cup electrodes were used (2.0 µVRMS) with a significant level of 0.05, and therefore the new electrodes seemed to be more immune to the electromagnetic interferences. In conclusion with these results, the developed low-cost electrodes can be used to develop wearable monitoring systems for long-term bio potential recording.

Keywords—Ag/AgCl, Electroencephalogram (EEG), Clinical Diagnosis.

I. INTRODUCTION

As we know nowadays during brain monitoring and another diagnosis and also in re-habitation system first priority is recording of bio-potential of Brian also known as EEG frequency analysis. The conventional Ag/AgCl wet electrodes are widely used for bio-potential measurements with benefits of simplicity, cheapness, and good technical performance. However, they have also some limitations that prevent their use in expanding applications of wearable wireless systems that are designed to be used during everyday living. The signal quality is degrading over time due to the dryness of conductive gel as it used for long term recording. Moreover, using the gel makes the electrode placement nontrivial for repeated use of the electrodes and time-consuming when a lot of electrodes have to be used. Moreover, the stained gel on the skin or the hair needs repeatedly washings; otherwise, they'll short closely placed electrodes. Finally, allergies are observed in some people when using gel-based electrodes.

Dry electrodes are designed to receive bio-potentials with no got to skin preparation and conductive gel. The principle challenge is to manufacture a biocompatible and adaptable electrode without gel yet with impedance attributes moving toward the wet electrodes. There are different novel plans for computing electroencephalogram (EEG) or electrocardiogram (ECG) signals including gold-covered needle electrodes, adaptable conductive polymer electrodes, dry polymer foam electrodes, and even material based dry electrodes. Also, we can be used these electrodes as a part of an active electrode. By implementing the active circuit on dry electrode we can reduce the electromagnetic interferences and also improves the input impedance.

We all know the basic two ways to design an active circuit for a dry- contact electrode. The first is a simple unity-gain buffer amplifier that uses for impedance conversion for the high impedance electrode. This approach has been widely used in previous studies since it leads to a smaller active electrode. The other one is to intensify and most likely channel the signal before sending it to the primary recording system. Right now, the common-mode rejection ratio of the framework debases because of the resistance of the components utilized in the hardware of the two electrodes which their signals are subtracted. It prompts additional wires. Two sorts of cheaper while low noise active electrodes were created based on the principal approach. One kind was with a level surface, and the other was with pins for recording EEG through hair.

The performance of those electrodes was assessed supported while recordings of ECG, EEG alpha wave, and steady-state visual electric potential (SSVEP). Past examinations that detailed the event of dry electrodes either give no correlation of the signal quality with wet electrodes or utilized simply general features. During this study, however, a comprehensive comparison was performed by including more practical measures

including the baseline and power-line noise also as signal offset and drift in the long-term recording.

II. CURRENT SCENARIO

We are able to define what type of Electrodes being used for Acquiescing the EEG signal from the brain. As in [12] we got the knowledge about the pin type dry electrodes to pin shows in below figure.

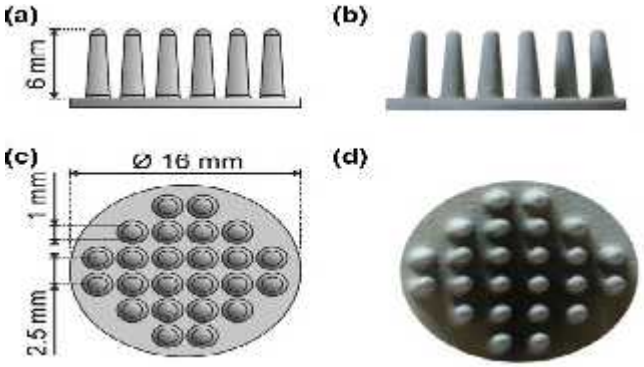

Fig. 1. Electrodes

A. Maintaining the Integrity of the Specifications

The material used for designing the active electrode and the structure of the electrode is Ag/AgCl. The main idea to design the complete system and also got knowledge of bio- amplifier and common-mode rejection and some other attributes [1]. This paper helps us to select the type of amplifier specification and features used in for pre amplifying signal. We are able to identify the difference between Instrumentation amplifier and other amplifier used as a preamplifier and main amplifier whose output is given to ADC. We understand basic modules required to extract EEG signal and how it's processed; we also understood the basic filter and order of filter used for filtering the signal. We understand the difference between the dry and wet electrode and the performance to the developed dry electrode to assess by comparing several performance variables calculated from the recorded signals.

III. BLOCK DIAGRAM & DESIGN

The designing of the block diagram plays a very important role as it visually describes the system as a whole by displaying the significant elements of the system. The diagram below is the block diagram of the project.

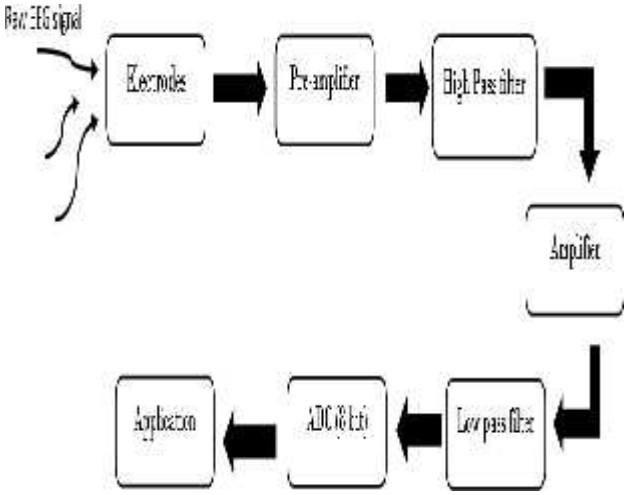

Fig. 2. Block Diagram of the system

Electrodes construction:

Two types of flat and multi-pin dry electrodes were developed and used in this study. The multipin electrode comprised of four silver pins covered with gold each 2.5 mm in breadth meant to permit EEG recording through the hairs. The level electrodes depended on brass, covered with gold and were intended for ECG or forehead- EEG recording. The electrodes had a distance across of around 11 mm.

They were introduced on a printed circuit board (PCB) which was appended to the fundamental active board.

The active circuit**:**

Two buffers were utilized for the circuit. The signals form the skins were picked up by the first buffer. Whereas the second buffer drives an active shielding/guarding of the circuit as well as the output cable.

The first buffer picks up the signal from the skin and the second one drives an active shielding/guarding of the circuit as well as the output cable. And for the better signal, we make instrumentation amplifier by the help of IC INA333 which is Low Power Precision Instrumentation Amplifier. It has Low Offset Voltage which is approximately 25 µV (Maximum), G ≥ 100 Low Drift: 0.1 µV/°C, G ≥ 100 Low Noise: 50 nV/√Hz, G ≥ 100 High CMRR: 100 dB (Minimum), G ≥ 10 Low Input Bias Current: 200 pA (Maximum) Supply Range: 1.8 V to 5.5 V Input Voltage: (V–) +0.1 V to (V+) –0.1 V Output Range: (V–) +0.05 V to (V+) –0.05 V Low Quiescent Current: 50 µA Operating Temperature: –40°C to +125°C.

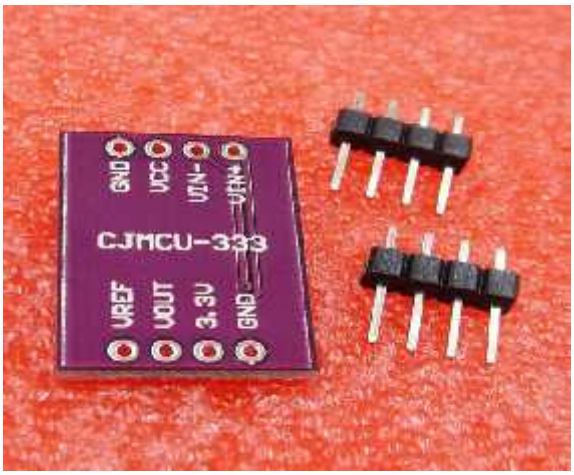

Fig. 3. Component used

Performance evaluation:

The exhibition of the created dry electrode was evaluated by contrasting a few performance variables determined from the recorded signals utilizing the created dry electrodes and conventional wet electrodes. It will be alluding to these factors as the comparison parameters.

Statistical methods:

GLM statistical test was utilized to compare the results of the wet and dry electrodes. The GLM test is utilized to evaluate the distinction of two mean values between two independent populations that in everyone the individuals are normal arbitrary factors and independent. For our situation, the two populations were the determined parameters of the signals from the ordinary and dry electrodes. The hypothesis of the normal distribution and independence of the members in each group were also tested statistically and were signed with a P-value of 0.05.

IV. RESULTS

Recording of biopotentials is that the primary a part of many monitoring, diagnosis, and rehabilitation systems. The traditional Ag/AgCl wet electrodes are generally utilized for biopotential estimations with advantages of straightforwardness, low cost, and great technical execution. However, they need also some limitations that prevent their use in expanding applications of wearable wireless systems that are designed to be used during everyday living. The conductive gel dries after some time, and this corrupts the signal quality in long haul accounts. In addition, utilizing the gel makes the electrode arrangement nontrivial for rehashed utilization of the electrodes and tedious when huge amounts of electrodes are to be utilized. Moreover, when we use gel based electrodes on any patient we need to wash it after the use so, some time might it caused some allergies on other patient.

Dry electrodes are designed to receive biopotentials with no got to skin preparation and conductive gel. The most challenging part is to fabricate a versatile and biocompatible electrode without gel but with impedance characteristics approaching the wet electrodes. There are various novel designs for measuring electroencephalogram (EEG) or electrocardiogram (ECG) signals including gold-coated needle electrodes, dry polymer foam electrodes, flexible conductive polymer electrodes, and even textile-based dry electrodes. These electrodes are often used passively or as a part of a lively electrode. The latter is employing a lively circuit for pre-amplification of input beside the electrode which significantly improves the sensitivity of the high impedance dry electrode to electromagnetic interferences.

V. APPLICATION

- Medical applications:

The medical field has an assortment of uses that could exploit brain signals in all related stages including counteraction, recognition, recovery and reclamation

- Prevention: Smoking, Alcoholism, Motion sickness.
- Diagnosis: Tumor, Brain disorder, Sleep disorder.
- Rehabilitation and Restoration: Brain stroke, Disability, Psychological Disorders.

- Neuroergonomics and smart environment

As recently referenced, conveying brain signals isn't restrictive to the healthcare field. Smart environments, for example, smart houses, working environments or transportations could likewise exploit brain-PC interfaces in offering further wellbeing, extravagance and physiological control to people's day to day life. They are additionally expected to observe compliance between the Internet of Things (IoT).

Drunk drivers, as a contributor to street mishaps, could likewise be portrayed using EEG signals. Furthermore, it has built up an audiovisual virtual condition so as to assess and break down the driving reactions alongside the related brain signals Educational and self-regulation

Neurofeedback shows potential for improving brain performance by means of focusing on human cerebrum movement regulation. It attacks the instructive frameworks, which uses brain electrical signs to decide the level of clearness of studied information. Customized interaction to every student is built up as per the resultant reaction experienced. Figuring out how to self-direct through noninvasive BCI has additionally been contemplated.

- Neuro-marketing and advertisement

Advertising field has also been an enthusiasm for BCI examines. The examination clarified the advantages of utilizing EEG assessment for TV ads identified with both business and political fields. BCI based evaluation computes the generated attention going with watching the movement. Then again, the scientists have considered the effect of another subjective capacity in the neuromarketing field. They have been keen on assessing the memorization of TV ads hence giving another technique for advertising evaluation.

- Games and entertainment

Entertainment and gaming applications have opened the market for nonmedical brain PC interfaces. Several games are introduced where helicopters are made to travel to any point in either a 2D or 3D virtual world.

Consolidating the highlights of existing games with mind-controlling abilities has been dependent upon numerous researches which will, in general, give a multi-brain diversion experience. The computer game is called Brain Arena. The players can join a cooperative or serious football match-up by methods for two BCIs. They can score objectives by envisioning left or right-hand movements.

- Security and authentication

Security frameworks include information- based; object-based as well as biometrics-based confirmation. They have demonstrated to be powerless against a few disadvantages, for example, basic insecure password, shoulder surfing, robbery, and cancelable biometrics. Cognitive Biometrics or electrophysiology, where just modalities utilizing bio signals, (for example, mind signals) are utilized as wellsprings of personality data, gives an answer for those vulnerabilities. The inspiration driving investigating the achievability of electrophysiology is that bio signals can't be casually obtained by outside spectators. They can be of incredible incentive for impaired patients or clients missing the related physical attribute too.

VI. CONCLUSION

While doing this project practically we faced many problems during filter selection and also during electrode ordering because in India according to our market survey pin type dry Ag/AgCl electrode is not available but due to successful EEG signal acquisition is easy nowadays through dry Ag/Agcl electrode so it will be available in India and other countries soon.

Till the time openbci.com is one of the sites where dry electrode pin is available. The active electrode measures the scalp EEG signal but there are some design challenges because we know brain signal is very low in power somewhere in micro-volts. The parametric design methodologies of active-electrode were explained and also reduce the noise mixing because of moving head. Also, at the study level, we did our best and we are looking for a specific brand which we'll be using is in making prosthetic arm.

VII. ACKNOWLEDGEMENT

This project cannot be entirely created by an individual. The timely completion of the project 'Designing and implementing of single-channel Active Electrode for EEG signal acquisition for Alpha, Beta, Gamma signals' has been possible because of our teacher and project guide Mrs. Sonal Barvey who provided us with guidance and motivation throughout its making. We thank her for giving us an opportunity to create this project.

We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge.

Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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Development of Textile Industry using IoT for Temperature, Humidity and Cotton Dust Control

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***Abstract*--The purpose of this paper is to present anidea of monitoring and controlling of textile industrial parameters like temperature, humidity and cotton dust which is a major issue. Increase in the any of above parameters than the desired valueleads to many health problems. Therefore in this paper the author proposed anIoT based solution through which these parameters can be limited below their threshold value.Depending on the Inputs received by the NodeMcu it performs controlling actions and tries to bring the parameters under normalcy.IoT used here helps to take precautionary action and alerts about the change in parameters to in-charged person.**

Keywords—Internet Of Things(IOT), IIOT, DHT11, Dust Sensor, Monitoring and Controlling

I. INTRODUCTION

Textile industry is the second largest industry in world next to agriculture. Therefore, main focus of the paper will be on monitoring temperature, humidity and cotton dust in the textile industry and also controlling the same. All the monitoring and controlling will be done through IoT. In textile industry it becomes very necessary to have proper temperature, humidity and cotton dust. Cotton dust is defined as dust present in the air during handling or processing of cotton which contains various other substances, and an increase in cotton dust leads to various health diseases.[1]

Looking in the current scenario, many industries have installed devices that measures required parameters and simply sends message on user's phone or uses alarm indication due to which manual controlling of parameters is needed[2]. Existing systems also use microcontroller(uC) like ATMEL 89C51 due to which implementation becomes a tedious task. Another main concern is 8051 system being under production and are slower which causes slower communication between devices[3].Some devices have limited range[5]. One of the devices also use Zigbee which is a short range technology[4].

measuring as well as controlling purpose which reduces the task of user to manually control the parameters. The device is user friendly which means range of the parameter can be changed as per the requirement of the industry. The system is set up on an open source platform Arduino IDE software which makes implementing code in various languages. NodeMCU is used for monitoring and controlling purpose whereas sensors like DHT11 and Sharp GP2Y10AUOP are used for temperature, humidity and dust sensing respectively. A 3rd Party Application BLYNK is used for graphical representation of the parameters[6-8].

II. PROPOSED FRAMEWORK

The following set of Sensors/Actuators which are used in the system design are listed as follows:

1.NodeMCU
2.DHT11 Sensor
3.Sharp GP2Y10AUOF Dust Sensor
4.SD1306 OLED screen
5.Module Relay board

1)NodeMCU: This is the main hardware of the project,which uses 128kB of memory and has 4Mb of storage capacity.



Fig.1. NodeMCU

2)DHT11: As the name says , it is a digital sensor which senses Temperature upto 50*C and Relative Humidity in between 20%-80%



Fig.2. DHT11

Textile industry is the second largest industry in world next to agriculture. Therefore, main focus of the paper will be on monitoring temperature, humidity and cotton dust in the textile industry and also controlling the same. All the monitoring and controlling will be done through IoT. In textile industry it becomes very necessary to have proper temperature, humidity and cotton dust. Cotton dust is defined as dust present in the air during handling or processing of cotton which contains various other substances, and an increase in cotton dust leads to various health diseases.[1]

Looking in the current scenario, many industries have installed devices that measures required parameters and simply sends message on user's phone or uses alarm indication due to which manual controlling of parameters is needed[2]. Existing systems also use microcontroller(uC) like ATMEL 89C51 due to which implementation becomes a tedious task. Another main concern is 8051 system being under production and are slower which causes slower communication between devices[3].Some devices have limited range[5]. One of the devices also use Zigbee which is a short range technology[4].

The following system gives solution to problems existing in current scenario. Here, IoT is used for The above diagram depicts the structure of the system which is used for sensing and controlling of Temperature, Humidity and Cotton Dust.
The System Design consist of 5 sections with the first 4 sections being involved in sensing and displaying part while the final section involved in monitoring the parameters.
The 1st Section is used for sensing i.e it senses the humidity, temperature and dust level by using Temperature and Humidity Sensor(DHT11) and Dust sensor(GP2Y1010AU0F) .The next section performs the task of reading the values from the sensors and sending that value to NodeMCU , which will convert those values into signals which are suitable for transmission over cloud. The 3rd section is the most important part of the system design as this section involves the Usage of IOT i.e in this section with the help of the WiFi module , NodeMCU sends the parameter to the server of an 3rd Party Application(in here BLYNK whose server name is BLYNK Cloud). After sending the data to the cloud , the 4th section comes into picture, this section is a display section as the parameters which were uploaded to the cloud are now being brought back and then are made to be displayed on the OLED screen.
The first 4 sections constitute of the 1sthalf of the system i.e the sensing part, the next half of the system is based on monitoring these parameters and that is done by the 5thsection. This section consist of actuator like relay, buzzer(used for controlling action) whichare turned ON once the parameter crosses the threshold.

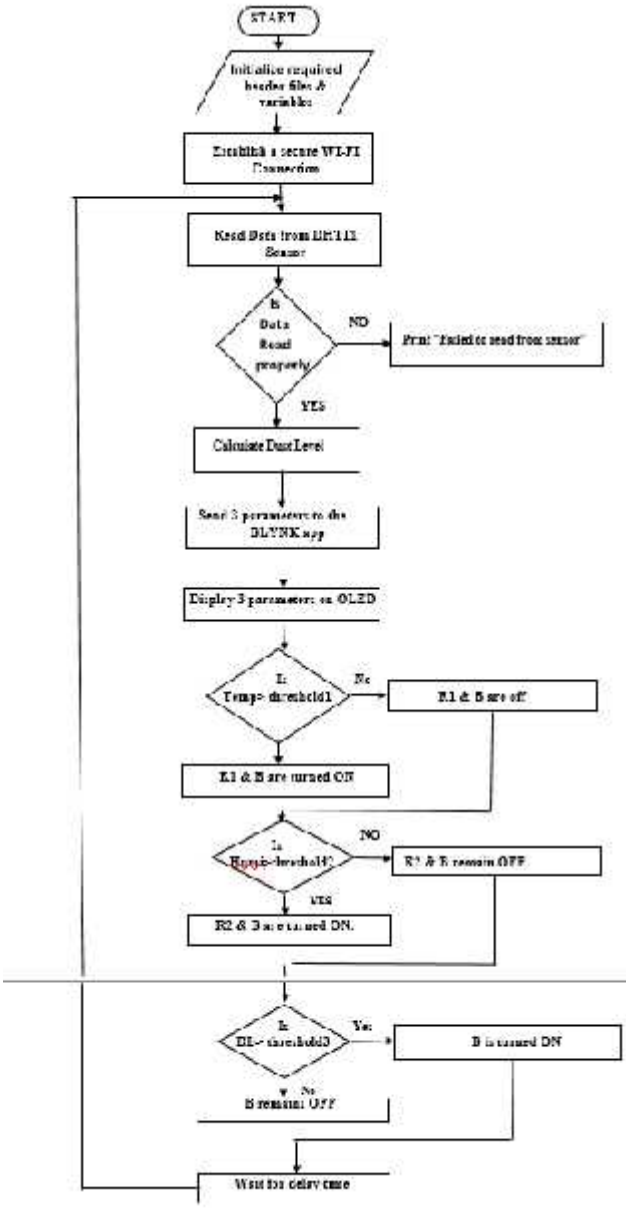
The working of the IoT System is as follows:

•The DHT11 sensor works on serial communication.
•This module sends a train of pulse signals for a specific time duration.

- Before sending the data it requires some time delay which isof 18uS.
- This delay is to ensure that the DHT11 is properly connected with the NodeMCU.
- After the delay time period is over and DHT11 is successful in establishing a connection with the NodeMCU, the next process begins.
- This process involves conversion of the given input signal coming from the output of 2 sensors and converting it into desired value which can be displayed on the OLED screen.
- For displaying all the 3 parameters simultaneously on the Oled, various parameters of the Oled needs to be restructured, these parameters are TextSize, TextColor and TextPosition.
- A 3rd party application named BLYNK is used to see the graphical representation of the data
- The data which are sensed by the sensors are pushed to the BLYNK server via NodeMCU.
- In order to ensure that there is no damage to the machine, as soon as the parameter of the machine goes beyond its threshold value, a signal is then send to the monitoring device from NodeMCU through the relay modules so that the parameters are brought down to the value below their respective threshold.
- NodeMCU will keep on sending data which is made available to it via sensors to the cloud at an interval rate which is set/defined by the user.
- The process starting from sensing of parameters upto its controlling is repeated continuously till a fault is detected in the system.

Development of Textile Industry using IoT for Temperature, Humidity and Cotton Dust Control

I.FLOWCHART



IV. FIELD SURVEY

On visiting a Textile Industry, we gathered the range of the parameters which will help with our project.

The data gathered is tabulated and shown below:

TABLE I : INDUSTRIAL DATA

Data/Parameter	Range
Relative Humidity	70%-80%
Temperature for Cotton	32*C-39*C
Temperature for Texterize	30*C-35*C
Cotton Dust	100-500 micro meter

V. RESULT

We have obtained the following set of results when the device was kept online for a period of 24HRS.

1.Display of values of the sensors through Gauges



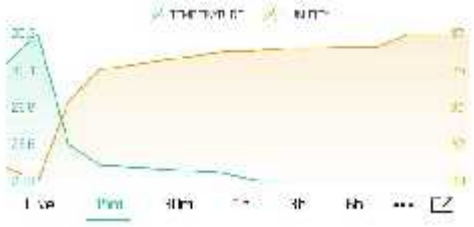
Fig.8 Display of Sensor Values

2.Graphical Representation of the variation of Cotton Dust



Fig.9 Line Graph of Cotton Dust

3.Graphical Representation of the variation of Temperature and Humidity



VI. FUTURE SCOPE

According to reports given by Nasscom, the market value of IOT is expected to hit the 9 billion $ mark by the end of 2020 and an approx. of 2 billion $ is expected to come from the Indian market, so there is a lot of scope for IOT in the coming years. With the massive increase in the IoT devices usage, it leads to security

and liberty issues getting magnified. While the consumers/end-users won't be the only one's using IoT , this services will also be put to use by various cities in order to be known as a smart-city. As the usage of Iot increases , one must not forget that Artificial Intelligence(AI) will also penetrate into every household which will improve to lifestyle of the people .

VII. CONCLUSION

The monitoring of temperature and humidity is done in thetextile industry. On addition, we also did the monitoring of cotton dust and thecontrolling of temperature, humidity and dust control. The monitored values oftemperature and humidity is displayed on the screen and then using the IOTthe actions related to it is taken. And in the same way the cotton dust ismonitored and been controlled. With the use of IOT the human effort is beenreduced and it became easy to controlled the temperature, humidity andcotton dust.

ACKNOWLEDGMENT

The following work 'Development of Textile Industry using IOT for Temperature, Humidity and Cotton Dust Control' can't be created by a single person. The timely completion of the work has been possible due to the guidance of our mentor Mrs. Archana Belge who imparted her knowledge regarding the topic on us and with her continual motivation, this work was completed. We are also thankful to the Department HOD Dr. Sandhya Save for allowing us to use the lab equipment's which were required for our project, and to our parents for providing us with all possible resources. We would also like to thanks Mr. Sunil Goenka MD/CEO/Chairman of 'GOENKA MILLS CO'OP LTD.' for giving his valuable time out of his busy schedule and allowing us to visit his Company for our research purpose.We also thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project possible.

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Health Analysis of Electrical Motors Using LabVIEW

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***Abstract*-The electromechanical machines normally require large foundation and makes lots of noise, vibration. The electromechanically machine even with medium and low capacity have tendency to vibrate more with condition .This paper focuses on experimental results to show that using LabVIEW, the study of the motor condition via measurement of current or temperature, vibration. Current. The signal are acquired using sensors and LAB VIEW as toolbox for indicating health of motor. The propose hardware presents the diagnostic strategy and discusses variables which influence the diagnosis. The analysis is done using toolbox with some standard reference and reports are recorded from engines tested to failure. The findings will provide user status of health condition of motor, maintenance aspect and life cycle application. So, this is going to relevant to industry because stator failures account for a high percentage of failures.**

Keywords—LabVIEW, Vibrations, Noise, Health

I. INTRODUCTION

Many industries concentrate on motor maintenance by constant and frequent motor observations for identification of faults. The system is entirely based on the advance technology, for prediction of early fault. This is the new strategy used to manage the system by detecting an early fault using the warning signal, which is used by everyone in the induction motor for maintenance. By using continuous induction motor monitoring, system can know the machine's age early on. Sensor used there that can sense the presence of incoming faults and by using early fault prediction method, warning signals will ring up before the system is completely shut down and any type of catastrophic failure or permanent damage will occur. For preventing permanent damage. To avoid permanent damage, the on-line health monitoring of induction motor. That system uses a completely wireless network. Although the cost of installation and maintenance is more expensive. LabVIEW software is entirely based on this technology, and LabVIEW requires much more installation costs in the correct PC system. While complete detection cannot take place, all the most detection can be detected using this technique, the machine's efficiency and reliability will be maintained overall. This research paper uses Vibration Monitoring to detect experimental faults. Active and advance sensors for detecting mechanical faults are attached here.

II. EASE OF USE

A. Accelerometers are precise measuring devices that can provide the parameters: acceleration of the vibration, vibration rate and displacement of the vibration. Many industrial accelerometers employ either a quartz or ceramic crystal as a sensing element. Quartz sensing components are usually used because they are stable over time and have a slight change with temperature in the output signal. Ceramic sensing components have excellent resolution and reliability in noisy environments, and can be equipped for low and high frequency measurements.

B. Maintaining the Integrity of the Specifications

We also used an ICP-480C02 (from PCB Piezotronics) signal conditioner. The mounting of the ICP sensor is magnetic, providing a convenient method for compact measurements, typically used to track electric motors for vibrations. Usually, accelerometers are mounted on the engine at key locations NI USB 6009 acquisition boards were used to connect the sensor to the computer. It has a USB interface with four inputs, two analog outputs, two optical inputs or ports for outputs Next, the vibration signals were collected from an induction motor and analyzed. The induction motor rotates a load which is made with multiple disks by means of elastic coupling. The load's moment of inertia is determined by the number of discs used. One accelerometer, connected magnetically and rotated around the motor to capture different data collection points.

III. THE PROPOSED MONITORING SYSTEM



Fig 1. B.D for health analysis of motor

Essentially, this technique is focused on sensor, D AQ: data acquisition chip and Labview program. Modern computer controlled data analysis and retri eval reveal new ways to evaluate motor safety. As shown in the block diagram, a piezoelectric accelerometer, a data acquisition board and a computer with LabVIEW software is used. Accelerometers provides precise measurement which is used in measuring instruments parameters like vibration acceleration, vibration velocity and vibration displacement. Most industrial sensors utilizes either a quartz or ceramic crystal as a sensi ngfeature.Quartz sensing components are usually a s they are very consistent over time and have a slight change with temperature in the output signal. Ceramic sensing components have superior clarity and reliability in noisy conditions, and it can be eq uipped for maximum and minimum frequ ency mea surements.we used an ICP
480C02 (from PCB Piezotronics) signal conditione r.Initially, accelerometer will be connected to the s urface of the electric motor for the error detection p rocedure.
When some malfunction happened or attempted to arrive, at that time machine begins to show some u nusual or some new things like vibrations, noise an d unexpectedly the temperature of the system incre ase, some sudden things show us the existence of t he defect in the machine.
The mounting of the ICP sensor is magnetic, provi ding aconvenient method for compact measuremen ts, typicallyused to track electric motors for vibrati ons.Usually, accelerometers are mounted on the en gine at key locations. A NI USB 6009 acquisition b oard was used to connect the sensor to the device. Which has a 4input USB interface, 2 analog output s, two optical inputs or ports for outputs.
Next, the vibration signals were collected from an e lectric motor and analysed.
The electric motor spins a load which itself is const ructed with several disks by means of elastic coupli ng.One accelerometer has been used, which has sin ce been magnetically connected and revolving acro ss the motor to collect different
data collection points.

Type of monitoring:-

1) Vibration monitoring
2) Acoustic emission monitoring
3) Current monitoring
4) Partial discharge monitoring

Such monitoring is very costly as acoustic emissio n monitoring or current monitoring, they need ver y expensive sensors to detect the defects, and other existing detection techniques are such forms of m onitoring that they have detected a single error as partial monitoring test only fault stator.
So vibration monitoring is chosen for constant mo nitoring as this monitoring can easily detect all me chanical defects such as bearing failure, air gap ex centricity failure and gearbox failure. Easily detect ing all faults by using vibration control.Here are th e reasons why you pick the Vibration Monitoring

1) **Faults related to stator:-**
In total overall faults 28% fault induced in the stator portion of the induction motor. Stator faults are basically induced due to insulation failure. Due to presence of over voltage and over current can also damage the stator winding and short circuited will be there and fault will arise in the stator portion of motor.

2) Faults related to rotor
Only 10% rotor faults are occurred in the motor. That faults occur due to high stress that fall on the rotor portion of the motor. Due to high voltage, high current or high frequency stress will fall on the physical portion of the rotor and it can be broken. And that is basically the rotor fault.

3) **Air gap eccentricity fault**:- This occurred due to improper stator or rotor alignment that form off fault. Rotor should be oriented aligned with stator, and a small air gap between them should be created. If the air gap between the stator and the rotor is not balanced, there will be an eccentricity fault.

4) **Gearbox faults**:- Gearbox fault occurs as a result of sudden changes in induction engine speed. Fluctuations in loads are the main reason for this form of fault. The rise and fall of the load, voltage, current of anything else, then the unexpected fluctuation is the main reason for the occurrence of the induction motor gearbox fault.

5) Bearing faults:- In total overall faults ,bearing fault occurring percentage is off 40% in induction motor. When shaft provide rotation in the induction motor then bearing fault will take place. Due to movement of the shaft bearing will also rotated, if the alignment of the bearing is proper then shaft will be continuous move without any disturbances and due to improper alignment of the bearing shaft will not move freely and properly. Due to that condition bearing can be get faulted and inner and outer faults are arise.

1. It's all mechanical faults assessed.
2. Low cost sensors are used
3. The process is simple.

This papers is proposed for continuous identification of defects means of a monitoring technique.
The technique takes the number of movements from th e control system as a reference and measures the curren t motor state.
Detection of defects depends on these phases:-

- Vibration measuring device: Accelerometer
- DAQ
- PC with LabVIEW software

A. LabVIEW software

This software allows the acquisition of vibration signal s via the acquisition screen, their real-

time display and the use of FFT for spectral analysi s. We can specify low and high values on the front side for the vibration signals
The mounted accelerometer then begins to assess c ertain vibrations.The vibration pulses
are in the form of Time -
domain obtained by sensor.
The digital signal processor uses this time domain and converts it into a frequency domain, which is a more understood domain, which specifically meets the definition of defect and type of error and can al so show the direction of the failure.

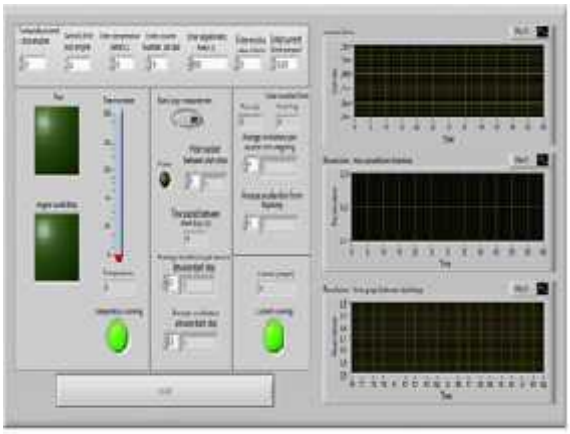


Fig 1 V-I Characterics on LabVIEW

C. Microprocessor Circuitry: Any microprocessor will require some ancillary circuitry, and the more complex the microprocessor will require the more circuitry. To prevent the high-speed internal switch from coupling to the power supplies, on each power pin, decoupling condensers are required.

D. Power Supply: The specification includes an output voltage of 10V, but the microprocessor operates from a 3.3V supply, which is also the ADC maximum range. The input signals had to be attenuated to connect the outputs to the ADCs.

E. Programming Environment: The code has two distinctly different components the embedded program running bare metal on the microprocessor and the application software running on operating system

F. Choosing communication interface: Different communication interfaces such as USB, SPI, etc. were considered. However, given its system-specific advantages over USB, SPI was selected.

G. Physical Interfaces and PCB Design the components above were assembled onto a custom PCB. This allows surface-mount components to be used (where stripboard or Vero board do not) and is considerably easier to design for a system which requires good noise immunity and large numbers of interconnects. The design was four layer (two outer signal layers and two inner power planes)

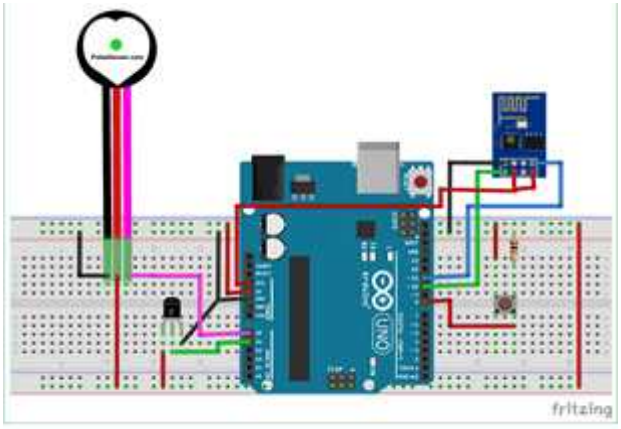


Fig 2 Expected Connection on Arduino Board

Arduino UNO: The advantage of Arduino over other type of microcontroller is, it's open source and cost is less compare to other type of microcontrollers. The simple in programming it is used many more professionals. Arduino (Fig2) is a type of ATmega328. Arduino has analog and digital input/output pins. Arduino board need 5v dc supply to operate. Arduino UNO is the heart of this work for data acquisition and controlling of motor. The condition monitoring sensors, LCD display are interfaced with input/output pins of Arduino. The control circuit are added are also interfaced with output pins of Arduino. Arduino board has the reset button, pins for connecting external source (i. e battery) and USB cable. It's also has transmitter and receiver pin for serial monitoring. Arduino produce a output of 3.3V and 5V.

Interfacing Data acquisition part of the system

There were several possible alternatives to the system data acquisition component, and here again the Raspberry Pi characteristics were significant. The SPI bus is built into almost every microprocessor. In terms of speed or functionality, some are more powerful than others, but the field of potential candidates is huge and it is difficult to reduce. The decision was made to base the device on an ARM processor for this task. In addition to the raw processing power, this was based on several factors such as the availability of free, high-quality development tools and standard peripheral libraries. The cost was fair, even in small quantities, especially when considering large-scale production.

