



ABHINAVARU

VOLUME 4 | ISSUE 1

DEPARTMENT OF ELECTRONICS AND
TELECOMMUNICATION

Dean's Message



Dr. Lochan Jolly
Dean(SSW)

Dear Students,

As a child, I was always fascinated by Tales of Arabian Nights, especially Aladdin and his Magic Lamp was my favorite. To be very frank I always dreamt of having a Magic Lamp, which I should Rub and a Genie should come out and fulfill all my desires. When I grew up like everyone I also accepted it is a Fairytale and it will never be true.

In 2013 I was given additional responsibility of Dean (student and staff welfare) and students overall development. I became in-charge of all student activities I started interacting with all student bodies i.e. professional, social and cultural. During my interaction whenever I used to float an Idea about some new activity, every time a voice would come from the group "Miss kaam ho jayega". I never received a reply "Maam it is difficult or cannot be done". These replies gave me a belief and confidence to do new and innovative activities. I could experience the energy and enthusiasm which was in abundance among the students to take every idea to its completion.

When it came to actual implementation, I and my team came across some misalignments from expected track due to ego clashes, selfish interest, power game, groupism etc. It was a big challenge to overcome this hurdle. Initially we used to address specific problem and try to sort out the issue but it did not help. So, from this year we started the activity called orientation for social, cultural and professional body office bearer students. The objective of the activity was to orient the students to take the college platforms for holistic development of all the students in a positive way. In this program we started addressing team with some words of wisdom about ethics and general code of conduct and motivated them to work in a team. We started experiencing that things became simpler and easier to implement.

We realized my childhood dream to have a Magic Lamp is fulfilled. The Genie of magic lamp is that you only need Ideas with proper orientation and motivation to work in a team.

Believe me you students are my strength and you give me confidence to start new things. I take the opportunity through this platform to say thank you to all of you for always being there.

God bless you all.
Take care.



HOD's Message



Dr. Vinitkumar Dongre
HOD, EXTC

It is indeed a happy moment for our Electronics and Telecommunication Engineering Department as the students have successfully brought out the another edition of the technical Magazine “Abhivarg” for the year 2018-19. ” which brings the students and teachers of various domains on a common platform to share and display their ideas and creative talents. The big theme today is to focus on creativity and innovation alongside academics. It is research and development that fosters innovation and out of the box thinking, be it in design or in implementation. As the department always strive hard to provide value based technical education and to mould the character of the younger generation, through synthesis of science and technology, so that their earnest Endeavour to achieve prosperity in life is matched by an ardent desire to extend selfless service to the society, The technical magazine is one of those initiative taken by the department to motivate the students to present their talent and innovative ideas, the efforts taken to bring about this innovative content is truly considerable.

This year for the first time Abhivarg has involved Parents to showcase their views through this medium. I would like to thank them for putting their valuable efforts and making our magazine more informative. A section, like always has been dedicated for acknowledging the individuals who actually made a difference by participating in different extra and co-curricular activities. A reader may also find some tips given by individuals who have cracked tough competitive exams. The magazine has blend of articles which will surely enlighten students and give them the inspiration to do something extraordinary in life. I congratulate the editorial team for the hard work and dedication they have invested in realizing goal, and wish my dear students success in all future endeavors.

Faculty Incharge's Message



Ms. Megha Gupta

Hello my dear students,

Its time again for me to interact with you all. Every time I write this message I think what to write? This time I had interacted with many alumni students for articles, for expert lectures, for industrial visits etc. Every time I interacted with any of the student I got to know something new. One of our student who was preparing for Gate since last two years, received a call from IIT Guwahati, but he rejected the offer. When asked for the reason, he said, Ma'am, I deserve better than this!!

One of our alumni is working at, Aeronautical Development Agency(Ministry of Defence) Bangalore. His experience is far imagination. He is working on what all he had learnt during his engineering and implementing knowledge beyond learning. He was an average student during his four years of engineering, but during his third and final year of engineering he had left all his extravaganzas and fascinations, and was completely dedicated to his studies.

Few of our students have worked really hard to be a part of a core company like Reliance Jio. I just wanted to share the experience with these students as these students give me a pleasure of being Mentor, a teacher. A teacher's value is determined if students approach them, remember them after leaving the college. With these words I would like to wish you all a wonderful journey for your future!!

Stay Blessed and have a bright future!!

All the best!!

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STUDENTS ARTICLE

FACULTY ARTICLE





Dr. Ruma Debnath
Assistant Professor

AN INTRODUCTION OF ND:YAG LASER & ITS APPLICATIONS

The 'LASER' is the acronym of 'Light Amplification by Stimulated Emission of Radiation' which is actually a device as shown in fig. 1 below emitting electromagnetic radiation to generate an intense beam through an optical amplification process based on the stimulated emission of photons. In 1960 [1] Theodore Maiman demonstrated a pulsed ruby laser as first laser device. Lasers are having three most important properties as Monochromaticity, Coherence and highly collimated i.e. Directionality [2]. The monochromaticity property of laser defines the ability of the laser to produce light having one wavelength. Coherence means that all photons emitted from the laser are at exactly the same phase and the collimation i.e. directionality property of laser allows it to stay as a tight, confined beam for large distances. The principle of laser is based on three features as Stimulated Emission within an amplifying medium, Population Inversion of electrons and an Optical Resonator.

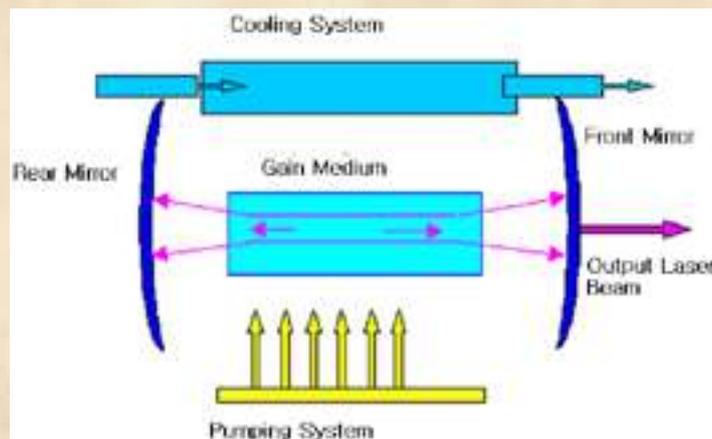


FIG.1 A BASIC LASER SYSTEM

The most essential elements of a laser are a laser medium also called active medium, a pumping arrangement and an optical feedback system [2]. The gain medium of a laser is a material of controlled purity, size, concentration and shape, which amplifies the beam by the process of stimulated emission. It can be of any state: gas, liquid, solid or plasma. The gain medium absorbs pump energy, which raises some electrons into higher-energy (excited) quantum states. Particles can interact with light by either absorbing or emitting photons. Basically, a cavity consists of two mirrors placed facing each other such that light bounces back and forth between them and each time passing through the gain medium which amplifies it. However, one of the two mirrors is named as output coupler having partial transparency of particular oscillating wavelength. The output laser beam is emitted through this output coupler. Moreover, the process of supplying energy required for the amplification of the propagating beam is called pumping. The energy is typically supplied as an electrical current or as light at a different wavelength, may be provided by a flash lamp or another laser. During emission, the photon is emitted in the same direction as the light is passing by. However, as the number of particles in excited state exceeds the number of particles in lower energy state, population inversion is achieved. Hence the amount of stimulated emission is larger than the amount of absorption due to which light is amplified and this makes an optical amplifier itself that generates a laser while placed inside a resonant cavity. The laser generated by stimulated emission is very much similar to the incident beam having wavelength, phase and polarization which gives laser light its characteristic coherence and allows it to maintain the uniform polarization and other monochromaticity established by the optical cavity design.

Various types of lasers are developed according to wide range of physical and operating parameters. According to physical state of the active material, lasers are characterized as solid state, liquid or gas lasers. If lasers are characterized by the wavelength of emitted radiation, then they are classified as infrared lasers, visible lasers, and ultraviolet, x-ray lasers.

Solid state lasers are popular in applications of medicine, military, pumping, manufacturing, automotive etc [3]. Nd:YAG is the most working solid state laser gain medium due to its excellent physical, chemical and optical properties [4]. Nd:YAG crystal is a commonly used active medium for solid-state lasers, because of its high gain and good thermal and mechanical properties. It is a laser based on YAG crystal. YAG is a host medium with favorable properties, particularly for high power lasers and q-switched lasers emitting at 1064 nm. Generally the crystalline host is doped with around 1% neodymium by atomic percent [5]. Laser operation of Nd:YAG was first demonstrated by Geusic et al. at Bell laboratories in 1964 [6]. It is a four-level gain medium (except for the 946 nm transition). It offers substantial laser gain even for moderate excitation levels and pump intensities. The gain bandwidth is relatively small, but this allows for a high gain efficiency and thus low threshold pump power.

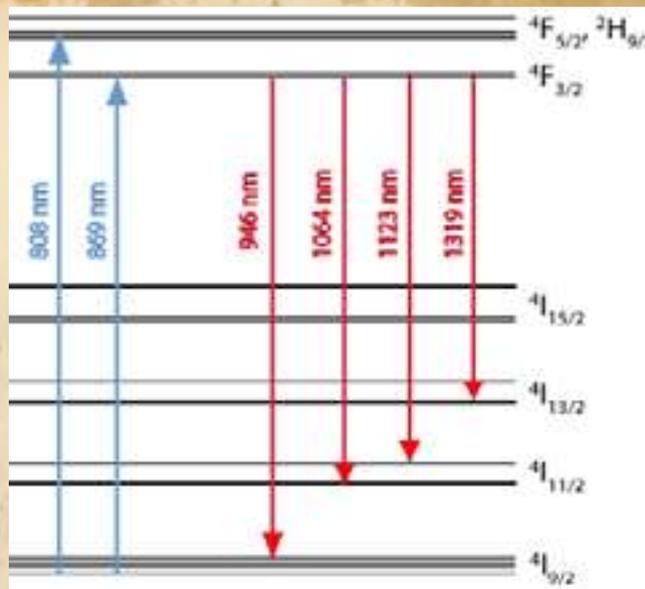


FIG.2 ENERGY LEVEL SCHEME OF ND:YAG

Nd:YAG lasers can be diode pumped or lamp pumped. It is the most commonly used solid state laser. Diode pumped solid state lasers can generate laser radiations of wavelengths by different nonlinear optical processes for various applications ranging from spectroscopy, laser machining, laser surgery etc. Diode pump based solid state lasers are gaining momentum in recent years because of their better performance and newer applications. Emission lines of Nd:YAG are at 946 nm, 1123 nm, 1319 nm and 1444 nm etc. Among them most common emission wavelength is 1064 nm. Outputs of this wavelength are at 532 nm, 355 nm and 266 nm can be generated by frequency doubling, tripling and frequency quadrupling respectively. Typical neodymium doping concentrations are of the order of 1 at %. High doping concentrations can be advantageous as they reduce the pump absorption length, but too high concentrations lead to quenching of the upper-state lifetime. The chemical formula is $Nd^{3+}:Y_3Al_5O_{12}$ (yttrium aluminum garnet). The crystal structure is cubic, mass density is 4.56g/cm^3 . Melting point of this crystal is 19700 C . Refractive index of Nd:YAG crystal at 1064 nm is 1.8 and fluorescence lifetime is 230 ns. Absorption cross-sections at 808 nm, 946 nm, 1064 nm, 1319 nm and 1338 nm are $7.7 \cdot 10^{-20}\text{cm}^2$, $5 \cdot 10^{-20}\text{cm}^2$, $28 \cdot 10^{-20}\text{cm}^2$, $9.5 \cdot 10^{-20}\text{cm}^2$, $10 \cdot 10^{-20}\text{cm}^2$ respectively. Other common host materials for neodymium are: YLF (yttrium lithium fluoride, 1047 and 1053 nm), YVO₄ (yttrium ortho vanadate, 1064 nm), and glass. A particular host material is chosen in order to obtain a desired combination of optical, mechanical, and thermal properties. Nd:YAG lasers and variants are pumped either by flashtubes, continuous gas discharge lamps, or near-infrared laser diodes (DPSS lasers). Pre-stabilized laser (PSL) types of Nd:YAG lasers have proved to be particularly useful in providing the main beams for gravitational wave interferometers such as LIGO, VIRGO, GEO600 and TAMA.

Laser diode array pumped Nd:YAG lasers are gaining momentum in recent years because of their performances and newer applications by using different nonlinear crystals. Frequency doubling and tripling of Nd:YAG laser radiations at 1.06 μm , 1.3 μm and 0.946 μm wavelengths in a nonlinear optical medium may be a source for laser radiations in the visible region of red, green and blue respectively [7-8]. Simultaneous multi wavelength oscillations (SMWO) of ND:YAG have found important application in different fields of laser radar [9], nonlinear optics [10], laser spectroscopy [11], optical communication [12], chemical identification [13] THz frequency generation etc [14]. Among them simultaneous dual wavelength laser (SDWL) oscillation attracts more attention due to its importance in medical uses [15] and THz frequency generation [14] by difference frequency mixing (DFM) technique [16]. Bethea [17] first reported SDWL oscillation of Nd:YAG (Neodymium-doped yttrium aluminum garnet, Y₃Al₅O₁₂) laser at both 1.06 μm and 1.318 μm in 1971.

However, second harmonic generation (SHG) through non-centrosymmetric medium is a well-known phenomenon. The anisotropic crystal (uniaxial or biaxial) having $\chi(2)$ nonlinearity and high birefringence property is commonly used to convert fundamental into second harmonic wave [18]. The efficiency of this conversion mainly depends on the direction of fundamental wave through the crystal, the phase matching and coupling between fundamental and second harmonic wave. Therefore for high efficient second harmonic generation it is necessary to propagate the fundamental wave into phase matching direction to get maximum coupling between fundamental and second harmonic waves. However, during phase mismatch condition, the generated second harmonic wave (up-conversion) is partially back-converted to fundamental wave (down-converted) with different phase with respect to the initial fundamental wave after coherence length inside the crystal. This phenomena is known as cascaded second order nonlinearity ($\chi(2)(2\omega;\omega,\omega): \chi(2)(\omega;2\omega,-\omega)$) which can build up equivalent effective third order nonlinearity ($\chi(3)$) larger than natural third order nonlinearity [19-20] within nonlinear crystal. In this phenomenon, one second order nonlinear process is followed by another second order nonlinear process in phase mismatch condition that introduces a phase shift between the launched and reconverted fundamental waves. Basically nonlinear crystals having large effective third order nonlinear coefficients are very rare. Therefore materials having large second order nonlinear effects can develop equivalent effective third order nonlinearity ($\chi(3)$) through cascading of second order nonlinear effects [21]. Cascaded second order nonlinearity has vital applications in self-focusing and self-defocusing.

[22], spatial solitons [23], all-optical switching [24], transistor action [25], high-speed optical shutters [26], electro-optical detection [27], electro-optic switching [28] etc. Depending on the phase mismatch, the fundamental wave focuses or defocuses within the crystal having cascaded second order nonlinearity similarly in Kerr media having $\chi^{(3)}$ nonlinearity, applicable for mode-locking of solid-state lasers for CW operation [29]. Earlier many works have been reported on solid state lasers for introducing cascaded Kerr nonlinearity within the several nonlinear crystals to perform Kerr lens mode-locking (KLM) of continuous wave pumped solid state lasers [22]. Among them Potassium Titanyl phosphate (KTP), Rubidium Titanyl Phosphate (RTP), Beta barium borate (BBO) are excellent nonlinear optical crystal which are widely used in cascaded second order nonlinear applications [30-32]. Due to their high nonlinear coefficient and higher optical damage threshold they are also efficient for SHG [30, 33-35]. Besides their higher second order nonlinearity, they also have high indirect third order nonlinearity which can be developed through cascaded second order process.



Shikha Sharma Gupta
Assistant Professor

Performance Evaluation of Ultra-thin Bulk (UTB), SOI MOSFET

Device miniaturization is an important part of VLSI design, which refers to reduction in dimension of device by keeping all other characteristic constant. As technology node is moving in submicron region, the performance of the device degrades due to short channel effects and narrow channel effects. The key issues due to these effects are drain- induced-barrier- lowering (DIBL), leakage current, hot electron reliability, punch through, sub-threshold slope, oxide breakdown, mobility, body effect, parasitic capacitance and parasitic resistance. The effects can be reduced by by Substrate Engineering.

In the early 1960's, the co-founder of Intel Corporation, Gordon Moore observed that the total number of transistors on an integrated circuits doubles every year. He predicted that this trend will be continued in future as shown in fig.1 [1].



Fig.1 : Plot of Transistor Counts against Dates Of Introduction , Moore's Law.

In subsequent years, this scenario will move down a bit, but the density of data doubled approximately every 18 months, and thus Moore's defines this definition as the current definition. When the magnitude of the channel length is of the same order as that of the width of depletion layer of source and drain junction, then the MOSFET devices is considered to be short.

In the MOSFET device if the length of the channel L is reduced upto certain extent, then the speed of the device increases and hence, the device will perform faster. Simultaneously the number of component per chip also increases. Due to reduction in the channel length of the device, the Short channel effects (SCE) arises. These effects are DIBL (Drain Induced Barrier Lowering), Punch Through, Hot Electron Reliability, Sub-threshold Current, Oxide Breakdown which severely affects MOS device performance. In order to reduce these effects Ultra-thin bulk (UTB), Partially Depleted SOI MOSFET and Fully Depleted SOI MOSFET [9] have been proposed. SOI reduces the above effects with least process complexities. SOI provides higher immunity to SCE (Leakage issues, sub-threshold and variability issues due to scaling) which further shrinks CMOS Technology. These devices are very attractive in terms of low power dissipation, higher speed VLSI applications because they have small parasitic capacitance and parasitic resistance. In general, it is believed that thin film SOI MOSFET's have ability to withstand SCE compared with bulk MOSFET's.

Short channel effect (SCE) arises when the magnitude of channel length is of the same order as that of the width of depletion layer of source and drain junction. Due to these the device behaves differently from other MOSFET's. In MOSFET device, if the length of the channel length L is reduced upto certain extent, then the operation speed of the device increases and the number of components per chip also increases, then the short-channel effects arise. These short channel effects are assigned to two physical phenomenons: the limitation enforced on electron drift characteristics in the channel and due to the shortening channel length the threshold voltage changes. In particular different short-channel effects can be drain induced barrier lowering(DIBL) [5], punch through, sub-threshold slope, hot electron reliability[8], leakage current[6][7],oxide breakdown, mobility, body effect, impact ionization, velocity saturation, parasitic capacitance and resistance.

SUBSTRATE ENGINEERING - Due to scaling, the technological as well as the economical benefits in very-large-scale-integrated (VLSI) circuits decreases. Thus the alternative way to increase the performance and speed of MOSFET's is to use different channel materials such as germanium and strained silicon. It has been believed that almost all of the performance benefit in CMOS implementations will derive from the n- MOSFET, PMOSFET demonstrate enhanced hole mobility, but the enhancement has been done to degrade at high vertical field. If the scaling has to be done upto the limits of the ultimate scalability, the device has to be such that the conducting channel is strictly under gate control and diffusion of the lateral field is minimized. By increasing substrate doping, the minimization have been accomplished. When there is a subsequent increase in substrate doping, the thickness of the depletion layer reduces under the channel and due to this strong coupling between the bulk and the channel is formed. This results in reduction of inversion charge density and weakens the gate control.

If the thickness of oxide scaled down, there occurs strong coupling between the gate and the channel. With the thickness reduction of gate oxide the supply voltage also scaled down and thus there is a need to control threshold voltage more precisely. Due to dopant fluctuations, higher bulk doping leads to more variations in threshold voltage. Therefore there is a need to reduce doping concentration of bulk, which is incompatible with the requirement of strong bulk control. A method to minimize the effect of bulk doping concentration is to reduce the bulk material. A SOI MOSFET structure have limited amount of bulk material on an insulating substrate. Partially Depleted MOSFET's are used in a number of applications. With the advancement in the technology the thinning of silicon film give rise to fully depleted SOI MOSFETS.

SILICON-ON-INSULATOR (SOI) As devices are made smaller some effects severely affects the device. All silicon device structures have some built-in problems related with parasitic circuit elements which are arising from junction capacitance. A method to avoid these type of problems is to fabricate devices in small islands of silicon on an insulating substrate [2] with Silicon- On- Insulator (SOI) wafers. In SOI, transistors are formed in thin layers of silicon that are separated from the main body of the wafer by a layer of electrical insulator, usually silicon dioxide [9]. Fig.2 [2] given below presents comparison of bulk MOSFET structure and SOI MOSFET structure. The capacitance at the source and drain junctions can be significantly reduced by SOI by removing the depletion regions extending into the substrate. The above technique helps in reducing the RC delay and hence provides a higher speed performance of SOI CMOS devices compared to bulk CMOS mainly at lower power supply voltage. The key advantages of using SOI are as, Reduced Source and Drain to Substrate Capacitance, Absence of Latch up, Lower Passive current, Higher Density and Low cost. SOI devices can be classified into two main categories: FDSOI (fully depleted SOI) MOSFETs and PDSOI (partially depleted SOI).

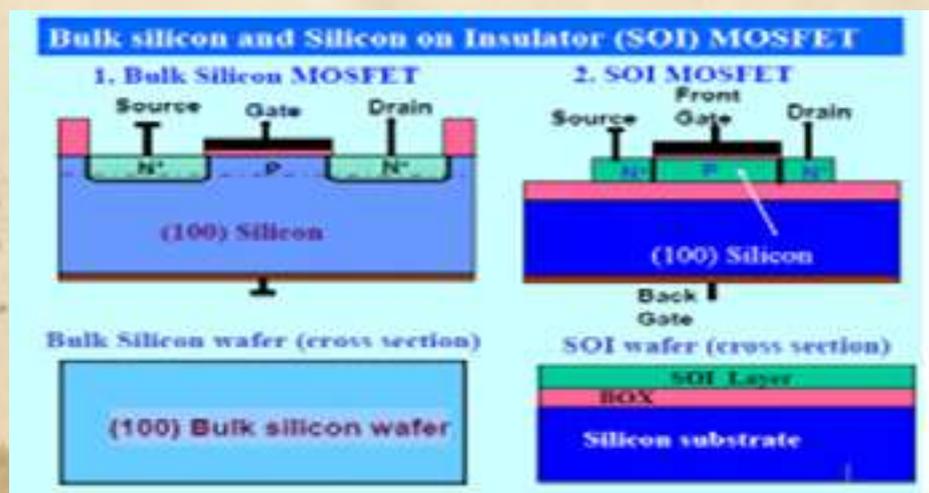


Fig.2 Bulk MOSFET Structure and SOI MOSFET Structure

In PARTIALLY DEPLETED SOI, the body is wider than the depletion region. As a result, variation in bulk voltage can occur depending on the amount of charge present. Because of the body effect [3] the variations in charge changes the V_t . In PD-SOI body is partially depleted and floats independent from bulk substrate. This floating body boosts performance but introduces history effect, kink effect.