Condition monitoring sensors:

The running state of the Single phase induction motor is continuously tracked by easily configurable and the majority use of light weight sensors. DHT11 sensor for measuring humidity, LM35 for measuring temperature, Piezoelectric sensor for measuring vibration, Acs712 for measuring motor current, voltage divider for measuring supply voltage and IR sensor for measuring speed are the sensors in the proposed work. In this work Arduino acquires the data. The Arduino has the ability to process the data, to send the data to cloud storage, to store the results in the local center, to give the user the warning message and to monitor the applications

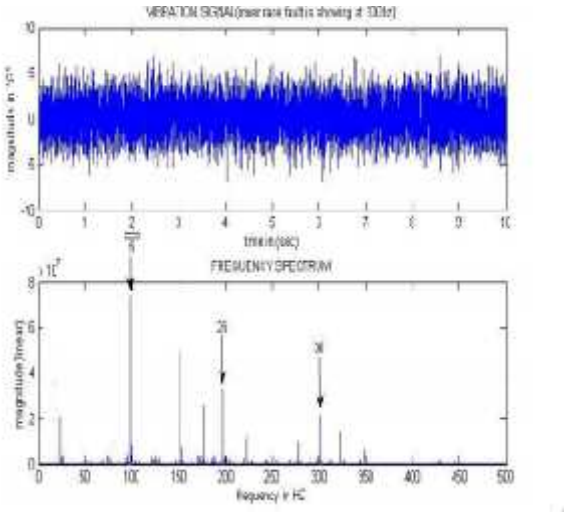
LCD display:

In this work 16*2 LCD display (Fig 5) is used for continuously display a data which is acquired from sensors. The display contains 16 pins. The supply of 5V is given across the Anode and cathode pins of LCD display. Pins 3, 4 and 5 are connecting to pot, for change the brightness of the LCD display. The LCD display contains 8data pins and 2 control pins. By programming the process, the data is continuously displayed in the LCD screen. To interface LCD display to Arduino 4 data pins, 2 control pins and 2 supply wires (i. e 5V and Ground) must be connect to Arduino. The processed data is displayed in the LCD display one by one. And also the additional requirement of smooth motor operation is displayed.

Vibration:

A Piezoelectric accelerometer, PU601R, connected to the 8th channel of BNC-2120 is used to pick up vibration at the bearing cap end. Now, the Server VI should be run continuously on the remote location and the following inputs have to be given on the front panel of the VI: Port: A free I/O port number of the processor on which data can be acquired. Message/Header Info: Any message that has to be sent to the client can be written here. Scan Rate: Number of samples to acquire per second. The limit of the DAQ Card is 200 ks/sec. Buffer Size: It is the number of scans each buffer will hold.

A typical result of the laboratory test motor is given for demonstrating the effectiveness of the system. For the sake of fault identification the vibration signal along with its frequency spectrum window in the client VI is zoomed and presented below. The result is obtained at 75% load and rated speed. The machine is run with a bearing having inner race fault. The harmonic spectrum shows a prominent component near 100Hz. This component must be due to inner race fault since it is close to the predicted characteristic frequency of inner race of 103.4Hz (Table 1). In a similar way, a number of other bearing faults (outer race, ball defect, cage defect etc.) have been successfully verified by this system



BENEFITS OF THE TECHNOLOGY

Following Benefits are come under the On-line health monitoring of induction motor:-

1) All industrial engines undergo continuous measurement and detection. So all incoming faults can be detected quickly.
2) Provide alarm warning signal.
3) Reduces overall expenses for maintenance and downtimes.
4) There is no danger. So no full effect on the system as well as on humans can be affected.
5) Proper induction motor maintenance, precision, and reliability can occur.

III. CONCLUSION

In this project for early detection and monitoring of motor system failures remotely. The system has the ability to combine various sensed parameters in real time and improve accurate detection of different faults occur in motor. The monitoring of the motor system presents the measurement of different parameters namely vibration of the motor, temperature, speed, surrounding humidity, supply voltage and motor current. Thus, compared to other conventional methods this system has more number of fields which enables alarm, alert messages and quick controlling. The concept of IoT is presented here for remote monitoring and controlling the motor. By using visual basics the data received from the controller node represent by graphically .The data is also displayed serially. The work is updated to extra fields for precious control. The application of the system is needed today for every electrical system (i. e EV vehicle and automation of industries where greater safety is needed). The system has the specific advantage less maintenance, easy and quick controlling and accessing of data remotely. Experimental results confirm the feasibility of the implementation of the system

In this literature various technique namely, knowledge based systems, fuzzy logic, artificial neural network and genetic algorithm expert system and some online techniques for fault diagnostics of induction machines has been reviewed.

That technique helps us to predict the early faults Detection by using that powerful and advance technology in that induction motor. That paper represents the super powerful technique which has great capability to identify the available faults with proper accuracy in the induction motor. The health of machine must be monitored and appropriate measurement taken, that appropriate fault detection method used for welfare of the society and welfare

Of machine.

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Energy Management System for Residential Consumers

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***Abstract*— The world's demand for electrical energy is continuously increasing due to modern lifestyle and advanced technologies. The conventional energy resources are diminishing and are at the edge of extinction, moreover their prices are rising. This leads to the need for alternative energy sources to satisfy the demand. The solar is one of the alternative source as it is abundantly available, economical and helps in reducing green house effect. This paper presents the idea of implementation of solar PV system as an alternative source for serving the residential load. A prototype is developed for the proposed system and tested for a part of residential load. Findings are reported in the paper.**

Keywords*— Renewable energy resource, solar PV system, Dynamic Pricing, Real Time Pricing, Residential Load

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I. INTRODUCTION

Growing energy demands and declining fossil energy supply, the design of a system for Residential consumers which will help increase the use of renewable energies and technology, decrease household's dependency on the grid by providing better management of Renewable Energy sources within the household. The overall research will have as intent, to use renewable energy, here solar, and also replace the ac appliances with dc appliances to a possible extent [1].

Large amount of energy can be saved by switching from AC appliances to DC-compatible appliances, even if they are running on AC. DC-based design increases the efficiency of all major residential and small commercial end-uses, including cooling, lighting, space and water heating, clothes washing, and dishwashing. DC is essential for all electronics. Key DC-based technologies include electronic lighting (fluorescent and solid state) and DC motors (driving fans, pumps, compressors and other devices, in particular in variable-speed operation where appropriate). The electricity billing system (tariff) on which we are reliable on includes extra charges according to unit consumption, which also includes unnecessary charges. The solution to all these problems is proposed in this research - work.[1]-[5].
The survey regarding the dc home appliances as compared to ac home appliances has been done.

The conclusion from this survey is that ac appliances are more power consuming than dc appliances; it requires more voltage as compared to dc. Also here we are using solar panel as the natural power source which will also reduce the bill which we are spending on artificial source. Though dc appliances are more current consuming than ac appliances, but also their duration period is long enough as compared to ac appliances.
An increasing fraction of the residential and commercial load is DC-internal, increasing the logic of DC power use in buildings. The primary focus of the analysis of DC potential end-used reported in this paper is the residential sector, but it has strong overlap with small commercial applications. We estimate that 33% of residential electricity use could be saved by converting all AC appliances to high-efficiency, DC-internal technology [6]-[10].

II. LITERATURE SURVEY

The electricity tariff is the methods of charging a consumer for consuming electric power. The tariff covers the total cost of producing and supplying electric energy plus a reasonable cost. The electricity tariffs depends on the following factors [1]-[2].

1. Type of load,
2. Time at which load is required,
3. The power factor of the load,
4. The amount of energy used.

The electricity bill increases as the power per unit is consumed. The basic idea of our project is to reduce the number of units to reduce electricity bill with the help of renewable energy. The thought process behind the project is to store solar energy and use it.

TABLE I: DISTRIBUTION OF TARIFF (RELIANCE ENERGY)

Slab	Range (Units)	Rate (Rs.)
1	0-100	4.3
2	101-300	8.3
3	301-500	11.5
4	501-1000	11.8
5	Above 1000	12.8

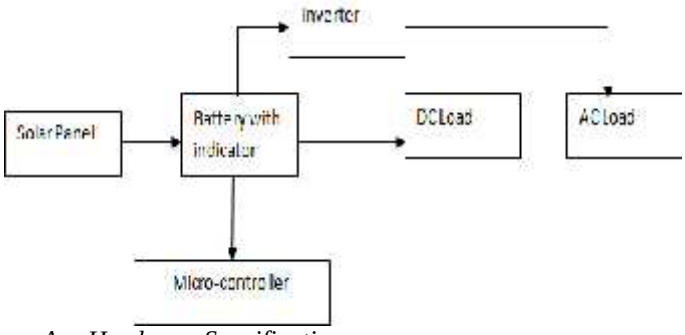
TABLE II: AC DEVICES TABLE ANALYSIS

Components	Watts	Amperes	Voltage	Rs.
Ceiling Fan	70	0.3	230	3000
Tubelight	40	0.2	230	260
Bulb/CFL	9	0.03	230	105
Television	120	230	0.5	-
Laptop Adapter	100	230	0.4	200
Cooler	155	230	0.6	-
Iron	1000	230	4.3	500-1000
Water Purifier	60	230	0.3	13500
Geaser	3000	230	13	2200

TABLE III: DC DEVICES TABLE ANALYSIS

Components	Watts	Amperes	Voltage	Rs.
Ceiling Fan	30	1.25	12-24-48	900
Tube light	10	0.3	12-24-48	200
Bulb/CFL	5	0.4	12-24-48	280
Television	36	0.7	48	-
Laptop Adapter	65	3.4	48	512
Cooler	-	-	12-24	-
Iron	-	-	12-24-48	850
Water Purifier	60	2.5	24	-
Geaser	450	18.7	24	3000

III. BLOCK DIAGRAM



A. Hardware Specifications:

1. Solar panel of 12 Volts , 1 Ampere, 20 Watts (which can give output voltage of upto 18 Volts)
2. DC Battery of 12 Volts, 7.2 AH with charging voltage @ 27^0C
3. Inverter module of operating voltage 12 Volts AC and DC with 6 Ampere amplitude voltage, output frequency of 220V AC with 100 Watts of load capacity
4. A.C. bulb of 9 Watt , 220-240 Volt, 50 Hz.
5. Battery indicator module
6. Node mcu (microcontroller)
7. 5 Volts 8 Channel Relay Module
8. Connecting Wires

B. Working:

The main motive of this project is to manage the energy in such a fashion that the results in reduction of the electricity tariff. It is possible only if the dependency from the grid can be reduced which can be done by using renewable energy source. In this project we are using solar energy as the driving force for the residential appliances. The working of the project can be considered in two conditions depending upon the load which is used.

- Case 1: When the load is AC in nature

The solar panel charges the battery, the output of the battery is dc which needs to be converted into ac in order to run an ac appliance. This conversion is done by the inverter. The output of the inverter will drive the ac load .

- Case 2: When the load is DC in nature

The solar panel will charge the battery, as the output of the battery is dc in nature it will be compatible for driving the dc loads. A chopper may be introduced between the battery and the load in order to adjust the level of voltage fed to the load.

The other major component is the microcontroller along with display. This display will indicate the

status of the battery such as its current and voltage parameters.

IV.RESULT AND DISCUSSION

Load	ON Time(approx)
AC load	3hrs
DC load	5hrs 30mins

Battery Charging time: 8 hrs

The battery was fully charged in 8 hrs. The ac load was sustainaed for approximately 3 hours and then it started fluctuating. When the load was

switched to DC it sustained for approximately 5 hours and 30mins and then the efficiency of the battery reduces gradually.

V. FUTURE SCOPE

Further modification can be done by introducing a grid interface, so even when the battery gets drained the grid can drive load. A rectifier needs to introduced in between the grid and the dc load ,which will rectify the ac voltage from the grid to the dc voltage which is compatible for the dc load. The project can be convered into "Smart Energy Management System for Residential Consumers" by automating the whole system. The system can be remotely controlled by the user through their mobile devices and particular application installed on it. By introducing the cloud storage for recording and all the parameters of the system, we can make it IOT based by doing the maintenance of the battery can be done easily. Also by analyzing the behavior of the battery the status of the battery can be predicted and measures and can be taken accordingly.

VI. APPLICATIONS

1.DC POWER UTILISATION

An inverter converts the DC electricity from sources such as batteries, solar panels, or fuel cells to AC electricity. The electricity can be at any required voltage; in particular it can operate AC equipment designed for mains operation, or rectified to produce DC at any desired voltage.

2.UNINTRRUPTABLE POWER SUPPLY

An uninterruptible power supply (UPS) uses batteries and an inverter to supply AC power when main power is not available. When main power is restored, a rectifier supplies DC power to recharge the batteries.

3.HVDC POWER TRANSMISSION

With HVDC power transmission, AC power is rectified and high voltage DC power is transmitted to another location. At the receiving location, an inverter in a static inverter plant converts the power back to AC.

4.THE GENERAL CASE

A transformer allows AC power to be converted to any desired voltage, but at the same frequency. Inverters, plus rectifiers for DC, can be designed to convert from any voltage, AC or DC, to any other voltage, also AC or DC, at any desired frequency.

The output power can never exceed the input power, but efficiencies can be high, with a small proportion of the power dissipated as waste heat.

VI. CONCLUSION

An emergence of direct-DC power systems onto the mainstream residential and commercial markets: the rapid adoption of distributed DC power system and of DC-based end-use applications such as electronic lighting, consumer electronics and TVs, and efficient DC-based motor technologies for relevant applications..

Therefore, the question naturally arises: Does it make sense to convert DC power from solar electric systems into AC for distribution within the building, just to have to convert it back to DC for use within appliances?

The market is currently experiencing the emergence of DC- distribution power systems designed for general service, and new standards are being developed that could accommodate all residential and commercial loads. Combining both the energy savings of possible DC-based appliances with the avoided AC-to-DC conversion losses within those appliances, the total energy savings could be large, at more than 30%.

ACKNOWLEDGEMENT

This work cannot be entirely created by an individual. The timely completion of the work 'Energy Management System for Residential Consumers' has been possible because of our teacher Mrs. Archana Belge who provided us constant guidance and motivation throughout its making. We are also thankful to Dr. Sandhya Save (Electronics Department, HOD) for her guidance and to our parents for providing all possible resources to gain the best possible knowledge. Finally, we would thank our college 'Thakur College of Engineering and Technology' for providing us with a platform and the necessary facilities to make this project.

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Design Of Motor Speed Controller For E-Bicycle

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***Abstract*-The designing of the e-bike has been need of the hour not only in western country but also in India. The need arises out of fuel constraints, pollution aspects and norms. The most important parts of the system is motor controlling mechanism. The speed controller is an electronic circuit, which not only controls an electric motor's speed but also serves as a dynamic brake. This controller unit uses battery pack power and drives it to motor core. In different voltages the electric bike speed controller sends signals to the motor hub of the vehicle. These signals detect a rotor's direction relative to the initiating coil. The proper functioning of a speed control depends on different mechanisms being employed. Hall Effect sensors assist in detecting the rotor's orientation. E-bikes let you get a good workout without stressing your muscles and lungs too much. For example, if you're a starting cyclist, you could find yourself breathless during uphill climbs. When scaling hills, you can turn to your electric speed control, gradually reducing your dependency on electronic activity as your stamina grows. If you enjoy cycling with family and friends, the ability to switch to electrical speed controls can help ensure a comfortable ride for everyone, regardless of varying abilities and strengths.**

Keywords –Electric Bike, Speed Controller, Hub Motor

ACKNOWLEDGEMENT

To begin with, we must sincerely acknowledge that without the inspiration we achieved under the guidance of Respected Mr. Roshan Varghese and Mr. Ravi Yadav, who works with Toroid Technologies, has helped us to face the challenges on an ongoing basis in technical aspects.

I. INTRODUCTION

Brushless Direct Current (BLDC) motor is a kind of synchronous engine where both stator and rotating magnetic fields have the same frequency. The BLDC motor has a longer life as there is no requirement for brushes.[1] Besides, it has a high starting torque, high no-load speed and restricted loss of energy. The BLDC motor can be mounted in 1-stage, 2-stage, and 3-stage configuration. Three-stage motors are among all, the most well-known configurations and are regularly utilized in E-bicycles. A DC motor interface has the core function of reading the throttle setting regularly and changing the current provided to the motor. It is accomplished utilizing a technique called pulse width modulation or PWM. Certain controller features include:

1. Low voltage cut-off:

Monitor the voltage of the battery and shut down if the voltage of the battery is excessively low. This shields the battery from over-discharging.

2. Limit over temperature:

Track the FET power transistor temperature and shut down the motor if it gets excessively hot. The FET power transistors are protected.

3. Cutting over-current:

Decrease the motor current if an excessive amount of current is delivered. It guarantees all motor and FET power transistors are protected.

4. Cut off brake:

Shut down the motor when the brake is on. This is a security feature. If the brake and throttle are applied simultaneously, brakes win.

II. PROPOSED SYSTEM

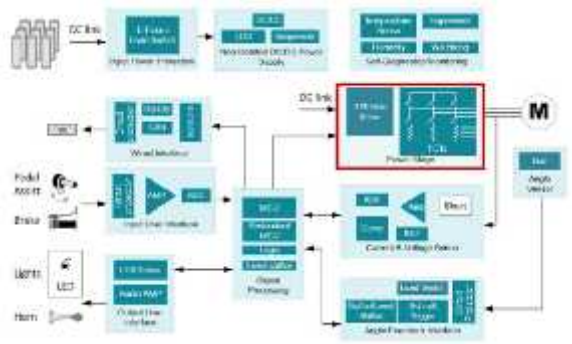

Fig. 1 Typical E Bike Block Diagram

To control a BLDC Hub motor's speed precisely, a closed loop system is implemented. The Hall sensor senses the position of the rotor and relays it to the microcontroller. Now, the controller is able to control the motor speed using PWM pulses, which control the duty ratio of the BLDC motor. The length of the pulses is directly proportional to the input voltage value. When the voltage value is small, the pulse will be narrow and the pulse width will be wide when the voltage value is high. These pulses also trigger the power MOSFET circuit which has high switching speeds. Switch action is to connect and disconnect power at PWM frequency across the motor.[2]

III. COMPONENTS REQUIRED

The Motor Speed Controller makes use of hardware components and software applications to display information:

Hardware Components:

1. Voltage Regulating Circuit: 36V nominal can drive the power MOSFET directly. Hence we use a device that has an in-built Buck-regulator like the DRV8323R or DRV8353R which will also help to promote the power design. Also, one of the two smaller voltage rails can be created inside the unit that will drive the motor.

2.Main Control Chip: We are using the PIC16F877 micro controller which eases the design of our controller. The PIC16F877 has various features like inbuilt 28 pins, including 228-bit I/O ports. This micro controller also supports PWM for motor control and helps in efficient running of the motor driver circuit.

Software and Tools:Software is fairly integral part of controller. Software system design includes the following several modules:

1.A/D sampling and conversion

2.PWM module

3.Over-current protection and under-voltage protection module.

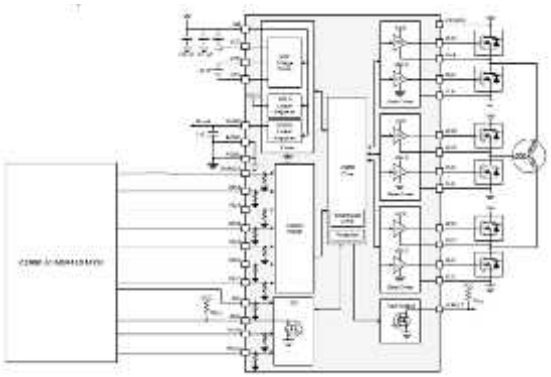

Fig. 2 Power MOSFET Circuit

IV. IMPLEMENTATION

A. PIC Microcontroller

PIC is a group of microcontrollers of Harvard engineering made by Microchip Technology, got from the PIC1640 initially created by the Microelectronics division of General Instrument [3]. PICs are well known with engineers and specialists the same due to their ease, wide accessibility, wide client base, broad assortment of utilization notes, accessibility of ease or free improvement apparatuses, and sequential programming (and flash memory re-programming) ability.

B. BLDC Motor

Brushless DC electric engine (BLDC engines, BL engines) otherwise called electronically exchanged engines (ECMs, EC engines) are engines driven by a DC electrical source with the help ofof a coordinated inverter/switch power supply, which creates an AC electrical sign for motor driving.

C. Voltage Source Inverter

The term' inverter' in the power-electronics sense signifies a class of power conversion (or power conditioning) circuits that works from a source of dc voltage or dc current and changes it into voltage or current. The 'inverter' is alluded to as a circuit that works from a solid dc source and produces conditioning yield. On the off

chance that the info dc is a voltage source, the inverter is known as a voltage source inverter (VSI). The VSI circuit has direct power over 'yield (air conditioning) voltage' though the CSI legitimately controls 'yield (air conditioning) current'.

D. Hall-effect sensors

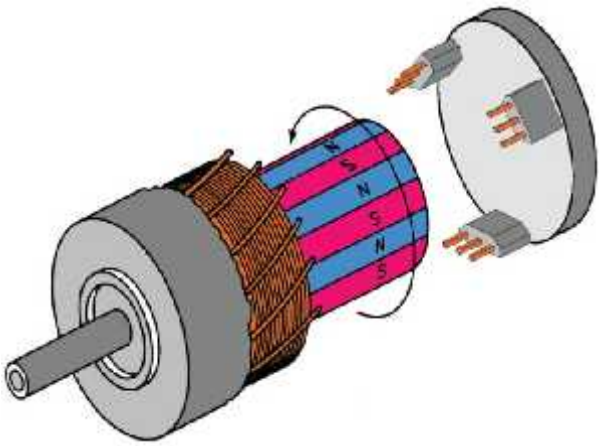

Fig. 3Brushless DC Motor with three Hall sensors to detect rotor position

These types of devices are based on Hall-effect principle, which expresses that an electric flow carrying conductor is held in the magnetic field applies a transverse power on the moving charge carrier which will in general push it to the other side of the conduit. A charge build-up at the conductor's sides will check this magnetic impact, making a quantifiable voltage between the conductor's different sides.

E. Power Supply

The ac voltage, typically 220V RMS, is associated with a transformer that steps down the voltage to the ideal dc yield level. [4] A diode rectifier then produces a rectified full-wave voltage which is initially filtered through a simple condenser filter to create a dc voltage. The subsequent dc voltage typically has some difference in ripple or ac voltage.

F .Potential Meter

Variable resistors are frequently alluded to as potentiometers, or pots, for short, since one of their most regular uses is as a movable divider of voltage. They were regularly called volume controls for a long time, in light of the fact that another normal use was to modify the volume of sound created by amplifiers, radio and TV receivers.Pots are made in an assortment of physical structures and are developed from various materials with the actual resistance dimension. Numerous pots are made for standard manual modification by means of a control handle while others are prepared for tuning of circuit yield just once in a while with a screwdriver or comparative instrument.

V. RESULT

The specification report details the instructions for building an electric bicycle with hardware. The study also lists the design criteria for an appropriate selection of the main components of the electric bicycle such as selection of motors, selection of batteries and selection of controllers. Already listed are additional safety features for the controller and miscellaneous ranges of mechanical components to design an elegant electric bicycle.

VI. CONCLUSION

This paper gives overview of the hardware design for designing an electric bicycle controller. This paper also gives a gist of the design criteria for an effective selection of the main components of the electric bicycle such as the controller selection. Additional protection features for the controller such as power protection as well as miscellaneous mechanical component selections to design an elegant electric bicycle are considered.The electric bike controller is one of the main parts of an electric bike, it is the brain of the e-bike, controlling the motor’s speed, start, stop. It is connected to all the other electronic parts such as the battery, motor, and the throttle(accelerator), display(speedometer), PAS or other speed sensors if exist.

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Personalized Warming and Cooling Jacket

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Abstract- **Anyone who intends to travel outdoor must be prepared to deal with all condition of weather, starting from the dry hot condition to the chilled coolness. The extremities of both the conditions can lead to serious health problems. Changes in single degree can affect body's biochemistry leading to various abnormalities. There is a limitation to which layers of clothing can be piled onto our body as well as taking steps to betray ourselves from the extreme hot weather. An appropriate solution to the extremities of weather is introduced. With the touch of a single button, the user can control the body temperature in response to the external temperature. At high altitude cough are common problems found among mountain climbers which are caused due to the temperature variations. Similarly in cold countries it is difficult for the humans to survive. In every such situation the proposed system helps the user efficiently. Such a suit helps the user to control and monitor the internal temperature of the suit from high temperatures to low temperatures, depending on the season, provided it guards the user from such illness caused due to climate changes and unexpected heating or cooling effects. This system is efficient solution to the drastic change in weather which causes many ill effects to humans..**

Keywords-Temperature control, jacket, wearables , health, human body, technology, automated, temperature sensors, fabrication, arduino, travel and wellbeing .

I. INTRODUCTION

Temperature related inconveniences are increasing day by day due to global warming. Changes in temperature may lead to serious health problems. It affect body's biochemistry leading to various abnormalities. Jacket which acts as both heating and cooling system as per requirement is introduced. Elimination of heat and extreme cold related inconveniences and maintaining a comfortable temperature level is the key outcome of this project. The jacket acts as a guard against the temperature variations and helps people to work comfortably irrespective of the weather conditions.

It gives better protection to the soldiers and workers working in extreme weather condition by keeping their body temperature at a prescribed level.

User can change the temperature manually as per whatever temperature they are comfortable with. The jacket can be customized as per users requirement. Users don't need to carry different type of clothing for different weathers conditions place to place.

II. MOTIVATION

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis. Nowadays, all the devices are more dependent on digital technology rather than analog technology. So, people while travelling different places can use this jacket to prevent temperature related illness.

The unit is fabricated inside the jacket which is similar to normal jackets. Any one can wear this jacket as it is not limited to a particular size. Most of the systems that are available only provides a single solution that is, to either hotness or coolness. The different systems developed prior to the proposed system are: Protective Jacket enabling decision support for workers in cold&hot climate[2] and has inbuilt temperature sensors to measure the temperatures. It can be controlled by an iOS or an android app.[5]

III. LITERATURE SURVEY

As we know that, the physical principles upon which modern coolers are based actually date back to the early 1800's. The first important discovery relating to thermoelectricity occurred in 1821 when a German

scientist, Thomas See beck, found that an electric current would flow continuously in a closed circuit made up of two dissimilar metals provided that the junctions of the metals were maintained at two different temperatures[1].

The available jackets in market are limited to just heating or just cooling. The thermoelectric cooler (TEC) used is a solid state heat pump made of thermocouples of high-efficiency semiconductor material that creates a difference in temperature of its two sides when a voltage is applied and current runs through it A P-type and N-type semiconductor alignment is enclosed between two ceramic plates [8]

This phenomenon is called the Peltier effect,French Physicist Jean Peltier concluded that when a current flows through a junction between two different conductors (from a battery or other voltage source), heating and cooling occur because charge carriers diffuse to opposite sides.Adaptable jacket based on climate make use of peltier effect to control the internal temperature.

IV. SCOPE OF PROJECT

As India is developing in terms of technology very rapidly, it is quite important that the devices which are introduced need to be updated on a regular basis. Nowadays, people are more inclined towards compact and mobile technology which are handy rather than analog technology. So, people can use this jacket in whenever required.

The proposed system is a battery powered system that provides both heating and cooling effect simultaneously as per the user requirement. It has inbuilt temperature sensors to measure the internal suit temperature. The heating and cooling effect is achieved by the use of a peltier. The peltier module is embedded inside the proposed jacket. Since it provides both cooling and heating effect, it has several advantages compared to other system. It is user friendly, comfortable, convenient and could measure wide range of temperature change. The temperature sensor measures the temperature of the system and displays it on the mobile screen. The heater and cooler in turn will help user to provide warming or chilling effects inside the jacket which helps the soldiers to withstand any kind of external environmental issues, which helps to work efficiently without heat or cold stress. The block diagram of the proposed system is shown in fig.1

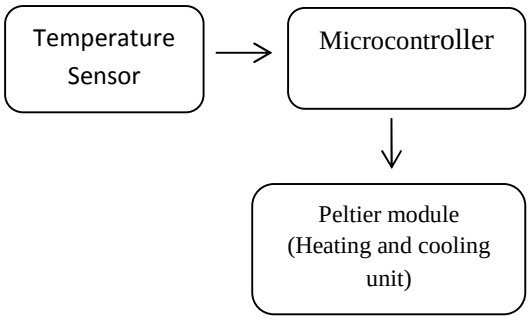

Fig 1.Block Diagram

The functionality of the suit is as follows: The user wears the suit like any other garment, but has the ability to turn on the temperature control device within the suit. Once turned on, the device displays the temperature of the inside of the suit in an LCD display/Mobile application. Initiating the hot or cold functions are as simple as pushing a button, and a rotary knob allows the user to control the internal temperature of the suit. The heating or cooling suits that are on the market are high in cost because they use pumps with moving parts or nano-fiber technology. None of them provide dual functionality. Therefore, a big goal and selling point for our product is its design for low cost and dual functionality.

When the polarity of the current is changed, and current is flowing in the opposite direction, the hot side of the TEC becomes cold and the cold side becomes hot. Therefore the ability to change the polarity of the flow of charge in the thermoelectric cooler allows one side to have dual function. One of the important advantages of the TEC is that it has no moving parts. Unlike traditional heat pumps, it is lightweight, and relatively small. This is crucial for a practical design.

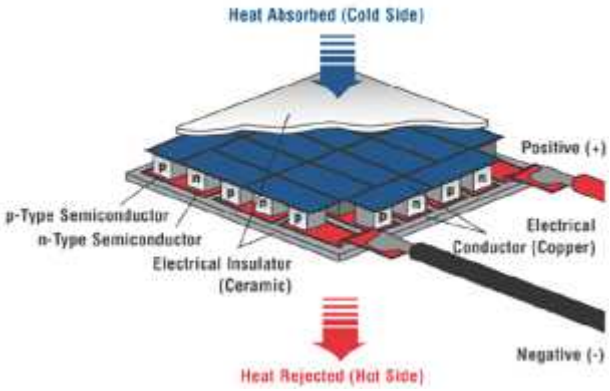

Fig 2. Peltier Module Functioning

V. Methodology

The basic working principle in the system is the peltier effect which produces both heating and cooling effect. The Peltier effect[5] states that when a voltage is applied between two electrodes connected to a sample of semiconductor material a temperature difference is created. If the heat needs to be transferred from one medium to another on a small scale, this phenomenon can be used.



Fig 3. Arduino Lilypad Temperature Sensor

A temperature sensor (Arduino lilypad) is used to sense the body temperature. The arduino lilypad is a temperature sensor that can be used to measure the temperature and produces an electric output proportional to the temperature. It gives an output voltage proportional to temperature in degree Celsius which is then given to a programmed microcontroller which compares the voltage with a threshold voltage and if the input is greater than threshold voltage the cooling system is activated else heating system will be activated.



Fig 4. Liquid cooler waterblock radiator



Fig 5. Mini water pump

Water Block Radiator: This block refers to the combination between the peltier module and the temperature circulating pipe which contains water. The water is made to flow through the jacket with the help of the water pump. According to the input applied to the peltier module, the temperature is set and the temperature is dissipated to the water block radiator which changes the temperature of the water flowing inside it.



Fig 6. Piping inside jacket

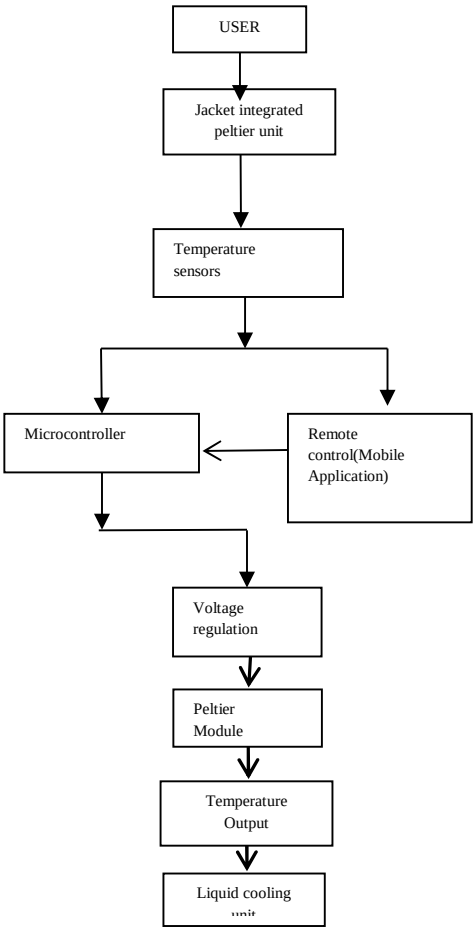

Fig 7. Block Diagram.

VI. COMPONENTS LIST

Table 1 List of components used to build the project

Components	**Quantity**	**Justification**
Peltier	2-4	For temperature variations
Temperature sensor	2-4	To sense the body temperature.
Mini water pump	1	For water circulation
Water block radiator	2-4	For heat or cold dissipation
jacket	1	
Rechargeable Battery	2	Power supply
Microcontroller	1	Control unit
Arduino	1	For programming purpose
Bread Board.	2	
Bluetooth module	1	For full manual control

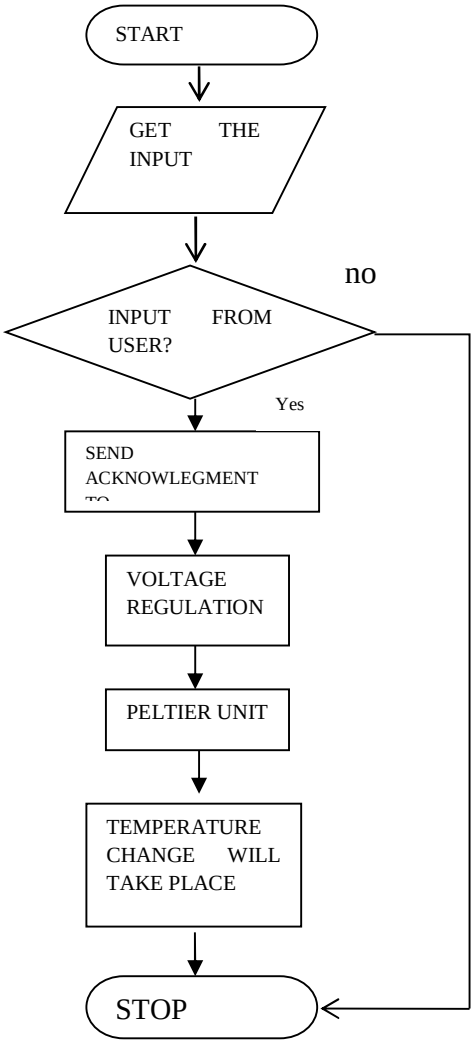

Fig 8. Flow Chart

Initially this project needs to study basic human body temperature range. The project needs to make a list of different temperature ranges suitable for human body.

The jacket needs to take input from the user which will be given through an mobile application connected to the jacket wirelessly.

This project will have user friendly interface so that the user can control the jacket which can be easily accessed through the remote app. The whole unit will be fabricated inside the jacket with removable rechargeable battery which will last about 3-5 Hrs.

After the unit is ready the project needs to go up for the connection with the jacket. This project needs to acquire all the required amount of components.

This project needs to burn the code and we need to test the efficiency of the unit. The temperature will be varied according to the user and is not limited to single temperature range.

VII. OBJECTIVES

The person will be wearing the jacket which is connected to a remote app which is used to give input to the unit integrated inside the jacket which consists of a Arduino and a microcontroller which will give desired output power which will result in temperature change.

The jacket acts as a cooler or heater according to the users need. The unit will maintain the temperature as desired by the user. The temperature sensor will sense the temperature supplied from the peltier unit inside the jacket and will further modulate the temperature automatically.

They are used in many applications such as military working at extreme temperature and high altitudes, travelers, workers etc.

VIII. EXPECTED OUTPUT

Experiment is done using peltier module, microcontroller, bluetooth module and switching circuitry. As per the user input or automated calculations the peltier module switches to heating and cooling system. Thus the system acts as both a heating and cooling module for the body. Here, the system is built using a peltier module, increasing the number of peltier would result in better performance so that each peltier can be placed in different parts of the body where the temperature sensitivity is higher.

IX. CONCLUSION

In this paper unobstructive climate controlled jacket based on peltier effect is introduced. Different temperature limits are used to enhance the heating or cooling performance.

This jacket allows the user to monitor and control the external hence internal body temperature from higher temperature to lower temperature, depending upon the climate variations.

It definitely protects the people from heat strokes and other health issues caused due to temperature variations. It creates the comfortability, practicality and mobility for the user within small proximity.