Fully Depleted Silicon on Insulator or FD-SOI is a planar process technology, an ultra-thin layer of insulator called the buried oxide is placed above the base silicon. This ultra thin bulk thickness can be 10 or 25nm. Finally, a very thin silicon film makes the transistor channel. Because of this thin silicon film, doping of the channel is not required, hence making the transistor Fully Depleted. Hence it is called “ultra-thin body and buried oxide Fully Depleted SOI” or UTBB-FD-SOI [10]. In terms of construction, this very thin silicon layer allows the silicon under the transistor gate, known as the body of the transistor, to be fully depleted of charges. This makes the gate to have a good control over the full transistor body. Hence making it better than a Bulk CMOS transistor, as supply voltage (hence gate voltage) decreases and transistor dimensions also reduces. FD-SOI helps in solving issues related to scaling, leakage and variability to further reduce CMOS technology beyond 28nm. It offers several advantages [4]. The superb electrostatic control of the transistor boosts the performance of FD-SOI and hence VDD gets lower (resulting low power consumption) at the same time creating an impressive performance. FD-SOI reduces the random fluctuation of dopant atoms, hence making transistor threshold (V_T) less variable. Because of this SRAM becomes stable and dense, and functions at a very low VDDmin. FD-SOI is intrinsically Low Leakage and retrieves better control over Short Channel Effects. One consequence is that as we are able to shrink the gate length aggressively, devices gets fit into smaller and smaller pitches and hence increase logic density. These above attributes are outcomes of using UltraThin Body devices, as they require no doping in channel (and consequently do not get affected from Random Dopant Fluctuation, which is becoming an crucial problem for Bulk CMOS) and exhibit wonderful electrostatic control of the channel. Therefore gets concluded into excellent V_T variability, limited Short Channel Effects, low DIBL (Drain Induced Barrier Lowering), very good Subthreshold Slope, and diode leakage and minimum junction capacitance [11], [12]. SOI permits transistors that may succeed beyond the boundary of the standard CMOS technology. For SOI circuits a dedicated technology and design is needed to overcome the limitations of microelectronics. With the improvement in the quality of the material and better control over the technology, the processing of alternative devices becomes more practical. Hence concluded that SOI has wide applications in the world of Nanoelectronics. Our result shows that the thickness of SOI TSi limits the scaling potential of FD to about 4 TSi. The performances of Fully Depleted devices are better as compared to Partially Depleted devices. PD devices offer the advantage of improved sub threshold behavior at the shorter gate length at the cost of lower on-currents.

PARENTS ARTICLE





ARUNA PHATALE

INDIAN SIGN LANGUAGE



DR. VANDANA
MALODE

Communication is the exchange of information between two people. Communication plays a very important role in human life. Human express their ideas with communication. Communication can be done by using different ways. Normally communication is carried out with speech and gesture. But some people don't understand this language. So, to express their ideas they use a different language called Sign Language (SL). Sign language is used by deaf and dumb people known as differentially abled person. They use special symbols called sign and understand sign language. To recognize sign language different methods and techniques are used. There are different techniques which are used for recognizing sign into text such as ANN, SVM, HMM which are used in Feature extraction during the Sign conversion process. But every technique is not suitable for dynamic process.

Deaf and dumb people use their hand to express their ideas. Indian sign language differs in the syntax, phonology, morphology and grammar from other country sign languages. The gestures include the formation of English alphabet. Sign language is a combination of conventional gestures, hand signs and finger spelling, plus the use of hand positions to represent the letters of the alphabet. Signs can also represent complete ideas or phrases, not only individual words. There are different sign languages such as American Sign Language, British sign language, Korean sign language.

While the act of transferring message using facial and hand gesture is known as a nonverbal communication. Deaf people can use nonverbal communication. They use sign language.

INTRODUCTION: -

Sign Language emerge and develop naturally within deaf and dumb communities. Each sign language has its own grammar and rules, with a common property that they are all visually perceived. Indian sign Language is not the official sign language of India in spite of 6 million deaf and dumb populations. Sign language is the active area of the research involving pattern recognition, natural language processing, computer vision and linguistics. It becomes difficult to recognize because the signs are made with hands, facial expression and other part of our body.

There are two main approaches used in the sign language recognition that is glove based and vision based. In first method user must wear the gloves which is not reliable because gloves carry a load of cables to connect the device to a computer. Such devices are expensive and reduce the naturalness of the sign language communication. In contrast the vision-based method requires processing of image features like texture, color, shape etc.

Sign consist three main features 1. Manual feature –It involve gestures made with hands. 2. Non-Manual-It consist facial expression or body posture which can both from part a sign or modify the meaning of a manual sign. 3. Finger spelling- where words are split out gesturally in the local verbal language for the word, whose sign we do not know.

Sign are either one handed or two handed. In one handed sign only one hand is active at a time while in two handed signs both hands are active, and they may or may not touch each other. So, in two handed gesture while signing, some fingers or even a whole hand can be occluded. This is the major problem in the task of recognition.

According to survey by taken government of India it is reported that over 21 million of people in India suffer from some form of disability. Out of this 7.5% people have disability with speech and 5.8% people face hearing disability. It is necessary that this part of our population should be equally treated as the rest of the society. This is achievable only when all these challenged people are given equal opportunities of education. To bring the gap some additional efforts require. More than 1 million of adult and 0.5 million children in India make use of Indian sign Language. But this number is very less. According to the profile year 2012 (People and Language Detail Profile), around 173 Students (only 45.4%) use Indian sign language.

With a low literacy rate, advancement in school is extremely difficult. Only a few qualified interpreters are available in a few schools. When the education is primarily “oral”, comprehension is much lower. A pool of trained interpreters does not exist. Interpreter training courses began in the year 2001 through the central government organization, (Ali Yavar Jung National Institute for Hearing Handicapped). Even if interpreters were available, the cost of hiring one, would likely be prohibitive for either parents or the schools.

Deaf and dumb youth's Greatest Needs (teens) is a better educational system with teachers and administrators trained in sign language. They need sign language to be used in classrooms along with oral methods. More schools could be developed for the Indian Deaf in cities that lack them. Indian Deaf teachers are needed. The Deaf may be trained as teachers of the Deaf, and few deaf teachers may be designated in each school for the Deaf. This would provide good adult Deaf role models as well as motivated and committed teachers.

According to the profile year 2012 (People and Language Detail Profile),

- Education Primary Schools 850
- Primary School Enrollment 34,500
- Secondary Schools 50
- Secondary School Enrollment 1,500
- Percent of Eligible Students Enrolled 2%

Most schools and clubs for the Deaf are located in cities; thus, the majority of the Indian Deaf in rural areas (59%) have no access to education. Fifty-nine percent of the Indian Deaf live in rural areas without access to schools or deaf clubs (Government of India, Ministry of Social Welfare 1981). Schooling is not mandatory in India and in most cases the family must pay for school.

Signs are either one handed or two handed. In one handed signs, only one hand is active at a time while in two handed signs, both hands are active and they may or may not touch each other. Sign language consists of words or finger spelling. Finger spelling is used to prepare words with the combination of letter coding. Letter by letter sign can be used to express the views for which sign does not exist. But for finger spelling no signs are used. So, this is the key importance of Indian sign language.

In two handed gesture while signing, some fingers or even a whole hand can be included. This is the major problem in the task of recognition.

1. Deaf and dumb people use their hand gestures when they want to communicate with normal people. But it is very difficult to understand the sign language for normal people.

2. Static gesture can be easily recognized, but dynamic gestures are difficult to recognize. For different application, different dataset is required.

3. Majority of the people who were born deaf or who became deaf accidentally early in life have only a limited vocabulary of spoken language. For them it is essential to create a standard dataset.

In different country different sign languages are used which has different abbreviation. It is mentioned in the below table.

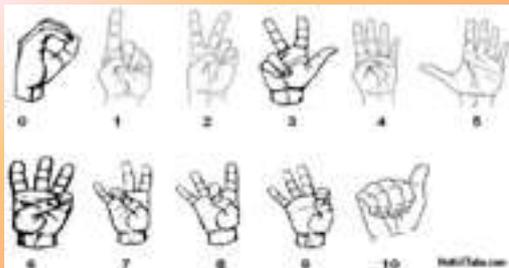
Table 1.1: Development of sign languages in different countries

SR.NO	COUNTRY	SIGN LANGUAGE	ABBREVIATION
1	United Kingdom	British Sign Language	BSL
2	United State of America	America Sign Language	ASL
3	Japan	Japanese Sign language	JSL
4	China	Chinese Sign Language	CSL
5	Australia	Australian Sign Language	AUSLAN
6	Middle-East	Arabic Sign Language	ArSL
7	India	Indian Sign Language	ISL

In other country sign languages are taught in school as a separate subject. So they can easily communicate with normal children. That's why deaf and dumb people don't get disturbed and get many opportunities in job or social events.

From this year 24rd Sept. is declared as a Sign language day. The government is also making such events so that deaf and dumb people also get equal pride in society.

ISL NUMBERS



1/8/2018

12

ISL MANUAL ALPHABET



1/8/2018

1

CONCLUSION:

Some techniques are used for static hand gesture, some for dynamic. This system can be useful in real time application with any background color, and is well suited for static as well as dynamic gesture. The deafness children can make the sentence and easily communicate with teacher and fellow student.

INDUSTRY INTERACTION



WE DO WHAT WE PRETEND TO BE GOOD TO



Mr. Vaibhav Singh

Automation Engineer

Siemens PP and Logistics Services for Airport

We always try to do something which is best for our careers prospective and in accordance to that we follow someone who is successful in his life but we forget to consider there environmental factor or background. So we have form a goal for career in accordance to our safer zone and environment. So we try to list some profession which we go for but not listen by chance. That may be based on our education (after engineering) or hobby.

ENGINEERING:

AFTER ENGINEERING WE GO FOR JOB (IF WE GET AND IF WE WANT) BUT MANY OF US GO IN IT FIELD IF YOU LIKE IT AND WANT IT GO FOR IT. BUT, WHO DON'T YOU HAVE MANY MORE OPTIONS.

CORE FIELD:

THIS FIELD INCLUDES ELECTRICAL, ELECTRONICS, CIVIL, MECHANICAL ETC. THOSE WHO WANT TO OPT FOR IT SHOULD HAVE VERY STRONG COMMAND ON CORE SUBJECTS AND YOU HAVE MANY OPTIONS.

Confused about your career options
after B.Tech?



•1. GATE (Graduate aptitude test in engineering) :

Graduate Aptitude Test in Engineering is an examination which opens the gateway to booming public organisations and the field of research. GATE is an All-India examination administered and conducted in eight zones across the country by the GATE Committee comprising of Faculty members from IISc, Bangalore and other seven IIT's on behalf of the National Coordinating Board, Department of Education, Ministry of Human Resources Development. We have two options after GATE.

M.TECH:

After getting a decent percentile in GATE we can opt master of technology in many fields in our core domain and depending upon marks we get IISc, IIT, NIT, IIIT, government colleges for M.Tech and get decent stipend plus in IITs you get project pay from company for which we do project and at the end probability of getting core company placement is very high.

PSU:

Public sector unit is very good option after good GATE score card it can be Maharatna (HPCL, BPCL, ONGC, Power Grid ,IOCL), Navratna (BEL,NACL,NMDC etc), Miniratna (AAI ,BSNL ,BEML ,etc) and some central government and state government companies like ISRO, DRDO, DIPP.

Private services:

Many MNC also recruit students through GATE and direct paper like L&T (electrical ,civil, mechanical),TATA steel.

Direct paper for precious institute:

Indian space research organization(ISRO) & Bhabha atomic research center (BARC) conduct paper for scientist directly after Bachelor of engineering and Tata institute of fundamental research (TIFR).

2. Masters in Economics:

Economics is field which based on your interest regarding GDP generation, current affairs, export& import, liquidity and share market prediction .It's totally depend on mathematics (integration and derivative) and analytics skill. Economics offers graduate and post-graduate in science, commerce and arts. But, we won't heard of science background person doing masters in economics but its very latest field to explore and best institute like IITs, IGIDR, DSC etc. We can get placed in R&D cell of any financial and mutual fund industry with very high pay.

3. MBA from IITs campus:

When you search for top Business Schools, names of few Indian Institute of Technology (IITs) stand-out. IITs are not only popular for its engineering programmes but also for its management programmes. MBA programmes provided by IITs also rank high in top business schools list. We can go for core companies through IITs and placed in R&D cells of firm. NITIE is very famous in IIT Bombay campus.

4. Actuarial science:

Actuarial science is the discipline that applies mathematical and statistical methods to assess risk in insurance, finance and other industries and professions. Actuaries are professionals who are qualified in this field through intense education and experience. Actuarial science includes a number of interrelated subjects, including mathematics, probability theory, statistics, finance, economics, and computer science.

5. CEED (Common Entrance Exam for Design):

Common Entrance Exam for Design is organized by the Indian Institute of Technology, Bombay. It is a national level entrance exam of design course which is conducted on behalf of Ministry of Human Resource Development (MHRD), Government of India. The exam is a gateway to get admission in M.tech and Ph.D design courses. After qualifying the exam, candidates can get admission in IISc Bangalore, IIT Bombay, IIT Guwahati, IIT Hyderabad, IIT Kanpur and many other institutions.

6. C-DAC (Centre for development of advance computing):

C-DAC recognizes the value of its intellectual resource and offers them the best not only in terms of a congenial but a competitive work environment, a competitive package with benefits and perks that match some of the best in the country. It offers courses in professional electronics VLSI & embedded system, cyber security and cyber forensics etc.

7. SSC (Staff selection commission):

Staff Selection Commission (SSC) is an organization under Government of India to recruit staff for various posts in the various Ministries and Departments of the Government of India and in Subordinate Offices.

- Scientific Assistant in metrology
- Junior engineer
- Officer in Income tax department
- Officer in Ministry of external affair
- Officer in CBEC
- Officer in CAG

8. Defence (Army, Navy, Air force):

After engineering we can go for technical officer in defence industry like HAL, BHEL, DRDO

Air force:

Air force conduct exam called AFCAT for flying pilot, flying officer, ground duty officer.

Army & Navy:

A good scorer in engineering can fill form directly after notification and get call for interview and can be placed as Lieutenant general or technical officer.

CDS (Combine defence service):

CDS examination is conducted twice a year by the Union Public Service Commission for recruitment into the Indian Military Academy, Officers Training Academy, Indian Naval Academy and Indian Air Force Academy maximum age limit 25 year. It's an aptitude test that includes logical reasoning, arithmetic, English, general science and current affair.

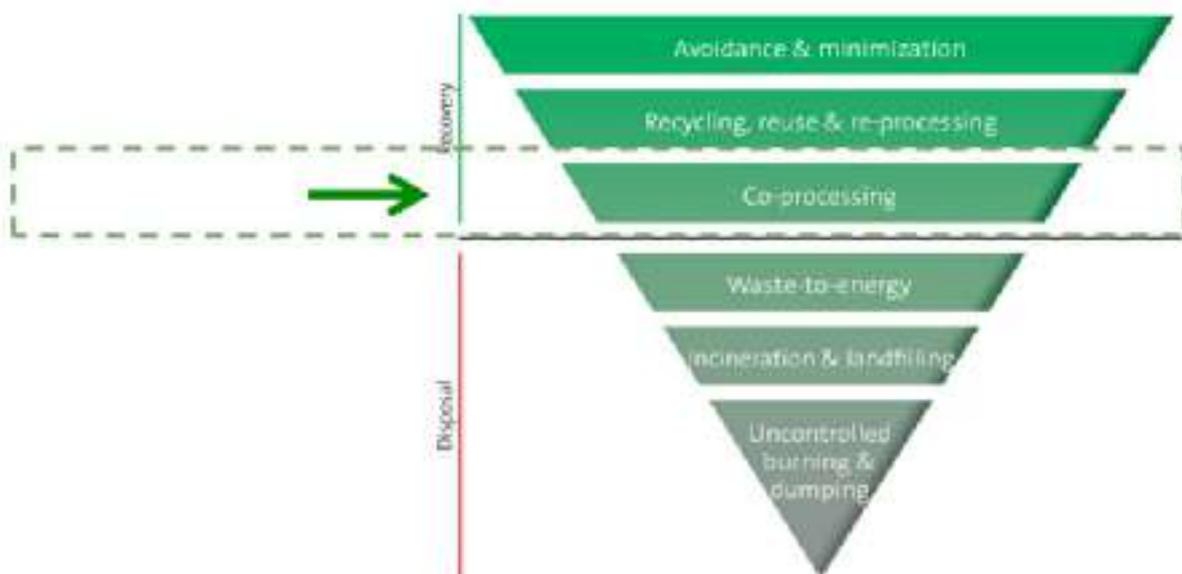


Mr. Kaushal Vyas

Assistant Manager, Business and Market
Geocycle India
ACC Limited

Having finished his engineering from Electronics and Telecommunication department, Kaushal was not too keen to take up a job in the IT industry as was the general trend of the placements, so he took up a role of a Business Development Consultant at a start-up that had visited for the campus placements. Following a 1 year stint at this start-up and the passion to work for the cause of environment, Kaushal completed his MBA in Energy and Environment from Symbiosis Institute of International Business, Pune. Here, Kaushal secured a campus placement at Geocycle India.

Geocycle is a waste management brand of ACC Limited and Ambuja Cements Limited within India and globally, a group company of LafargeHolcim, world's largest cement manufacturer, headquartered in Switzerland. Geocycle has been providing waste management services to various industry sectors in over 50 countries across 5 continents for managing waste by disposing it through co-processing in cement kilns.



Waste Management Hierarchy

Co-Processing in cement kiln is a scientific, proven & established technology for disposing hazardous & other non-recyclable waste in an environmentally sustainable way. Due to its advantages in terms of complete destruction of waste and no residual left over, cement kiln stands apart and above the different methods of waste disposal like incineration, waste to energy and land filling in the waste management hierarchy, as shown below.

Basel Convention Technical guidelines have adopted cement kiln based waste co-processing as a preferred option to traditional waste management methods. Developed countries in Europe, Japan, USA, Canada and Australia have successfully co-processed different types of wastes in cement kilns since the beginning of the 1970s. Various countries have successfully achieved a TSR (Thermal Substitution Rate) over 40 per cent and in certain cases even up to 90 per cent.

The circular economy, when applied to waste management, consists of 3 levers: avoid landfilling, foster industrial symbiosis and increase resource efficiency. This concept is the essence of Geocycle activities. Geocycle's operations adopt co-processing of waste in cement kilns as an approach to bring the concept of circular economy to life through turning unusable waste into a safe, usable resource. This approach provides a practical answer to the problems raised by the current linear resource model: take, make, use and dispose. Geocycle provides sustainable, safe and reliable answers to society's waste challenges; striving to bring society a step closer to a zero-waste future.

The waste before it can be co-processed successfully inside the cement kilns, it needs to be pre-processed and brought in the form in which it can fed inside the kiln. A cement kiln is huge cylindrical structure with almost 90 meters in length and 6 meters of diameter. Any waste that has calorific value, gets used up as an alternate fuel and any waste that has material value gets used up as an alternate raw material for the cement manufacturing process inside the cement kiln. The various stages of pre-processing are shown in the picture below.



Unsorted waste to Processed waste

The temperatures inside the cement kiln are in the range of 1400 to 2000 degree Celsius which ensures that there is complete thermal destruction of waste and no residue remaining at the end of the whole process, thus nothing goes to the landfill, ensuring zero liability for the waste generator, towards the environment. At such high temperatures, the organic constituents of the waste are completely destroyed into CO₂ and water. All the acidic gases are neutralised by the alkaline materials present within the kiln, as Calcium Oxide is the primary ingredient for cement manufacturing, which is alkaline in nature. Lastly, the inorganic constituents including the heavy metals react with the raw materials and become a part of the clinker matrix.

Geocycle treated 10 million tonnes of waste in 2017, an increase of 13 percent versus 2016. 10 million tonnes is almost twice the total yearly household waste generation of Switzerland or the equivalent of 2 million garbage collection trucks. Globally, through its 80 waste pre-treatment facilities and 180 co-processing facilities Geocycle offers sustainable solutions to more than 10,000 customers. Geocycle has developed its facilities utilizing its leading edge proprietary technology and helps divert solid waste from landfill and uncontrolled dumping, reducing pollution of land and oceans.

Currently, more than 16.9 million tonnes of CO₂ emissions is prevented through recovery of energy from the waste processed by Geocycle and there lies a huge scope of prevention in years to come.



A Cement Kiln



Mr. Jerson Fernandes

Embedded Systems

Wikipedia defines it as a programmed controlling and operating system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts.

Modern embedded systems are often based around micro-controllers (i.e. CPUs with integrated memory and / or peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) may also be used, especially in more-complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).

Since an embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance.

Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

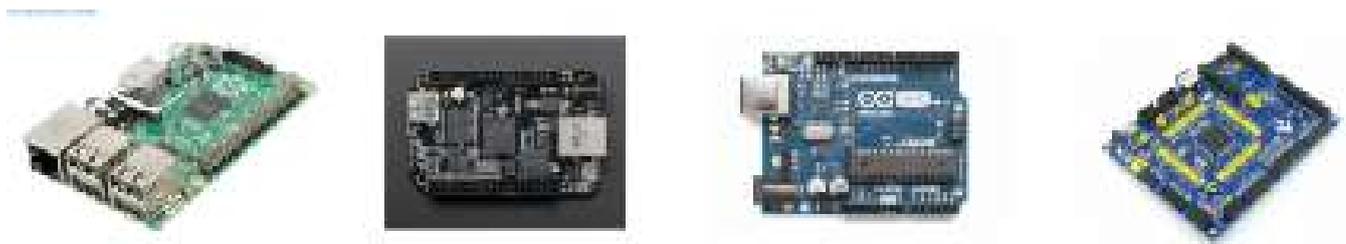


Embedded systems are designed to do some specific task, rather than be a general-purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs.

A common element used in very-high-volume embedded systems is the system on a chip (SoC) that contains a complete system consisting of multiple processors, multipliers, caches and interfaces on a single chip. SoCs can be implemented as an application-specific integrated circuit (ASIC) or using a field-programmable gate array (FPGA).

TYPES OF EMBEDDED SYSTEM PLATFORMS:

Numerous microcontrollers have been developed for embedded systems use. General-purpose microprocessors are also used in embedded systems, but generally, require more support circuitry than microcontrollers. There are several ready to use platforms like the Raspberry Pi, BeagleBone, Arduino, ARM.