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IMPLEMENTATION OF MODEL OF LED STREET LIGHT WITH SOLAR TRACKING AND SENSOR

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Abstract: **-This paper illustrates and defines the use, applications and need of an LED street light model with solar tracking and sensors. Currently in India, enormous electric energy is consumed by the street lights, which are switched on when it becomes dark and switched off when the sun rises irrespective of the traffic and environmental conditions. This is a huge wastage of electrical energy and in order to reduce it a smart energy management system has been designed. In this model, lux level of the street light changes as per natural light, motion in the vicinity of the system and weather conditions, thus the street light will switch to full light intensity when a human or a vehicle is detected and the intensity will be lowered if there is no one present in the surrounding. This system incorporates a natural light sensor, motion sensor, rain sensor and a fog sensor. Itis a stand-alone system and works irrespective of any other street light. To make the system more energy efficient as far as the consumption is considered, it draws out power from the solar panel and not the conventional electrical energy source. This solar panel is mounted on sun tracking system, which generates maximum possible power available from the sun. This power is stored in the battery and can be used for the street lights at night.**

Keywords –Street light, electrical energy, sensors, sun tracking

I. INTRODUCTION

The project has an impact role in our energy utilization of renewable sources that are available in abundance, of such bulbs or permanently being shut off which will not be change for a while. Symptoms for identifying street light problems are intensity loss, flickering, temperature problems or performance drop. Flickering is a common issue encountered which is probably caused because of line maintenance shut down, installation issues, improper wiring, etc. Therefore, the project is bonded with Auto-Sun Tracking Solar Panel that helps in storing maximum light energy. The system depends on the cost efficient and systematic management. This will help the government to delay with catastrophic failures of street lights before time

II. PROPOSED METHODOLOGY

which leads to less indirect pollution caused by generation of electricity. It monitors and predicts the light efficiency parameter of sun position to achieve maximum production of electrical energy through the solar panel. Including parameters like motion, fog, rain gives this domestic energy management system an upper hand from the led systems been used currently. The basic idea is to eliminate the HPS bulb street lights completely and replace it with smart systems that work on solar power with a supportive storage battery. It cuts off the power consumption and with respect to the current scenario the lights won't be dependent on the electricity providers for power. The aim is to limit power expenses and maintain a simple domestic energy management system in which each street light would have its own power generation circuit. LEDs are much brighter with less consumption of electricity; more luminance is generated. Adding to the energy management by lights being switched on only when it is necessary. Led lights with such sensitive operation are brilliant plans that can be utilized to improve a domestic energy system but improper maintenance can lead to minor loss. The entire population depends on the street lights for smooth functioning and safety concerns, may it be a pedestrian, or vehicles, or any kind of street market. The HPS bulb deals with extreme temperatures, pressures, etc. which leads to malfunctioning

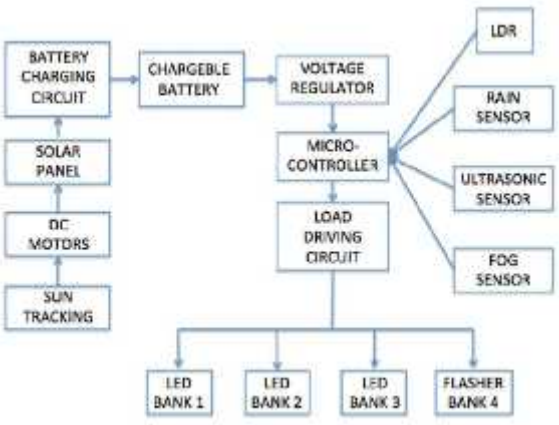

Fig. 1 Block diagram of the LED street light model.

we are not just using solar energy from the Sun by just employing the solar panel but also incorporating maximum power point tracking (MPPT). With the help of LDR's mounted on the panel, solar panel will constantly track the Sun's direction and will get aligned in that particular direction so as to get maximum solar energy. Also, two DC motors will be required for the rotation of this solar panel assembly. we are not just using solar energy from the Sun by just

employing the solar panel but also incorporating maximum power point tracking (MPPT). With the help of LDR's mounted on the panel, solar panel will constantly track the Sun's direction and will get aligned in that particular direction so as to get maximum solar energy. Also, two DC motors will be required for the rotation of this solar panel assembly.

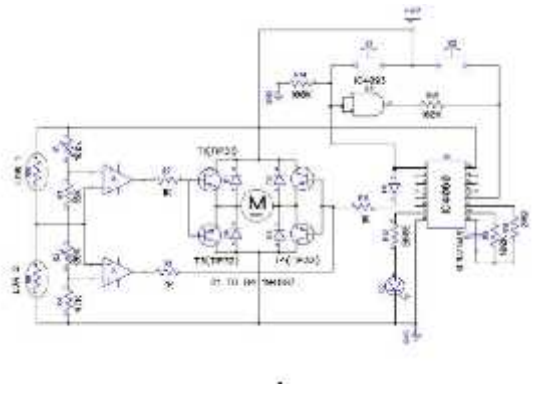

Fig. 2 Sun tracking circuit.

Now, the solar power collected from the panel cannot be given directly to the battery since the solar power throughout the day is constantly varying. So, in order to provide a constant voltage to charge the battery, we make use of a battery charging circuit. The battery used is 12Ah 12Volts.Thus, during the day time all the solar power will be stored in the battery, which will then be used during night to power the streetlight.

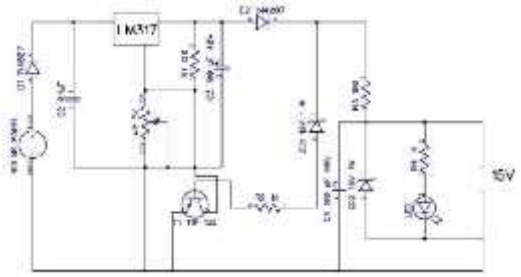

Fig. 3 Battery charging circuit.

Here, microcontroller PIC16F877A is used to automatically control the streetlight as per the situation. But the output current from the microcontroller pins is not enough to drive the load. Thus, a load driving circuit is used to drive the load. Typically, a total of four sensors are being used; each one for a different purpose.

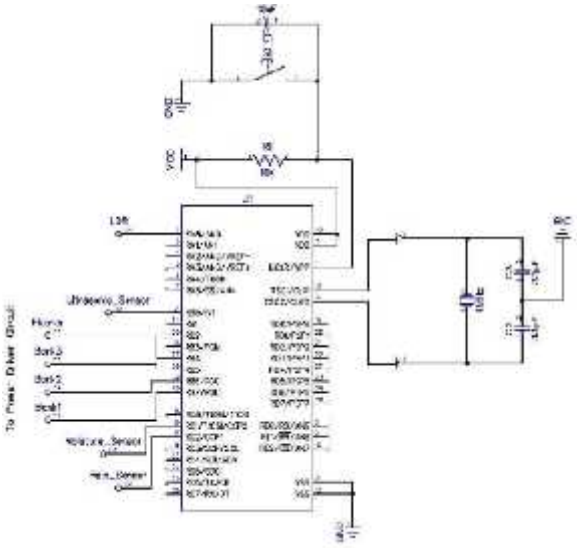

Fig. 4 Microcontroller circuit (PIC16F877A).

The LED street light model system makes use of hardware components and software applications to save power: Hardware Components.

1. Solar panel refers either to a photovoltaic module, a solar hot water panel, or to a set of solar photovoltaic(PV) modules electrically connected and mounted on a supporting structure. We have used a 10 Watt – 12 Volt Solar panel. This panel gives an output voltage of up-to 24 Volts, which is regulated and supplied to the battery. It provides a current of 900mA-1A. This panel is mounted on a sun tracking arrangement so that maximum energy from the sun can be extracted



Fig. 5 solar panel

2. Various sensing sensors that would sense the physical parameters from the environment and submit the electrical equivalent to the microcontroller to control the lux accordingly



Fig. 6 ultrasonic sensor, LDR, rain sensor, fog sensor, limit switch

Software and Tools-

MPLAB IDE is a Windows-based Integrated Development Environment (IDE) for the Microchip Technology Incorporated PIC micro microcontroller (MCU) families. MPLAB IDE allows you to write, debug, and optimize PIC micro MUC applications for firmware product designs. MPLAB IDE includes a text editor, simulator, and project manager. MPLAB IDE also supports the MPLAB-ICE and PICMASTER emulators, PICSTART Plus and PRO MATE II programmers, and other Microchip or third party development system tools. Using MPLAB to design and simulated the code for the light intensity switching system.

III. RESULT

It comprises of four different sensors in order to monitor the lux level available naturally, weather conditions such as rain and fog and movement of pedestrians and vehicles. When the lux level decreases, the resistance of the LDR reduces and it activates all the other sensors. Thus no street light will work when there is sufficient natural light available even in rainy or a fog condition. The movement of human (i.e. pedestrians or vehicles) was tested and successfully the streetlight switched to maximum intensity (i.e. bank 1, bank 2 and bank 3 were switched on) for a preset time of 30 seconds and it went back to approximately 30% when no movement was detected. Also, weather-based intensity control switching feature was tested. By pouring water on the rain sensor, the streetlight intensity was observed to be 70% along with the glowing flashers to give a reference to the road direction.

IV. CONCLUSION

This project primarily focuses on designed to be intelligent and energy efficient. The use of a Solar Tracking arrangement saves a lot of electric energy and is also environmentally friendly. The ultrasonic sensor keeps a track of the movement of pedestrians and vehicles while the rain sensor and fog sensor keep checking the weather conditions continuously. The lights are turned on automatically when the lux levels drop below the visibility levels and thus the lights are turned on automatically. The intensity of the light is controlled based on the weather and movement of pedestrians or vehicles. When there is no movement, the light intensity is reduced, in order to save energy. This system is a stand-alone system and thus, any faults in a one lighting system will not affect any other lighting system. Implementation of this system on a large scale can generate huge amounts of profit and at the same time lead to a greener future.

Disaster Management

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***Abstract*— The water level Indicator employs a simple mechanism to detect and indicatethe water level in an overhead tank or any other water container. The sensing is done by using set off our probes which are placed at four different levels. We can conclude that this system is very beneficial in rural as well as urban areas. It helps in the efficient utilization of available water sources.**

Keywords—Internet Of Things(IOT), IIOT, DHT11, Dust Sensor, Monitoring and Controlling

I. INTRODUCTION

Water Level Indicator may be defined as a system by which we can get the information of any water reservoir. The water level indicator system is quite useful to reduce the wastage of water from any reservoir while filling such a reservoir. Water is the most essential thing on earth. Safe drinking water is essential to humans and another life form seven though it provides no calories or organic nutrients. The total amount of water available on Earth has been estimated at 1.4 billion cubic kilometers, enough to cover the planet with a layer of about 3km. About 95% of the earth's water is in the oceans, which is unfit for human consumption. About 4% is locked in the polar ice caps, and the rest 1% constitutes all freshwater found in rivers, streams, and lakes which is suitable for our consumption. A study estimated that a person in India consumes an average of 135 liters per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our freshwater resources.

II. PROBLEM DEFINITION

As in metropolitan cities, it has been found that there happen very water calamities such as floods, landslides. This can cause some ill effects on human life. By implementing this we can get rid off of such fatal accidents.

III. WORKING

When the water started filling to the overhead water tank then the green led, glows, next when the level reaches up to the midlevel of the overhead water tank then yellow led glows after that the red led glows that the tank is going to be full or full at last the buzzer sounds when tank is going to be overflow

IV. CIRCUIT DIAGRAM

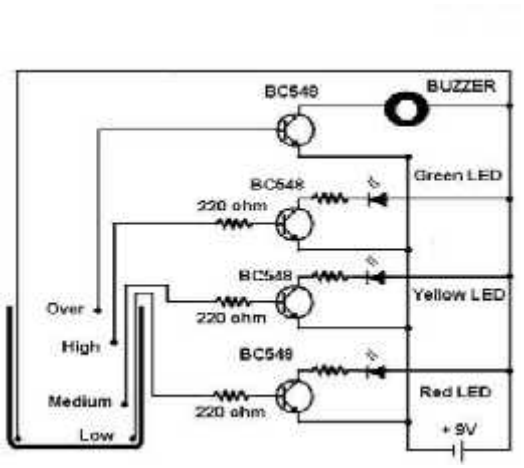

Fig 1 Circuit Diagram

V. ADVANTAGES

The water level indicators are low cost in the market.Any person can identify the water level easily by hearing the beep sound. By using this we can control the water level safely and easily

VI. APPLICATIONS

The water level indicator is used in Hotels, Home apartments, commercial complex, and in factories. The pumps used in the water level indicator are single-phase motor, submersible motor, and in the three- phase motor. By using the two motors, two sumps, two overhead tanks we cannot control by a single circuit. Automatically the pump will switch ON/OFF when the water level in the tank is empty and full. We can also measure the fuel level in motor vehicles liquid level containers are huge in the companies

VII. CONCLUSION

We have implemented this project in our college. If this is implemented in our cities, villages then there will not be any water crisis. The level of the water before it exceeds the threshold value can be controlled.

VIII. PROJECT SCOPE

Now no need to go on the hills and take a look. If it exceeds the threshold water level then the alarm starts blaring, which in turn withdraws the attention of present officers. Due to this, the evacuation of the surrounding would be easier. The aftermath of floods can be minimized to a great extent.

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Super Sensitive Intruder Alarm Circuit

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***Abstract*— Super sensitive intruder alarm circuit is a simple device that uses IR sensor and 555 timer IC. This is a very simple circuit made with basic components. An IR sensor consists of a transmitter and a receiver. It works on the principle of photo conductivity. 555 timer IC is used to regulate the timing between the sensor detecting an intruder and the alarm. Super sensitive intruder alarm gives out a noise upon detecting an intruder. It can be used as a security device in places like bank lockers, restricted areas, etc. It is a project which has a great future scope and vast application**.

Keywords—IR Transmitter receiver, 555 timer, LM358 Op-Amp

I. INTRODUCTION

IR based security alarm circuit can detect any movement and trigger the alarm. This circuit is very useful in homes, banks, shops, restricted areas where an alert alarm is needed on any movement. This circuit is based on IR sensor where an IR beam is continuously falling on a photo diode, and whenever this Infrared beam breaks, by any kind of movement, alarm is triggered. IR sensor consist an IR LED and photo diode, in which IR LED emits IR radiation and photodiode detects the radiation.

Photodiode conducts current in reverse direction, whenever light falls on it, and voltage across it changes, this voltage change is sensed by voltage comparator (like LM358) and generates output accordingly.

In this IR based security alarm circuit, we have placed IR LED in front of photodiode, so that IR light can directly falls on photodiode. Whenever someone moves through this beam, IR rays stops falling on photodiode and Buzzer start beeping. Buzzer automatically stops after some time, as buzzer is connected to 555 timer in monostable mode.

II. PROPOSED FRAMEWORK

The following set of Sensors/op-amps which are used in the system design are listed as follows:

1. 555 Timer IC
2. LM 358 Op-Amp
3. IR Transmitter
4. IR Receiver
5. Resistors and capacitors
6. Buzzer

1)555 Timer : Here 555 timer acts as a free running oscillator. It will generate the frequency when high pulse is applied at RESET pin. The generated frequency of 555 timer varied by varying resistor values R4, R5 or by varying the capacitor value C3.



Fig.1. 555 Timer IC

2) LM 358 Op-Amp: LM358 IC consists of two operational amplifiers. Each Op- amp has two inputs (inverting and non – inverting) and one output. The op – amp output is high when non-inverting voltage is greater than the inverting voltage and it is low when inverting voltage is greater than non inverting voltage.



Fig.2. LM 358

3) IR Transmitter Receiver: The operating voltage of transmitter is around 2 to 3V, to drop the remaining voltage we connect a resistor in series with IR led. It is always used in reverse bias. It almost acts as a closed circuit when it receives IR rays and it has high resistance when it does not receive any IR rays.



Fig 3. IR Transmitter Receiver

4) Buzzer: This device gives out an alarm when an intruder is detected.



Fig.4. Buzzer

5) Resistors and capacitors: Resistors of range 100 ohms to 10k ohms are used while capacitors of range 0.01uF to 10uF are used along with 1 variable capacitor.



Fig.5.Resistors and capacitors

III. WORKING

This circuit is designed to alert the user when an intruder enters into the home. If there is any obstacle in front of IR sensor, it generates an interrupt signal. This interrupt signal is given to the buzzer to alert the user. IR transmitter always emits the IR (Infrared) rays which have to be received by IR receiver. When there is an obstacle in front of IR sensor, the transmitted IR rays are reflected back to the IR receiver. The output of Op-Amp is high when IR receiver receives the reflected IR rays. This output of operational amplifier is connected to the RESET pin of 555 timer. The output of 555 timer is low when input voltage applied at pin 4 of 555 timer is low. When input voltage at pin 4 is high, then 555 timer produces the frequency which can be adjusted by the different value combinations of resistors R1, R2 and capacitor C3.

- Obstacle Present → IR Receiver Receives IR Rays → Op-amp Output High → 555 RST Pin High → Buzzer Produces the Sound.
- No Obstacle → IR Receiver does not Receive the Rays → Op-amp Output Low → RST Pin Low → No Sound

Many IR sensors are arranged in house at different locations. The outputs of all these sensors are given to RESET pin of common 555 timer. When any sensor detects the intruder, the reset pin of 555 timer becomes high and buzzer will produce the sound.

IV. CIRCUIT DIAGRAM

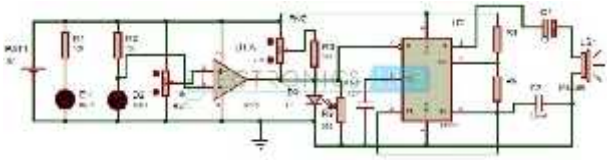

Fig.6. Super Sensitive Intruder Alarm Circuit

V. FUTURE SCOPE

The Intruder Alarm was built to our satisfaction. This project and implementation is about how to prevent theft in homes, offices, banks, museums etc., this project and implementation can be both wired and wireless technologies. In future we can use the application of this instrument to protect the vehicles. This device is highly useful to mankind especially present scenario.

VI. CONCLUSION

The detection and reporting of intruder in the area is done efficiently and thus human interference is reduced. The alarm is made with minimum components and is also cost efficient. This can prove useful in many areas of security.

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Automatic Temperature Controlled Fan

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***Abstract*—Ourmotive is to construct a fan that is automatically adjusted by the temperature of the room with the help of Arduino board. Then we will check if the temperature value is greater than 35 or not, if the temperature will be greater than 35, then the relay will be activated and the fan will start to rotate. The module is intended to display the temperature parameters on the LCD display. The main technique used is PWM(Pulse Width Module), which is used to control voltage.**

Keywords—Arduino UNO, Pulse Width Modulation(PWM)

I. INTRODUCTION

This project is a standalone automatic fan speed controller that controls the speed of an electric fan according to the requirement. Use of embedded technology makes this closed-loop feedback-control system efficient and reliable. The microcontroller (MCU) ATMega8/168/328 allows dynamic and faster control and the LCD makes the system user-friendly. Sensed temperature and fan speed levels are simultaneously displayed on the LCD panel. The project is very compact and uses a few components only. It can be implemented for several applications including air-conditioners, water-heaters, snow-melters , ovens, heat-exchangers, mixers, furnaces, incubators, thermal baths and veterinary operating tables. The project will help save energy/electricity.

II. METHODOLOGY

2.1 TheComponents Used:

1. Arduino UNO,
2. DHT11 sensor,
3. DC fan,
4. 2n2222 transistor,
5. 9V battery,
6. 16x2 LCD ,
7. 1K resistor,
8. Breadboard
9. Connecting wires.

1. Arduino board:This is the latest revision of the basic Arduino USB board. It connects to the computer with a standard USB cable and contains everything else you need to program and use the board. It can be extended with a variety of shields: custom daughter-boards with specific features. It is similar to the Duemilanove, but has a different USB-to-serial chip the ATMega8U2, and newly designed labelling to make inputs and outputs easier to identify.



fig.1 Arduino board

2. DHT 11 sensor:The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers. The sensor can measure temperature from 0°C to 50°C .

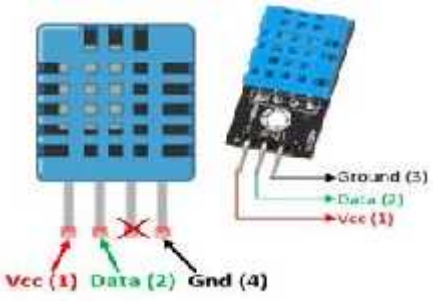

Fig 2. DHT 11 sensor

3. DC fan :A fan is a powered machine used to create flow within a fluid, typically a gas such as air. A fan consists of a rotating arrangement of vanes or blades which act on the air. The rotating assembly of blades and hub is known

as an impeller, rotor, or runner. Usually, it is contained within some form of housing or case. We require this to adjust the room temperature.

4. 2n2222 Transistor: a common NPN bipolar junction transistor (BJT) used for general purpose low-power amplifying or switching applications. It is designed for low to medium current, low power, medium voltage, and can operate at moderately high speeds.

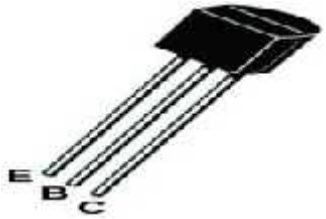

Fig.3 2n2222 transistor

5.16x2 LCD:16×2 LCD is named so because it has 16 Columns and 2 Rows. There are a lot of combination available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32)32 characters in total and each character will be made of 5×8 Pixel Dots.



Fig.4 LCD 16x2 display

6. 1K Resistor: it is used to restrict the current flow so that a particular device does not experience overload of electron supply and burn. We are using this to ensure our transistor and sensor do not spoil.

7. Breadboard:used to ensemble all the components in the working conditions. This board provides us with common points horizontally and vertically to let power supply reach every component.
8. Regulated Power supply:In this circuit we used 9-12V battery.
9. Connecting Wires: For connection we used connecting wires.

2.2 Interfacing diagrams:

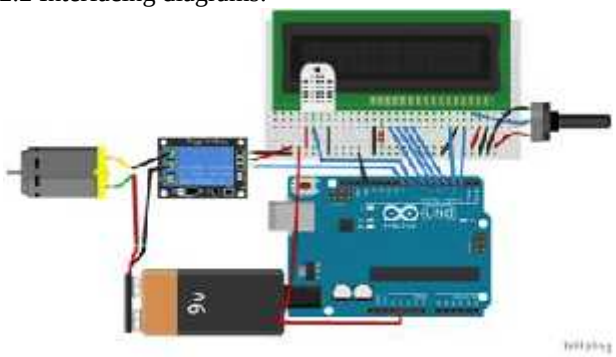

Fig. 5: Interfacing diagram with Arduino Board

2.3 Working:

A low-frequency pulse-width modulation (PWM) signal, usually in the range of about 30Hz, whose duty cycle is varied to adjust the fan's speed is used. An inexpensive, single, small pass transistor can be used here. It is efficient because the pass transistor is used as a switch .One disadvantage of this approach, however, is that it can make the fan noisy because of the pulsed nature of the signal. The PWM waveform's sharp edges cause the fan's mechanical structure to move (like a badly-designed loudspeaker), which can easily be audible.

• 3.4 Circuit Connection: Connect VSS pin of LCD to ground of Arduino.
• Connect VDD pin to 5V of Arduino.
• Connect V0 pin to the center pin of 10K potentiometer. Connect other two pins of potentiometer to the 5V and the ground.
• Connect RS pin to the pin 2 of Arduino.
• Connect R/W pin to ground of Arduino. This will put the LCD in read mode.
• Connect E (Enable) pin to the pin 3 of Arduino.
• Connect D4-D7 pins to the pin 4, 5, 6, 7 of Arduino.
• Connect pin 15 which is the positive pin of backlight of LED to the 5V pin through the 220ohm resistor.
• Connect pin 16 which is the negative of backlight of LED to the ground of Arduino.

Then connect the Keyes_ST1y relay module to the Arduino. On the input side of the relay module, make the following connections:

- •Connect VCC pin of relay module to the 5V pin of Arduino.
- Connect the IN pin of the relay module to the pin 9 of Arduino.
- Connect the GND pin of relay module to the GND of Arduino.

2.4 Programming Arduino for PWM(Pulse Width Modulation):

The program for this Arduino is also very easy as the library is available for this. Connect Arduino board to the PC and select the correct COM port in Arduino IDE. Compile the program (sketch). Then select the correct board from Tools Board menu in Arduino IDE and upload the sketch to Arduino through standard USB port.

V.PROGRAM CODE

```
#include <DHT.h>
#include <LiquidCrystal.h>
LiquidCrystallcd(7, 8, 9, 10, 11 ,12);
#define DHTPIN 6
#define DHTTYPE DHT22
DHT sensor(DHTPIN, DHTTYPE);
int relay_pin = 9;
void setup()
{
lcd.begin(16,2);
sensor.begin();
pinMode(relay_pin, OUTPUT);
digitalWrite(relay_pin, HIGH);
}
void loop()
{
lcd.clear();
float t = sensor.readTemperature();
if (isnan(t))
{
lcd.print("Failed");
delay(1000);
return;
}
lcd.setCursor(0,0);
lcd.print("Temp: ");
lcd.print(t);
lcd.print(" C");
if (t > 35)
{
digitalWrite(relay_pin, LOW);
lcd.setCursor(0,1);
lcd.print("Fan is ON ");
delay(10);
}
Else
{
digitalWrite(relay_pin, HIGH);
lcd.setCursor(0,1);
lcd.print("Fan is OFF ");
}
delay(2000);
}
```

III .CONCLUSION

Electric Fan is one of the most popular electrical devices due to its cost effectiveness and low power consumption advantages. It is a common circuit and widely used in many applications. It is also one of the most sensible solutions to offer a comfortable and energy efficient. In fact, the fan has been long used and still available in the market.

Nowadays, the demand for accurate temperature control and air freshening control has conquered many of industrial domains such as process heat, automotive, industrial places or office buildings where the air is cooled in order to maintain a comfortable environment for its occupants. One of the most important concerns involved in heat area consist in the desired temperature achievement and consumption optimization.

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FORMULA STUDENT ELECTRIC VEHICLE

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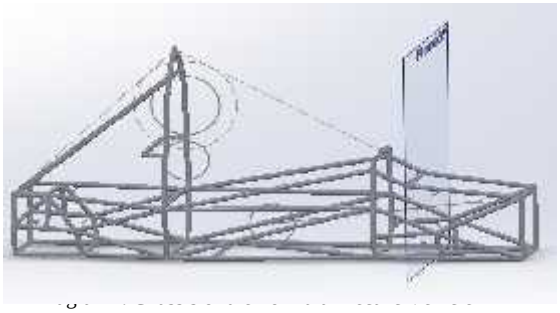
***Abstract* —I am a part of Mavericks Racing team and we are making an electric car for partake in 6th Formula Imperial. Formula Imperial is a national event where students from various college showcase their IC, hybrid or electric car. There are various static events and dynamic events such as acceleration, endurance, race, autonomous. We endeavored to produce a semi- autonomous driving four wheeled car which is made by only few teams in India.**

Keywords —Electric car, battery, battery management system, Lithium Ion battery, Brushless DC motor, IMD, Motor Controller

I.PARTS OF ELECTRIC CAR

- chassis
- suspension
- breaking
- steering
- Differential
- electric
- autonomous driving



The Chassis, suspension, breaking and steering were designed by the mechanical department with high precision and careful calculations. We will be focusing on only the electric and autonomous parts, but the above mentioned parts cannot be ignored.

II. PARTS UNDER ELECTRIC

- Battery
- BMS
- IMD
- Shutdown system
- Motor
- Motor controller

We are going to discuss various parts of electric car and also specify the parameters of the parts used in the vehicle.

A. Battery

You give life to what you give energy to. Here, life is given to our electric vehicle by our battery which gives it the energy. The battery requirement stated in the FSAE rule book says the battery chemistry should not be any acid format and can be any lithium chemistry. So we choose lithium ion chemistry because high energy density means greater power in a smaller package. The lithium Ion provides power 160% greater than NiMH, 220% greater than NiCad. Lithium Ion has higher voltage so a stronger current is provide which allows it to power stronger devices. As compared to other battery chemistries it has longer life shell which is only 5% discharge loss per month. The battery of electric vehicle is divided into two parts.

- GLVS (Grounded low Voltage System)
- TS (Tractive System)

1) TS

The TS of the vehicle is defined as every part that is electrically connected to the motor and TS Battery. The TS voltage is up to 600VDC.

2) GLVS

The GLVS is the part which deals with low electric such as lights, shutdown system and IMD. GLVS is also used as controlling voltage of the higher voltaged TS.

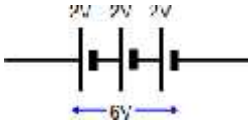
3) Selection of parameters of Battery pack

From past races of our team the data of acceleration, top speed, max torque and energy at every straight and turns of the track were used. This data then was simulated with the specifications of our motor used which was used to calculate the specifications of battery and also the battery capacity.

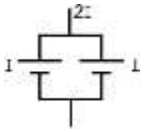
TABLE I: CONFIGURATION OF BATTERY PACK

Voltage	72V
Current	200Amps
Total Capacity	2.5kWh

4) How to calculate the number of cells required
Let us assume that the nominal voltage of a cell is 2v. So when the batteries are connected in series the voltage increases. Example when two batteries of 2v are connected in series we get 4v.



So the nominal voltage of Lithium Ion battery is 3.7v, so we have connected 20 batteries in parallel.
Now when these batteries are connected in parallel the current of the batteries are increased. So if we assume current of a single cell to be I amps and two cells are taken in parallel we get 2I.



Using these principles upon deciding the voltage, current and capacity of battery pack we were able to calculate the no of cells in our battery pack. Because of this we were also able to calculate the weight of the battery pack which helped us in more accurate simulations.

TABLE II. CELL CONFIGURATION OF BATTERY PACK

Nominal voltage of a single cell	3.7v
Nominal current of a single cell	1200mah
No of cells in parallel	20
No of cells in series	17
Total no of cells	20x17=340 cells

B. .BMS (Battery Management System)
The battery should be maintained carefully. It should not be charged over a certain level. It should not be drained below a certain level, it is called the lower threshold, and also the battery should not be used above a certain level for continuous time.

The BMS is essential for a battery. It protects the battery from all the above problems. When the battery is being charged the BMS doesn't allow it to charge over a certain level and as soon as it reaches the threshold it activates the latch and stop the charging automatically. During very high intensity rounds the motor is ran at a very high speed than dropped to low speed and this keeps on happening, so at such times the battery voltage varies from time to time and this causes the individual cells of battery to have different voltage values. The BMS manages this problem by balancing the batteries by giving voltage to the batteries of low voltage from batteries of high voltage. This process is called cell balancing. The BMS also initializes the shutdown latch when the battery falls under the lower threshold.

C. IMD (Insulation Measuring Device)

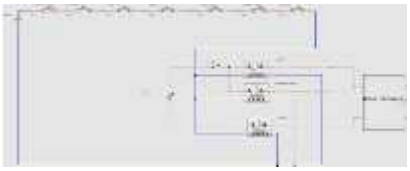
IMD is a safety device which measures the overall insulation of the car. The IMD measures the insulation between the GLVS and TS and is connected to the chassis. All the grounds of the circuit is connected to chassis via the IMD. When any insulation of wire is damaged it causes short and this is detected by the IMD. The IMD latch will activate which will in turn shutdown the GLVS.

D. Shutdown system

The shutdown system is a circuit which consists of series of kill switch, master switch, latching Circuit and relays. The working of shutdown circuit should be such that with the help of GLVS the tractive system should shutdown causing the car to cut the electrical power and stop. Failure of any part of the vehicle can cause great damage to other parts as well as the vehicle. In worst cases can harm the driver. The shutdown circuit is crucial during such failure and can reduce any further damage. The shutdown circuit works in combination of many parts which is made in compliance with the terms of the rule book.

E. Motor

The motor is the part which gives the car final momentum. It is one of the most essential part of car and was chosen very carefully. From the data of past races, we calculated torque and power of the motor. We choose Brushless DC motor because of high torque requirement and nominal efficiency of 80%. Since our



vehicle is rear wheel drive and the motor is positioned at the rear, the motor in our electric car is directly connected to the wheels via a differential.

During turn the speed of both the wheels should be managed to avoid skidding, this is done by the differential. Differential is a mechanical part and is present in all the vehicles.

TABLE III. SPECIFICATIONS OF THE MOTOR

Manufacturer	GOLDEN MOTOR
Model Number	HPM-10KW

Motor Type (PM, Induction, DC Brush…)	HIGH POWER BLDC
Nominal motor voltage (Vrms l-l or Vdc)	72V DC
Nominal / Peak motor current (A or A/phase)	Nom:160A Peak: 200A
Nominal / Peak motor power	Nom:10000W Peak: 20000W

F. Motor Controller

The Motor Controller is the part which controls the motor. It handles the acceleration, manages the RPM and provides suitable voltage to the coils.

The Brushless DC motor has three poles which require supply which is alternating and phase shifted equally. This alternating and phase shifted supply is provided to the motor by the motor controller. Now to increase the speed of motor the motor controller simply increases the amplitude of the supply keeping the phase shift same. The motor controller also has the job to monitor the temperature of the motor and protect the motor from burning of coils. The motor controller is connected to the motor is mentioned in the circuit below.

The following diagram is present in the information document of the motor and motor controller selected.

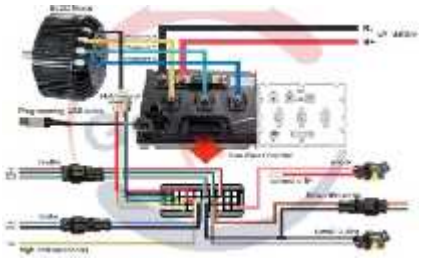


DIAGRAM II. CONNECTION OF MOTOR AND MOTOR CONTROLLER TABLE IV. SPECIFICATION OF THE MOTOR CONTROLLER

Manufacturer	GOLDEN MOTOR
Model Number	VEC500
Maximum Input voltage:	96V
Nominal Input Current:	150A
Output voltage (Vac l-l or Vdc)	72V

G. Charger

As important is it to run the vehicle at full capacity it is important to charge it properly as well. Selecting a charger which charges the battery safely is necessary. Chargers which charge the battery quickly have tendency to heat up the battery and risk the life of battery and damage it. Similarly charger with high charging time is not suitable for racing events. So we selected a charger which fits between the above mentioned criteria. The charging time is given by

T = Ah / A Where,
T = Time hrs.
Ah = Ampere Hour rating of battery A = Current in Amperes

TABLE V BATTERY CHARGING DATA

Charger Manufacturer	TENGSHUN
Model Number	TS-3620
Maximum Charging Power:	900W
GLV/TS isolation location: (i.e. cell boards, main unit, etc.)	
Certification?	Yes No
Maximum Charging Voltage:	72V
Maximum Charging Current:	45A
Input Voltage:	100-240
Input Current:	6A

III. WORKING

The Electric Vehicle works in two modes, self-driven semi- autonomous and by a driver.

In the driver mode the car is ran at its full potential which can be controlled by the driver as possible. The vehicle is started with the help of a key, unlike a IC engine car there are no vibrations present and the ignition is signified with the help of a custom made buzzer. On the drivers dashboard there are telemetries which show battery status, speed, torque, IMD status, failure light, and temperature light. There is only brake and accelerator paddle in the vehicle. When the brake

paddle is pressed, the throttle is killed. This is done by the motor controller.

On ignition the battery energizes the pre charge relay. The pre charge relay ensures that the immediate circuit is pre charged to at least 95% of voltage of the TS battery. After the circuit is pre charged, the AIR is activated and gives voltage to the motor controller.

The presence of AIR ensures that on connecting the battery the motor controller does not receive the very high discharge from the battery which is usually present. When the car is shutdown, a discharge relay is activated. It performs the action of draining the remaining current present in the motor controller.

IV. SAFETY

Safety is of utmost importance in an electric car because of presence of a very powerful motor along with a high voltage battery. There are proper and thorough inspections done before the event of the car, and failing to meet these requirements could lead to disqualification. While driving, in case of emergency there is a kill switch located at the dashboard. When the brake fails there is also a Brake over travel Switch which acts as a kill switch. Additionally, there are two kill switches located on the sides of the car which can be easily accessible by the team members in case of emergency. There is also a High Voltage Disconnect which can be used to disconnect the battery and stop the system. The high voltage Disconnect is made in such a way that it can be disconnected in 10 seconds without the use of tools by anyone.

V. ACKNOWLEDGMENT

Firstly I would like to thank my seniors who took the efforts of initiating this project. They have maintained great discipline in the team and have been managing properly.