SOFTWARE ARCHITECTURES:

Embedded systems firmware architectures revolve around certain constructs.

1. Super loop construct

In this, the firmware executes a software loop which in turn calls various sub-routines(functions) to effect various actions. This is the simplest construction and is most often used in tiny/small sized projects.

2. Event controlled system

The time spent by the embedded system is broken into foreground and background tasks. In the foreground, time-insensitive functions keep the system running and up-to-date. The interrupt systems is the backbone of the event handling mechanism. In this, the signalling of an interrupt generates an immediate response by diverting the processor to service the event. After the event is handled, the processor returns back to what it was doing in the foreground. An example is how a telephone call / message interrupts you from what you're doing. You would attend to the interruption and then resume what you were doing.

3. Multi-tasking

Multiple tasks running simultaneously according to human perception. There are two basic types of multi-tasking that are used : co-operative and pre-emptive.

In co-operative multitasking, each task runs to completion and then hands control to the next task. This is also called round-robin multitasking.

Pre-emptive multitasking splits the processor time among a number of tasks. This is done by using a scheduler that switches tasks either at a specified time or based on priority of an event associated with it.

When you speak of multitasking, you will encounter the RTOS (real time operating system). A RTOS offers time determinance in an embedded system. Many complex systems use an RTOS for their working. Since the integrity of data is to be maintained between task switches, a RTOS uses message queues, semaphores, mutexes to ensure sanity of the overall system.

An important difference between most embedded operating systems and desktop operating systems is that the application, including the operating system, is usually statically linked together into a single executable image. Unlike a desktop operating system, the embedded operating system does not load and execute applications. This means that the system is only able to run a single application.

RELIABILITY OF AN EMBEDDED SYSTEM

Various techniques are used to ensure that an embedded system works reliably when deployed for use. The watchdog timer, brown out reset, power up timer, EEPROM lock are some such features that ensure to build reliability of a product.

A watchdog timer is a periodic interval timer that resets the processor if it is not refreshed before it runs out of time. Run-away code or blocking code would essentially freeze the system and make it unresponsive. The watchdog reset brings the system back to a running state.

The brown out reset ensures that the processor will run the programmed code in the proper sequence when a power line glitch throws it out of sync. The brown out reset fires when the processor supply dips below the specified brown out reset voltage threshold.

The EEPROM lock ensures that writes to the EEPROM memory block are not triggered accidentally by a processor that has lost control due to a power glitch or otherwise. A specific sequence of instructions delivered to the processor within a particular time frame opens the lock to enable writes to the eeprom.

PROGRAMMING

Most embedded systems these days are coded in C or C++. When speed is essential, programmers may include inline assembler code to get the best performance out of the processor in use.

Debugging is usually done using an ICE (in circuit emulator) or a ICD (in circuit debugger) using a JTAG port on most new chips or a ICSP port in slightly dated chips.

HOW DO YOU GET STARTED?

The arduino family provides ready to use boards with a lot of peripheral modules as shields. These can be a good starting point for your journey into the embedded world of computing. There is a huge potential for embedded computing as a lot of new technologies take for granted the availability of an embedded computer to provide multiplicity of features at a low cost.

Hope you will find information provided in this article useful to get yourself motivated to design and develop embedded systems. Wish you a happy journey into this world.



ALUMNI ARTICLE



Mr. Kaushik Mishra

Mr. Kaushik Mishra is currently a Junior Electronics Engineer at JSK Innovative Technology Pvt Ltd, Mumbai. He has done his graduation in Electronics and Telecommunications from University of Mumbai in 2017. He is involved in R&D work at JSK Innovative Technology Pvt Ltd and is also responsible for Testing and Quality assurance of products developed in the company.



"JSK Innovative Technology Pvt Ltd" ISO certified is popular with its brand name JSK URJA in the market.

At JSK URJA we manufacture specialized LED Dimmable Drivers. Currently we have launched Digital Dimmer (1st time in India) and Dual phase dual color driver which is small in size and cost effective.

In coming future we are going to launch WIFI and Bluetooth based Smart Drivers. Our company provides a good platform to fresher's to learn and work in the field of electronics.

I joined the company in the year 2017. I was provided basic training by our senior engineers on electronic components and circuits. After completing my training I got to work on products such as TRIAC based dimmable driver and Analog based dimmable driver.

In the past one year I have worked on number of products and was able to gain knowledge of various types of PCBs and their designing. I have got hands-on experience on designing softwares such as Proteus, Eagle, Protel, Altium etc.

I have done R&D on TRIAC dimmable driver and was successful in resolving the issue of Flickering.

My job in the company is quite wide spread from manufacturing to quality assurance of final product. If any problem occurs like pad is not of correct size, masking is not proper, track is missing etc. I have to rectify the problem with the design and resolve the issue. I also need to read various datasheets of components and decide which one is better and can be used in the product.

At JSK URJA we also get an opportunity to interact with clients. It helps us to understand their requirements and helps us to figure out what new developments we can bring in our product.



Mr. Pratik Jain

Blender – Rendering the World of Imagination

Do you have stories running in your head which you want to bring out but do not know how to do it? Is it difficult to visualize the 3d objects in the 3d space? Wonder how people do VFX, how can a person talk to himself in a movie as a double role character? Why are the green screens used in the industry nowadays everywhere? Can we make use of the VFX and make such videos? Or are you good at understanding concepts and want to spread them to the world using animation? Well if these are the questions you ask and want to find an easy, simple, less complex and FREE solution then the answer is Blender.

Blender is OPEN SOURCE software and can be downloaded to any Windows MACOS or Linux operating system for FREE. Are you a good programmer? If yes great it can help in your blender experience. Blender is written using C, C++ and Python language, if you have a good command on python you could be able to do things a bit fast as the syntax is almost the same. NOT a programmer? Well it doesn't matter; Blender has a fantastic GUI (Graphical User Interface) and everything that you want to do in blender can be done with the help of mere clicks on the GUI using mouse or using a couple of shortcuts using your keyboard. Once you get familiar with the GUI and the keyboard shortcuts making a video is as easy as recoding a video from your mobile camera.

Where to start learning blender? Nowadays with the growth of internet knowledge has just become free and very easy to get just the one thing you need is interest and determination. Edx is one of the best websites if you want to learn almost anything, with the best teachers coming from the best universities making best possible videos to enhance your learning experience. Coming back to blender there is a course which is a 4 week course which will demand hardly 3 to 4 hours per week! This course is from IIT Bombay. This can just open gates for your learning in blender. The course just deals with basics with no prerequisites required.

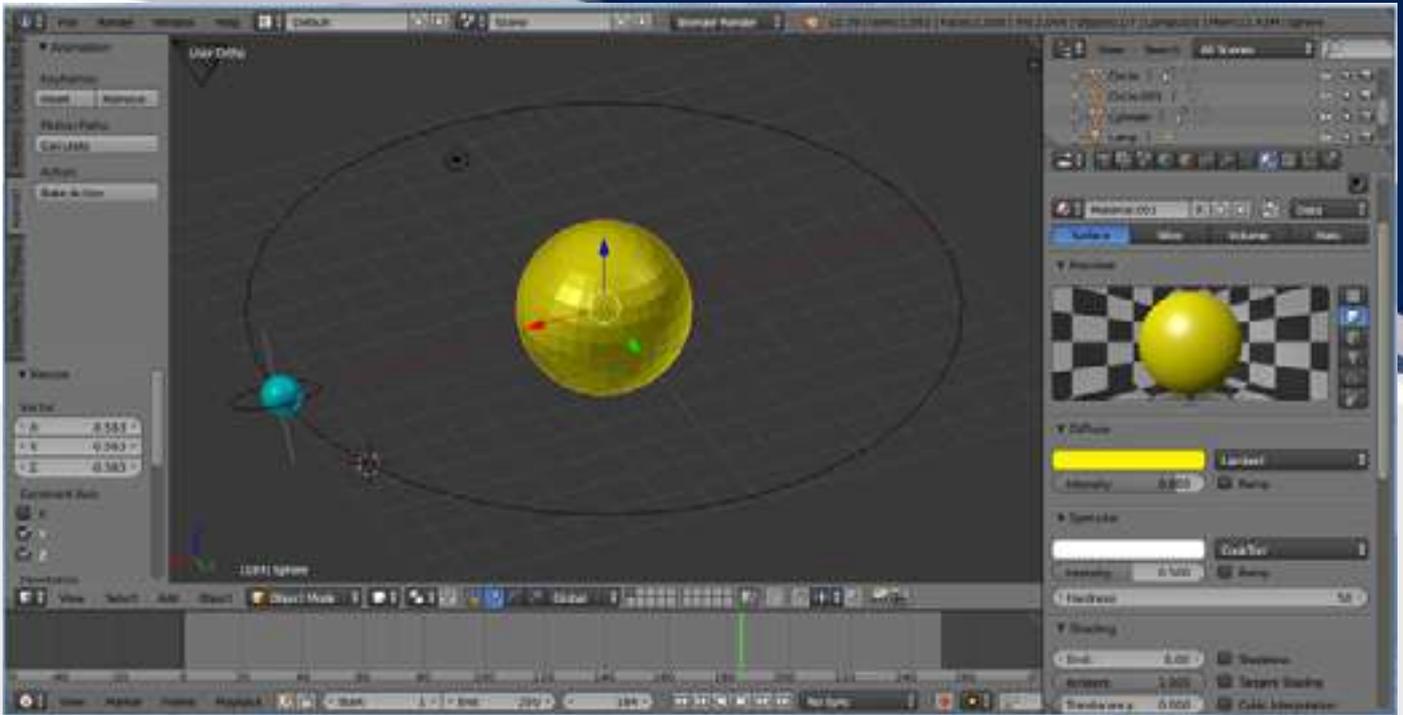


Figure 1: GUI of blender with a basic orbital system as the object

Engineering a field which requires a lot of visualization talking about EXTC we have Satellite communications, electromagnetics where 3d visualization can actually build interest in these subjects and with the YouTube platform you can earn pretty good if your videos actually help the viewers.

IMPORTANT LINKS:

<https://www.edx.org/> (Official website for edx courses)

<https://www.edx.org/course/basic-3d-modeling-using-blender> (The basic course from IIT Bombay on blender)

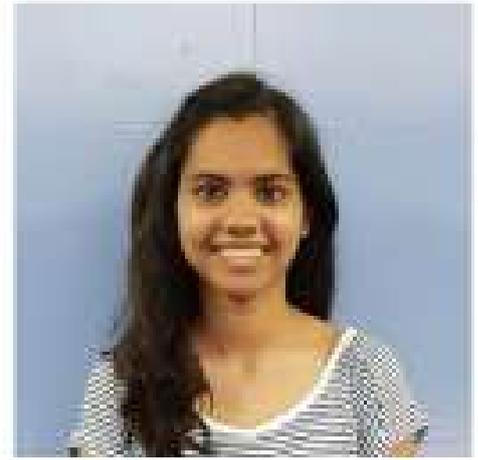
<https://www.edx.org/course/basic-3d-animation-using-blender> (the basic course on using animation in blender from IIT Bombay)



Internship



DISHA REVANDAR SE EXTC B



DOORDARSHAN

Doordarshan is a public service broadcaster owned by the Government of India. It has been extensively used by the government to telecast in case of emergency and war. I had the opportunity to visit its Mumbai office to study and analyse the various domains and sectors involved in its daily operations.