To the Electronics and telecom as well as Electronics students who are my fellow team members, who have been researching with me all this time a taking great efforts in this project they have been with me even when the times were tough.

I would like to also our mentor Ms. Archana Deshpande who has helped us in understating few difficult circuits and guided us in the project and aided us to procure parts and components.

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WIRE DEFECT REVEALER

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***Abstract*— Continuity in a wire can also be detected using a digital multimeter but discontinuity cannot be located in the wire if the digital multimeter is used. This paper report covers the study of wire defect reveller. This tool locate defect in the wires, by using Amperes law of electromagnetic induction. This tool provides the faulty spot of the wire. This project based on DIY IC555 which trigged on the 1 /3 of Vcc.**

***Keywords*— Electromagnetic induction, Continuity, Amperes law, Discontinuity, Multimeter &etc…**

I. INTRODUCTION

The wire defect reveller is a circuit which can detect discontinuity in a wire/cable and most importantly it can detect where the discontinuity exists. Continuity in a wire can also be detected using a digital multimeter but discontinuity cannot be located in the wire if the digital multimeter is used. Using this circuit one can detect and locate the discontinuity in a wire and hence the entire wire is not wasted and the part of the wire which is still continuous can be used further. The indicator may contain a buzzer or a Light Emitting diode light. In this project a LED light has been used as an indicator. The LED keeps on glowing once input is given to the circuit and when the circuit approaches a part of the wire where discontinuity exists, the LED light starts blinking.[3] The tester consists of an indicator in series with a source of electrical power (normally a battery) terminating in two leads. If a complete circuit is established between the test leads, the indicator is activated and the LED starts blinking. Once we have figured out where the discontinuity is using this tool, we can get rid of that part of the cable and use the rest of it and prevent copper loss.

II. REVIEW OF LITERATURE

Ammeter is used to measure current. Similarly, voltmeter is used to measure voltage in a device. Multimeter used to measure resistance and many other measurements in electricals field. Galvanometer can function as Ammeter if it measures across resistor, i.e. in parallel to resistor. Similarly, it will function as voltmeter if measured in series with resistor. First of all, the journey started from analog meter to digital meter. In analog meter, it had coil and its principle (induction etc) were used. Drawback of analog meter was that, it fluctuated in its readings and major error were shown. It resulted in faulty measurement and was later replaced with digital. Gradually time leaded to digital era, in digital multimeter, ammeter, voltmeter was discovered or made. Fluctuations were very minute comparative to analogy meters. Sensitivity was major factor or role played in this case. But here there were some shortcomings. When we wanted to check current flowing in wire, we needed to connect terminals of multimeter to wire which is very dangerous. If at all a person not wearing rubber gloves while connecting terminals to open wire which has high voltage could result into death to trauma. So, in order to avoid this situation, we upgraded to Contactless Digital voltmeter and ammeter. They worked on principle of inductance and capacitance. Induction principle was rightly given by Faraday. Basically, when an alternate current is flowing in one coil there will be an emf produced in another coil which will lead current to flow in that coil. In capacitance if there are two parallel plates where in which one plate is given positive charge, the other plate will develop opposite charge. Non-contact voltage detectors don't need to physically touch the measured hardware. They work by sensing the AC electric field created by live AC wires. They're used to quickly see if there is something live, e.g. connected to a wall outlet, inside a device. You can also use them to track where power wiring is going inside a wall etc. They often also have a metal detector so you can also track wires which are not live. Benefit of contactless meter is that we don't need to touch the naked wire. We can conclude from the readings shown in display. Non-contact voltage detectors are a quick, inexpensive way to check for the presence of live voltage on ac circuits, switches and outlets before working on them. When low voltage is generated it will function separately and same for high voltage. Still there are changes that need to be cure and rectified and still there is more research and work going on.

III. METHODOLOGY

All these voltage/wire fault detectors work on a simple principle of electromagnetic induction. A magnetic field

is produced around a current carrying conductor and if current through the conductor is alternating current (AC), the magnetic field produced varies periodically. When we place an antenna near an AC energized object, a small current gets induced into the antenna due to electromagnetic induction. By amplifying this current we can light up a LED or a buzzer circuit, indicating that AC voltage is present. The circuit can be used to check AC voltages in wires, switches, plugs, wall sockets, electronic devices etc. without making a direct contact. It will also show the phase and neutral wire from the two AC wires by making LED blink only on phase wire and being in off state on neutral wire. This circuit is using a 555 timer IC, a 2N3819 FET (Field effect transistor) with some resistors and capacitors.[4] The 2N3819 transistor is working as AC field detector and the beeper circuit is built around the 555 timer IC.[2] 555 timers are the most common chip used in DIY electronics projects because it's inexpensive, small and very useful.[5] This circuit is quite simple. When the voltage on Pin-2 falls below 1 / 3rd of VCC the Output on Pin-3 goes HIGH and the LED lights up. As long as this pin continues to be kept at a low voltage, the OUT pin will remain HIGH.[4] So, when the antenna detects an alternating input the output goes HIGH and LOW and the LED blinks accordingly. This circuit can be operated from 6 to12-volt DC.[4] If you are operating the circuit with lower voltage then we have to change the LED current limiting resistor according to the operating voltage to brightly blink the LED. On 6 volt you can use a 270 ohms resistor, on 9 volts use 320 ohms and on 12 volts use 470 ohms. The antenna can be a 2 to 4-inch wire, do not remove the insulation from the wire and wound a good plastic tape on the antenna from tip to bottom so it will not come in contact with the AC directly. Connect Pin-1 to ground, Pin-2 to the antenna, Pin-3 to the LED and the buzzer, Pin-6 to the positive leg of the capacitor & Pin-7 to one end of the 10K resistor.Then Pin-6 or the Threshold pin and Pin-7 or the Discharge pin need to be connected to each other. Pin-8 and the other end of the 10K resistor connect to the positive rail of the circuit board, and finally connect all the negative legs to the negative rail of the circuit board.

IV. CIRCUIT DIAGRAM

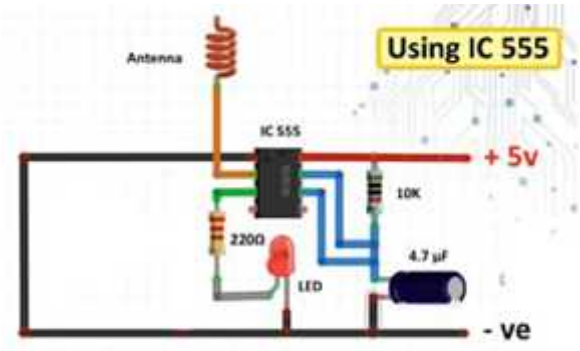


TABLE I COMPONENT USED

COMPONENT USED	PURPOSE
IC 555	Variety of timer, pulse generator & etc.
10KΩ RESISTOR	A resistor is a two terminal device that provides opposition to the flow of current.
220Ω RESISTOR	A resistor is a two terminal device that provides opposition to the flow of current.
4.7µF CAPACITOR	Capacitor is a device that stores electric charge and it block the flow of DC it only allows that signal which have higher frequency.[5]
ANTENNA	An antenna is which can sense alternate current and because of alternate current the EMF get induced across it which will trig the IC555.
POWER SUPPLY 5V	It supplies power to the require circuit.
LED	Which shows the output OR output indicator.
ZERO PCV	The circuit is mounted on this board which allow to configure the circuit board.[1]

V. ADVANTAGES

- It prevents copper loss as it detects the part of the wire which is not needed and it can be thrown away so the rest of the wire can be used again.
- It can detect discontinuity in a wire without having any physical contact with the wire which is not possible in the ordinary continuity testers already available in the market.

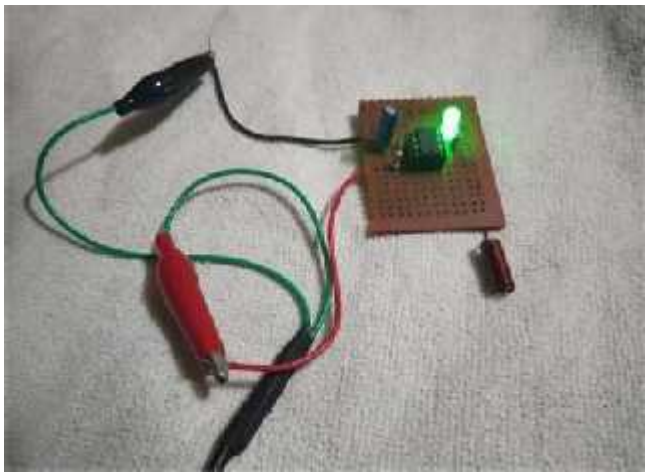
VI. DISADVANTAGES

- It can only detect discontinuity in AC voltage.
- It needs high voltage input to work.
- It has a limited range; it cannot work outside the range.

VII. APPLICATION

- It has applications in hospitals for paralysed patients to figure out which part of the body is paralysed.
- It has a lot of applications at construction sites.

VIII. IMPLEMENTATION



IX. RESULT

When the circuit is given input the LED glows and that means the circuit is activated. When this circuit is brought near a wire/cable which is continuous the LED is on but when it comes near a part of the cable which is discontinuous the LED starts blinking.

X. CONCLUSIONS

The main important work the project is to determine if a given cable is continuous or not and if it is discontinuous then determine where the discontinuity is.

Using this circuit, we can determine the discontinuity without actually making any contact between the circuit and the cable.

ACKNOWLEDGMENT

I acknowledge to Thakur College of engineering and technology for providing such a kind of platform. Where students can express their ideas and researches related to the technical or non- technical subject and also can even develop their skills. And I also acknowledge Mrs. Amruta Naik and the teaching staff for guiding about this topic and How to write a research paper.

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Electronic Dice

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Abstract— Playing with dice is an age-old game. We all love to play with it too. Playing with dice needs us to pick up a dice and make sure that it is unbiased. Making a block as a dice* and *cutting it clearly to make sure that it is unbiased is all an old story. The dice becomes biased if the shape is not cut well.

Also, the dice can become biased due to deformations. If it is a wooden die, it can deform due to dampness in the atmosphere or due to mechanical stress. To solve all these problems which we have with a conventional dice, we have made a dice circuit which solves all the problems of a conventional dice.

I. INTRODUCTION

Dice is used to play many games like snake ladder, Ludo etc. Generally, dice is made up of wooden or plastic, which gets deformed with time and become biased. A Digital dice is a good alternative of old-fashioned dice, it can't be biased or deformed. It operates at such high speed that no one can cheat. To create this digital dice circuit, we have mainly used 555 timer IC and 4017 IC.

An electronic LED dice which is nearly unbiased. There is no chance to cheat as the circuit operates at such a high speed that the circuit is almost imperceptible to the human eye. There is also little maintenance and there is hardly any impact on aging of the circuit. The frequency may vary a bit with change in power supply voltage, aging of the active and passive components but still the randomness will be preserved without any trouble.

II. CONSTRUCTION

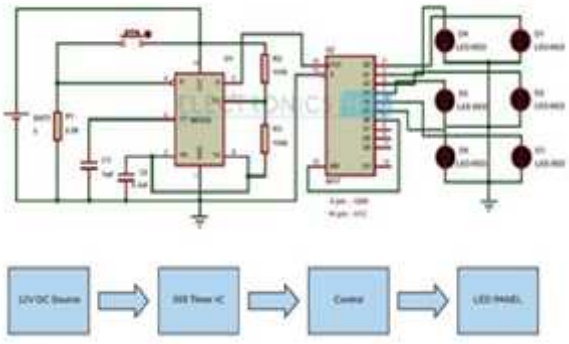
This circuit uses 555 timer as an astable multivibrator. In this mode, the circuit is arranged with R2 = 100 KΩ, R3 = 100 KΩ and C2 = 0.1 µF.

With this configuration, the circuit operates as a pulsegenerator with a frequency in order of kilo hertz. This means that the circuit produces a clock cycle of about0.000210 seconds which is imperceptible to the human eye. We cannot observe the values which change at that faster rate so there is hardly any possibility of getting the dice biased.

If the count is 1, LED-1 will glow. If the count if 2, LED-2 will glow and so on until the sixth count. When the count is six, the sixth LED will glow and after that for the next The power supply pin and ground are not shown in the circuit diagram as it is the schematic generated by the software Proteus. However, the power supply of 9V is given to the 16th pin of IC 4017 and the 8th pin of IC 4017 is given to ground.

This is how the circuit functions and you can increase the frequency of the circuit if you feel that you need more randomness so that it is very hard to perceive. This circuit can be implemented on a general-purpose PCB with a 9V DC power supply.

III.CIRCUIT DIAGRAM



IV. LIST OF COMPONENTS

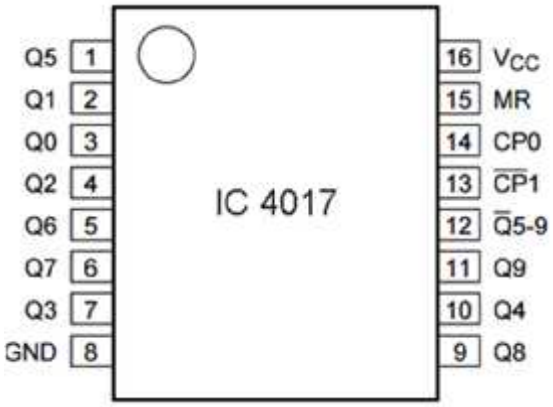
1. LEDs X 6
2 .555 Timer IC
3 .CD4017 Decade Counter IC
4. Resistors – 2.2KΩ, 100KΩ X 2
5. Capacitors – 1nF and 0.1µF
6. Push Button
7. 9V Battery
8. Breadboard
9. Connecting Wires

clock pulse the counter will advance and the count increments to seven. In this count, the circuit resets itself as the seventh count is given to the reset pin which is PIN-15.

V. WORKING

The 555 Timer IC is an integrated circuit (chip) implementing a variety of timer and multivibrator applications Depending on the manufacturer, the standard 555 package includes over 20 transistors, 2

diodes and 15 resistors on a silicon chip installed in an 8-pin mini dual- in-line package (DIP-8).[4]
The 555 has three operating modes:
Monostable mode: in this mode, the 555 functions as a "one-shot". Applications include timers, missing pulse detection, bounce free switches, touch switches, frequency divider, capacitance measurement, pulse-width modulation
(PWM) etc.
Astable - free running mode: the 555 can operate as an oscillator. Uses include LED and lamp flashers, pulse generation, logic clocks, tone generation, security alarms, pulse position modulation, etc.
Bistable mode or Schmitt trigger: the 555 can operate as a flip-flop, if the DIS pin is not connected and no capacitor is used. Uses include bounce free latched switches, etc.
4017 IC is a CMOS decade counter chip. It can produce output at the 10 pins (Q0 – Q9) sequentially, means it produce output one by one at the 10 output pins. This output is controlled through the clock pulse at PIN 14. At first, output at Q0 (PIN 3) is HIGH, then with each clock pulse, output advance to the next PIN. Like one clock pulse makes the Q0 LOW and Q1 HIGH, and then the next clock pulse makes the Q1 LOW and Q2 HIGH, and so on. After the Q9, it will start from the Q0 again. So, it creates sequential ON and OFF of all the 10 OUTPUT PINs. Below is the PIN diagram and PIN description of 4017:



This circuit uses 555 timer as an astable multivibrator. In this mode, the circuit is arranged with R2 = 100 KΩ, R3 = 100 KΩ and C2 = 0.1 µF.
With this configuration, the circuit operates as a pulse generator with a frequency in order of kilo hertz. This means that the circuit produces a clock cycle of about
0.000210 seconds which is imperceptible to the human eye. We cannot observe the values which change at that faster rate so there is hardly any possibility of getting the dice biased.
If the count is 1, LED-1 will glow. If the count if 2, LED-2 will glow and so on until the sixth count. When the count is six, the sixth LED will glow and after that for the next clock pulse the counter will advance and the count increments to seven. In this count, the circuit resets itself as the seventh count is given to the reset pin which is PIN-15. The power supply pin and ground are not shown in the circuit diagram as it is the schematic generated by the software Proteus. However, the power supply of 9V is given to the 16th pin of IC 4017 and the 8th pin of IC 4017 is given to ground.
This is how the circuit functions and you can increase the frequency of the circuit if you feel that you need more randomness so that it is very hard to perceive. This circuit can be implemented on a general-purpose PCB with a 9V DC power supply.

VI. RESULT

The clock pulses are given to a counter cum decoder circuit made with flip flops with the seventh output given to reset. It has nine possible outputs out of which, the seventh is given to reset because we only need a count up to 6 as a dice has six faces only. The first six outputs are given respectively to the LEDs, so that the respective LED will glow for the corresponding count.



VII. APPLICATIONS

1. This unbiased electronic dice with LEDs can be used wherever traditional dice is used like:
2. Snakes and Ladders
3. Chutes and Ladders
4. Ludo
5. Monopoly
6. Business

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Invisible Burglar Alarm

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***Abstract*: The main use of the burglar alarm is from the point of view of safety. Whenever an intruder enters the house the burglar alarm is used to alert the owner of the house. It can prevent robbery and can also save life.**

I. INTRODUCTION

A burglar alarm system is designed to detect an unauthorized entry into a house or area. Burglar alarm systems can be used in residential buildings, commercial buildings, offices, industries and even in military locations.

Many security alarms were designed and published in Electronics hub. Here is the simple and efficient burglar alarm using Phototransistor and an op amp comparator.

Most of the home security systems are very expensive. With the help of thisproject, an inexpensive burglar alarm system can be implemented.

II. LITERATURE SURVEY

Alarm systems are designed to provide cues to make operators aware of an operational problem, so that mitigation actions can be taken. New technologies are enabling innovative designs of alarm systems for safety-critical systems. To help better design alarm systems in advanced control rooms of nuclear power plants (NPPs), recent researches on alarm system design in the NPP domain are reviewed from the following aspects:

(1) functions of an alarm system and opportunities and challenges of new technologies;

(2) effects of alarm floods and different alarm management methods;

(3) visual presentation of alarm information;

(4) evaluation criteria for alarm systems. Through the comprehensive literature review, this article proposes research topics related to human factors and ergonomics that are worth studying in advanced alarmsystems of NPPs.

III. METHODOLOGY

The design of the burglar alarm system is easy to understand. There are different components used to design a burglar alarm system. They are namely

- LM358 – 1
- IR Transmitter or IR LED – 1
- Photo Diode – 1
- 10 KΩ – 1
- 150Ω – 1
- 10 KΩ POT – 1
- Buzzer – 1

a) LM358: It is a dual Op Amp IC. It consists of two independent operational amplifiers that can be used separately. It is commonly used in all op amp circuits; transducer amplifiers, active filters, general signal conditioning and DC gain blocks.

b) IR Transmitter: Infrared or IR is a range of light frequencies that have longer wavelength than visible light. Hence, they are not visible to human eye. An IR transmitter or IR LED is a device that emits infrared light.

c) Photo Diode: A photo diode is a device that converts light to electrical current. It is basically a PN junction that operates in reverse bias condition. When light falls on the photo diode, a reverse bias current flows in the junction that is proportional to the luminescence of the light.

d) Buzzer: It is an alarming device that makes a loud sound when current flows through it.

IV. WORKING

The aim of this project is to implement a simple Burglar Alarm System that can detect an unauthorized entry by a burglar. All the connections are made as per circuit diagram. The working of the circuit is as follows.

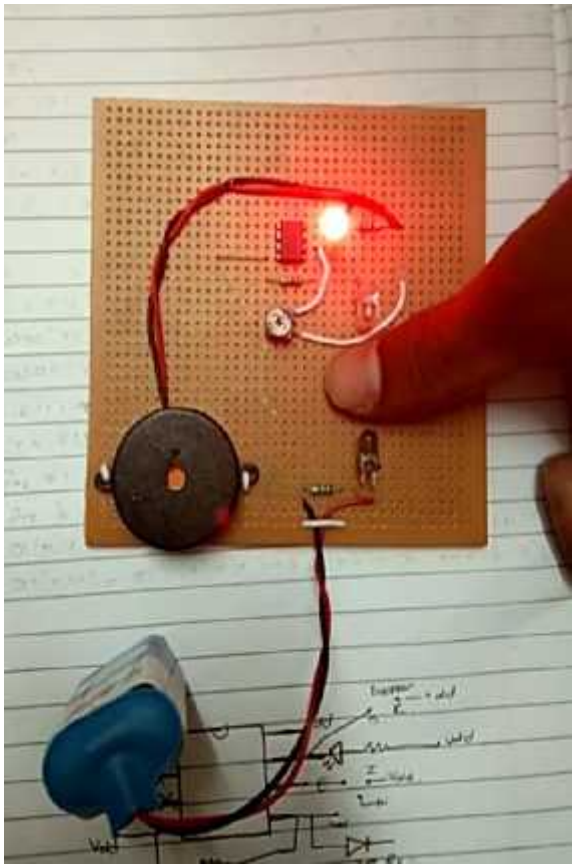
LM358 is configured to work as comparator in this project. When the system is powered on, the IR transmitter or IR LED emits infrared light. This light falls on the surface of the photo diode.

As it is connected in reverse bias fashion, when the light falls on it, it conducts and current flows through it. Since it is connected to the non- inverting terminal (pin 5) of the opamp, output of the op amp comparator will be high. As the buzzer is connected between Vcc and output of op amp, no alarm is made.

When an intruder or a burglar enters the gap between the IR transmitter and photo diode, the light falling on the photo diode is interrupted and it doesn't conduct.As a result, the input at non-inverting terminal (pin 5) is less than the input at inverting terminal (pin 6). Hence, the output of the comparator is low. This will trigger the buzzer and a loud alarm is made.

V. RESULT

There is a space between the photodiode and the receiver. The light from the photo emitter is continuously falling on the IR receiver. Whenever there is a disturbance between the transmitter and receiver the light stops falling on the receiver. This triggers the system and alarm starts buzzing. This indicates the concerned person that there is a burglar in the concerned place.



VI. APPLICATIONS

A security alarm is a system designed to detect intrusion– unauthorized entry– into a building or other area. Security alarms are used in residential, commercial, industrial, and military properties for protection against burglary, as well as personal protection against intruders. Security alarms in residential areas show a correlation with decreased theft. Car alarms likewise help protect vehicles and their contents. Prisons also use security systems for control of inmates.

Some alarm systems serve a single purpose of burglary protection; combination systems provide both fire and intrusion protection. Intrusion alarm systems may also be combined with closed-circuit.

television surveillance (CCTV) systems to automatically record the activities of intruders, and may interface to access control systems for electrically locked doors. Systems range from small, self- contained noisemakers, to complicated, multirally systems with computer monitoring and control. It may even include two-way voice, which allows communication between the panel and Monitoring station.

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Sound Activated LED

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***Abstract*— The lights utilized in the circuit gleam as per the length and pitch (volume) of sound; fundamentally these are intended to pick the high force sound like Bass sound. So, these lights follow the high contribute beats music, applaud sound, and Turn ON and OFF as per sound example. Anyway, the affectability of the circuit can be expanded to pick the low notes as well.**

I. INTRODUCTION

Applaud Switch is a fundamental gadgets small scale venture, made with the assistance of the essential parts. Applaud Switch can turn ON/OFF any electrical part or circuit by the applaud sound.

A circuited switch, which works with sound of applauding or something comparable for example the change comes to ON status when applauded a few times and to OFF position when applauded again relying upon the circuit. It is known as a sound enacted drove or basically an applaud switch.

The sound activated LED is commonly found on an electronic Microphone (it is a kind of electrostatic capacitor-based microphone which wipes out the requirement for a polarizing power supply) which detects the music and through the circuit one can get the LEDs sparkle concerning any type of sound and consequently, the sound vitality is changed over into light vitality.

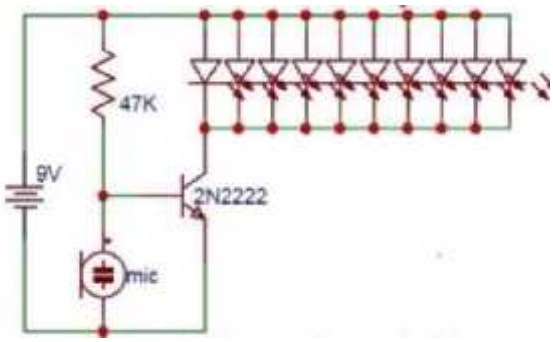
The activity of the circuit is basic. The applaud switch system is useful of the human day by day movement like switch on/off the light in the home from any area. Switch on and off any peripherals inside the vehicles, enact the surveillance cameras for the universally useful and the military reason. It is vitality proficient and is utilized in broad daylight places like clinics.

II. IMPLEMENTATION

The circuit is mostly dependent on transistors in light of the fact that the negative terminal of a microphone is straightforwardly associated with the transistor. There is absolutely no utilization of Electronic Switch so as to turn on/off the circuit, so when there is an association between the battery and the circuit it implies the circuit is currently turned ON and it will take the contributions to the type of Sound Energy.[1]

Transfer circuit which turns on/off the circuit. The venture has a capacity to take the sound having a similar pitch as that of an applaud sound as the information. In spite of the fact that, it doesn't imply that the sound should be actually the applaud sound, it tends to be any stable sound having a similar high pitch as applauding sound. It can likewise change over the sound vitality into the electrical vitality since the information is given to the circuit as sound while the circuit gives the yield as a LED light when it sparkles.

III. WORKING



LIST OF COMPONENTS

1. Bread board.
2. Transistor (2N2222).
3. Resistor (47KΩ).
4. Electrets Mic.
5. Red LEDs (10).

In sound activated LED, condenser microphone gets the sound signals and changes over them into voltage levels. These voltage signals are additionally encouraged into resistor. Further, an NPN transistor is utilized to intensify the signal from the high pass channel. At that point, music signals are given to the transistor. Transistor fills in as enhancer and shines the ten LEDs as indicated by the sound example. This creates a fascinating arrangement of LEDs which follows the beats. The affectability of receiver can be changed with the assistance of the resistors. Higher the affectability of MIC and higher the affectability of circuit implies MIC can pick low volume sounds, henceforth LEDs can shine on low pitch music too.So, by altering its affectability it very well may be made less touchy which responds just

on high note beats or make it progressively delicate to respond on each and every beat in the music. For this reason, the affectability is set to direct level. From the given circuit, it is understood that the 10 LEDs are connected in parallel to each other. Firstly, one of the pins of the resistor goes to the anode of the LED whereas the second pin of the resistor goes to the base of the transistor. To be precise, the role of the base region is to function as the trigger for a larger emitter-to-collector current. At time when the base current receives sufficient current, a larger current then starts flowing from the emitter to the collector. The transistor's collector is connected to the LED cathode. The positive terminal of the electrets microphone (it is a type of electrostatic capacitor-based microphone which eliminates the need for a polarizing power supply by using a permanently charged material.) goes to the base of the transistor while, the negative end of it is connected to the emitter of the transistor.

A 9V power supply is given to the circuit for it to run. The positive end of the power supply is connected to the anode of the LED while its negative end goes to the transistor's emitter.

Condenser Microphone ought to be associated appropriately in the circuit, as indicated by its extremity. Transistor is a NPN transistor, which is utilized as an Amplifier here.

NPN transistor goes about as an open switch when there is no voltage applied on its Base (B) and it goes about as shut switch when these is some voltage at its base.

Resistor assists with controlling the current experiencing LED; Resistor can be utilized to adjust according to LED Voltage and current.

For the most part 0.7 volt is sufficient to get it completely led per their power or pitch.

The clap sound sensed by condenser microphone is amplified by transistor.

The circuit comprises of a receiver. From the outset the switch is in the off state. At the point when the encompassing sound force isn't sufficient, the control of the microphone is never again successful. At the point when the microphone is to work, and when the outside world has an uproarious sound, (for example, applaud) Microphone gets the sound sign and the switch is turned on (open). After the sound is killed, the circuit is closed down and the circuit is stopped after a specific timeframe.

A sound activated LED utilizes less number of segments, subsequently the force disseminated is low.

Hence the vitality utilized is additionally low. This circuit has total disposal of labour.

One can get to this fair by sitting in one corner. No need of turning it ON and OFF more than once.

switch can be used in places where indication for some message is to be given because this project allows the

IV. FEATURES

This alarm can be used in store rooms, dark area where switches are not visible. It can be used for places where light ON-OFF switch is not accessible easily. This is also helpful for people with disabilities like sight disabilities, handicap, etc. This alarm will allow such people to somehow have comfort in turning ON-OFF the light especially late at night without asking others for help. One of the greatest benefits of LED lights is its long service life. LEDs used in this type of lighting device have high working efficiency and thus may last for up to 11 years compared to energy saving lamps which have a service life less than a year. For instance, LEDs operating for 8 hours per day will last for about 20 years of service life, and only after this duration, we will be forced to replace the light source for new one. In addition to this, frequent switching on and off has no negative impact on the service life.

LEDs are as of now the most vitality proficient source having significantly less vitality utilization (power) than radiant, fluorescent, metal halide or mercury lights, inside the glowing effectiveness of 80-90%. This implies 80% of the vitality provided to the gadget is changed over to light, while 20% is lost and changed over into heat.

It tends to be utilized in libraries as a cutting edge sort of alarm. This caution doesn't make sound yet makes the LED shine as a sign to keep up quietness in the room. Henceforth, these kinds of alarms are especially ideal in libraries more than the ordinary signal cautions. [2]

These can likewise be utilized in emergency clinics. It's required that one ought to keep up quiet in emergency clinics. The typical alerts consistently make commotion in any crisis circumstances, upsetting different patients.

Henceforth this alarm doesn't make a sound rather it just gleams the LED showing any crisis without upsetting different patients.

V. EXPECTED OUTCOME

The expected output can be studied by considering two cases.

CASE 1: When the sound is a high pitch sound, the LEDs glow brighter.

CASE 2: When the sound is a low pitch sound, the LEDs are dim.

Hence, the LEDs glow according to the pitch of the sound.

VI. CONCLUSION

Sound activated LED or simply a clap

user to control the circuit from one corner of the room. The clap switch mechanism is helpful

of the human daily activity like switch on/off the light in the home from any location.

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Automatic Rain Sensing Wiper

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***Abstract*—Over the past two decades, the automotive industry has aggressively researched ways to exploit modern computing and electronic advances in the development of safety, reliability, and entertainment technologies for vehicles. With drivers exposed to an ever increasing number of distractions, automatic rain-sensing wiper systems become an even more appealing feature, as they work to minimize the time the driver must take his/her hands off the wheel. Most traditional systems offer intermittent as well as variable speed operation. The traditional wiper system however requires driver constant attention in adjusting the wiper speed. Traditional windshield wiper speed constantly varies according to time and vehicle's speed. Because the manual adjustment of the wiper distracts driver's attention, which may be a direct cause accidents. This is review paper for automatic wiper in various methods and also explain the basic skeleton for adjust speed of wiper automatically cording to the amount of water on the windshield and in addition with also in advance removal of moisture inside the car while raining. The system activates the wiper to operate in full automatic mode and detect moister using CAN technology.**

I. INTRODUCTION

You have seen Automatic Wiper System in luxury cars where Windshield Wiper automatically gets activated when there is Rain or if there is some water on the windshield. Electronic Wiper is very common device that is attached in every car to wipe the water on the windshield during the rain. But generally they are manually operated and we need to switch them ON manually. But today we are going to build Automatic Rain Sensing Car Wiper System using 555 Timer IC.

This circuit automatically detects the rainfall and activates the wiper to clear the windscreen. The Number of distractions, automatic rain-sensing wiper systems become an even more appealing feature, as they work to minimize the time the driver must take his/her hands off the wheel. Most traditional systems offer intermittent as well as variable speed operation. The traditional wiper system however requires driver constant attention in adjusting the wiper speed .Traditional windshield wiper speed constantly varies according to
time and vehicle's speed.

AIM

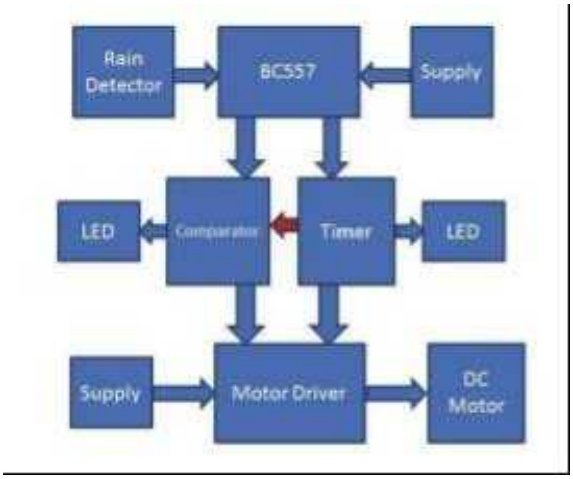
To study and design of Automatic Rain Sensing Wiper
Circuit using 555 Timer IC .

Because the adjustment of the wiper distracts driver's attention, which may be a direct cause accidents. This is review paper for automatic wire in various method and also explain the basic skeleton for adjust speed of wiper automatically cording to the amount of water on the windshield and in addition with also in advance removal of moisture inside the car while raining. The system activates
the wiper to operate in full automatic mode and detect moister.

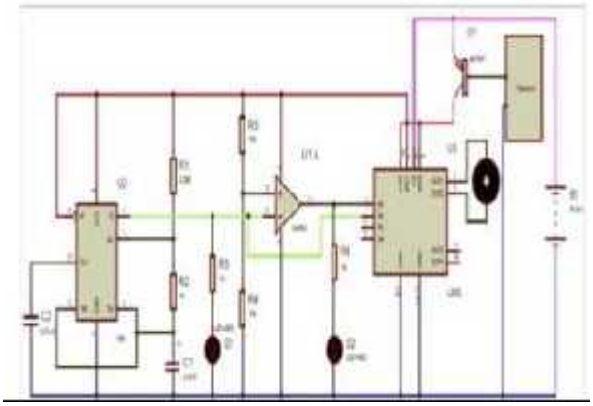
OBJECTIVE

Despite this, automatic rain-sensing wiper systems are relatively uncommon in modern vehicles for a number of reasons. They are often too expensive, too unsightly, or too unreliable to be desired in new automobiles. Many attempts have been made at constructing an effective, reliable, and cheap rain detection and wiper control
System for vehicles speed and intermittent interval automatically according to the amount of rain. In this type of sensors uses the fact that there fraction angle and the amount of reflection of the light are different when the 2 windshield is wet. Even though optical sensors are used widely they have some disadvantage. One of disadvantages is the sensitivity to external light. Another problem is occurs when car drive at night or gone
through tunnel and even in underground parking. For this many systems still activate the wiper when the car comes out of tunnels or underground parking lot.
Another shortfall, maybe a major one is that the sensing area is a relatively small portion of windshield. Hence the system operates only with limited area.

II. BLOCK DIAGRAM



III. CIRCUIT DIAGRAM



This Automatic Rain Sensing Wiper Control Circuit can be divided into four parts. First part includes 555 IC in a stable Mode, second part includes ComparatorLM358, third part has Motor Driver circuitry using L293D and forth part is Rain Detector.

For a stable Multi vibrator, we have used a 555 Timer IC for generating pulse in every 2-3 seconds (depends on capacitor value), means 555 Timer IC is configured in a stable mode. Output of a stable multi vibrator is directly connected to inverting pin of Comparator LM358 and
Pin No 7 of Motor Driver L293D. Output of comparator is directly connected at pin 2 of motor driver IC.
Comparator LM358 IC is used here for comparing 555 timer IC's output voltage and reference voltage across comparator's non inverting terminal, set by using Voltage Divider Circuit (R3 and R4). Two LEDs have
been used, one at the output of 555 a stable circuit and other at the output of comparator LM358. A Water Detector or Rain Sensor is used for detecting the water or rain. Output of a stable multi vibrator and Comparator is applied to motor driver IC will further drive the wiper
motor. Whole circuit can be powered using 5v-12v battery depending upon the application. L293D, which it
is used [1].

IV. WORKING

Working of this Automatic Rain Sensing Car Wiper project is simple. As we already explained that this circuit has four parts namely Astable Multivibrator, Comparator, Motor Driver and Rain Detector. When water drops of rain falls over the Rain Sensor then it will trigger the PNP transistor BC557 and PNP transistor turns ON the power supply of whole circuit and circuit start working until there is water on the Rain Sensor. Now after the power supply has been turned ON, Astable Multivibrator starts oscillating in configured frequency. Now when the output of 555 Timer IC goes HIGH then the comparator LM358 gives LOW output and when the output of 555 IC goes LOW then the Clock wise and anticlockwise and wiper attached to it turns right to left and left to right, through Motor Driver IC L293D. That is how the wipers automatically sense rain and comparator's output goes HIGH. And by using these two outputs DC motor turns gets activated. They remain activated until there is water on Rain sensor, as soon as the water evaporates wipers get stopped. Two LEDs are also used here used for indication[1].