I was introduced to the Audio and Vision mixing processes. A vision mixer is a device used to select between multiple video inputs. A video signal consisting multiple inputs is converted into a single output. An audio mixer combines various sound signals from multiple electronic devices and also adjusts the volume levels, source positions, etc. Various reverberation and echo effects can also be achieved.

Later I learned about the Camera control unit (CCU) and the CAR room present in Doordarshan. In CCU various camera parameters like iris, colour and temperature are controlled while in the Central Apparatus Room (CAR) a stabilised power is provided to various technical areas present in the organisation.

I was also given brief information about Computer Graphics room, Editing room, Tape library and Playback room. These are the places where the clips are edited and processed before being transmitted. I also witnessed the live telecast process.

The transmitter section was the most interesting section to study. In Doordarshan the embedded audio and video signals are transmitted to terrestrial transmitters or satellites via uplinks and downlinks. In terrestrial transmitter, the transmission takes place through local transmitting antenna while satellite transmission takes place with the help of earth station. Doordarshan has both the facilities available.



It was also fascinating to know about the ENG setup, DSNG Van and the OB Van. An electronic news gathering setup is a single camera setup consisting a colour camera, portable VTR and a time based corrector. The ENG setup is in cooperated in a DSNG Van. A DSNG Van is widely used for live news coverage, while an OB Van is a mobile studio used for outdoor live events. The transmission is satellite based via uplinks and downlinks. An OB Van usually consists of an Audio and Video Mixer panel, VTR area, Camera control unit and a transmitter.

Doordarshan gave me knowledge about television signal transmission and it's processing. A brief idea about television and its broadcasting was achieved.

ROHIT SHARMA TE EXTC B



EXNST & YOUNG

“It always seems impossible until its done”

The experience of working as an intern at Ernst & Young was fascinating and was enough to mould me as I advanced into my career. Ernst & Young being one amongst the Big Four globally, was an attraction and I could not afford to lose this opportunity.

After attending a few seminars and workshops on Cyber Security held in different colleges, I was quite keen to know more and more. ‘Hacking’, a very fancy and attractive term was a difficult task and it wasn’t a piece of cake. Many IT Security institutes claimed to provide certifications, but even after getting a Certificate in Internet Security and Ethical Hacking, I wasn’t really satisfied with the time and money I spent for the certification. There was a huge amount of knowledge lacking in me.

I was fortunate enough to get this opportunity based on my certification and I was called for an interview. Yes, an interview at the end of second year was frightening. I appeared for the interview, HR as well as Technical rounds and somehow I happened to clear both the rounds even after all the nervousness drying up my throat. Finally I got a call from one of the HR employees saying that I got selected and she told me that it will be a 3 months internship. I was not expecting this as I thought it would be a one month internship. My parents were actually more focussed on the internship than my academics which motivated me.

This being my first position in an office atmosphere, I didn’t know exactly what to expect. The environment here at EY is quite relaxed, yet it taught me how to behave in the workplace. Simply working in the office and getting used to everything here has definitely prepared me for whatever my next position may be. Just observing the everyday events has taught me more about teamwork, and how people can come together to get things done. Although sometimes I have to remind myself to use my inside voice, I feel I’ve adapted to the office life relatively well. In the initial first month I got acquainted to different people working in different sectors and their experiences.

I was given some reporting work which was not really about Cyber security or anywhere closer to it, but I could not complain, so I did it. Later there was a time when I used to work at different client locations in a day, one of them being the leading coffee company globally. Testing activities like Wi-Fi Penetration Testing, Vulnerability Assessment & Penetration Testing, Opportunistic Hacking, Network Infrastructure Testing etc. were performed and I got familiar to them.

It was super fun until my college reopened. I used to attend my college for the first half of the day and after that I used to go to work. I even had to do well in my college internal examinations. Getting scolded at college was becoming a routine everyday but staying calm and progressing was the key. It was a hectic job but it was worth it. I did learn a lot of things which I expected before beginning with the work. It was really a life changing experience for me as I really want to grow myself in the field of cyber security.

It is important for students to involve themselves in internship programs in order to be in a position of understanding the important aspects of work. Internships not only teach you about the work, but also how to work. Communication is a very important aspect in the corporate world. Like I said, this internship has improved my skills a ton, both off paper and on paper. I didn't realize it all of this time, but this position served not only as a positive learning experience, but a resume builder as well. I came into this with a resume that was basically naked, now I am leaving and I have lots of updating to do. My resume doesn't need a makeover, it needs to be restarted from scratch, and that's a good thing! I underestimated how much work I did that actually translates to my resume.

This has truly been a great learning experience and I'll be forever indebted to those who gave me at EY. As far as your internship goes, remember to always be friendly, work hard, and ask questions. Always ask questions. Hopefully you come away from your internship with as much as I did.



PRATI KSHA
SHRIVASTAVA
SE EXTC B

NAIR HOSPITAL



MANSI SINGH
SE EXTC B

We are very grateful to the perspective department of B.Y.L Nair Hospital and Thakur college of engineering and technology for providing us an opportunity to be a part of their internship activity, this helped us in learning something different from our domain, which is an important part for being a successful human that is the fundamentals of cooperate world. It will be very helpful in future for us.

We admit that our college is very much interested in student's over all development . TCET provides internship in the very first year of the engineering, which is not a topic of concern in many other colleges of engineering. It was a great experience working with the Nair staff members.

INTERNSHIP DETAILS:

The overall project was related to cloud software. The software was named as H. I. M. S (Hospital Information Management System). After the approval from M. C. G. M this software was supposed to be implemented in all 399 hospitals of Maharashtra that comes under M. C. G. M. We as an engineering student were supposed to observe and analyze the different problems faced while using the software and let them know about different additions that were required in the database. Apart from providing the assistance, we also learned about system Management, uploading data on the intranet portal ,barcode scanning and most importantly software security system .

Internet enabled software applications present the most common security risk encountered today , with software's ever expanding complexity and extensibility adding further fuel to fire. So the H.I.M.S software developers had come up with cloud software which is more secured and viable

The software was working on intranet, admin rights were blocked for security reasons and thus confidential information regarding the patients were secured. There were 32 modules in the software so as to facilitate the different department of the hospital with this software. This also created awareness in the public regarding the necessary basic identity proofs because while registering the software always required an aadhar card or mobile number as proof. We were also there to help the medical staff to understand the software, its working and assist them regarding the software. Overall experience was very nice and in all this process college was also very supportive for us.



MANALI PARAB TE EXTC B



GSM AND 3G TECHNOLOGIES AT MTNL

•Summary

The internship started from 11th of June, 2018. On the very first day I was assigned a mentor Mr.D.K.Jadhav who guided me throughout the internship tenure. For completion of the project I had to work with different departments to get practical exposure to various activities carried in those units. The first three days of the internship included a detailed orientation about the different existing as well as evolving Telecom technologies. The different departments I visited were as follows

- 11th to 13th June – Orientation
- 14th to 22nd June - Base Station Subsystem (BSS)
- 23rd to 30th June - Operation And Maintenance(OMC-R)
- 2nd to 6th July – Network Switching Subsystem (NSS)
- 7th to 12th July – Billing And customer Care (C&CC)

•Background

GSM Overview

Global System for Mobile Communication (GSM) is a standard developed by European Telecommunication Standard Institute for second-generation Digital cellular network used by mobile devices. It was first deployed in Finland in December 1991. 2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described as a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution, or EGPRS).

Overview of 3G

3G is the third generation of wireless mobile telecommunications technology. It is the upgrade for 2G and 2.5G GPRS networks, for faster internet speed. This is based on a set of standards used for mobile devices and mobile telecommunications use services and networks that comply with the International Mobile Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union. 3G finds application in wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV.

•Purpose

The main reason of working under this project was to acquire knowledge and hands on experience on telecommunication technologies and broadband communication system. After the commencement of the internship I was first trained to work on the traditional communication system i.e. landline (PSTN) and then we moved towards the emerging wireless technologies

•Conclusion

In the end I would like to conclude that it was indeed an enriching experience to learn about the conventional and newly developed communication technologies. The final conclusion is that the study of of GSM & 3G system operated and installed in MTNL has helped me to understand the practical variations in the theoretical concepts studied in our course plan. The study has also helped me to have a better understanding of current technologies being implemented and also the scope of further research in the field of communication. As we are moving towards software and IT sector, even communication sector is evolving itself into a software based hardware sector.



STUDENT ARTICLE



SALONI JAIN
BE EXTC A

TACTILE DEVICE FOR BLIND PEOPLE SURVEY ARTICLE

Blind people make use of the sensation of their fingers to read books and documents using a specially crafted script for them called the 'Braille Script'. Braille language is the one of the sources through which blind people can read and write but due to the unavailability of books in braille language they cannot read and write as normal person. This is the biggest barrier in their educational growth.

Each letter, number, punctuation mark, character is represented by a Braille Cell. A Braille Cell is made up of six dots that fit under the fingertips, arranged in two columns of three dots each. Each cell represents a letter, a word, a combination of letters, a numeral or a punctuation mark. In Braille, an alphabet is made up by a combination of six dots. Each character in Braille consists of one or more (to a maximum of six) raised dots. The position of the different dots represents the different letters of the alphabet. The first ten letters of the alphabet are formed using the top four dots (1, 2, 4, and 5). Adding a dot 3 makes the next ten letters and adding a dot 6 to that makes the last six letters. Each Braille cell or character is made up of six dot positions, arranged in a rectangular matrix containing two columns of three dots each.

Various methods are adopted to convert this Braille language into other forms of perception. They are as listed below:

1. Text to Braille converter (Software Based)

It uses an algorithm which enables the user to convert the Text which is available in English language into Braille Script and thus gives impetus for the visually impaired to read that text. These paper represents very simple models which can blind people easily handle.



2. Text to Speech Converter (Software Based)

Character Recognition/Pattern Recognition has become main aspect of Computer vision. Optical Character Recognition is a method where characters are recognized from images digitally. Many algorithms are available for this purpose but I Novel algorithm implements this in a faster and efficient way based on unique segmentation technique. This algorithm has been implemented in MATLAB R2010a with a set of test images and an accuracy of 98% has been obtained. Text to Speech conversion is an artificial tool that converts text to speech sounds. There are quite a number of methods to generate speech sounds but this Selective Speech Synthesis provides naturalness in speech sounds based on phonemes, diaphones and syllabus.

3. Text to Speech Converter (Hardware Based)

Visually impaired people face difficulties in interacting and gaining full advantage of computers. Recently, and with the fast evolution in technology, researchers proposed to give the blinds the ability to take advantage of these advancements. Accordingly, designers and engineers started working on projects that relate input and output devices to the computers in order for the blind individual to have full control of the hi-tech machines. However, investments in these kinds of hardware presented complexity in the design, in addition to the high cost imposed by the devices used. The projects objective is to design and develop a Braille System. Output Device for the visually impaired individuals that enable them to interact and communicate.

4. Braille Translation By Lee

The Braille Translation Program (Lee, 2006) is a program for Apple Mac OS X that translates the text to Braille as it is typed into the editor, and allows for the text to be edited. Changes are reflected immediately in both the ASCII Braille and Braille output. It supports translation into both Grade One and Grade Two Braille in different languages. The Braille Translation Program also supports the translation of Braille into print besides supporting the translation of print into Braille, it. The translation algorithm used was developed by Shannon Thrower (Thrower, 2005). Figure 2.5 shows a screenshot of the Braille Translation Program, with a section of text translated into Grade One Braille.