V. PROBLEM FORMULATION, SOLUTION & IMPLEMENTATION

In manual wipers in order to move back and forth across the windshield, the windshield wipers are controlled by the windshield motor. When you activate the windshield switch on your turn signal indicator or other control arm next to your steering wheel, it sends a signal to the motor and operates the wipers at different speeds and duration. When the wiper blades don't move after turning on the switch, it's often caused by a malfunction in the wiper motor.

NEED FOR AUTOMATION:

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low cost automation. Automation plays an important role in automobile.

• Nowadays almost all the automobile vehicle is being atomized in order to product the human being. The automobile vehicle is being atomized for the following reasons.

• To achieve high safety
• To reduce man power
• To increase the efficiency of the vehicle
• To reduce the work load
• To reduce the vehicle accident
• To reduce the fatigue of workers
• To high responsibility
• Less Maintenance cost

VI. APPLICATIONS

1. It is used in four wheelers
2. It is used in aircrafts
3. It is used in Trains
4. It is used in 6 wheelers
5. It is used in Helicopters

VII. RESULT

Our system uses rain sensor to detect rain, this signal is then processed by 555 timer and take the desired action. The rain sensor works on the principle of using water to Complete its circuit, so when rain falls on it its circuit gets completed and sends out a signal to 555 timer IC and drive the motor to simulate car wiper actions. This circuit automatically detects the rainfall and activates the wiper to clear the windscreen

VIII. CONCLUSION

As almost everything described already for this design, we would like to say that there are still many kinds of enhancements one can implement on this project to make it even more convenient. The project we have made and presented is quite efficient, cost effective and convenient also. The speed controlling mechanism can be added to this project which will make it work according to the intensity and speed of water coming on the sensor. The basic maneuvering is done only to make it cost effective and reliable.

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Luggage Security Alarm

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***Abstract*—When we travel by train we are always skeptical about the theft of our luggage and find ways and means to secure our luggage, many a times unsuccessfully. We were looking at a simple and more efficient way of doing the same. We made a luggage security alarm with the help of musical tones IC 3561 which is powered with 1.5x2 V batteries and hence is very portable.**

***Keywords— IC 3561, Siren, skeptical*.**

I. INTRODUCTION

During traveling on the bus or the train, we carry many things like luggage and costly things, but we have the fear that somebody might steal the luggage. So to guard our luggage, we usually lock our luggage through the old methods with the help of lock and chain. After all these, we still stay in fear that any thief may break the chain and take away all the valuable things. To overcome this problem, here is a system, namely luggage security alarm circuit which is based on the NAND gate [1]. The main aim of this system is to generate an alarm when any unauthorized person tries to steal your luggage. This system is very useful when you travel in the night time. Another application of this luggage security alarm system is, you can use in your home for the security from the theft. Another application of this circuit is that you can employ these into your house so to avoid the attempt of robbery in your house with the help of this alarm circuit. When anyone tries to open your door, loop break and sound from alarm produces. The moment the lock is broken, the IC generates an alarm either a police siren, fire engine siren, machine gun sound or an ambulance alarm thus notifying the owner about the theft of his luggage, hence alarming the owner about the theft.

II. CONCEPT

The concept of this alarm is that it uses NAND gates to implement its circuit different components has been used to make this project like capacitor, relay switch, resistors, diode and transistors. We need to have good knowledge of NAND gate to implement this circuit. Relay switch is used it is an electromagnetic switch operated by relatively small electric current that can turn on or off a much larger electric current. It works on the principle of electromagnetic attraction.

III. CIRCUIT DIAGRAM

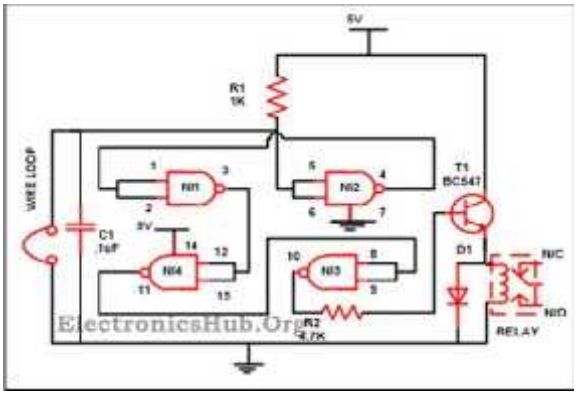

Fig 1: Circuit Diagram Of luggage security alarm.

IV. FINAL MODEL

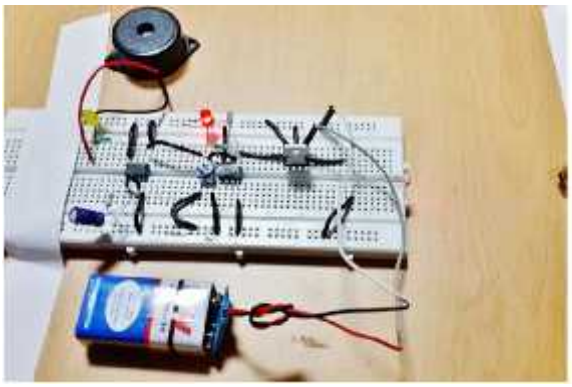

Fig 2. Final Model

V. IMPLEMENTATION AND WORKING

Functioning of these circuits is very easy when we will receive, output is based on the voltage on pin 5. At the time when power supply is attached to the circuit pin 5, voltage is zero as loop is unbroken. Hence at pin 4 voltage is high which is coupled with pin 1 and pin 2 also it can be known through NAND gate that when both inputs are at high state output is low hence at pin 3.of gate 1, we get low which is once more attached to pin 12 as well as 13 moving them also to the low which in turn makes the pin 11 to switch at high switching pin 8 as well as pin 9 also at high and low voltage at pin 10 due to this

transistor linked to it via a resistor will not boost the base of it. This implies that our baggage is secure. [2].

VI. APPLICATION

Now imagine someone trying to steal the luggage, therefore, the loop which is connected to the luggage will breaks. When loop breaks pin 5& 6 goes high and opposite action takes place. As a result, pin-10 will become igher, and the transistor will start conducting, then an alarm will generate the sound. This alarm sound will not turn off until the loop is intact again.

In the above luggage security system circuit, depending on the rating of the relay, the battery used can be 6-15V. The buzzer can also be connected directly without the need of a Relay. A relay can be used if the alarm works on AC supply an extra isolation would be required from unexpected current spikes. A diode can be used by the relay because any reverse voltage spike can lead to damage the circuit at the source.

VII. RESULT

The security concerns raised by the typical chain-and-lock arrangement have been completely overcome by using our Luggage Security Alarm. The alarm will not stop till the time we once again interact with the loop.

VIII. CONCLUSION

This circuit provides an extra benefit with a fact that it can be used for hundreds of travel hours. Because, in idle mode of the circuit, the total power consumption is minimum. In addition to this, this circuit provides multiple sound effects for generation of varieties of alarm sounds.

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CELL PHONE DETECTOR

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***Abstract*-This handy pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from a distance. So it can be used to prevent use of mobile phones in examination halls, confidential rooms etc. It is also useful for detecting the use of mobile phone for spying and unauthorized video transmission. The circuit can detect the incoming and outgoing calls, SMS and video transmission even if the mobile is kept in the silent mode. Assemble the circuit on a general purpose PCB as compact as possible and enclose in a small box like junk mobile case. As mentioned earlier, capacitor C3 should have a lead length of8mm. Use of a short telescopic type antenna. Usethe minimum 12V battery of a remote control and as small gadget pocket size. The unit will give the warning indication of someone uses a cell phone.**

I. INTRODUCTION

As increase in the technology in the world using the electronic equipment are being used in a Wrong way like in the examination halls and confidential rooms. Cell Phones are used to perform various malpractices, use of cell phones have led to usage of various hings. It has become easier for the data to circulate without the permission of the creator. Copying, Cheating rates have increased significantly because of the usage of cell phones. To Avoid this wea re introducing this project called Cell Phone detector [1]. The most common electronic equipment used now-a-days is Cell Phone or Mobile Phone. With advancement in communication technology, the requirement of cell phones has increased dramatically. A cell phone typically transmits and receives signals in the frequency range of 0.9 to 3GHz. This project provides a simple circuit to detect the presence of an activated cell phone by detecting these signals. This handy pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from some short distance. Our project provides a simple circuit to detect the presence of an activated cell phone by detecting these.

The authors conveyed that as the increase in the technology in the world using the electronic equipments are being used in a wrong way avoiding this by introducing a project called cellphone detector the mobile detector or sniffer senses the presence of an activated mobile cell phone from a distance. The circuit can detect the incoming and outgoing calls, SMS and video transmission even if the mobile phone is kept in the silent mode. They observed that the moment the Bug detects RF transmission signal from an activated mobile phone, it starts sounding a beep alarm and the LED blinks.

II. LITERATURE SURVEY

When a call is coming to the mobile phone, the transmitter inside it becomes activated. The frequency of the transmitter is around 900MHz.The coil L1 picks up these oscillations by induction and feds it to the base of Q1. This makes the transistor Q1 activated. Since the Collector of Q1 is connected to the pin 2 of IC1 (NE555) , the IC1 is triggered to make the LED connected at its output pin (pin 3) to blink. The blinking of the LED is the indication of incoming call. The authors have discussed the techniques for detecting cellular phones. The device examines the existing technology currently available on the market, they have discussed about the existing design that utilizes mostly discrete components, and a design approach using a down converter in conjunction with a bandpass filter. The existing technologies available on the open market are examined and discussed. These technologies are not adequate, because they are inaccurate and expensive.

The first signal detection technique, an existing design utilizing discrete components is difficult to implement. They are very affordable to construct, but require precision tuning. This design is analyzed and found to be inaccurate. The second signal detection technique, a design using a down converter, voltage controlled oscillator (VCO), and a bandpass filter was investigated for cellular phone detection. The performance of this technique through hardware and computer modeling is discussed and the results are presented. The new system is accurate and a practical solution for detecting cellular phones in a secure facility.

III.CONCEPT

Mobile phone uses RF with a wavelength of 30cm at 872 to 2270MHz. That is the signal is high frequency with huge energy. When the mobile phone in active, it transmit the signal in the form of sine wave which passes through the space. The encode audio/video signal contain electromagnetic radiation which is picked up by the receiver in the base station. The transmitter power of the modern 2G antenna in the base station is 20-100watts Radio Frequency detection simply consists of intercepting a sinusoidal signal passing through space.

On average, mobile phone frequencies operate with a wavelength of 30cm between 872 and 2170 MHz.

This means that when the device is activated the signal has high frequency and energy. Global System of Mobile Communication (GSM) digital phone transmissions are allocated two frequency bands: one at 900MHz and the second at 1800MHz. Within each band there are roughly 100 carrier frequencies on 200kHz spacing. Mobile-phone uses RF ranging from 700 to 2600 MHz in the GSM (Global-System of Mobile communication) and LTE (Long Term Evolution) bands, that is the signal is high-frequency with huge-energy. When a mobile-phone is active, it transmits the signal in the form of sinusoidal-wave which passes through the space. The encoded audio/video signal contains electromagnetic- radiation which is picked up by the receiver in the base- station. [2]

IV. LIST OF COMPONENTS

1. R1 2.2MΩ
2. R2 100KΩ
3. R3 2.2MΩ
4. R4 1KΩ
5. C1 0.22uF
6. C2 100uF
7. C3 47pF
8. ICCA3130 Op-Amp
9. BC548NPNTransistor
10. LED
11. Connecting wires
12. 9Vbattery

V. CIRCUIT DIAGRAM

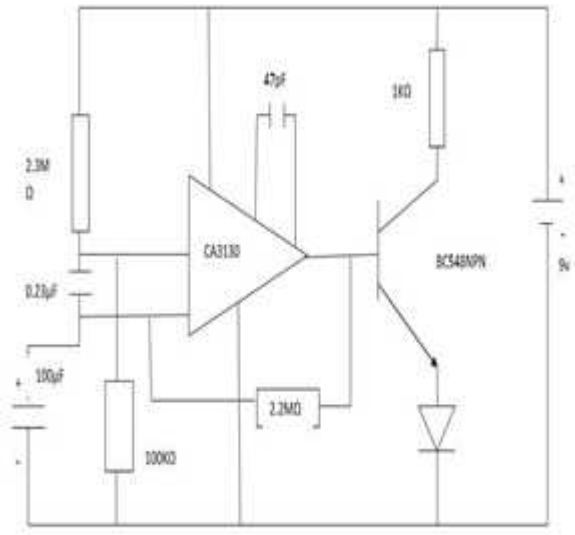

Fig 1. Circuit Diagram

VI. FINAL MODEL

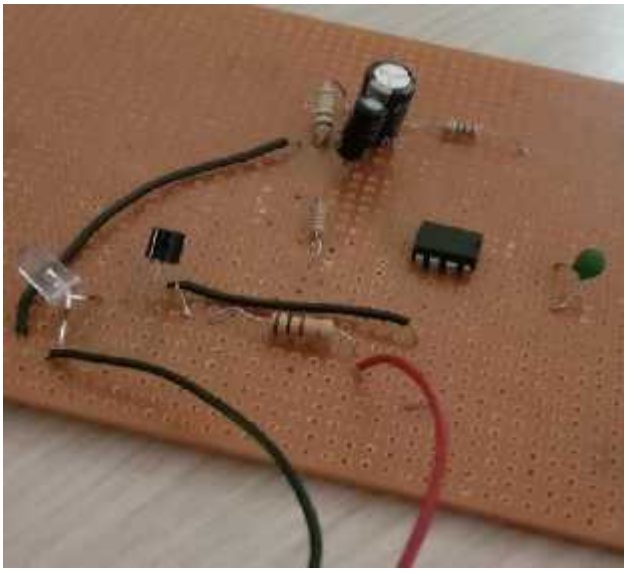

Fig 2: Cell Phone Detector

VII. IMPLEMENTATION AND WORKING

In this circuit we have used a CA3130 OP-Amp IC for detecting incoming or outgoing signa around it. Op-amp non-inverting end is connected to Vcc through 2.2M resistor and it is also connected to the ground through 100K resistor and 100uF Capacitor. Its inverting terminal is feedback from its output through a 2.2M resistor for amplify the signal. Two 100nF capacitors are connected between inverting and non-inverting terminal, working as loop antenna for the system. Two 100nF capacitors are connected in series between Pin 1 and 8 of op-amp to boost the gain of the current to voltage converter at its output pin. Output of this op-amp is connected at the base of NPN transistor namely BC547 through a 1k resistor and a LED is connected at its emitter for indication. And a 9volt battery is used for powering the circuit. A buzzer can also be used for sound indication.[2] This circuit consist an op-amp with some active passive components. An LED is used for indication of presence of cell phone. Op-amp is configured as Frequency Detector or Current to Voltage Converter and its output is connected to a LED r using NPN and
PNP transistors. Working of Mobile Detector is simplE. [3]Two 100nF capacitors (C2 and C3), in parallel, are used for detecting RF signal from Mobile Phone. These capacitors are working as loop antenna for the system. When there is any call or SMS then capacitors in parallel detect the data transmission frequencies or RF signal and output of op-amp goes high or low (fluctuating) due to generated current at the input side of op-amp. Due to these fluctuations, LED turns on and off through NPN transistor according to the signal's frequency. Now PNP transistor is also triggered with the same frequency and LED starts blinking until data Transmission gets finished.

VIII APPLICATION

1. It can be used to prevent use of Mobile phone in examination halls, confidential rooms etc.
2. It is also useful for detecting the use of mobile phone for spying and unauthorized video Transmission.
3. It is useful where the use of mobile phone is prohibited like petrol pumps and gas station.

IX. RESULT

As soon as the cell phone detector detects the signal that has been transmitted be the phone while receiving a call or a message the led starts blinking. This will help to identify the presence of cell phones by detecting the presence of the signal transmissions and the output given by the LED.

XI. CONCLUSION

This pocket-size mobile transmission detector or sniffer can sense the presence of an activated Mobile cell phone from a distance of one and a half meters. So it can be used to prevent use of mobile phones in examination halls, confidential rooms, etc. It is also useful for detecting It is also useful for detecting the use of mobile phone for spying and unauthorized video transmission.

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X. FUTURE SCOPE MOBILE PHONEDETECTOR

1) It is a low range detector, of the order of centimeters. Its range can be increased using antenna.
1) Use of antenna will enhance the project to a great extent as signals can be detected from a long range.
2) Buzzers or other output devices can be connected for better results.

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LINE WIRE DETECTOR

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Abstract - ***The carrying out of test for the presence of a live wire over decade has been the use of different tool that involves the direct contact between the live wire and the designed tools, and this is unlikely to change in the foreseeable future. One of the major tools in use over the years has been the light tester containing a neon bulb as indicator which is inefficient in this present era of conduit wiring system. In this paper, the tool capable of detecting the presence of live wire inside a conduit pipe is achieved by the use of discreet component and antenna that will sense an electromagnetic field from a current carrying conductor, amplify it andshow a light is as an indicator. Practical results obtained show an appreciable degree of accuracy and reliability of the system. More over it is user friendly since direct contact with live wire is avoided.***

I.. INTRODUCTION

The little limitation is that it can only test live wire when it make contact with it Donald Macadie, an engineer with the united post office (ups) in 1920s also embark on the project of multi-meter to solve the problem of most electrical measurement of which the test for voltage and electricity related test take the major part [5,6,7]. The multi-meter was designed to measure quantities such as alternating and direct current in ampere, alternating and direct voltage in volt, frequency in hertz, capacitance in farad, continuity test for open circuit and others. The multi meter has two probe usually the positive terminal as the red probe indicating live, also the negative terminal as the black probe indicating the ground or the neutral. In using the multi-meter either the analogue or the digital type to carry out any confirmatory test, the red probe is connected the live supply while the black probe is connected the ground. Corresponding deflection on the analogue multi- meter or an equivalent decimal digit displayed on the digital multi-meter indicates the presence of electricity in that wiring system. The limitation of multi-meter Journal of Engineering and Energy

Research Volume 2, Number 2, 2012 © 2012 Insider Academic Publishers 13 despite its numerous function test for open circuit will have to be carried out at various point of the conductor to check for open circuit whenever there is fault by making contact with the live wire, this makes it impossible for underground and conduit cable open circuit test.

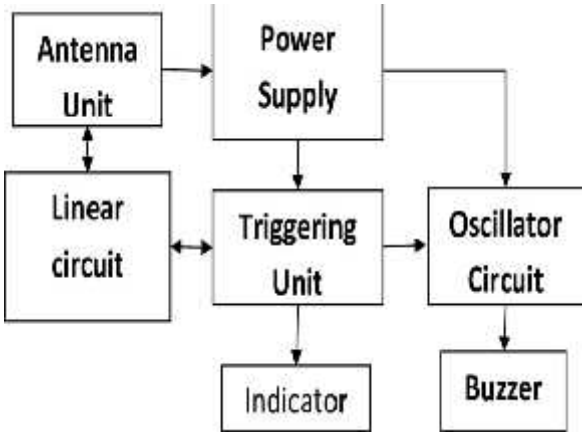

Fig 1: Block Diagram

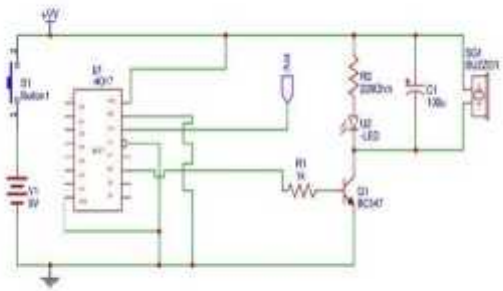

Fig 2 : Circuit Digram

II. FUNCTION OF COMPONENT

A. *IC 4017*

Most of us are more comfortable with 1, 2, 3, 4… rather than 001, 010, 011, 100. We mean to say that we will need a decimal coded output in many cases rather than a raw binary output. We have many counter ICs available but most of them produce binary data as an output. We will again need to process that output by using decoders or any other circuitry to make it usable for our application in most of the cases. Let us now introduce you a new IC named IC 4017. It is a CMOS decade counter cum decoder circuit which can work out of the box for most of our low range counting applications.

It can count from zero to ten and its outputs are decoded. This saves a lot of board space and time required to build our circuits when our application demands using a counter followed by a decoder IC. This IC also simplifies the design and makes debugging easy.

B. *Transistor*

. When it works as an amplifier, it takes in a tiny electric current at one end (an input current) and produces a much bigger electric current (an output current) at the other. In other words, it's a kind of current booster. That comes in really useful in things like hearing aids, one of the first things people used transistors for. A hearing aid has a tiny microphone in it that picks up sounds from the world around you and turns them into fluctuating electric currents. These are fed into a transistor that boosts them and powers a tiny loudspeaker, so you hear a much louder version of the sounds around you. William Shockley, one of the inventors of the transistor, once explained transistor- amplifiers to a student in a more humorous way: "If you take a bale of hay and tie it to the tail of a mule and then strike a match and set the bale of hay on fire, and if you then compare the energy expended shortly thereafter by the mule with the energy expended by yourself in the striking of the match, you will understand the concept of amplification." Transistors can also work as switches. A tiny electric current flowing through one part of a transistor can make a much bigger current flow through another part of it. In other words, the small current switches on the larger one. This is essentially how all computer chips work. For example, a memory chip contains hundreds of millions or even billions of transistors, each of which can be switched on or off individually. Since each transistor can be in two distinct states, it can store two different numbers, zero and one. With billions of transistors, a chip can store billions of zeros and ones, and almost as many ordinary numbers and letters (or characters, as we call them). More about this in a moment.

The great thing about old-style machines was that you could take them apart to figure out how they worked. It was never too hard, with a bit of pushing and poking, to discover which bit did what and how one thing led to another. But electronics is entirely different. It's all about using electrons to control electricity. An electron is a minute particle inside an atom. It's so small, it weighs just under 10^{-31}kg.The most advanced transistors work by controlling the movements of individual electrons, so you can imagine just how small they are. In a modern computer chip, the size of a fingernail, you'll probably find between 500 million and two billion separate transistors. There's no chance of taking a transistor apart to find out how it works, so we have to understand it with theory and imagination instead. First off, it helps if we know what a transistor is made from.

III. WORKING

Presented here is a 220V live wire scanner. The clock input of the IC is connected to a wire, which acts as the sensor. Here, we have used 10cm length of 22SWG wire as the sensor. When you hold the sensor (metallic conductor or copper wire) close to the live wire, electric field from mains activates the circuit. As the input impedance of the CMOS IC is high, the electric field induced in the sensor is sufficient to clock it. The output obtained at pin 11 of CD4017 drives the LED. Flashing of the LED (LED2) indicates the presence of mains, while LED1 indicates that the scanner is active.

The circuit can be used to find stray leakage from electrical appliances like fans, mixers, refrigerators, etc. It can be easily assembled on any general- purpose board or the discrete components can be directly soldered on the IC.

9V PP3 battery powers the circuit. If you use a mains adaptor, make sure that it is well regulated and isolated; otherwise, even the stray electric field from mains transformer will clock the circuit.

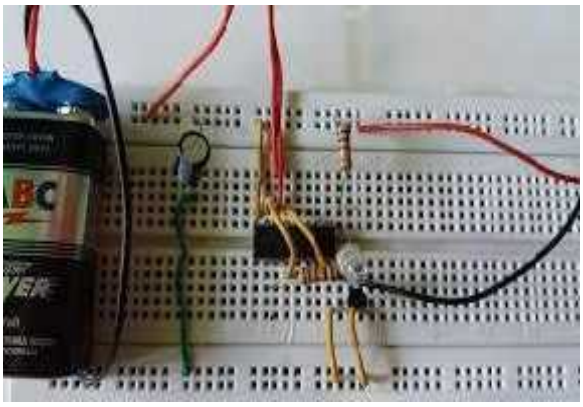

Fig 3: Circuit implementation



Fig 4: Crvuit Implementation

IV. RESULT

The resistors R4 (470k) and R5 (220k) and the capacitor C1 (100nF) in this circuit are the timing components which decide the frequency. The gates N1 and the N2 detect the presence of the AC voltage around the live wire and weak AC voltage picked from test probe. The oscillator circuit is enabled or disabled by the output pin of the gate N2 which is output pin 10.

When there will be no AC voltage present near the live wire then the output pin 10 will remain low and as a result, the diode D3 conducts in the forward biased mode and holds back the oscillator part from oscillating. Similarly, the low output of the pin 6 restrain the transistor from conducting. As a result the buzzer will not beep and the LED will remain low.When the circuit detects the presence of AC voltage near it, then the output pin 10 goes high. This will allow the oscillator to oscillate at around frequency of 1 KHz. When the oscillator will oscillate, then it will make the LED to blink at very high speed and the buzzer will start to beep. While LED and buzzer are actually oscillating but they appears to be continuously on as the speed of blinking is very high. AIM :line current detector using 4017 decode.

V. CONCLUSION

Line wire detector we can reduce the time to build underground fault. We can check the fault in wall so we can check wire is dead ,faulty or live wire .The antenna is connected linear by a feedback resistor placed at pin 1 and pin 2 of the 4017 inverter. The value of R1 is chosen to keep the characteristic high CMOS input impedance amplifier so that changes in the surrounding electromagnetic field produce a minute voltage change on the aerial track. The value of R1 is selected for 10MΩ

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[6] https://www.elprocus.com/

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Design and Implementation of Water Level Indicator

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Abstract— The water level alarm circuit is a simple mechanism to detect and indicate the level of water in the overhead tank and also in the other containers. Nowadays, all the householders/owners are storing the water in overhead tanks by using the pumps. When the water is stored in the tank, no one can identify the level of water and also, no one can know when the water tank will fill. Hence there is an overflow of water in the tank, thus there is a wastage of energy and water. The cost of the water level alarm circuit low and its use full for the overhead water tanks, swimming pool boilers, etc.. The water level alarm circuits are used in the factories, chemical plants, and electrical substations and also in other liquid storage systems.

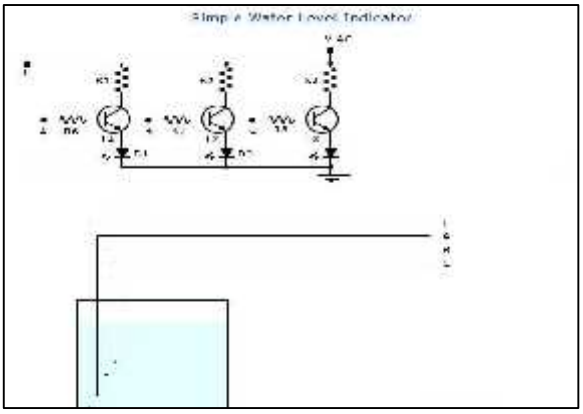
I. INTRODUCTION

Water tank overflow is a common problem which leads to the wastage of water. Though there are many solutions to it like ball valves which automatically stop the water flow once the tank gets full. This is a simple and handy DIY circuit that will detect the water level and will indicate via LED upon getting the water tank full or a pre-set level. This simple transistor- based water level indicator circuit is very useful to indicate the water levels in a tank. Whenever tank gets filled, we get alerts on particular levels. Here we have created 3 levels (low, medium and high), We have added 3 LEDs to indicate the three levels (A, B, C). The process requirement in many industries, farms, hostels, hotels etc. includes an overhead tank for water, which is usually fed through an electric pump that is switched off when the tank is filled up, and on when it becomes empty. As such, the most common way of knowing when the tank is filled is by observing when it overflows the brim. Depending on the type of liquid being handled, the overfilling of such a tank could lead to heavy material losses ranging in the order of thousands of Naira per week. These losses can be prevented if the tank is regulated automatically by incorporating a feed-back control mechanism, which would be capable of tripping the pump on or off as required. Although pumps equipped with variable speed motors could be more efficient than on/off mechanisms, the former are expensive to procure and maintain, especially for small and medium enterprises. Furthermore, commercially available water level sensors are expensive being imported into the country and as such cannot be deployed in every household. Control systems are classified as open loop or closed loop. In open loop systems a command is given to a system and it is assumed the system performs properly. A closed loop system,on the other hand, compares the result or output of the system to a desired output and takes appropriate corrective actions. Closed loop systems therefore, generally exhibit more accurate performance but cost more and tend to be more unstable.

II. CONSTRUCTION

We can consider this whole circuit as 3 small circuits, each one for indicating, when a particular level (A,B,C) of water have been reached. When water level reaches to point A, circuit with RED LED & transistor Q1 gets completed and RED LED glows. Similarly, when water level reaches to point B, circuit with YELLOW LED and transistor Q2 gets completed and Yellow LED glows, same goes with point C.

III. CIRCUIT EXPLANATION



The circuit can be easily assembled on a general-purpose PCB and enclosed in a wooden box. The three LEDs should be mounted on the front panel of the box with a spacing of about 4 cm between them. Short lengths of four 18 SWG copper wires may be used for sensor probes. For the common sensor A, a bare copper wire of 18 SWG should be used. For sensors B and C two single-core PVC wires should be used, with their insulation removed to a length of one centimetre towards the ends. All the four wires may be tied around

a 12.5mm dia. PVC tube with nylon thread at different heights, without touching each other.

The sensor probes should be kept in the tank vertically and connected to the main circuit using four flexible PVC wires of different colours. The circuit is powered by a battery eliminator or a 9V battery and kept near the motor switchboard. The current drawn by the circuit, when all the LEDs glow, is up to 50 mA, which is less than the current drawn by a 9V bed-lamp.

IV. COMPONENTS REQUIRED

SR NO.	COMPONENT	QUANTITY
1	BC547	3
2	10Ohm	3
3	COLOR LEDs	3
4	9vBattery + clip	1

V. WORKING

Our objective measure and display the level of water in a container and avoid overflow of water. Here we are using transistor (of NPN type) as a Switch. Initially there is no voltage applied to the base of the Transistor Q1 and the transistor is in OFF state and no current is flowing through collector and emitter and LED is OFF (See below diagram to understand Transistor Pin structure).

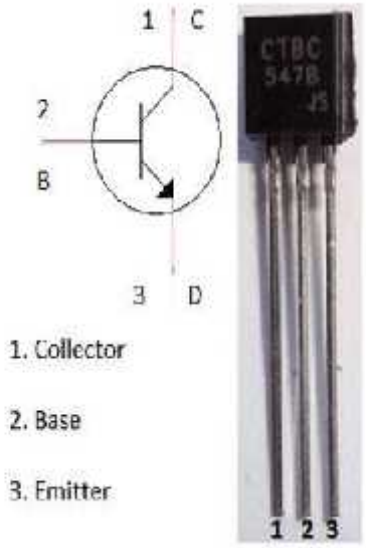
When the water level reaches to Point A in the tank, the positive side of the battery gets connected to the base of the Transistor Q1 through the water. So when a positive voltage has been applied to the base of the Transistor Q1, it gets into ON state and current starts flowing from collector to emitter. And RED LED glows.

You can see resistors (R1, R2, R3) at the base of each transistor, which is used to limit the maximum Base current. Generally a transistor gets its ON state fully when a voltage of 0.7 V is applied to the base. There are also resistors (R4, R5, R6) with each of the LEDs, to drop the voltage across LEDs, otherwise LED may blow up.

Same phenomenon happens when water level reaches to Point B. As soon as water level reaches to Point B, a positive voltage gets applied to the Transistor Q2, it gets ON and current started flowing through YELLOW LED, and LED glows. With same principle, GREEN LED glow when water level reaches to Point C.

VI. BC547 TRANSISTOR

It is basically an NPN bipolar junction transistor (BJT). The word transistor is a combination of two words, transfer and resistor. So, the basic purpose of transistor is transfer of resistance. A transistor is normally used for amplification of current.The larger current at the emitter and collector can be controlled by the small amount of current at the base. BC547 can be used commonly for amplifiers and switches. Similar to all the other transistors BC547 has also three terminals e.g. collector terminal, base terminal and emitter terminal respectively. The amount of current flowing from base to the emitter controls the amount of the current flowing through the collector. BC547 is usually used for amplification and switching purposes. Its maximum current gain is around 800. A fixed DC voltage is required for its proper operation in desired region. Proper voltage supply is known as biasing. BC547 is biased in a way that it is partially on for all the applied inputs, for the amplification purpose. The input signal is amplified at the base and then transferred to the emitter. BC547 is an NPN Bipolar Junction Transistor. Mostly it is used for the switching purpose as well as for amplification purposes. Similar to the other transistors BC547 is also used for the amplification of current. The smaller amount of current at the base is used to control the larger amount of currents at collector and emitter as well. Its basic applications are switching and amplification. The transistor, BC 547 is shown in the figure below. When the input voltage is applied at its terminal, some amount of current starts to flow from base to the emitter and controls the current at collector. The voltage between the base and the emitter (VBE), is negative at the emitter and positive at the base terminal for its NPN construction.



VII. ADVANTAGES

- Power Saver
- Easy to Operate
- Fast Response
- Money Saver (limiting wastage of water and electricity)
- Automatic (these devices work on their own)
- Water Maximization

- Reliable Electronic Design
- New Control Minimize Fouling & Deterioration
- Easy Installation with LED Monitoring

VIII. DISADVANTAGES

• Water level controls need to be replaced time after time.
- The rust, foul and deteriorate
- Electronics are usually built separately.
- More difficult installation
- Most float switches are outdated.
- No Warranty or Guarantee.

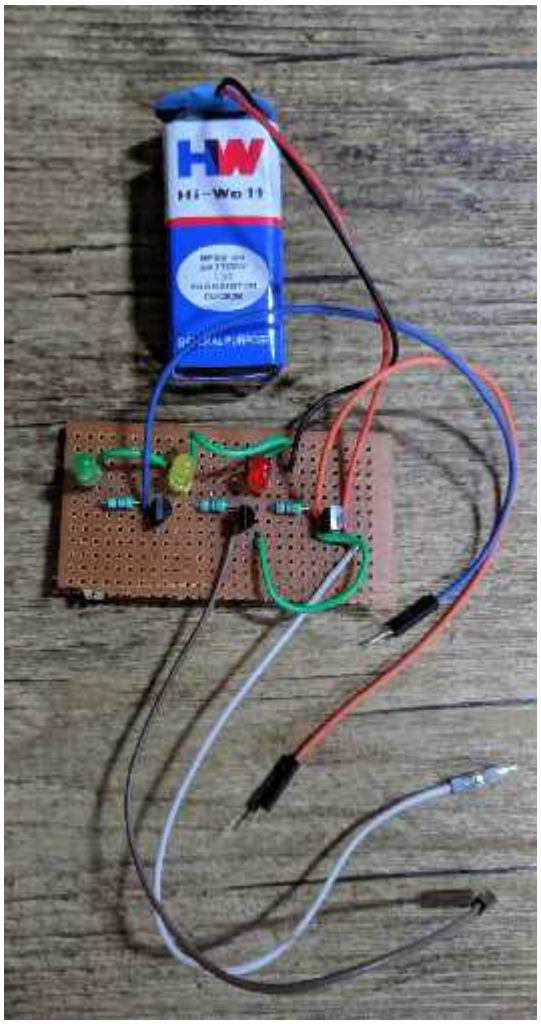
IX. APPLICATIONS

- Automatically turn ON/OFF pumps
- Can be used in factories, commercial complexes, apartments, home,
- Fuel tank level gauging
- Oil tank level control
- High & low-level alarms
- Pool water level control
- Life station switches
- Leachate level control
- Storage tanks
- Boilers
- Chemical equipments
- Cooling tower water level control

X. CONCLUSION

An automatic water level indicator was designed and constructed using available materials and successfully tested at Thakur College of Engineering and Technology, TCET. The electronic circuitry was realized using available simple components such BC547 transistors on a general PCB. Performance evaluation of the system says that it can indicate water level within a specified range, an indication that it can be applied for reducing energy and material losses in the process industry, small and medium scale enterprises as well as in farms, homes etc., where water and other ionic chemicals are usually stored in overhead tanks. We are proud to express our delight as the project we embarked upon is successfully finished in such a short span. The project gave us more confidence that we will be able to put in practice, whatever the theoretical and practical knowledge we gained during the study till now. It really motivates and persuades us to do more and more perhaps better way in the future with motivation and dedication towards improving and contributing to the society.

XI. PRACTICAL IMPLEMENTATION



ACKNOWLEDGMENT

The satisfaction that accompanies the successful completion of the task given to us would be incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crown all the efforts with success. It's our pleasure to thank Dr. Vinitkumar Dongre, the head of department of electronics and telecommunication engineering, TCET for proving support and encouragement to all the second-year students working on their respective projects and allowing us to work in such a resourceful lab of this esteemed institute. We would also like to thank our Project Based Learning (PBL) Lecture head Mrs. Amruta Naik for helping us for the selection and implementation of the project.

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Design and Implementation of Automated Solar System

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Abstract*— In Solar Automation we are making a circuit that can work using solar energy other than any other conventional sources of energy. We are using LDR this circuit so that it can detects light and the circuit works accordingly.

I. INTRODUCTION

The main objective behind this project is to use clean and renewable source of energy to save our environment. Needless to say that the Sun is the biggest source of renewable energy for the Earth. The fact is that even though the earth receives only a part of the energy generated by the Sun (i.e. Solar energy), that part of solar energy is also tremendously huge. The Earth receives solar energy in the form of light and heat. But in today's world, the words 'power' and 'energy' are leaned more toward conventional source of energy

The circuit can be easily assembled on a general-purpose PCB and enclosed in a wooden box. The three LEDs should be mounted on the front panel of the box with a spacing of about 4 cm between them. Short lengths of four 18 SWG copper wires may be used for sensor probes. For the common sensor A, a bare copper wire of 18 SWG should be used. For sensors B and C two single-core PVC wires should be used, with their insulation removed to a length of one centimetre towards the ends. All the four wires may be tied around a 12.5mm dia. PVC tube with nylon thread at different heights, without touching each other.

The sensor probes should be kept in the tank vertically and connected to the main circuit using four flexible PVC wires of different colours. The circuit is powered by a battery eliminator or a 9V battery and kept near the motor switchboard. The current drawn by the circuit, when all the LEDs glow, is up to 50 mA, which is less than the current drawn by a 9V bed-lamp.

II. COMPONENTS REQUIRED

SR NO.	COMPONENTS	QUANTITY
1.	BC 547 Transistor	3
2.	10 Ohm resistors	3
3.	COLOR LEDs	12
4.	9v Battery + clip	1
5.	Solar panel 12 waD	1
6.	Rechargeable baDery	1
7.	Capacitors 1uF	2
8.	Capacitors 10 uF	1
9.	Regulator	1

III. WORKING

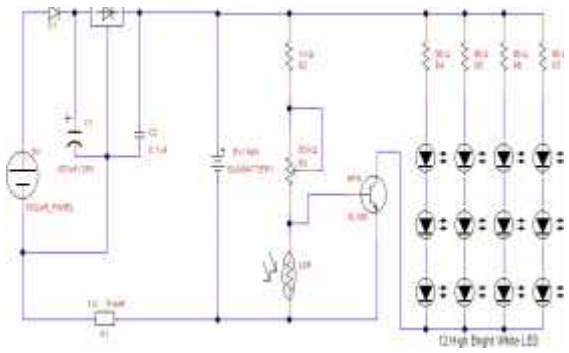
It converts the sunlight into direct current(DC). Then energy is then Stored in Rechargeable battery. Also an LDR is connected in the circuit which detects then presence of the light around the circuits hence the circuit gets on when there is dark around the circuit. Based on the principle of photovoltaic e ect, solar cells or photovoltaic cells are made. They convert sunlight into direct current (DC) electricity. But, a single photovoltaic cell does not produce enough amount of electricity. Therefore, a number of photovoltaic cells are mounted on a suppor?ng frame and are electrically connected to each other to form a photovoltaic module or solar panel. Commonly available solar panels range from several hundred waAs (say 100 waDs) up to few kilowaDs (ever heard of a 5kW solar panel?). They are available in di erent sizes and di erent price ranges. Solar panels or modules are designed to supply electric power at a certain voltage (say 12v), but the current they produce is directly dependent on the incident light. As of now it is clear that photovoltaic modules produce DC electricity.

IV. BC547 TRANSISTOR

It is basically an NPN bipolar junction transistor (BJT). The w o r d transistor is a combination of two words, transfer and resistor. So, the basic purpose of transistor is transfer of resistance. A transistor is normally used for amplification of current.

The larger current at the emitter and collector can be controlled by the small amount of current at the base. BC547 can be used commonly for amplifiers and switches. Similar to all the other transistors BC547 has also three terminals e.g. collector terminal, base terminal and emitter terminal respectively. The amount of current flowing from base to the emitter controls the amount of the current flowing through the collector. BC547 is usually used for amplification and switching purposes. Its maximum current gain is around 800. A fixed DC voltage is required for its proper operation in desired region. Proper voltage supply is known as biasing. BC547 is biased in a way that it is partially on for all the applied inputs, for the amplification purpose. The input signal is amplified at the base and then transferred to the emitter.

BC547 is an NPN Bipolar Junction Transistor. Mostly it is used for the switching purpose as well as for amplification purposes. Similar to the other transistors BC547 is also used for the amplification of current. The smaller amount of current at the base is used to control the larger amount of currents at collector and emitter as well. Its basic applications are switching and amplification. The transistor, BC 547 is shown in the figure below. When the input voltage is applied at its terminal, some amount of current starts to flow from base to the emitter and controls the current at collector. The voltage between the base and the emitter (VBE), is negative at the emitter and positive at the base terminal for its NPN construction.



V. ADVANTAGES

- It is easy to use. Energy is freely available. Does not causes any type of pollution.
- Circuit gets switched off when there is no need of light

VI. DISADVANTAGES

- Initial investment is High
- In some places it is not a dependent source

VII. APPLICATIONS

It has applications in hospitals,Schools,Modern Houses etc. As day by day conventional fuel reserve is decreasing Solar energy is future in Energy Sector

VIII. CONCLUSION

An automated solar system was designed and constructed using available materials and successfully tested at Thakur College of Engineering and Technology, TCET. The electronic circuitry was realized using available simple components such BC547 transistors on a general PCB.

ACKNOWLEDGMENT

The satisfaction that accompanies the successful completion of the task given to us would be incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crown all the efforts with success. It's our pleasure to thank Dr. Vinitkumar Dongre, the head of department of electronics and telecommunication engineering, TCET for proving support and encouragement to all the second-year students working on their respective projects and allowing us to work in such a resourceful lab of this esteemed institute. We would also like to thank our Project Based Learning (PBL) Lecture head Mrs. Amruta Naik for helping us for the selection and implementation of the project.

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Laser Security System

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***Abstract*— nowadays, security is the most important aspect of everybody's life. We require security everywhere at homes, airports, malls, banks, jewelry shops, etc. We are aware about many of the different security systems around us like fire alarms, CCTV, biometrics one of such security systems is the Laser Security System. It keeps you and your valuables secure even before they are touched. It can also keep your pets and babies safe by notifying you about them crossing a certain boundary. There's a lot to it which we are about to discuss in the following pages.**

Keywords—LDR, infrared, fluorescent, sensor, Integrated Circuits

I.INTRODUCTION

Laser based Security System is a type of security and alarm that uses laser light and a light weight sensor. A security system protects our homes, offices, banks, lockers etc. from intrusion and unauthorised access. There are differing types of security systems available and laser-based security system is a crucial and efficient type. A Laser security system can act as a standalone system, which makes some sound or noise when it detects any irregular activity, or are often a part of a much bigger security and home automation system, which can send messages, call the owner etc. This system for security uses the combination of LASER light and LDR. The LDR module has an on-board potentiometer to adjust the sensitivity of LDR, so that it only senses laser light falling onto it. The concept is sort of simple and similar to what we see in movies where antique, priceless ornaments are protected under laser lights. As someone crosses these lights, an alarm runs on to indicate unauthorised presence. This project works similarly. In normal conditions, where there is always laser light falling on the LDR, the LDR module always gives a high signal to microcontroller. When someone crosses this laser light, it will behave as an obstruction between the LDR module and laser light, resulting in no light falling on LDR. In such cases LDR module gives a low signal to the microcontroller, which indicates it to switch on an alarm. This design provides inexpensive yet effective form of protection against intruders as well as it can be easily used to secure the building e.g. Banks because it is highly sensitive due to the light activated alarm circuit. LASER-Ray goes through long distance without scattering effect and thus the Ray is almost invisible. Only the radiation point and incident point are visible. So, by this security project we will make an invisible boundary of a sensitive area.

In Section II, Literature survey has been discussed. In Section III Methodology has been discussed, the working and circuit diagram has been shown. In Section IV Advantage, Disadvantage and application has been discussed.

II. LITERATURE SURVEY

In [1], The major component used is LDR. The Cadmium Sulphide cells are also capable of reacting to a broad range of frequencies, including infrared (IR), visible light, and ultraviolet (UV). The variation of the resistance value has some delay, different if you go from dark to bright to dark or lit. The quality response time of a LDR is on the order of a tenth of a second. This slowness gives advantage in some applications because rapid changes in lighting that might cause an unstable sensor (e.g. fluorescent tube powered by AC) are filtered. When light drop on it its resistance stay less which does not give input signal to the 555 timer to urge continuous output. When light is off that lead LDR to generate output signal to activate the 555 timer and which then generate a continuous signal to blow horn

In [2], The circuit was analysed on the basis of alarm time and delay time. Based on the conduction of the T1, the non - inverting voltage receives a variable voltage. When a person cross the beam is obstructed and T1 cease to conduct. The LED & buzzer is activated. In the situation the base of the T2 is kept high by the capacitor c1 for few second till the IC1 becomes low. After T2 is turned off the C2 gives current to the buzzer for few second.

In [3], the researchers have made available compilations of information on laser and its significance to the innovations of security. The three main components of the circuit were laser, a detector and sensing circuit. When the laser beam is interrupted and can't reach the detector, its voltage output changes, and the circuit sense the change and put out a warning signal. LDR has to be placed in dark region so as to be activated and the circuit to work faster. The circuit consist of mirrors which allows the laser beam to reflect through mirror. This is often beneficial for advanced protection over a small object.

The circuit consumes lots of energy to work and thus implanting this system with AC connection using transformer and rectifier circuit would give better performance. Also using of infrared laser could make the laser net invisible to human eye. Use of microcontroller could give better result for the laser security system.

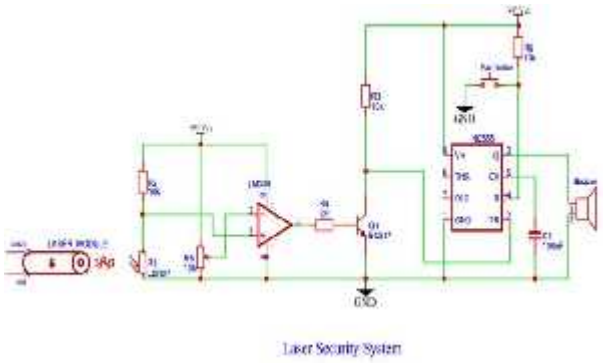

Fig1.1: Circuit Diagram

III. METHODOLOGY

A. Working

Until the reset push button is pushed, the alarm will stay on hence, we can place the reset button at a secret location so that only the owner can disable the alarm.

Components Required

1.LM358 (Op – Amp IC), 2.NE555 (Timer IC), 3.LDR, 4.3x10 KΩ Resistors, 5.220Ω Resistors, 6.10 KΩ Potentiometer, 7. BC547 (NPN Transistor), 8.Small Buzzer, 9.Push Button, 10.Push Button, 11.Laser Pointer, 12.9V Battery, 13.Connecting Wires, 14.Breadboard.

A simple, cheap and effective laser-based security system is developed in this project. First, the Op – Amp circuit acts as a comparator i.e. it compares the voltages at the inverting and non – inverting terminals and produces an output accordingly. The LDR – 10 KΩ resistor Voltage divider is connected to the non – inverting terminal of Op –Amp and a POT is connected to the inverting terminal. Assume, the laser pointer is placed directly in line of sight to the LDR and thus the light from the laser is continuously being incident on LDR. In this situation, the resistance of LDR falls down to few Ohms (or tens of Ohms) and as a result, the voltage at the non – inverting terminal will be less than that at the inverting voltage. The output of the Op –Amp is low and the transistor is OFF. If the laser light is blocked by an intruder from falling on the LDR (even for a small duration), the resistance of the LDR goes to few hundreds of Ohms and as a result, the output of the Op – Amp will be HIGH. This will turn on the Transistor.

As the output of the transistor is connected to the Trigger Pin (Pin 2) of the 555 Timer IC, if the transistor is ON, the trigger pin gets a short low pulse and as a result, the output of the 555 becomes HIGH. This will activate the alarm by turning ON the buzzer.

Since, the 555 Timer IC is configured as a Bi – Stable Multi-vibrator, a small active low trigger pulse at the trigger pin will set its output to HIGH and in order to reset it we need to push the reset button.

B. Advantage

- The circuit, construction and setup for the Laser Security.
- System is very simple.
- If used with a battery, the laser security system can work even when there is a power outage.
- It is used for restricting area of kids and pet animals so that they won't cross a particular boundary.
- Laser security systems are easy to install. It requires very few systems and easy installation method.
- Tampering cannot take place since advanced technology is used.
- As CCTV cameras are visible, whereas lasers aren't visible with naked eyes.

C. Disadvantage

- The laser security system works only if the laser is obstructed. If the intruder passes without obstructing the laser, it is considered as a failure.
- In order to secure a larger area, we need more lasers and corresponding sensors.
- These are expensive than the other security systems.
- Cut Phone Line- If your alarm system is connected to your security company by phone line only, you can run into problems. A burglar may cut your phone line before entering your home and all monitoring and communication with your alarm company is terminated.
- False Alarms- While a home alarm system can provide security and peace of mind, it has the potential to become fairly annoying as well. It is not uncommon for false alarms to occur with your system.

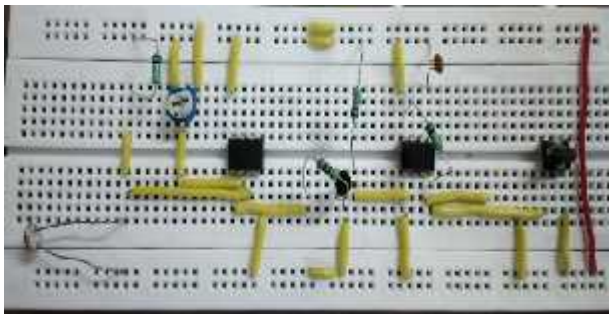

Fig 1.2: Breadboard Implementation

Deterrent to Criminals-Most home alarm systems provide small lawn signs or placards for your window that indicate that your home is protected by a security company. In many cases, the presence of this type of sign alone may persuade burglars and other criminals to pass over your home and move on to a dwelling that is not protected by a security system.

D. Application

- Laser Security System can be used in safety lockers in our homes, where even if the locker's code is hacked, it acts as an additional layer of security.
- Apart from security systems, this laser based setup can also be used to check if pets or babies crossed a certain boundary.
- Used for home security.
- Used in banks for burglar alarm.
- It can be used in jail to prevent prison break. Used as automatic indicator.
- It can be used in mine areas to indicate restricted places.
- Helps to keep eyes on kids and pet animals.

IV. CONCLUSION

Home security systems are rapidly growing fields with growing technologies. Changes made during advancement are much more efficient. Laser security system has many advantages in order to have high level of security for important things. Today highly secure surroundings are needed to maintain important documents, files to prevent them from getting robbed. Laser security system provides security with alarming systems at the same time the laser flows are being interrupted. Some alarm systems serve a single purpose of burglary protection; combination systems provide both fire and intrusion protection. Intrusion alarm systems may also be combined with CCTV systems to automatically record the activities of intruders, and may interface to access control systems for electrically locked doors. Overall, laser security system prevents our valuables from getting robbed along with its various uses. It is highly recommended security system these days which has many advancements along with the growing technology

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SOUND ACTIVATED SYSTEM

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***Abstract*- Sound operated switch is one among the interesting applicationsof IC 555 timer. Thecircuit usesa IC 555 timer and BC547 for its operation. The electrets microphone is employed to supply the heart beat to the timer 555.it produces alittle electrical signal which is amplified by succeeding transistor range.**

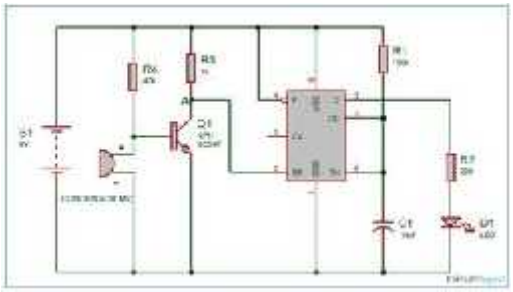
INTRODUCTION

sound activated switch is essentially sense the noise at high frequency .it are often turned ON by any sound of roughly same pitch of sound.There main component of this clap switch circuit is that the Electric Condenser Mic, which has been used as a sound sensor.Condenser Mic basically converts sound energy into electricity , that in turns wont to trigger 555 timer IC, through a Transistor. And triggering of 555 IC would activate the LED, which can be automatically turned OFF.

I.METHODOLOGY

The concept of sound activated system is IC 555's 8th pin is connected to resistor 100kohms and 7th and 6th pin is connected to capacitor 10microfarad.7th pin connected to resistor 220ohms and led.2nd pin is connected to transistor BC547.and transistor's base is parallel connected resistor 1kohms.Transistors collector is connected to resistor 47kohms and condenser mic.Resistor 47k is connected to positive side and mic is connected to negative side.

II.WORKING



Fig(1): circuit diagram

We are using Electric Condenser Mic for sensing the sound, transistor to trigger the 555 timer IC and 555 IC to show ON the LED through a coffee voltage trigger.You can see the circuits and connections within the above schematic diagram of clap switch. Initially the transistor is in OFF state because there's not enough (0.7v) base-emitter voltage to show it ON. and therefore the point A is at high potential, and point A is connected to trigger pin 2 of 555 IC, as a result Trigger pin 2 is additionally at high potential.As we all know that, to trigger the555IC throughTrigger PIN 2, the voltage of the PIN 2 must be below Vcc/3. So at this stage LED is OFF. Now once we produce some sound near condenser mic, this sound are going to be converted into electricity and it' ll raise the potential at the bottom , which can turn the Transistor ON.As soon because the transistor becomes ON, the potential at Point A would become low and it'll trigger the 555 IC due to the low voltage (below Vcc/3) at Trigger Pin 2 and LED will activate . we've connected the LED to Output PIN 3 of 555 IC through a 220ohm resistor. After a while LED are going to be turned OFF automatically because we are using 555 timers IC in monostable. LED will remain turned ON for 1.1*R1*C1 seconds.So we will see, with this formulae, that we will change this duration, by changing the worth of Resistor R1 or/and Capacitor C1.We can modify this circuit using Relay to control the Electronic devices (120/220V AC). Control PIN 5 of 555 Timer IC should be connected to Ground through a 0.01uF capacitor.To test this circuit you need to make any kind of sond loudly as this small condenser mic don't have long range. Or you can directly hit at the mic lightly .

III. APPLICATION

Sound detector isn't restricted to show the LEDs ON and OFF, but it are often utilized in any electric appliances like Tube Light, Fan, Radio or the other basic circuit which you would like to show ON by a Sound. the first application involves anelderlyor mobility- impaired person .a sound activated switch is usually used for a light-weight , television, radio or similar device that the person will want to show on/off from bed.

IV.RESULT

When the circuit is given in put the LED glows which means the circuit is activated. When led glow meaning there sound has make at high frequency.

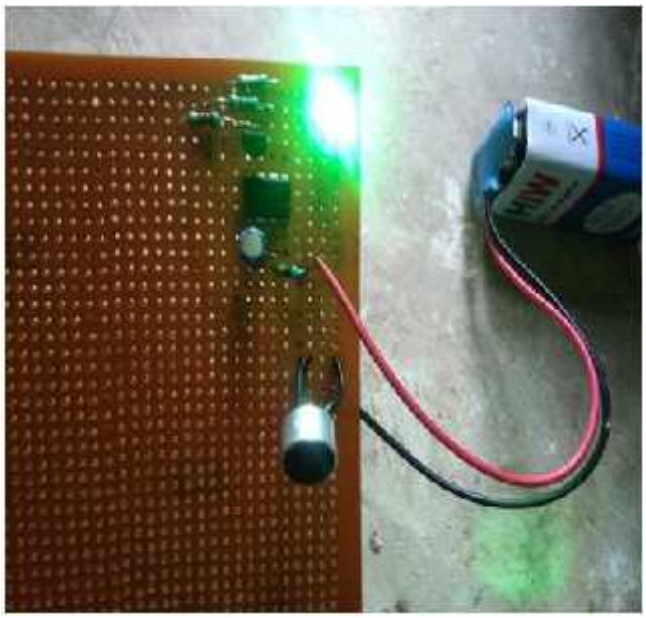


Fig.(2): Circuits diagram

V.CONCLUSION

we learned about the way to implement theoretical knowledge to practical work and also that the way to approach towards any project. We tried to beat the difficulties by knowing the difference between theoretical and practical background. Practical errors can't be shown on paper.

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Magnetic Walking Stick for the Visually-Impaired

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***Abstract:*-In order to help the visually challenged those people to walk more confidently is proposed. The study hypothesizes a smart walking stick that alerts visually-impaired people over obstacles, and fire, water in front could help them in walking with less accident. It outlines a better navigational tool for the visually impaired. It consists of a simple walking stick equipped with sensors to give information about the environment. A white cane is used by the blind or the visually-impaired to scan the surroundings for obstacles and orientation marks, and find the correct path. The visually-impaired using a white cane still need a sighted guide when they need to walk down the street or use the stairs. This proposed project will help them reach their destination without much dependency on a sighted guide. It uses magnetic reed switches mounted on a specially-designed walking stick. The complete system requires magnetic tracks designed for the visually-impaired.It is built around two magnetic reed switches, 1.5V AA pencil cell, piezo buzzer, connecting wires and 1.27cm (1/2-inch) PVC pipe for construction. Two normally-open (NO)-type reed switches are placed at the bottom of the walking stick, which is connected to a buzzer. The proposed construction detail of the magnetic walking stick.**

I. INTRODUCTION

This system presents a concept to provide a smart electronic aid for blind people. The system is intended to provide overall measures artificial vision and object detection. . The aim of the overall system is to piezoelectric material, a pressure variation is generated. A piezo buzzerconsists of piezo crystals in between two conductors.When a potential difference is applied across these crystals, they push one conductor and pull the other conductor by their internal property. The continuous pull and push action generates a sharp sound wave.Piezo buzzers generates a loud & sharp sound. So,they are typically used as a alarm circuits. Also they are used to make an alert of an event, signal or sensor input. A special characteristics of piezo buzzer is,the sound pitch or level is not depended on the voltage level that is, it works only in a specific voltage range.





The reed switch is an electrical switch operated by an applied magnetic field. It was invented at Bell Telephone Laboratories in 1936 by W. B. Ellwood. The simplest magnetic-field sensor is a reed switch. It contains two ferromagnetic nickel and iron reed elements in an evacuated, hermetically sealed glass tube to minimize contact arcing.

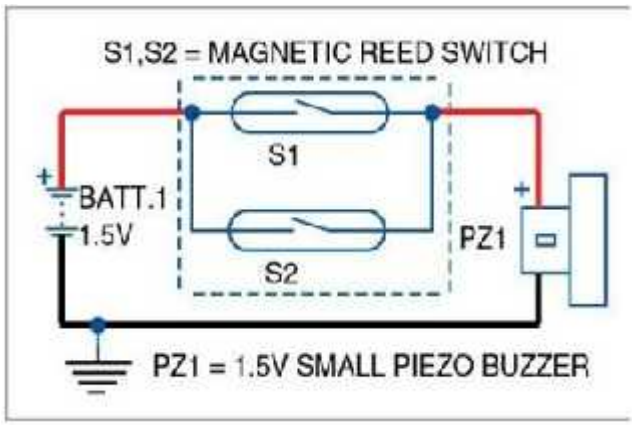
When an axially aligned magnet approaches the switch, its magnetic force closes the reeds. The magnet typically generates at least a 50 Gauss force to overcome the return

force or spring of the reed elements. Reed switches are inexpensive, require no standby power, and can function with both ac and dc electrical loads.

However, they are relatively slow, so they may not respond fast enough for some high-speed applications Since the switches are mechanical devices with moving parts, they have a finite number of operating cycles before they eventually fail. Switching high- current loads can further reduce life expectancy.

The power supply to the pcb is given by using an 9v battery.

CIRCUIT DIAGRAM

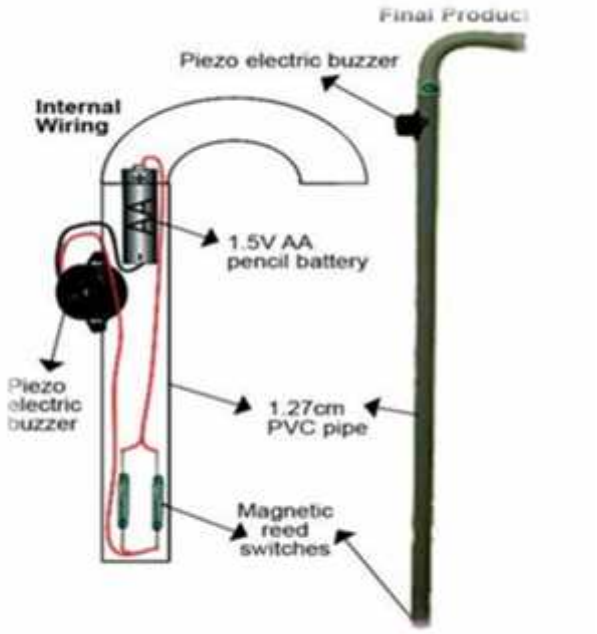


The circuit diagram of the walking stick for the visually-impaired is shown above.

It is built around two magnetic reed switches, 1.5V AA pencil cell, piezo buzzer, connecting wires and 1.27cm (1/2-inch) PVC pipe for construction.

Two normally-open (NO)-type reed switches are placed at the bottom of the walking stick, which is connected to a buzzer.

II. THE PROPOSED DETAIL CONSTRUCTION OF THE STICK



This was the proposed construction of the walking stick which was initially accepted but had many issues as the battery(power supply) was not been able to keep inside the stick as shown in the fig.and the internal wiring of the circut was also as the radius of the pipe was small and we were not able to accomplish it and there were many challenges to complete it but we tried to put all the wires the supply wires outside the stick, and also the reed switch while placing inside the stick had issues and 2-3 switch got damaged too.

Table: 1. LIST OF COMPONENTS AND COST

Components	Cost
Zero PCB	10
Wires	50
Reed Switch	30
Piezo Electric Buzzer	35
Pvc pipe	65
Stationery	22

CIRCUT DESCRIPTION & WORKING

Take a 1.27cm PVC pipe and insert two reed switches and a 1.5V cell inside the pipe, as shown in Fig

Mount the buzzer at a suitable location outside the pipe. The whole system can be enclosed inside the PVC pipe and used as a white cane. The user does not need to carry any other device. He or she should always keep the tip of the walking stick near the magnetic track while walking. It shows the application of the project along the magnetic track .The magnetic track is one of the must in the application of this project in daily life.

I. APPLICATIONS



The Magnetic walking stick can be used in many places for the blind to be independent and walk free without any fear of falling or entering to danger zones or prohibited areas as this stick requires an magnetic path throughout the pathway for its application when an pathway is designed they can easily follow the same pathway and if they are distracted or enter into an wrong area the buzzer will alarm them and guide them to follow the perfect pathway, also the crowded places like railway station or bus depot they can easily travel without any hesitation as they may have thier own pathway.

II. DRAWBACKS

The main drawback of the magnetic Walking stick is that it requires an special magnetic pathway through which if the stick goes by and enters into non magnetic path the buzzer will alarm the blind person to follow the right path. For this a magnetic path has to be designed without which this cannot be used in action, also in public bridges streets easily magnets can be palced as there are metals which may attract magnet and help the blind to be on the right path too.

Government has to think and make many plans which can be easliy implemented in cities as many smart cities are being built. Also this is an low cost long lasting project which may help the blind people in a long run as specially in railway stations bus depots which has the fixed pathway towards the bus or trains.

This project will indeed be successful and fruitful for the people and will be a good initiative for handicapped people at low cost.

III. CONCLUSION & RESULT

The project the design and the architecture of new concept of smart electronics guiding stick for blind people using magnet. The advantage of system lies in the fact that it can prove to to be very low cost solutions to millions of blind persons working and hustling daily worldwide. The proposed system of various working units make a real-time system that helps travelling and navigating pathways more secure and safe.

It can be further improved to have more DECISION taking capabilities by employing various types of sensors and thus could be used for different applications.The system aims to solve the problems faced by the blind people in daily life and also ensures safety upto some extents

IV. FUTURESCOPE

It can be further enhanced by using VLSI(very large scale integration)technology to design the PCB unit. This makes the system further more compact. Also use of RFID(Radio Frequency Identification) tags will transmit location information automatically to PCB unit when the intelligent stick is in its range.

Also the GPS(global positioning system) can be integrated to the the stick for more security and more accurate location tracking of the person if he/she goes out alone for work can be tracked by the caretaker.

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Role of Institutes in preparing Intellectual Property Rights (IPR) Awareness

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***Abstract*— Faculty members of Thakur College of engineering and Technology (TCET) designed an awareness program on Intellectual Property Rights (IPR) for school students to convey its importance.**
Workshop is conducted for students of grade 8th to 12th. Objective of this workshop is to help and motivate students in future to register their patents and copyrights. It will instill the concept of IPR in the young minds of the students.
This workshop is a step towards providing platform for school children to aware of the practical aspect of the Intellectual Property Rights.

Keywords- IPR , Patents, Copyrights, Trademarks

I. INTRODUCTION

Intellectual property (IP) refers to creations of the mind, such as inventions, literary and artistic works, designs, and symbols, names and images used in commerce.
The purpose of intellectual property laws are to encourage new technologies, artistic expressions and inventions while promoting economic growth. IP rights are important because it can protect business from competitors and providing an important revenue stream. Also offer customers something new and different. United Nations created a specialized agency, the World Intellectual Property Organization (WIPO) for IP protection by law, for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit of invention or creation. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and innovation can flourish.
In most countries, there are four primary types of intellectual property (IP) that can be legally protected: patents, trademarks, copyrights, and trade secrets
Copyright is a legal term used to describe the rights that creators have over their literary and artistic works. Works covered by copyright range from books, music, paintings, sculpture and films, to computer programs, databases, advertisements, maps and technical drawings.
A patent is an exclusive right granted for an invention. Generally speaking, a patent provides the patent owner with the right to decide how - or whether - the invention can be used by others. In exchange for this right, the patent owner makes technical information about the invention publicly available in the published patent document.
A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. Trademarks date back to ancient times when artisans used to put their signature or "mark" on their products.[2]

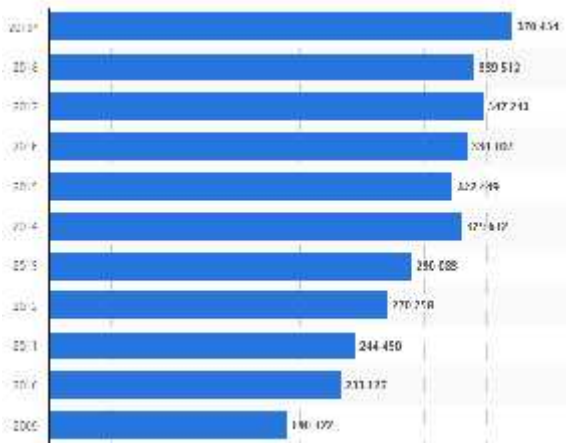

Figure 1 Number of patents issued in the United States from FY 2009 to FY 2019[6]

In FY 2019, a total number of 370,434 patents were granted at the U.S. Patent and Trademark Office
China and United States are most innovative countries, based on the number of patents issued per capita.
According to a report by the World Intellectual Property Organization of the United Nations. In 2017, India's patent office granted 12,387 patents.

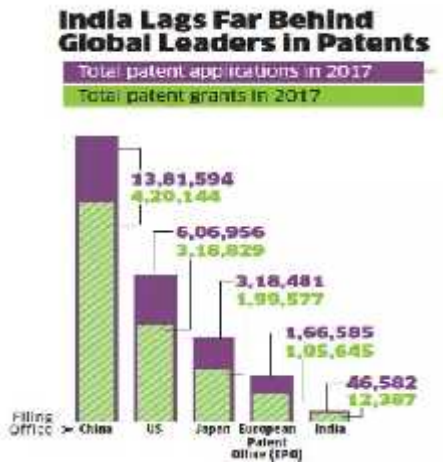

Figure 2 Comparision of patent filed by various county [4]

India is conducting quality research in many fields, but the country is lagging behind in patenting, according to National Research Development Corporation (NRDC). India has still not woken up fully to the significance of intellectual property rights (IPR), particularly patents, and their commercial implications.

Patent filings and grants in India are dominated by foreign applicants: they filed two-thirds of patent applications in 2018-19, and got four-fifths of grants, according to the Office of Controller General of Patents, Designs and Trade Marks. In India, Qualcomm, the US chipmaker, topped both patent filings and grants in 2018-19. It made 1,559 applications, more than six times the filings of Tata Consultancy Services (TCS), the top Indian company on the list. Qualcomm was granted 405 Indian patents in 2018-19, four times the patents assigned to state-owned Bharat Heavy Electricals Ltd (BHEL), the Indian company with the most patent grants last fiscal.

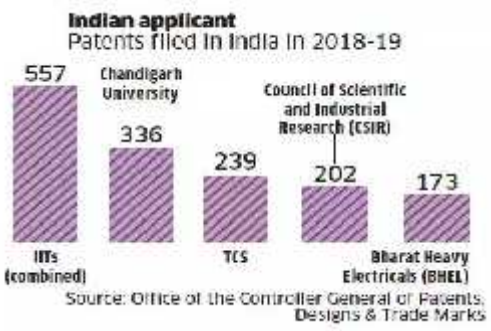

Figure 3 Number of patent filed in India in 2018-19[4]

The regulatory authority for patents is the Patent Registrar under the office of the Controller General of Patents, Designs and Trade Marks, which is part of India's Ministry of Commerce and Industry. Patents are valid for 20 years from the date of filing an application, subject to an annual renewal fee.

India is lagging on the world innovation Map. In 2018 International Intellectual Property Index, India was ranked 44th out of 50 countries. [3]

This implicitly means India is losing on new business opportunities. Setting up an innovation culture right from high school is the only way to build up this new growth engine for India.

Raising awareness about Intellectual Property Rights is the need of the hour. It's important to inculcate a culture of innovation among the young Indians for which learning the role that IPR (in the form of patents, copyrights, trademarks etc.) can play is the very first step. Thus, the purpose of this study is to examine the awareness of intellectual property rights (IPR) among the students. The target audience is High school students for this study.

II. DESIGN AND DEVELOPMENT

The objective of the project is to raising awareness for school students which will make learning with fun.

It will make teaching and learning entertaining and attractive with quality enhancement in learning attainments of students.

Basic problem identified is most of the people are not aware about IPR and its necessity. Even awareness about filing patents is low in India. Therefore started this workshop considering target audience as High school students to aware them early. Workshop is conducted for students of grade 8th to 12th.

As intellectual property rights play a significant role in the field of academia. There is a need to emphasize on the awareness and importance of protecting IPR. [1]

An earlier study conducted by McCabe (1993) found out that 55% of academicians are not willing to devote any real effort to documenting suspected incidents of students plagiarising other peoples' work. Plagiarism is using other author's work as your own without proper acknowledgement. As a result of ignorance of the importance of IPR, the issue of plagiarism has become a major concern to many institutions of higher education.[7]

Deployment steps:

TCET faculty members developed self-sustainable model and provide the workshops and laboratory free of cost to all the schools.

Step 1: Development of content.
Step 2: Conduct workshop for school students.
Step 3: Give introduction of IPR
Step 4: Make students aware about importance of IPR with giving different examples and stories.
Step 5: To identify the things come under IPR.
Step 6: Explain some ways to protect IP
Step 7: Feedback about student to know their understanding and to check requirement in change in design to identify areas of improvement.
Step 8: Make it a self-sustainable model with respect to expenses and amount of man hours required.