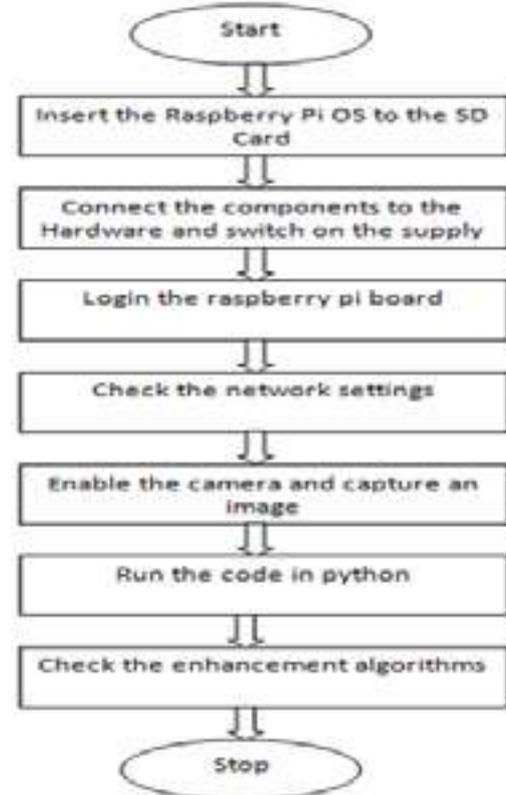
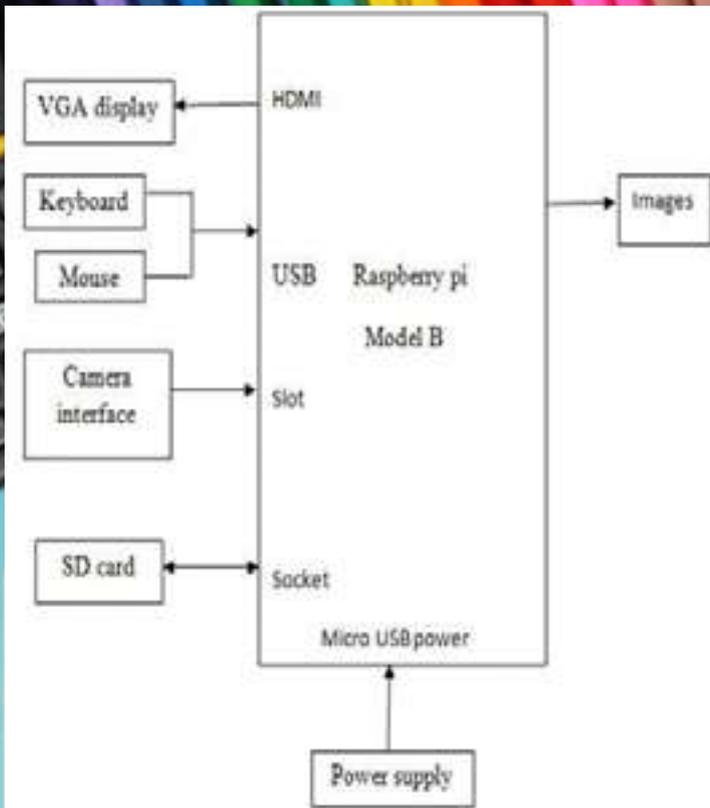


The Raspberry pi, camera module, braille keypad, Motor driver IC is the main components of this project. This device has a camera and braille keypad (2x3 matrix) with motors on lower side which serves as part 1 and raspberry pi on the other which serves as part 2. A finger is put between part 1 and part 2. The person moves his or her finger along with the device (camera on downside) over the character (alphabet, number or punctuation mark) on the paper. Then, the camera captures the image of the character and the image is stored which acts as the input. Braille keypad which is connected or mounted on the relay mechanism acts as output. Conversion of image to character through image takes place through extraction method. The image is compared with the predetermined algorithm of different characters and it recognizes the particular character which is very close to the character indication features. After character recognition, this character will be converted to braille language (Raised dot pattern) accordingly. With the help of this braille language data, the motors below the braille keypad start working.

Raspberry Pi drives the motors according to character so that particular dots which are assigned to that character pops out. Remaining will remain as it is (stable state). In this way, braille character is sensed by the person. After few seconds, all motors are brought back to stable state. To speed up the response of motors, L293D is used which is a Motor Driving IC. It is placed between main processing module and output module.

EXAMPLE:

Suppose the camera captures and stores the image of 'A' Then this is converted into character by image extraction method i.e. character 'A' is compared with the predetermined algorithm which determines the particular character. Then after recognition of alphabet A, it is given as input to motors. A means the first button out of 6 buttons will be lifted high (Braille keypad is 2*3 matrix with six buttons in each block. Combination of these six blocks gives all the alphabets, numbers and other characters) which is done setting the first motor out of 6 in a stable state. Thus, the visually impaired reader will understand that the alphabet is 'A'.



EXPECTED RESULT:

This project provides best solution to the visually impaired people for their educational growth by converting the text (English) into braille language which is the base of their reading and writing skills. This application enables the blind people to read the any book, magazine and newspaper which is available in another language (English) instead of Braille. In this project input is basically image of the character. After the conversion of this image through image processing output is obtained which is recognized character.

CONCLUSION:

Thus, the visually impaired reader does not require any special book which is in braille language as he can use the braille converter. So reading any book will be possible for them as the normal one. Speed of reading can be increased further. Also, the variation in handwriting and various size of the text can be detected and converted into braille language in future. For further improvement, a multi language Braille translator will be considered. Look-up tables for different languages could be stored in FLASH memory so that when translation of text in a particular language is required, the corresponding look-up table is loaded. We hope this Text to Braille Converter will be helpful for the betterment of the visually impaired people and enlighten their life.



SHRIYA SHAH BE EXTC B

TITLE OF THE PROJECT: Implementation of a system to detect moving objects with shadow compression using foreground segmentation.

TYPE OF PROJECT: Application

OBJECTIVE:

The project captures silhouettes of moving objects which will be positioned on previously recorded backgrounds to produce an interactive video artwork. The objectives for the project are to research a practical algorithm, implement the algorithm, and finally, apply filtering techniques to the extracted foreground to reduce the noises remaining from the segmentation. For all the categories of the information which human can receive, most of it comes from vision. The video means a description of one object's appearance in a continuous period of time. As the science technology develops rapidly, the video application becomes increasingly important in everyone's daily life. In recent years, because of the rising requirement of security in public zones, intelligent video surveillance, which is an effective method, has a significant influence on the information society. Over the past several years, numerous intelligent video surveillance systems have been emerging in the society. They play an important role on various categories of industries and places now. In contrast to the traditional video surveillance technology, intelligent video surveillance method has several advantages.:

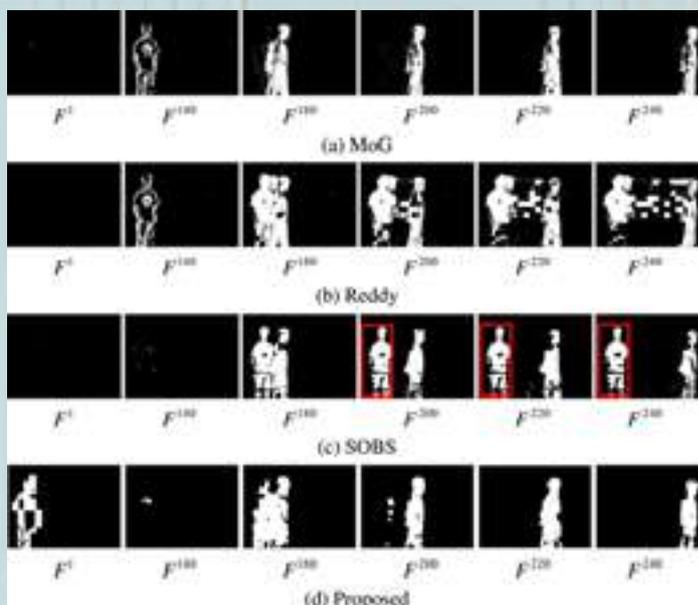
- a) 24-hour reliable surveillance: The intelligent video surveillance adopts artificial intelligence algorithms instead of the manual work to analyze the videos, which reduce the effect of human factor on the surveillance result.
- b) Precise detection: Through defining the surveillance requirement in the process of detection, we can get a precise result of objects we want to detect.
- c) Facilitate to search for specific data: To search for information of specific data or object fast and accurately, intelligent surveillance technology can build data index by extracting the feature from the surveillance video. Consequently, it increases the efficiency of search.



d) Predict the potential movement of targets: Intelligent surveillance technology can adopt artificial intelligence algorithm to calculate the moving direction and speed of objects in the video, which offers a predication of the targets' potential movement. The video is filled with a large amount of information while people always only pay attention to the moving objects. So, the fundamental technology of intelligent video monitoring is automatic detection of the moving foreground objects. Detection of targets is to subtract the moving objects from background in the image sequence captured by camera. However, due to the background in the natural condition is not stationary, which means there are several factors such as weather, illumination, slow moving (distant pedestrians), static moving (leaves swing) affecting the background, it is difficult to detect the moving objects in dynamic background. In short, This investigates the working of a foreground segmentation algorithm that will be used to extract moving foreground objects from a video. The video will be shot with a standard digital camera in a controlled environment. The resulting video from the extraction process will contain a silhouette that tracks the foreground objects' movements. The objectives for the project are to research a practical algorithm, implement the algorithm, and finally, apply filtering techniques to the extracted foreground to reduce the noises remaining from the segmentation. The entire system consists of two phases, an extraction phase and a filtering phase. The extraction phase is responsible for subtracting each video frame with a reference background model. The result will be passed to the next phase for further processing. The filtering phase will take the subtracted images and apply morphological operations to create a shadow figure. Lastly, Canny edging technique help finalizes the figure to obtain a smoothed silhouette.

LITERATURE SURVEY:

A robust adaptive algorithm of moving object detection for video surveillance by Elham Kermani and Davud Asemani(2015): In this paper, a novel method is introduced for the detection of moving objects in surveillance applications which combines adaptive filtering technique with the Bayesian change detection algorithm. In proposed method, an adaptive structure firstly detects the edges of motion objects. Then, Bayesian algorithm corrects the shape of detected objects.



LITERATURE SURVEY:

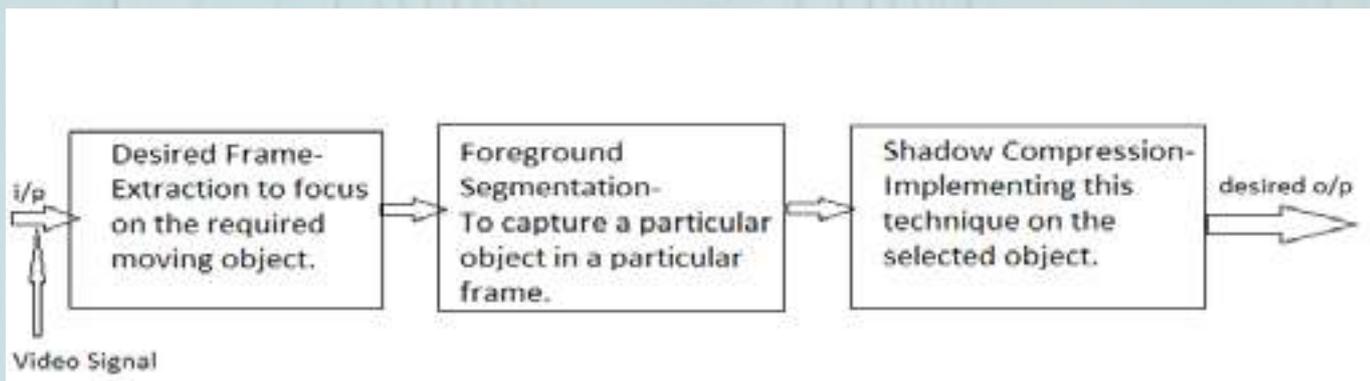
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Object Detection Using Background Subtraction and Foreground Motion Estimation by Tadaaki Hosaka, Takumi Kobayashi and Nobuyuki Otsu(2015):In this paper the main aim was to overcome two major drawbacks of existing methods: dynamic background changes such as swinging trees and camera shaking tend to yield false positives, and the existence of similar colors in objects and their backgrounds tends to yield false negatives.