There are some ways to protect IP

- Register copyrights, trademarks, and patents.
- Register business, product or domain names.
- Create confidentiality, non-disclosure or licensing contracts for employees and partners.
- Implement security measures.
- Avoid joint ownership.[5]

III. LIST OF SCHOOL

Sr. No.	Academic Year	Date	School Name	No. of students
1	2018-19 (odd)	4th July 18	Oxford Public School, Charkop,	90
2		5th July 18	Sheth Vidhya Mandir English High	88
3		6th July 18	Samata Vidhya Mandir, Kandivali	78
4		11th July 18	Oxford International School, ICSE	65
5		27th Sep 18	Thakur college of Science &	84
6		28th Sep 18	Bosco Boys, Borivli (W)	25
7	2018-19 (Even)	06-12-2018	Purshottam High School, Kandra	41
8		12-12-2018	Vidya Vikas Mandal School, Andheri	48
9		19-12-2018	M.P.Shah English School, Vile	35
10		02-01-2019	Juhu Sandhigram Mumbai Public	124
11		04-01-2019	M M Pupils Own High School,Khar	68
12	2019-20(odd)	26-06-2019	Thakur Shyamnarayan	107
13		10-07-2019	Samata Vidya Mandir,Kandivali (E)	110
14		12-07-2019	Kendriya Vidyalaya no.2,Colaba	56
15		16-07-2019	Vibgyor Hilth, Goregaon(W)	15
16		16-09-2019	Oxford Public School, Kandivali(W)	70
Total				1144

Table 1 List of schools

After workshop, feedback will be taken from students about the content delivery and understanding of usefulness of IPR.

IV. RESULTS

1. Feedback taken after every session to understand the learning attainment and the satisfaction about workshop. It has been found that all the students are highly satisfied and enthusiastic during workshop and participate with full energy.

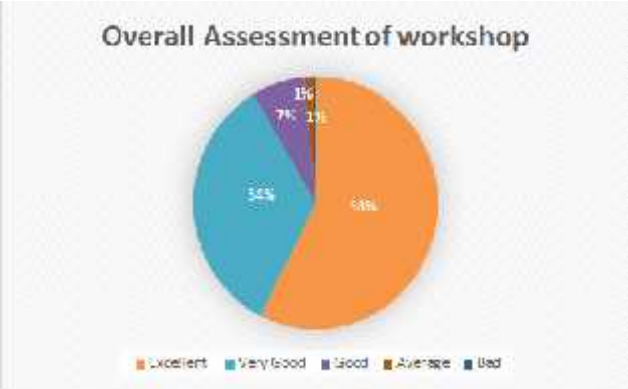

Figure 4.a) Feedback of students about workshop



Figure 4.b) Feedback of students about workshop



Figure 4.c) Feedback of students about workshop

2. Target for workshop is that in every six months atleast 200 students and 5 schools should be covered in workshop. The figures 5 and 6 show achieved targets by covering equal or more than minum required students and schools. Figure 7 shows pictures of some workshops conducted.

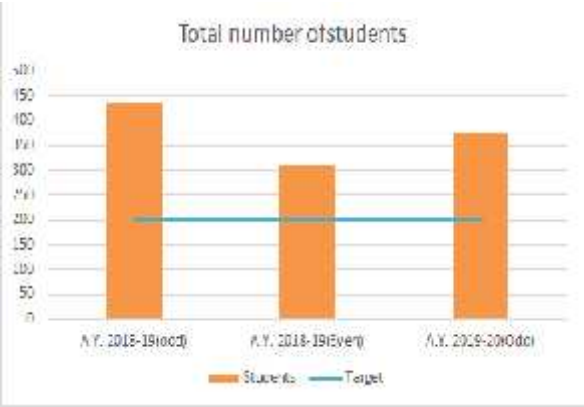

Figure 5 No. of students trained during workshops

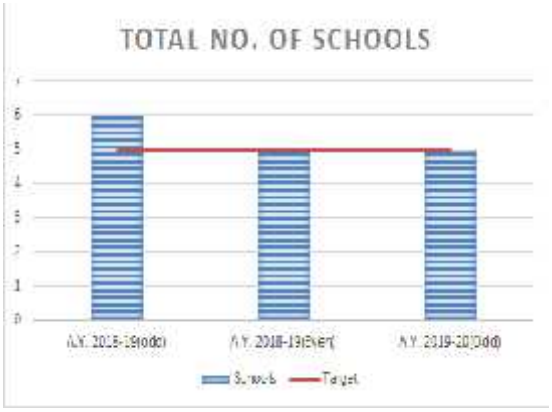

Figure 6: Total No. of schools



Figure 7: Photographs of workshop for teachers and students

V. CONCLUSION

This workshop is a step towards providing platform for school children to aware of the practical aspect of the Intellectual Property Rights. It also helped in informing students how they can register their copyright and patent in future. Hence, it will promote research culture in them. It is receiving a positive response and acceptance from students.

ACKNOWLEDGMENT

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Institutional Internship: Skill Enhancement Evaluation Model

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***Abstract*— Engineering Education helps students to learn to create, design, solve problems and analyze the solutions for that particular problem. This field of education can provide revolutionary results. The statistics about employability of engineering graduates show that only 25% of them are employable [1]. This is because they lack in skills like in-depth knowledge of curriculum, ability to apply the knowledge in practice and communicate their ideas to others.**

This paper presents a model of institutional internship developed by Thakur College of engineering and Technology (TCET) to help the engineering graduates become first level of professionals. The in-house internship program is conducted for students of first year and second year of engineering in TCET. Objective of this internship is to develop an attitude for learning, ability to communicate and apply technical knowledge for developing solutions.

Keywords- Engineering education, Institutional, Internship , skills, industrial skills.

I. INTRODUCTION

AICTE has made internship mandatory for technical education and has also published guidelines for 600 hours of internship in four years of curriculum. This has been implemented because of the continuously increasing demand of the technical manpower, who can deliver quality in the field of expertise. One of the greatest advantages to students in having internships is the access they get to accomplished professionals in their field. Consequently, speakers from the executive ranks are very popular with students—it's a great career development and role modeling experience for interns. [8]. Therefore, internship is the need of the hour to make the engineering graduates skilled so that they can become practicing professionals who can be productive immediately after completing the four years of curriculum [1].

Providing students with access to in-house training—both in work-skills-related areas, such as a computer language, and in general skills areas, such as time management—is a tangible way to show students you are interested in their development. [8]. So institute has built a platform for internship in the institute which will address this challenge by using the resources of the institute i.e. laboratories and faculty mentors, along with industry experts in a blended form to attain practicing skills required to make engineering graduates global leaders. This will be a cost effective solution and hence sustainable, because it does not require building up industry environment or center of excellence in the institute which requires lot of investment. The students not getting the opportunity for out-house internship can register for institute internship which can be a platform to develop the required skills in them[10].

This paper is a study of impact on Skill developed (attitude, knowledge and skills) through Institutional Internship in Engineering students.

II. LITERATURE SURVEY

The hands-on work experience interns receive is invaluable and cannot be obtained in a classroom setting, making this one of the most important benefits of internships. Interns have the opportunity to apply acquired knowledge to real work experiences, witnessing firsthand the day-to-day job duties they can expect to encounter in their chosen field. In addition to learning the specialized skills of a particular field, transferable skills such as communication, teamwork, and computer proficiency are also obtained in an internship, fully preparing interns to enter the workforce upon graduation[9]. Interns should be doing work related to their major, that is challenging, that is recognized by the organization as valuable, and that fills the entire work term.[8]The hands-on work

experience interns receive is invaluable and cannot be obtained in a classroom setting, making this one of the most important benefits of internships. Interns have the opportunity to apply acquired knowledge to real work experiences, witnessing firsthand the day-to-day job duties they can expect to encounter in their chosen field. In addition to learning the specialized skills of a particular field, transferable skills such as communication, teamwork, and computer proficiency are also obtained in an internship, fully preparing interns to enter the workforce upon graduation[8]. One of the most important internship benefits is that college graduates who already have some work experience in the form of an internship stand out to potential employers. Internship experience makes a college grad more marketable as they usually require less training and can handle more responsibilities. You may also receive a higher starting salary than those who do not have internship experience and are entering the workforce or starting a new career[8].

III. IMPLEMENTATION

In TCET we started sending our students for internship from 2015-16. Every year from then this program is conducted. In the academic year 2019-20 the tracks that were included were:

Internship Tracks
Social Internship
Data science using R
Website and mobile programming
Start-up Internship
Digital Marketing
Video Making Internship
Arduino Workshop
Electronic Product development
TEXAS Centre of Excellence
Mechanical Mechanism
Model Making Internship
Interior Design Internship
MIDAS Internship

All the department in the institute were involved in some of the internships. Engineering, Sciences and Humanities Department has organized “Social Internship”. Under this head the students who had opted for this internship were sent to the adopted village of Thakur College of Engineering and Technology, Mumbai. Students interacted with the families and kids there. Teaching sessions were conducted for school children, some motivational sessions were also arranged. Adults were encouraged to send there children to school.

In Data Science using R, students were introduced about the importance and requirement of this curriculum in industry. All the aspects of Data Science along with some projects were discussed during the internship. This program was conducted by Computer Science Department in TCET.

Nowadays, we all are well aware of the importance of website development and mobile app development. This generation of engineers is no stranger to this section of technology. Looking into the same Information Technology department of TCET had organized this internship program. Industry experts were called to take sessions and let the students understand the industrial scenario and requirement.

After graduation, not all the students are moving for 9-5 job in companies, there are few who want to start their own venture with some innovative thoughts. To cater this requirement of students an internship was conducted for Startup. Various entrepreneurs were called to guide students on how to start, how to arrange funds, how to find a place to start a venture and the queries related to this were solved during the sessions.

Digital Marketing is the need of the hour. Companies, start-ups and products, every sector needs the digital market to establish and advertise itself. Digital world has made the world even bigger, but approach to each route is shortened. So, digital marketing gurus had conducted special sessions for students who had opted for this head of internship. What digital world is? How everyone is connected ? And above all, how to market yourself was taught to students in internship for Digital Marketing.

Visual presentation of any work creates a better impact on the audience. Video making was one of the aspects of internship program where students learnt the art of

creating a video and presenting one's work in an effective manner. All the internship programs were captured by students of video making and a beautiful video was created to showcase the event.

Electronics and Telecommunication Engineering Department had conducted internship on Arduino. To provide brief overview of different IOT based systems and understanding of the basic features and architecture of Arduino Uno board. To design creative, imaginative physical applications was the main aim. Electronics Engineers are lacking in core knowledge and hence rushing towards IT sector for jobs. To enhance technical competency and interest in students this internship program proved very helpful.

Electronic Product Development, this internship helped students understand the basics of electronics products from the scratch. Design of basic components was taught and students were given hands-on experience.

TEXAS Center of Excellence, product development was conducted under the guidance of industry experts with the components and products which were provide by TEXAS.

Mechanical Mechanism and Model making were the internships conducted by Mechanical Engineering Department of TCET. Engineering mechanical mechanisms were explained to students and they were made to make models of mechanical structures.

Interior Design and MIDAS were the internship heads under Civil Engineering Department of TCET. MIDAS software is engineering software that set a new standard for the design or bridges and civil structures. It features a distinctively user friendly interface and optimal design solution functions that can account for construction stages and time dependent properties. Students were oriented for this software. Interior design students were taken for site visit to various ongoing structures, including the construction site in campus itself.

IV. DEVELOPMENT AND DEPLOYMENT

The development of the process included the following steps:

Step 1: Making the team of faculty mentors from each department.

Step 2: Identifying the theme for internship based on institute/ industry expectations

Step 3: Identifying the resource person and infrastructure.

Step 4: Making of a plan to conduct the two week internship.

Step 5: Identifying experts from industry for evaluation.

Step 6: Developing evaluation sheet and guidelines for grading and distribution of certificates to students[10].

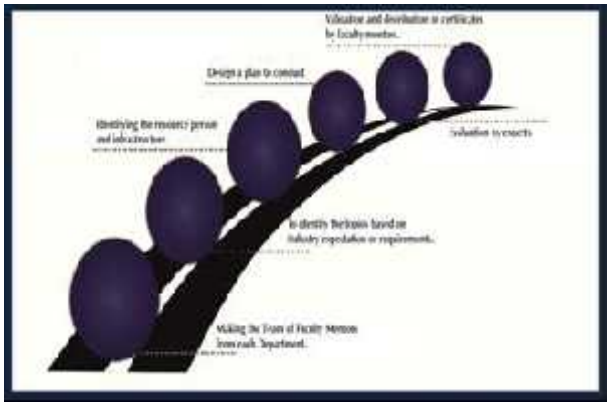

Fig 1: Design and development stages of process

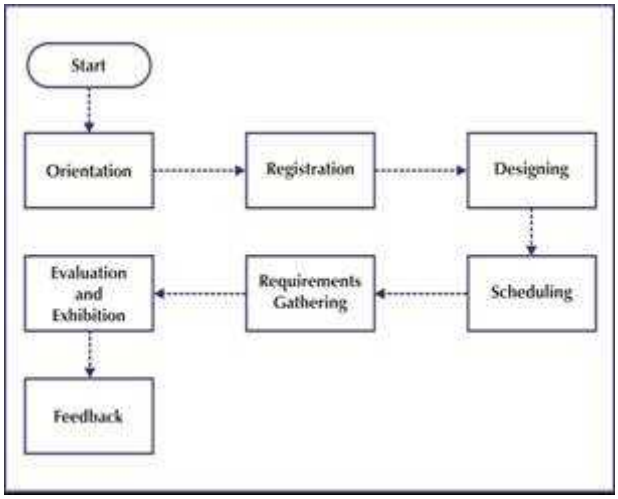

Fig 2: Deployment of process

Deployment process:

Following steps were followed for deployment of institutional internship:

Step1: Internship faculty mentor team interacted with first year students and gave them orientation about institutional internship program and its topics.

Step 2: Registration of institutional internship program for various topics was taken using Google forms.

Step 3: Internship program Team designed a schedule and content for two week duration.

Step 4: Hardware Components required for this internship project are issued from R & D cell of TCET and all other expenses are borne by department/Institute.

Step 5: First time in phase I of institutional internship in December 2017 Industry experts from various industries interacted with students only during evaluation and gave their inputs to enhance their design/product as per industry standards and market trends.

Step 6: An improved Institutional internship was launched second time in phase II of institutional internship sessions in June 2018 were conducted by industry experts and alumni students and they guided students on various technologies and even invited students for Industrial visit which gave then exposure of related industry environment.

Step 7: Further an improved Institutional internship was launched in Phase III in December 2018 in which the problem statement from industry was given. A team of senior leadership team visited SME's and interacted with them and got problem statements for inhouse internship. In this way a joint internship was offered to the students in association with the SME which gave boost to the students learning and skills attained.

Step 8: Recent phase, that is phase III in June 2019 was conducted under one head for all the departments. First week was the introduction and orientation week for the students. Faculty members or the industry experts had oriented respective students on the topic. Second week was the implementation week, according to the orientation given, students were allocated the tasks/projects and implemented them. Third week was for online course certifications.

Step 8: Exhibition cum evaluation for students during Institutional internship was conducted and their product /design were evaluated by industry expert who gave the problem statement.

Step 9: A feedback is taken at the end of the program to understand the experience and learning of students during institutional internship.

Step 10: Certificate with grades was given to the students who successfully completed the assigned project during internship.

V. MONITORING

Monitoring was done by faculty mentor and process in-charges

1. Preparedness for conducting institutional internship is checked by process in-charge. Checks are conducted for theme and its relation to domain, number of problem statement from institute/industry, schedule for two weeks, hardware and software requirements and list of industry experts/ Alumni.

2. Attendance is maintained and monitored by faculty in-charge.

3. The progress of the students during program is monitored by the institutional internship team of faculty.

4. Evaluation of students is done and grades are assigned by Faculty in-charge in consultation with industry experts.

5. Feedback from student is taken at the end of two weeks by faculty in-charge.

6. Impact study of the institutional internship on the performance of the students is monitored and documented by process in-charge[10].

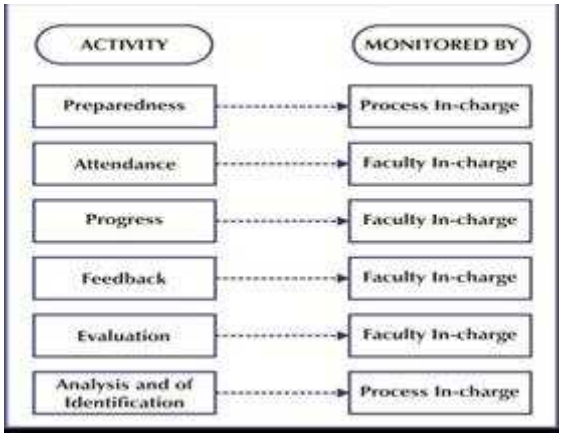

Fig 3: Monitoring process

VI. RESULTS

Students were judged on the basis of their performance on punctuality, maintenance of daily grade and skill test.

Table2: Sample of Students Grading during Internship

SN	Name of Student	Marks To be awarded by			Total Marks	Percentage	Overa Grad
		Punctuality Grade (Satisfactory/Good/Excellent)	Maintenance of Daily Grade (Satisfactory/Good/Excellent)	Skill Test Grade (Satisfactory/Good/Excellent)			
1	Mukul Gharpure	8	7	8	23	76.67	Excelle
2	Satyaprakash Mishra	6	7	6	19	63.34	Goo
3	Virag Nimeshkumar Do	9	8	8	25	83.34	Outstan
4	Swati Dubey	8	7	8	23	76.67	Excelle
5	Shubham Gawade	6	6	6	18	60	Goo
6	Roshan Kewat	6	7	8	21	70	Very Go
7	Aniqa Ajay Somthankar	6	7	8	21	70	Very Go
8	Atul Kumar Tiwari	9	9	8	26	86.67	Outstan
9	Suraj Naidu	7	8	8	23	76.67	Excelle
10	Sagar Chitre	7	8	8	23	76.67	Excelle
11	Anurag Tiwari	9	9	9	27	90	Outstan
12	Suraj Jha	7	7	7	21	70	Very Go
13	Urvi Shukla	8	7	8	23	76.67	Excelle
14	Devesh Varma	7	7	7	21	70	Very Go

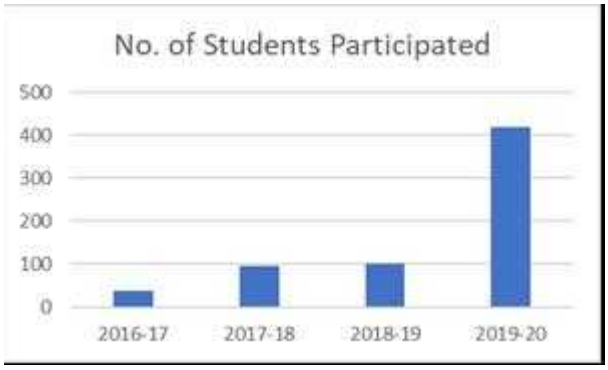

Figure 4: Number of students participated in internship in last three years.



Figure 5: Number of industry experts

The student feedback in Table 1 shows that students are satisfied with the content of the program and find that the program has successfully helped to inculcate professional attitude, knowledge and skills in them.

Figure 4, 5 and 6 shows that every year the participation of students, faculty, alumni and industry is increasing. Also no. of problem statements received from industry for institutional internship is also increasing every academic year.

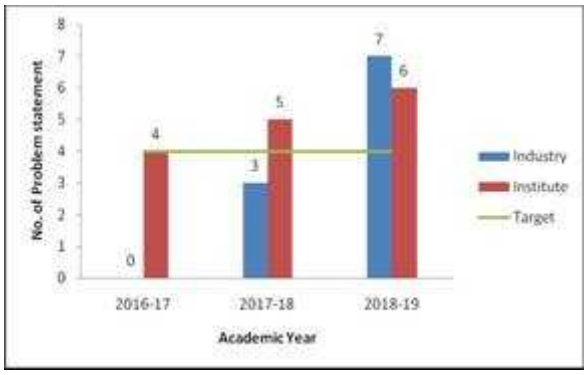

Figure 6: Number of problem statements given by institute, by industry



Figure 6: FOSS certificate obtained by ARDUINO students

At the end of the program students are evaluated by the faculty mentors and industry experts. The feedback of industry expert about this institutional internship certificate is that anything extra done by students to enhance their skills is given weightage during placement interviews.

VII. CONCLUSION

It is a necessity of the technical era that the student should get employability skills with the understanding of the University curriculum. Internship can fill the gap between the academics and the industrial requirement and provide skills which will increase the efficiency and performance of the students in the process oriented system in industry.

Institutional internship an initiative by Thakur College of Engineering & Technology is unique and enhances cognitive, affective and psychomotor skills in students. This internship program gives a platform for working on problems defined by institute and industry. Students

develop solution for the institute and industry by working in the institute under the mentorship of faculty experts and the industry expert. Guidance and inputs from the industry experts, mentoring by faculty members, and advice from alumni, all these helped students to achieve their target in stipulated time. Moreover, this initiative started by TCET in 2016-17 is accepted by AICTE and formal guidelines are circulated by them which are similar to the institutional internship model run by TCET. But definitely the AICTE guidelines will help TCET to explore new horizons and possibilities to make this program more successful in the time to come.

ACKNOWLEDGMENT

We would like to express our special thanks of gratitude to TCET management as well as TCET principal Dr. B. K. Mishra who guided us to start this institutional internship program. Secondly we would also like to thank various industry experts who had helped us directly or indirectly, our alumni, and our students who worked to make this program successful.

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Analyzing the grey areas of poor results through Documentation and recording of data analytics

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***Abstract*— Every process which is defined will ultimately be judged by the impact it makes on organization conduct. While it can be tempting to think about measurement only after the process is completely executed, it is critical to have leading indicators that could help us improve the outcome on a continual basis even before the process is completely executed. At TCET, program success is very critical and hence various best practices have been implemented to map processes to program outcomes, so they could pinpoint individual processes and tweak them to get favourable program results. Breakthrough improvements has been achieved after implementing and monitoring innovative practices. This paper highlights the role that data analytics can play through documentation and recording for the successful implementation of any process in an organization. A case study emphasizing on how efforts were taken to improve the pass% of students from 2013-14 and 2014-15 batch till final year of engineering has been shown. An example of the role of TCET examination department has also been made.**

Keywords— Data analytics, Corrective actions, Risk mitigation, process contribution.

I. INTRODUCTION

Ease of data capturing at source, higher computational power and better visualization techniques have made data analytics powerful and easy to implement. It has therefore, become a vital component of organization processes, allowing organizations to measure their process performance while providing actionable insights and information on the process's efficiency and effectiveness. Right metrics and measurement techniques help focus on extent of contribution of a specific process to organizational goals [1]. Variance and their trends help take timely corrective actions. Analytics also helps to evaluate if a corrective action is contributing towards the betterment of the outcomes as expected. Right insights become best practices to be proliferated across organization for better results.

Data analytics help remove subjectivity and provides hard fact that cannot be denied. It helps pinpoint the issue objectively. Historic data was used to understand what was happening. Near real-time analytics of that data are now allowing organizations to better understand why it is happening and provides input into predicting what could happen. Timely intervention can help reduce the damage or multiply benefits [2]. With quantification of context, more meaningful insights help in faster justification of actions and reduce turn-around time. Quick feedback from continual analytics also helps organizations to approach with corrective actions. Analytics driven insights are now uncovering issues, influencing organization processes and driving continuous improvement within an organization. Organizations now have access to a greater quantity and quality of internal and external data than ever before.

The need for analytics therefore is-

1. To improve processes on a continual basis
2. To lead process transformation initiatives
3. To enhance the overall customer/stakeholder experience and help achieve organizational goals and objectives.
4. As a quantitative record while going for accreditation and/or grading of the organization.

Therefore, this work concentrates on objectives, development, deployment and benefits of data analytics.

II. SIGNIFICANCE OF QUALITATIVE DATA ANALYTICS

Advantages of qualitative data analytics are as follows:

- Provide a visually appealing depiction of organization goals and visions
- Motivate students and staff to achieve defined outcomes as far as academic objectives enlisted are concerned

To achieve these two factors, it's important to have the backing of a strong leadership (to ensure smooth data analytics process), up-front planning for data collection/use and a strong human capability for a thorough data inquiry. The authors in [4] have emphasized on the challenging aspects of data quality. Some of them are as follows:

a) What if data important to an analysis is empty?
b) What if the data is present but is invalid in nature?

c) Whether appropriate linking of records is done? when data is consolidated from more than one source
d) Whether the chosen practices is not lacking in transparency?

In implementing any process, the key steps include:

1. Define objectives that will ensure qualitative results
2. Brainstorm on best possible ways of achieving the same
3. Generate qualitative data to develop the process into a best practice
4. Monitor through periodic review

III. DEPLOYMENT OF BEST PRACTICE

Implementing best practices in any organization involves the following methodical approach:

A. Define the objectives

Let the objectives be defined based on the following pointers:

1. To collect data as near to the source as possible
2. To conduct near real-time analysis for timely interventions
3. To analyse benefits of corrective actions taken
4. To find the deficiencies in the processes
5. To mitigate risks in the processes
6. To calculate process contribution towards organization goals

B. Development of Best Practice

Any practice can be deemed as best practice only if following steps are undertaken:

Step 1: Outcomes are defined for every process.

Step 2: Process outcomes are mapped with Program outcomes.

Step 3: Attainment of every program outcome is calculated.

Step 4: Lower attainment of a program outcome defines a risk or provides scope for the improvement of the process.

Step 5: Corrective actions are taken to improve the attainment of program outcomes.

Step 6: For every process, risks are identified, and process is modified to mitigate the risk.

C. Deployment of Best Practice

Steps to be undertaken for successfully deploying the best practices developed are as follows:

Step 1: All the Processes are defined with reference to PDCA cycle.

Step 2: For all the processes, outcomes are defined. Step 3: The outcomes of the processes are mapped to Program outcomes.

Step 4: For every process, timeline is defined.

Step 5: For every process, Risk and mitigation are defined.

Step 6: As per the guideline of the process the data is generated. For example, Students' internal assessment test marks, assignment marks, attendance, CGPI, Extra-curricular activity and co- curricular activity data etc.

Step 7: The gathered data is further analysed as per the guidelines mentioned in the process. For example, CO-PO-PSO mapping, student validation, placement eligibility list etc.

Step 8: The analysis of data in each process is used to map the outcomes of the process with program outcomes.

Step 9: This mapping gives the attainment of every program outcome which is measure of effectiveness of the process.

Step 10: If attainment of a particular PO is less then correction is done in the Process.

Step 11: If a particular PO is not attained then the restructuring of the process is needed.

D. Monitoring of innovative practice

It is extremely important to monitor the functioning of innovative practices by undertaking the following measures:

1. Periodic review by process owners
2. Internal audit is conducted every three months and external audit is conducted every year.
3. Quality assurance team checks the documents monthly and an overall score is given to the department based on input data. Through data analytics, key findings made

E. Benefits of innovative practice

Analytics has helped us to improve some of our processes like:

1. Improving attendance
2. Improving end semester exam performance
3. Predicting placement probabilities for identified students
4. Departments to take timely corrective actions and mentor staff and students for better outcomes
5. Identifying which are the key improvement areas through the findings of the QA report

IV. CASE STUDY

A. Introduction

In TCET, the examination department prepares timely reports based on results obtained by students across all branches. The objective of doing so is to assess the extent to which the student has achieved the academic objectives as per the standards set in compliance with the ISO manual. The ultimate target of any subject teacher is to meet the academic related result quality objective of at least 70% of Course Outcomes/Programme Outcomes. One such sample has been taken of the documentation process of result analysis undertaken by the examination department faculty wise as seen in Table I.

TABLE I: RESULT ANALYSIS FACULTY WISE

SEM	BRANCH	SUBJECT	SUBJECT TEACHER	RESULT%	ISO REQUIREMENT	WHETHER ISO REQUIREMENT ACHIEVED	+%	-%	REMARK

B. Example

As an example of how data analytics plays an important role through documentation and recording for the successful implementation of any process in an organization, we have taken the example of how the poor performance of students in the subject of Wave Theory & Propagation (WTP) and Circuits & Transmission Lines (CTL) was worked upon.

CTL is a subject whose objectives include analysing circuits in time and frequency domain, synthesizing passive networks using various methods and studying network topology, network functions, two port network etc. The outcome of this course requires students to apply their knowledge in analysing circuits using network theorems, find the various parameters of two port network, and synthesize networks using passive elements.

WTP is a subject whose objectives include understanding the basic laws of electrostatics and magneto-statics in vector form, solve electromagnetic problems using different numerical methods, understand the propagation of wave in different media like dielectric and conducting media by solving wave equations and finding parameters of the media etc. The outcome of this course requires students to apply numerical methods for designing antennas, identify and solve problems related to the propagation of waves, knowledge of behavior of EM waves etc.

C. Implementation using Fishbone analysis

Using Fishtail analysis, the root cause analysis of the poor performance of the students in the subjects of Wave Theory & Propagation and Circuits & Transmission Lines was done. This analysis involves the following steps [5]:

Step 1: Define the problem statement

Step 2: List the major categories of the cause of the problem. Step 3: To every cause, ask the question “why does this happen?” this will help in sub-branching the already created branches (of Step 2)

Step 4: Continue asking “why?” to go into deeper levels of causes. This may help you to address some of the root causes and prevent future problems.

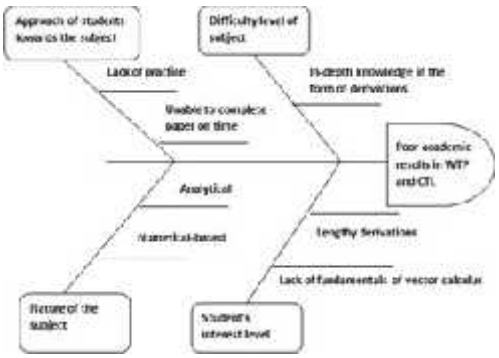

Fig. 1: Analysing poor academic results in WTP and CTL through Fishbone analysis

1. Problem Statement:

   Result of the subjects’ CTL and WTP in the academic year was less than the ISO norms.
2. Causes of the problem:
   - Difficulty level of the subject
   - Approach of students towards the subject
   - Nature of the subject
   - Students’ liking of the subject

Other factors that may also be included are: Crème of students at entry level is below average, poor FE results etc.

TABLE II: RESULT OF CTL & WTP IN ACADEMIC YEAR 2014-15

SUBJECT-WISE RESULT ANALYSIS
SECOND YEAR - SEMISTER III
BRANCH: ELECTRONICS & TELECOMMUNICATION ENGINEERING

YEAR	SUBJECT NAME	SUBJECT TEACHER	EXAMINER	ISO REQUIRE-MENT (FOR OVERALL RESULT)	PASSING %

Dec-14	CIRCUITS AND TRANSMISSION LINES	Faculty A and B	Faculty A and B	75%	55.62%
Jun-15	Wave Theory & Propagation	Faculty A and B	Faculty A and B	75%	77.33%

After this result analysis, the feedback of the faculty by students is checked and its analysis is done. The feedback of the faculty is given in Table III.

TABLE III: FEEDBACK ANALYSIS OF FACULTY

Sr. No.	Year	Faculty Name	Subject Name	Feedback
1.	DEC 2014	Faculty A	CTL	91.14%
2.	June 2015	Faculty A	WTP	88.35%

From above table it is evident that students like the teaching of that faculty member and hence teaching method of the faculty is not a problem. More causes of less result are found.

3. Deeper Level of Causes:

The tendency of students to practice less numerical by themselves. The immediate impact of this is observed when the paper is lengthy, and students are unable to complete their paper.

The overall nature of the subject itself. A purely derivation-based subject like Wave Theory & Propagation which involves understanding of mathematical equations is another reason for poor performance by students. A purely numerical based subject like Circuits and Transmission Lines with no scope of descriptive study may be a let-down for students for whom theoretical subjects are their strong points.

4. Measures to overcome the problem:

From the fishbone analysis, it was concluded that both the subjects WTP and CTL are analytical and numerical based subjects. For better understanding of these kinds of subjects, more practice of numerical is required. In the syllabus of WTP and CTL, there is mention of only one hour tutorial. For better understanding and more practice, two hours tutorial were allotted every week for these two subjects. To give proper attention to each student, the entire class was divided into batches.

5. Impact of the measures taken:

- The measures taken resulted in the respective faculty giving undivided attention to lesser number of students
- With less number of students in a given slot, the concerned faculty could ensure that major doubts could be clarified.
- As we can see in the Table II and III, there has been a significant improvement in the results of both the subjects as compared to the previous year

TABLE IV: COMPARATIVE STUDY OF RESULTS IN CTL IN 2014- 15

Subject-Wise Result Analysis
Second Year - Semister III
Branch: Electronics& Telecommunication Engineering

YEAR	SUBJECT NAME	SUBJECT TEACHER	EXAMINER	ISO REQUIREMENT (FOR OVERALL RESULT)	PASSING %
Dec-14	Circuits and Transmission lines	Faculty A and B	Faculty A and B	75%	55.62%
Dec-15	Circuits and Transmission lines	Faculty A and B	Faculty A and B	75%	76.79%

Table IV and V shows the subject wise result analysis done by the exam section. From Table IV it is evident that in Semester III in academic year 2014-2015, the result for Circuits and Transmission Lines is 55.62% which is less than the ISO requirement. But after conducting extra tutorials additional practice could be given to students. Hence in academic year 2015-2016 the result for Circuits and Transmission Lines is improved to 76.79% which fulfils the ISO criteria.

From Table V it is evident that in Semester IV in academic year 2014-2015, the result for Wave Theory and Propagation is 77.33%. But after conducting extra tutorials additional practice could be given to students. Hence in academic year 2015-2016 the result for Wave Theory and Propagation is improved to 81.25%.

TABLE V: COMPARATIVE STUDY OF RESULTS IN CTL IN 2015-16

SUBJECT-WISE RESULT ANALYSIS
SECOND YEAR - SEMISTER IV
BRANCH: ELECTRONICS & TELECOMMUNICATION ENGINEERING

YEAR	SUBJECT NAME	SUBJECT TEACHER	EXAMINER	ISO REQUIREMENT (FOR OVERALL RESULT)	PASSING %
Jun-15	Wave Theory & Propagation	Faculty A and B	Faculty A and B	75%	77.33%

Jun-16	WAVE THEORY AND PROPAGATION	Faculty A and B	Faculty A and B	75%	81.25%

Not only did the results show tremendous improvement but on further analysis of the results of these two batches following was the trend seen as seen in Table VI.

TABLE VI: ANALYTICS OF RECORD OF FE AND BE MARKS OF THE TWO BATCHES

Batch	FE results (Pass %)	BE results (Pass %)
2013-14	64.125	85.5
2014-15	55	97.33

It is clearly seen that the FE results of 2013-14 was more than that of 2014-15. However, since the results of the 2013-

14 batch in SE specifically in CTL was less, corrective measures were taken for the 2014-15 batch resulting in tremendously improved results once the two batches reached final year of engineering. This only shows that proper documentation and recording is extremely important to analyse the grey areas of poor results in order to take corrective actions.

V. CONCLUSION

Not all problems are similar and similar problems won't get solved by same solution. Analytics helps identify the uniqueness by providing contextual references and hence promotes innovation. It helps members to brainstorm in the right direction and tweak their solution to provide the most optimal solution. It also establishes a commitment to constant betterment and improvement that allows an organization to remain competitive and to constantly improve and adapt. Understanding through data analytics is much easier than through subjective analysis. A better example of this is the constant efforts that the examination

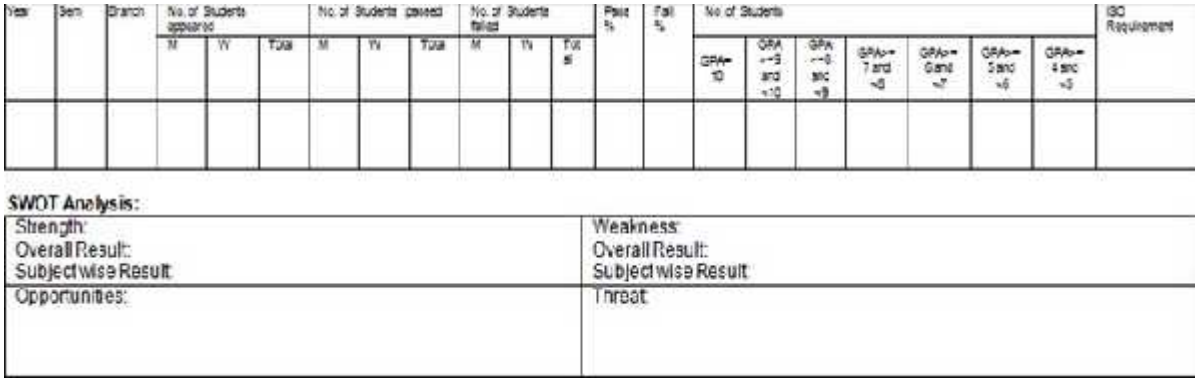

Fig. 2: Documented record of the overall result analysis prepared by the examination dept. of TCET [6

department of TCET has put in creating the documentation that provides the overall result analysis across all branches and thereby analysing the SWOT of the same as seen from Fig. 2.

It has been observed that by adopting Fishbone analysis technique, we could identify the root cause of poor results in the subjects of WTP and CTL. The understanding of the root causes led us to take appropriate measures which resulted in improvement of results in these two subjects.

Documentation and analytics not only encourage development of innovative and breakthrough changes to ensure quality and performance improvement, it also helps manage change effectively. This approach helps identify changes to methodology for continuous improvement. This contributes to integrating any change in management process within the normal day-to-day organizational activity, making the change process seamless. Organizations that devote proper time and resources to build data analytics capabilities will be better positioned to out-perform their competitors in the coming years. The best example we have considered is of the examination department of TCET whose continuous efforts has led to the timely analysis of the student performance across all branches through detailed documentation paving way to create analytics that will help measure success for current action and reference for future work.

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Succession planning a key to sustainable organizations

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***ABSTRACT*: Succession is one of the vital elements of the human resources management process. Management ought to make out that employees at the various leading positions in an organization cannot stay forever and must prepare a prior plan to cover all key roles and scrutinize skills to avoid the gaps during the transition. Uncertainty is the reason we need succession planning. Therefore planning a successor for key positions are an essential practice every organization must follow to maintain organizational stability. Replacing a key employee when they shift to another role, leave the company, are fired, retire or die by another person having strategic leadership skills is very important to avoid friction in operations. The planning process is intended to create a pipeline of talented successors that will keep the organization running with a minimum interruption when employee changes occur. Leaders must assure the stakeholders that the organization has a plan for continuity in terms of quality maintenance and flow of the organization's operations. This purpose can be served by talent visualization, employee preservation, and succession planning. In TCET we believe in internal succession because there is a cost involved in terms of productivity, money and time in bringing someone new to fill up the key roles. Further existing employees, who have been a part of the organization for years, know the goals, values, and processes of the organization very well. Internal succession also reduces talent drain which may cause loss to the organization. The organizations like Microsoft, Honeywell, Infosys, Tata, GE, IBM, Marriott have proved that succession planning has given them the ability to survive various storms. This article suggests that establishing a link between succession planning and institute objectives is the key element for sustainable organizations.**

KEYWORDS: Succession planning, sustainable organization knowledge management

I. INTRODUCTION

Succession planning identifies the needs of various vital management positions, starting from teachers, departmental heads, deans, vice principal and ranging up to the top position in the organizational body. It also defines management levels to give extreme litheness in lateral entries and to ensure that as teachers achieve huge experience, their skills towards managing the activities will extend and will be generalized in relation to total objectives of an organization relatively than to only objectives of department.

The efficiency of an educational leader highly impacts the quality of education, which directly affects the learning outcomes of the stakeholders. Colleges & Universities are owned by different levels of organizational leaders. The achievements of an educational institute or an organization relies on qualified, experienced and trained leaders who share their experience, skills and knowledge in the form of guidance which motivate others to achieve the goals of institute or organization [1]. Educational organizations are required to create the graduates who fulfill the need of industry once they are allotted some assignment. The needs of market are changing so rapidly that it is unable to predict but at the same time the educational leaders of the organization also change their way of delivering the content which creates the graduates to fulfill the needs of industry at any moment of time, once they join the organization. To survive in the market the institute needs a good leadership which will help in dealing with day to day activities and events. Otherwise, an organization may start falling apart from its structure without being noticed or observed early in its course by its people [2]. It's only after a year or two that poor leadership takes a toll on the organization when trends or events catch up with the organization. In academia,

the effectiveness and success of leadership in education have been affected by various factors for a long time. This is a major issue that the education community has not been able to adequately address as it should have. Studies show that many colleges and universities don't have adequate or effective leadership training programs, while others assume that individuals, who are being considered for promotion to the next higher position, can learn academic leadership on-the-job [3]. This section will present the different categories of crisis and challenges in academic leadership that includes inadequate leadership preparation and training, ineffective leadership, lack of interest and motivation, overwhelming workload, increased responsibilities, resignation, and retirement. All these factors can severely affect the organizational structure of an education institution. When the leadership position requires dealing with management of resources especially allocating funds, the seriousness of the responsibility is a critical issue that can cause the organization to fail because of poor preparation and training. Organizations or institutions have a greater responsibility in providing adequate leadership preparation and training if they are to maintain stability, continuity and improvement in their operations. The survey shows how private and public institutions failed in their commitment to develop or nurture their next generation of leaders. Some colleges have employed academic leaders whose background or experience was not in academia as noted in the following: There is a huge concern towards the institution that there are plenty of institute which are governed by un-experienced leaders who are blank with the details of educational activities. If the number continues to increase, the occurrence of risk in higher education will become an industry that is led by people who do not truly understand it, who view it as a product to be manufactured and sold to create the brand in market. While succession planning is a foundation of business leadership, it is curse in academia. It is rare indeed for department heads, deans, head of institute or university head to groom potential successors. When someone does step down, either expectedly or unexpectedly, an outside search is usually conducted and it is often at least a year before a permanent successor is in place"

II. MOTIVATION

All organizations need a proactive and future focused process, which will measure and develop a talent pool of individuals who are willing and able to learn and occupy higher positions when needed.

Employees must transfer the information and knowledge they gained to their successors before leaving the organization. Also it has to keep the track of manpower requirements, competency and skill gaps. Succession planning is a tool to groom high performing employees at various levels for the next position and take up the responsibility whenever necessary.

III. NEED OF SUCCESSION PLANNING

Educational institutions vary widely in type, just as private and governmental entities do. Any one Succession Planning will not fit all. The content which is accepted in local school, colleges or university is not compulsory that it will be same for research university or some branded university. But it is clear that large universities or institutes are unique for the simple reason that many people must move to other higher educational institutions if they are to be promoted from department head to dean, from dean to principal or chancellor, or from chancellor or principal to director. This particular reason makes an institute difficult to defend the expenses on grooming talent or identifying them for future which actually benefits the other institute. Some higher-educational institutions have committed to leadership development programs to groom talent, and that kind of commitment is to be seen more in the future. The simple reason for taking this step is, as the people comes to retirement age they are needed to be replaced.

IV. SCOPE

Quantity and Quality of people towards profession can be taken into account by the organization to cover succession planning? The scope of succession planning explains in detail about it. The succession planning and its management may vary from the local market to the global market. A specific training program targets leaders from selected job groups, job levels, functions, or positions. Often, such programs grow out of crises such as excessive revenue in selected areas of the organization. On the other hand, a generalized training program focuses to prepare people for improvement in all job groups, job levels, functions, or positions. This is the initial point for identifying the new talents wherein their training, education, and development are the needs for meeting individual career goals.

V. OBJECTIVES

The objectives behind the succession planning is listed below –

1. Identify successor for each key position
2. Training successor with necessary skills
3. The right leadership for the company in the years to come.
4. Focus on an organization's future needs, not its past accomplishments.
5. Encourage differences of opinion.
6. To take advantage of internal succession

VI. DEVELOPMENT OF BEST PRACTICE

In TCET succession planning is one of the best practices we follow in TCET because it has helped us to stay focused on our vision and mission. In the process of developing it as best practice we follow certain principals which are –

- Open mildness.
- Clearly defined vision and mission statement which is known to everyone.
- Offering regular feedback to responsibilities.
- Providing training to peak performers.
- Identify the performance gaps
- Proactive succession planning

VII. DEPLOYMENT OF BEST PRACTICE

Deployment of succession planning is equally importune because failing to deploy means failing to exist. Some of the steps during deployment of succession planning are-

1. Identify Key positions in session / Department / institute.
2. Determine the required job Competencies for selected key positions.
3. Determine the likelihood of these positions getting vacant in future.
4. List down competency profile of the selected employees (through competency mapping).
5. Analyze and match the competencies between the selected position & Employees who closely match the required competencies.
6. Decide on two successors for the selected position.
7. Employee with closest match to competency requirements of position will be the first successor to the position.
8. The second successor will be the one with the second closest competency match to the position requirements and so on.
9. Track overall progress.

While deployment, we should prepare the replacement chart where organization identifies short-term and long-term emergency backups to fill critical positions. The focus of short- term replacement is on finding backups while a critical person is out for a short time. Short time replacement examples are vacation or sickness [4].

Similarly, the focus of long-term replacement planning is on finding backups to fill critical positions for longer intervals. Long-term replacement examples are death, disability, sudden resignation. Replacement planning is necessary because organizations cannot afford the delays in decisions because timely decisions decide the roadmap of the organizations. It is observed that delays taken in decision making may result into business loss, customer's dissatisfaction or employee's dissatisfaction, reduced work efficiency or missed targets. Following figure shows the Organization Chart of TCET.

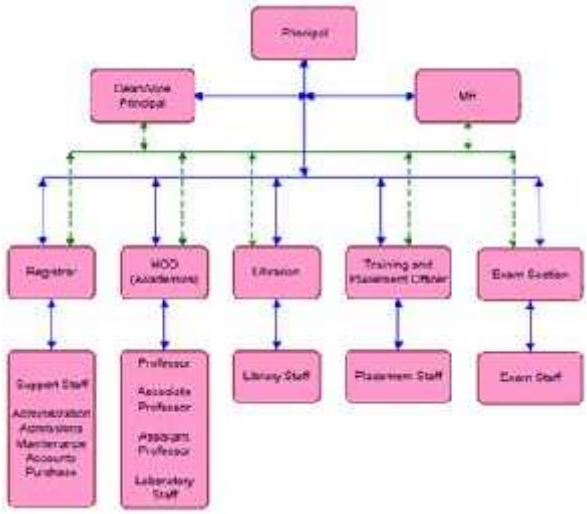

Fig. 1. TCET Organization Chart

A sample replacement chart for each key role can be prepared and implemented whenever need arises. For this responsibilities of key role positions should be listed, which is already done in terms of responsibility

matrix in quality manual of TCET. Necessary training for skill enhancement should be given to successor in advance before actual transition. Depending on short or long term replacement transition can be made with less or no friction at all. In figure 2, a sample regalement chart is shown with rank, name and readiness factor of replacement. The more the readiness factor, the less will be the friction in the transition.

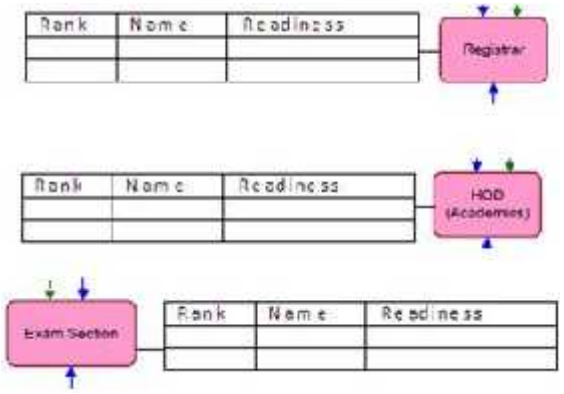

Fig.2. Sample replacement chart

VIII. RESULTS OF BEST PRACTICE

In TCET, we aim to achieve following results.

1. Changeover of key positions with minimum friction
2. Retention of talented faculties.
3. Focus on mission and vision of the organization

Succession planning ensures hiring internally which is beneficial to an organization in terms of time, money and efficiency. Internal persons are loyal to the organization and familiar with its goals and objectives, and current leadership is familiar with internal candidates' strengths and qualifications. Vacancies in leadership positions may disrupt the workflow and leave staff members with no clear, unified vision or direction. But when the potential hire has been selected and trained internally, quick and clean transitions can minimize disruptions caused when a leader leaves. One survey respondent commented that internal candidates have an edge because "they basically interview every day." They can also receive the daily training and experience to assume specific leadership positions in the future. Internal hiring can be more cost effective – it saves an organization time and money required to find, interview, and hire external candidates. Sometimes the budget cuts plaguing institutions restrict to hire their own staff, and succession planning in preparation for such a situation can help ensure that enough employees have the leadership skills to assume administrative or managerial duties if needs. Again, succession planning requires more than simply identifying candidates and hiring internally – a staff member with exceptional technical skills and experience needs to develop leadership and managerial skills to be qualified for top leadership positions. Institutions provide adequate job-specific training, but to implement succession planning, academic departments also need to provide opportunities for employees to develop managerial and leadership skills. A relatively small percentage of the professional staff have the aptitude or inclination for true managerial responsibilities. This limits our ability to develop leaders regardless of training. These are fine people and competent academicians but not oriented to management. The attitude described will make it difficult for leaders to implement succession planning in their department.

IX. IMPACT STUDY

Implementation of succession planning ensures why talented employees remain in the organization as they are valued and are encouraged to apply for senior positions. Reasons why employees leave the organization is lack of incentives for high performance, lack of promotion opportunities for talented employees, which forces them to consider joining the opposition when they are headhunted. Succession planning helps the organization to preserve good or better people and don't entertain who are not eligible for the same as per requirement. It helps to create the right leader or leadership skill for the organization in the future. It's a wide-ranging planning which protect the organization from any emergencies which may appear in the future. It also binds the organization with a single cord which is the permanency of the company. Succession planning inspires the institute or an organization to devote the huge span in training and development to ensure lower abrasion rate. It also shapes the overall policy of Human Resources in the organization.

A good succession planning can reduce the risk of educational disorganization, as far as appointing the rightful candidate to hold academic manager positions is concerned. This particular condition occurs either at the end of tenure or long leave or vacancy appointment. Hence, succession planning helps to ensure the

sustainability of an organization. The subsequent discussion focuses on the expectations required of academicians and hence display the impact of succession planning if it is adopted in institution of higher education. Effective managerial skills of academicians are essential as they create strong relationships between and within organizations involving the providers and customer's skills comprising theories, techniques and behavioral guidelines, if are effectively applied, will enhance the manager's practice. In the education set up, academicians are those responsible to the dean of faculty for matters pertaining to the management, organizing and delivering of duties for teaching, and the administration of research in the faculty. Within the faculty, academicians are required to manage the process of curriculum review which involves looking through the courses offered by the faculty. These include the mentoring duties on to the curriculum which involves course content, methods of delivery and assessment and most importantly the documentation of these matters, either manually or electronically, the duty also negotiation of these developments through the faculty and the university processes. This will include the development of links with other faculties in the University and, perhaps, with other universities with a view to the provision of collaborative courses. Academicians at his faculty level have to manage the process leading up to the faculty regularized teaching quality assessments. This includes preparing self-assessment programme, making recommendations for improvement, preparing and compiling of documentation, liaising with staff of the faculty academic office, ensuring detailed arrangements for assessment visits are made, meeting with assessors and also preparing for the process of accreditation of the faculty courses by the relevant professional bodies. These job specifications are essential requirements of academicians which warrants for managerial skills. Delivering the knowledge on managerial skills will require the teaching from leaders in a systematic best practice and this is commonly developed through mentoring relationships. Research on mentoring has evidenced that employees with mentors are much more likely to experience a range of positive outcomes. For more precise duties, in the faculty, academician's needs to assist with management procedures related to research activities. The duties will depend on other loads, but might at times include help with production of documents for the Research Assessment exercises and the faculty annual research report. Among others also include drafting publicity about the faculty and its courses for inclusion in the University's undergraduate and postgraduate prospectuses and other similar publications, including electronic information sources. The managerial skills of academicians have to be complemented by knowledge on attending and reporting to faculty committee meetings, and participating in several additional faculty committees related to management of teaching and research or external liaison. Academicians in the organizations have duties that involve them in the membership of various committees within the faculty as well as the university. They keep a very close liaison with other officers within and outside the faculty, in the faculty and the university, and at the same time assist in the promotion of the activities conducted by the faculty elsewhere in the University and to external agencies. Hence, the better way is to train academicians in a systematic pooling of potentials and prospects with development programme to ensure smooth transition of leadership and execution of duties. Although it is commonly practiced in corporate organization, good succession planning will systematically help prospective academicians to streamline their managerial skills to ensure effectiveness and smooth running of the institutions, for new leadership roles as the need arises or when one's term has ended. There is a need for selection criteria for these talents to be readily 'groomed' for managerial position in the academic institution. The establishment of the succession plan and related models help to nurture and strengthen the high performance culture in institutions of higher education via professional work force that exhibits self personality and professional personality, possession of competency and vital values towards sustainable achievement of their future. The key strategy of the succession plan is to mould and harness the talent of professional work force at academician's level to fill in strategic positions. It also aids in the career path and laid foundation of guidance necessary for the accomplishment of tasks and duties of the future.

The preparedness of the succession planning can be checked by asking following questions to the key position holders of the institute like Principal, Deans, HODs..

1. Skills required for the key positions [5]

2. How many people will be leaving the department / section / organization – both voluntarily and involuntarily – over the next five years?
3. Have you listed the skill sets those employees who are leaving will take with them?
4. Will you employ externally or promote from within to fill those gaps?
5. Where will our department / section / organization be in next five years?
6. What type of training opportunities do we need to provide to ensure our current employees develop the skills we need after five years?
7. Have you identified your successor? Mention the area where your successor needs training for executing your responsibilities.

X. WHY IT IS A BEST PRACTICE

In TCET succession planning is one of the best practices because it has helped us to stay focused on our vision and mission. Internal succession keeps faculties motivated. Friction in operations is minimized when a person is well trained for the new position well in advanced.

XI. CONCLUSION

The best practices have helped the technical institutes to construct a strong leadership to attain the educational objectives. These practices further accomplish technical institutes in broad perspectives to grow vertically and horizontally. The teachers and students as the major stakeholders of any institute benefit with best practices at greater scale. Therefore, it can be concluded that the use of implementation of best practices in the form of planning to avoid leadership or faculty crisis can enhance the efficacy which can lead to accomplish the desired goals.

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An Effective Activity Based Learning in an Autonomous Engineering System

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***Abstract*—Today, imparting an outcome-based education to engineering students has become the need of the hour. What used to traditionally be a teacher-centric approach, is now becoming student-centric with a range of pedagogical approaches in teaching now being thought of. Indulging students in the learning process to ensure active participation is the key idea behind the concept of 'activity-based learning'. In today's learner centric environment, activity-based learning has a vital role to play. This paper highlights the current trend of activity-based learning in engineering curriculum by addressing the manner in which it can be effectively conducted. An example of how activity-based learning has been effectively conducted in TCET has also been highlighted.**

Keywords— student-centric, outcome-based education, activity-based learning.

I. INTRODUCTION

Keeping in mind the societal needs and demand of young minds, practitioners of higher education have the challenge of teaching within the confines of a classroom with the intention of achieving pre-determined and intended learning outcomes. In today's outcome-based education system, the emphasis is more on making learners perform and practice the task they are intended to learn when they complete the course. Hence the need to align the activities constructively with the learning outcomes which forms the crux of Activity-based learning. [1]

It is important to frame the curriculum of Activity-based learning especially in an engineering institute in such a way that students are involved in activities that demands for role-play simulations, open-ended interactive problems etc. This will not only result in an active, conducive learning environment but will also enable good non-cognitive skills being developed by students. [1]. At the end of the day, it is important to transit from the method of learning which focuses on learners memorizing by rote in a knowledge acquisition system towards a system that encourages students to learn more consequentially with application of suitable skills [2].

Activity-based learning aims to engage students through activities increase their critical thinking ability. It also boosts the individual and team skills, improving communication skills among students, making students feel important in a classroom and so on [3].

The discussion on Activity-based learning in this paper is further divided into the following sections. Section II discusses the difference between learning from traditional teaching and learning through Activity-based learning. Section III discusses the current trend of Activity-based learning in engineering institutes across India. Section IV describes the activities undertaken under Activity-based learning in the TCET autonomous system. Finally, in Section V, suitable conclusions have been drawn.

II. TRADITIONAL TEACHING VERSUS ACTIVITY BASED LEARNING

In Traditional teaching, teachers play an important or an active role and when it comes to students or the learner, the role is basically passive. In traditional teaching, students rarely interact with the teachers. The only aim of traditional teaching is to make student learn by listening to the lectures. Traditional lecturing is what is followed from decades and it's something regular. For educating students in a better way and with good enthusiasm, Activity-based learning has been introduced that involves a student-centered approach where students interact with the professor instead of just listening to them. In Activity-based learning, students are motivated to interact and communicate with the professor as well as with the students rather than ideally just listen to the professor in conventional approach.[4]

In conventional teaching, students working capability can get suppressed to an extent as their involvement may not uniformly be the same. Studies reveal that there is significant difference between activity-based learning and learning from traditional teaching methods. Several conclusions have been drawn while comparing both learning methods and the most significant conclusion was that strategies for promoting active learning among students to traditional lectures can increase knowledge of the students and comprehension capability.[5]

III. ACTIVITY-BASED LEARNING IN ENGINEERING COLLEGES

Activity-based or modern learning is becoming an urge for modern day's learning approach which is student centric approach. These techniques are adopted by the professors of engineering degree. Endorsing these techniques becomes the need of the hour. Engineering colleges focus on the design, development, and fulfillment of subjects and also ensures that students are becoming more perceptive of design.

The primary motive of Activity-based learning is to strengthen the students practical learning process because study reveals that in India, the curriculum imparted to students involve students learning only theoretically. Engineering colleges are therefore aiming to focus on outcome-based education and to achieve this, objectives are predefined in the institute. Activities are included in the curriculum so that students graduate with not just conceptual know-how but also sound expertise.

Activity-based learning is intended to instill the following qualities in an engineering student which are listed below:[6]

- Student participation: Students collectively work for different tasks big and small so that they can be effectively engaged in doing activities in classroom.
- Critical assessment: Student are encouraged to focus on logical thinking and are asked to robust their capabilities to think out of box.
- Sharing of knowledge: Tasks are assigned to the students on varying topics which usually focus on interaction among the students and results in sharing the knowledge among themselves.
- Team-work: This helps improve levels of collaboration among team members

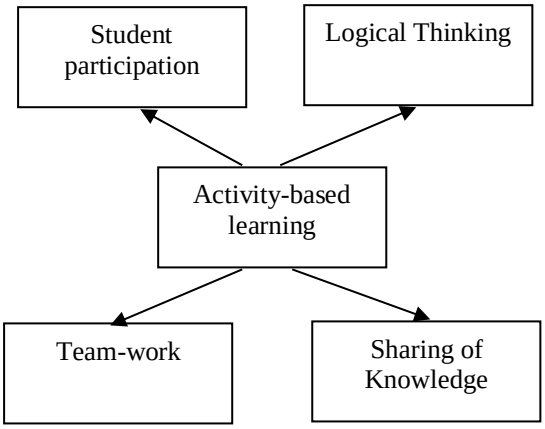

Fig.1.Salient features of Activity-based learning

IV. ACTIVITY BASED LEARNING IN TCET

In the autonomous system of TCET, Activity-based learning has been introduced within the curriculum of second-year engineering. Some of the activities that have been undertaken are as follows.

A. Debate

A debate is a formal way discussion on a particular matter in public. Debates are that kind of Activity-based learning which encourages a participant to read and think extensively and then verbalize everything together in one place. The tools for gauging students in a debate include quick thinking, sound argument and confident speaking. A facilitator of a debate looks out for qualities like reasoning, articulating, listening, responding and ultimately respecting one another.

In a debate program, students engage voluntarily in a social activity that reaps significant intellectual benefits, and rewards academic skills: quick thinking, sound argument, and confident speaking. three skills were considered essential for leadership and promotion of the best ideas: grammar, logic, and rhetoric—what we now know as reading, writing, and speaking. And for those who observe debates, they see citizens reasoning, articulating, listening, responding, and ultimately respecting one another. debate creates the sort of confident leaders who can direct public thinking toward moral and prosperous decisions.[7]

B. Technical & Non-technical Quiz

A quiz is a way to test the knowledge of a student about a particular subject in the form of mind sport. It was introduced by Richard Daly, manager of Theatre Royal in Dublin in the early 1790s. [8] Enhancing learning through such a gamified learning activity develops learning through student engagement and enjoyment.

This activity was conducted in the form of online quiz where students were given multiple choice type of questions. While the activity was conducted, a plethora of students showed great degree of engagement and enjoyment through technical and non-technical quiz.

C. Word Association Test

Word Association Test (WAT) is a written activity that helps read the personality that a student taking the test possess. Here, a word is shown and one is required to write a sentence using that word which comes to the mind first. On seeing that word there could be different ideas that come to the mind, however, writing the first spontaneous reaction is what is expected. For every word, 15-30 secs are given in order to not let the student get confused with subsequent thoughts and pens down his first thought about that word only.

Introduced by Carl Gustav Jung in 1910 [9], this activity has shown to have an emotional impact on a participant when used as a tool in psychiatry. WAT is known to tap the conscious and unconscious mind by getting unusual responses from the participants. While conducting this activity, as the facilitator, we found out that students wrote the sentences mainly based on real world situations and personal experience.

D. Thematic Apperception Test

Developed by psychologist Henry A. Murray, Thematic Apperception Test (TAT) involves showing the participants ambiguous pictures of people and asking them to come up with an explanation for what is happening in the scene. The purpose of the test is to learn more about the respondents' thoughts, concerns, and motives based on the stories they create to explain the vague and often provocative scenes depicted in the pictures. Subjects are asked to tell a story explaining what is happening in the picture including the events that led up to the scene, what is happening in the scene, what each of the characters is thinking or feeling, and what happens next [10].

While conducting this activity, we explained to the students to come up with a story that comprised of a primary character, several secondary characters and a suitable plot. Students were informed to use simple language, have vibrant shades of optimism if required and not write memorized stories.

E. Street play

Street play is a form of theatrical performance and presentation in outdoor public places which does not have specific paying audience. These spaces can be anywhere including shopping centres, college or university campus or street corners. The motive of performing in outdoor public spaces is to target large number of people. In India, street play also popularly known as 'Nukkad Natak' actors are mainly teachers and students who intend to bring about a social change in the society.[11]

This activity was conducted to sensitize the students and the audiences with the societal issues. Students were grouped and were allotted the topics of street play. Students were asked to script the plot of the play using optimistic language to pass on a strong message to the audiences.

F. Survey

A survey is a method to gather data from a group of people to acquire information on various topics. Surveys can help to gauge the thought process or opinions of individuals related to a specific topic. Surveys can be taken in two modes: Online and Offline.
Online survey can be conducted through various websites by circulating link to the participants. Whereas offline survey can be pen and paper based or verbal.

Students were clued-up to carry out this activity in online mode. The topics for the survey were related to commonly found societal issues. The information gathered through these surveys were assimilated by students and were later asked to make a statistical inference through presentations.

V. CONCLUSION

Studies have shown that Activity-based learning not only promotes holistic development of students but also helps create a more relaxed learning environment in the classroom. The conventional method of traditional teaching needs to be overcome by giving more opportunities to students to interact with one another and actively participate in the learning process. Activity-based learning does just that. It not only enhances the student's interaction level but also encourages implementing innovative and interesting instructional. In terms of achieving the set learning outcomes, Activity-based learning supports a balanced and integrated outcome of knowledge, right attitude and skill. Making students not only intelligent but also well-behaved and skilled is what sums up Activity-based learning in general. By discussing what activities have been undertaken under Activity-based learning in TCET, this paper has shown Activity-based learning as a learning approach that encourages and develops students' active participation in learning theories or concepts through various activities and hands-on experiences in a multitude of learning environments.

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Process of Question Paper Setting to Enhance Educational Productivity

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***Abstract*— In all educational developments, one of the most troublesome questions is that of evaluation. Written examination is the most widely used tool in evaluation and assessment of the competency of the engineering students. At present, questions are prepared casually just before the examination and are not subjected to any quality check, which may lead to confusion or wrong understanding of the questions by the students. This paper is aimed at providing guidelines and a scientific method to frame good question papers to improve the quality of evaluation and assessment of engineering students.**

Keywords— Question, Setting,Evaluation , Skills, Assesment

I. INTRODUCTION

Written examination is still the widely used tool of evaluation both in formative and summative evaluation. It cannot be replaced entirely by any other method. In contrast to practical and oral examinations, written examination leaves a record for revaluation in case of a controversy. The instrument used in the written examination is the question paper. Assessment is usually done at two levels: Internal assessment periodically, usually at the end of each term conducted by the departments known as formative assessment, in semester examination and end semester examination, usually at the end of each year conducted by the University, known as summative assessment1. For these examinations question paper setting is an important task. At present, questions are prepared casually just before the examination and are not subjected to any quality check, which may lead to confusion or wrong understanding of questions by the students. Moreover, the question paper quite often lacks validity, reliability, relevance and objectivity. The quality of question paper can be improved by adequate preparation1-3. Therefore, this paper is aimed at providing guidelines and a scientific method to frame good question papers to improve the quality of evaluation and assessment of engineering students.

II. QUESTION PAPER SETTING /PREPARATION

The steps involved in question paper setting are:

1. Decision on the design of question paper
2. Preparation of a blue-print of the question paper
3. Preparation of a model question paper
4. Preparation of a marking scheme
5.Refining the question paper
6.Editing the question paper
7. Review of the question paper

III DESIGN OF A QUESTION PAPER

The decision of the design of question paper is a policy decision, which has to be made by the Dean/Principal of the college, in consultation with the Engineering Education Unit. The recommendations of AICTE affiliated Universities are to be followed. The points to be decided are:

1. Weightage to be given to different forms of questions i.e. how many essays, short answer type questions, very short answer type questions, or multiple-choice questions should be decided to make a balanced question paper. This also involves decisions on the number of question papers in a subject, number of marks, total number of questions, and time allotted for the paper. The number of sections in each question paper also requires to be decided.
2. Weightage to be given to different learning objectives and to different topics or areas of the subject. If the educational objectives were already divided into must know, desirable to know and nice to know categories, the same weightage can be adapted in the question paper. Since the terminal examinations are for certification of the competency of a learner in terms of knowledge and skills that he is supposed to acquire at the end of a course, the question paper should not be made very difficult. On the contrary, the question paper should aim at finding out whether the minimal skills/knowledge required has been achieved by the student or not.
3. Guidelines regarding the use of options, nature of sections and difficulty level of the paper are also required to be delineated. Once the above decisions are made, it is advisable to write them in clear and simple terms. Such a document will help at a later stage to write the instructions to the Question Paper setters.

IV. BLUE-PRINT OF THE QUESTION PAPER

Blue-print of a question paper, also known as table of specifications, is a two-dimensional chart giving

placement of different questions (in terms of marks and number of questions) in respect of objectives tested by the item(s), content area under which item is framed, and the form of question (Table 1).

Table 1: Blueprint of question paper

Objectives / content area	Knowledge (Recall)			Understanding (Interpretation)			Application (Problem solving)			Skill	Total
	O	SA	LA	O	SA	LA	O	SA	LA		
Total											

O = objective; SA = short answer; LA = long answer

V. PREPARATION OF A MODEL QUESTION PAPER

The model question paper is written on an item card. A model item card is given below.

Table2: Model item card

Objective: Content area/Topic: Form of Question: Question	Marks: Estimated difficulty level: Estimated time:	
Model answer	Points of answer	Marks for the points

VI. PREPARATION OF A MARKING SCHEME

Once a model paper has been prepared, the next step is to evolve a marking scheme. The purpose of marking scheme is to assign proportions of marks to different parts of the answer. There are two types of marking schemes – Analytical (Objective type and short answer type) and Global (Long answer type).

VII. REFINING THE QUESTION PAPER

After the model question paper and the marking scheme has been made, a second critical look at the questions is recommended. While reviewing questions to refine them, the following questions need to be asked:

1. Does the question test an important learning outcome?
2. Is it based on a predetermined objective?
3. Is the scope of the well defined as regards to:

- Clarity of directions?
- Language of the questions?
- Length of answer?
- Marking scheme?
- Appropriate difficulty level?

A question should be relevant to the set objectives of the course. The emphasis should be on the professional skill and competence. Derivations and Analytical questions can be asked in long questions. The questions should not relate to trivial or insignificant, vague and diffuse topics. The following questions given as short notes in Application on Satellite communication are examples: VSAT application, CATV, MATV. Questions on a rare phenomenon or entity does not represent higher learning and does not necessarily judge the practical or professional ability of the student and hence must be avoided as far as possible. The length of the question paper should be such that it should be reasonably feasible for an average student to answer it within the stipulated time. The mark allotted to each question is usually predetermined, and it should be proportional to the length and difficulty level of the question. At the same time the questions sampled should be such that uniform coverage of the entire curriculum is done. The language should be clear, and unambiguous. The language should be understandable by an average student. Blooms taxonomy can be applied in the following specific areas:

1. Write and revise learning objectives
2. Plan curriculum
3. Identify simple to most difficult skills
4. Effectively align objectives to assessment techniques and standards
5. Incorporate knowledge to be learned
6. Facilitate questioning

Generally, Bloom's Taxonomy used for the following reasons also

1. Blooms Taxonomy system makes the teaching staff to think about the type of questions before they are put in black and white.
2. This brings about a clarity when questions are formulated by the staff members.
3. It is possible that the question paper is termed as tough or easy by the students. Bloom's Taxonomy assists the staff to bring out a balance while setting the question paper.
4. Consistency is also observed across all module question papers when Blooms taxonomy is introduced in the assessment system.

Special care may be taken to avoid spelling or grammatical errors which may cause confusion or even alter the meaning. "Open ended" questions are apt to encourage rambling by a student and it may be difficult to ascertain substance amidst the verbiage. Short answer questions without a 'stem' or verb do not indicate precisely what the examiner wants.

VIII.EDITING OF QUESTION PAPER

Editing is the next step in the preparation of the question paper. While editing the question papers, the following points are to be checked:

1. Grouping questions according to objectives, form of questions, content area, etc.
2. Numbering questions
3. Instructions for administration

IX. REVIEW OF THE QUESTION PAPER

The question paper may be reviewed with the help of the review of the checklist:

Table3: Checklist for reviewing of question paper

1	Has the paper covered the syllabus in a fair way without giving undue emphasis to one part or another?
2	Does the paper test the full range of abilities as defined by objectives in the syllabus?
3	Has the weightage to the various topics, different forms of questions and objectives adhered to the scheme shown in the blue-print?
4	Has the paper been set at an appropriate level of difficulty (i.e., the questions neither too easy nor too difficult to average students)?
5	Will the paper provide an adequate discrimination between performance of candidates of different abilities?
6	Does the question paper have comparability of options in terms of objective, content, form and difficulty?
7	Are the questions precise and unambiguous?
8	Is there any excessive overlap between questions?
9	Can the paper be satisfactorily answered in the time allowed?
10	Is the question paper comparable in standard with those set in previous years?
11	Does the paper avoid repetition of question paper from previous years?

The final step is to ensure confidentiality by sending rough sheets to the university or destroying them as per the instructions.

X. CONCLUSION

In this paper, a systematic approach will improve the quality of question paper setting in our examinations. The steps involved are plan the design, prepare the blue-print, prepare a model paper, prepare a marking scheme, refine the questions, edit the questions, review the questions repetition and quality check to improve educational productivity. It is necessary to mention here that application of Blooms Taxonomy should cover the learning outcomes of the module being tested. As we know that learning outcomes should form the basis for any type of assessment. It must also be mentioned here that the Blooms Taxonomy principles serve as guide lines to the staff framing the question paper but it is largely left to them to bring out a balanced paper as the final outcome. It is fair to conclude here by saying that the comments from the external examiners have become more positive on the question papers sent to them for review, after the introduction of Blooms Taxonomy in the college.

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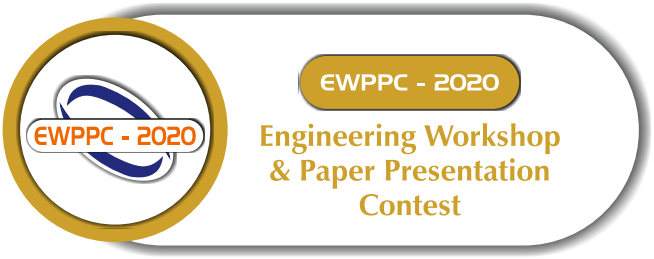





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