Moving Object Detection based on Background Modeling by Yuanqing Luo(2015):This paper designs a shadow elimination algorithm based on Red Green and Illumination (RGI) color feature, which can be converted from RGB color space, and dynamic match threshold. The results of experiments demonstrate that the algorithm can effectively reduce the influence of shadow on the moving objects detection.

In the areas of high safety standards such as stations, airports, schools, banks and so on, surveillance cameras are now ubiquitous, producing a large number of videos every day. The massive nature of surveillance videos makes it very difficult for human investigators to manually search target through all videos. Therefore, it is urgent to enable the surveillance system to intelligently detect irregularities, suspicious targets, etc. To this end, moving object detection (or shadow compression), which aims to find independent moving objects in a scene, is an important preprocessing step.



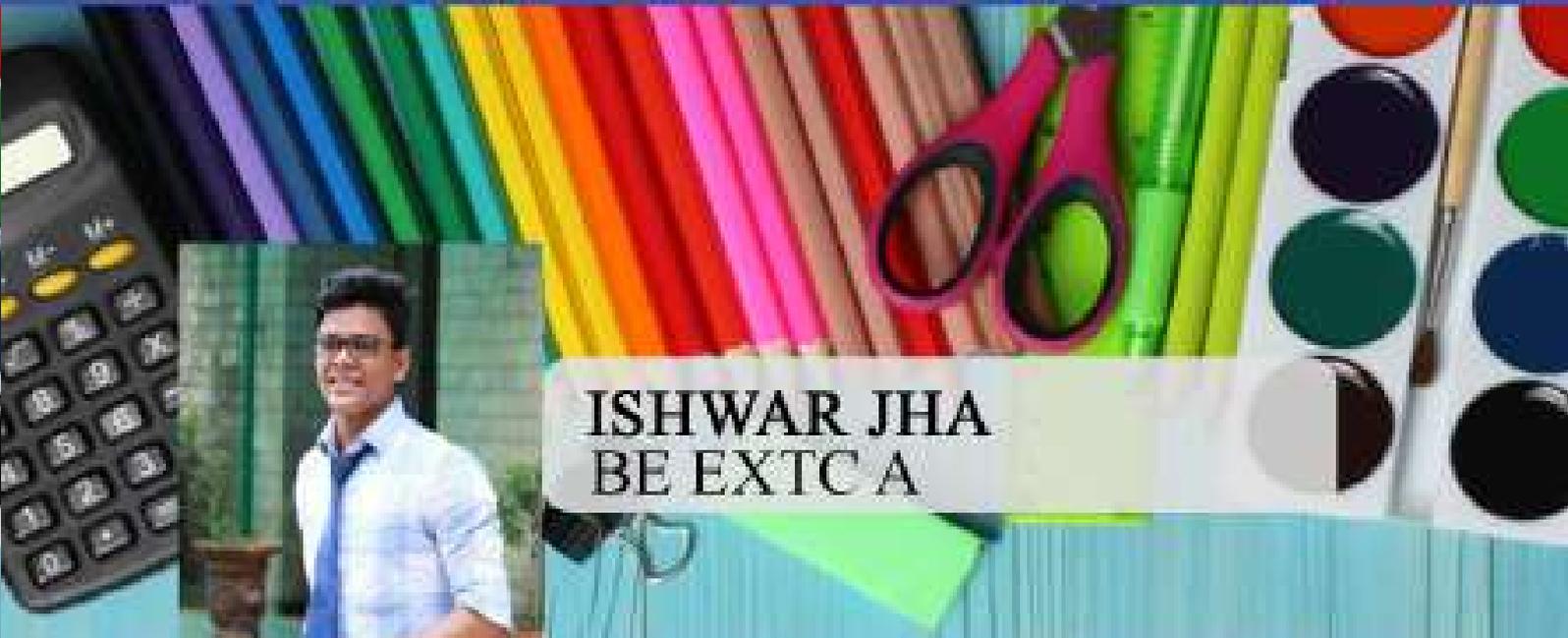


WORKING:

As shown in the above mentioned figure, we will be giving a video signal as an input. The video signal will be processed, and the frame containing the desired moving object will be extracted. Further, foreground segmentation is carried out where the image is focused and divided into several segments. After obtaining the desired image, the background surrounding the image is clipped off using shadow compression. The output will be in the form of a black and white image, black representing the unwanted background and white representing the desired image.

Expected Outcome:

The design and test results of a statistical extraction algorithm used for video foreground segmentation. The goal is to develop a software package that processes a video and outputs a shadow that accurately tracks the shapes and motions of any foreground objects.



ISHWAR JHA BE EXTC A

EMERGENCY SERVICE DRONE

INTRODUCTION:

A drone, in a technological context, is an unmanned aircraft. Drones are more formally known as unmanned aerial vehicles(UAVs) or unmanned aircraft systems (UASes). Essentially, a drone is a flying robot. The aircrafts may be remotely controlled or can fly autonomously through softwarecontrolled flight plans in their embedded systems working in conjunction with onboard sensors and GPS



In the recent past, UAVs were most often associated with the military, where they were used initially for anti-aircraft target practice, intelligence gathering and then, more controversially, as weapons platforms. Drones are now also used in a wide range of civilian roles ranging from search and rescue, surveillance, traffic monitoring, weather monitoring and firefighting to personal drones and business drone-based photography, as well as videography, agriculture and even delivery services.

HISTORY OF DRONE/UAV USE CASES:

The first generally used drone was a full-size retooling of the de Havilland DH82B "Queen Bee" biplane, which was fitted out with a radio and servooperated controls in the back seat. The plane could be conventionally piloted from the front seat, but, generally, the plane flew unmanned and was shot at by artillery gunners in training. The term drone dates to this initial use, a play on the "Queen Bee" nomenclature

In late 2012, Chris Anderson, editor in chief of Wired magazine, retired to dedicate himself to his drones company, 3D Robotics Inc. The company, which started off specializing in hobbyist personal drones, now markets its solutions to photography and film companies, construction, utilities and telecom businesses, and public safety companies, among others.

In late 2013, Amazon was one of the first organizations to announce a plan to use commercial drones for delivery activities. Others have since followed suit; for example, in September 2016, Virginia Polytechnic Institute and State University began a test with Project Wing, a unit of Google owner Alphabet Inc., to make deliveries, starting with burritos produced at a local Chipotle restaurant.



Other common drone applications include drone surveillance and drone journalism, as unmanned aircraft systems can often access locations that would be impossible for a human to get to. Drone education is also expanding; Embry-Riddle Aeronautical University, long a training ground for the aviation industry, now offers a Bachelor of Science in Unmanned Systems Applications, a Master of Science in Unmanned Systems and an undergraduate minor in Unmanned Aerial Systems.

DRONES IN THE ENTERPRISE:

A 2016 Business Insider BI Intelligence report forecasted the growth of enterprise drone use to outpace the consumer drone sector in both shipments and revenues by 2021, reaching 29 million shipments worldwide.



The integration of drones and internet of things technology has created numerous enterprise use cases; drones working with on- ground IoT sensor networks can help agricultural companies monitor land and crops, energy companies survey power lines and operational equipment, and insurance companies monitor properties for claims and/or policies.

A 2015 experiment in Austin, Texas, showed how drones can potentially "connect the dots" using IoT. A security tech company teamed up with a drone startup to hunt for ZigBee beacons to try to provide an overview of what IoT networks were present in residential and business areas of the city. The companies reported that the results were quick and instructive.

From logistics to agriculture to security, unmanned aerial vehicles and IoT are frequently part of the same discussion; offering a component in ubiquitous connectivity and interactivity.



DRONES AND SECURITY:

The rapid adoption of drones has sparked complaints and concerns. From a privacy standpoint, drones have been used by voyeurs and paparazzi to obtain images of individuals in their homes or other locations once assumed to be private. Drones have also been deployed in areas deemed to be potentially unsafe, such as urban areas and near airports.

- Unmanned aircraft must remain within visual line-of-sight of the remote pilot in command and the person manipulating the flight controls of the small UAS or, alternately, within VLOS of the visual observer
- Drones must at all times remain close enough to the remote pilot in command and the person manipulating the flight controls for those people to be capable of seeing the aircraft unaided by any device other than corrective lenses
- UAVs may not operate over anyone not directly participating in the operation, under a covered structure or inside a covered stationary vehicle
- Daylight-only operations, or civil twilight (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting
- Must yield right of way to other aircraft

DRONES IN INDIA:

General India Drone Laws

Drone use is allowed in India, but there are several drone laws that need to be followed when flying in the country. Operators must ensure that they follow the following drone laws when flying a drone that weighs over 250 grams in India,

- Do not fly your drone over densely populated areas or large crowds
- Respect others privacy when flying your drone
- Do not fly your drone within 5km of airports or in areas where aircraft are operating
- You must fly during daylight hours and only fly in good weather conditions
- Do not fly your drone in sensitive areas including government or military facilities. Use of drones or camera drones in these areas are prohibited
- You must be at least 18 years old and have completed a training course
- You must only fly your drone within visual line of sight



- You cannot fly more than one UAV at a time
- Do not fly your drone within 50km of a border
- Do not fly your drone more than 500 meters into the sea, from the coastline
- Do not fly within 5km of Vijay Chowk in Delhi
- Do not fly over national parks or wildlife sanctuaries
- All drones must have liability insurance

Permit Needed For Recreational Drone Use?

A drone permit is required for recreational drone use. At this time we are unable to obtain a drone permit for operation in India. Please contact your local police station to obtain permission.

Permit Needed For Commercial Drone Use?

A permit is required for commercial drone use in India. At this time we are unable to obtain a drone permit for operation in India. Please contact your local police station to obtain permission

BRINGING YOUR DRONE ON AIRPLANES GUIDE:

All drones should be brought on carry on luggage if possible. This is because according to the Montreal Convention, airlines are only liable for losses up to ~\$1,000 USD. When traveling internationally, theft and lost luggage can be common issues, particularly if your flight has many connections. If your drone is worth more than \$1,000 USD and you cannot bring it onto the plane you should consider shipping it with DHL, Fedex, or UPS instead and fully insure the shipment.

You should NOT place drone batteries in your checked baggage. All drone batteries should be placed in a Medium Size Lipo Battery Bag like the one shown here in the link and brought onto the plane in your carry on bag. Lithium-ion batteries are considered “dangerous goods” by airlines and rules surrounding these batteries on planes are EXTREMELY strict due to multiple incidents of these batteries catching fire. Failure to properly pack lithium-ion batteries in a bag such as the one shown in the link above can result in the airline seizing them, you getting fined, or being denied boarding.



BUYING DRONES IN INDIA:

Read all of our India Drone Laws, and now looking for drones, parts, accessories, or something else? Read our guide for Buying Drones In India. It includes information on drones for sale in India, import taxes, payment options, and shipping.

What You Need to Know About Drones in India

Last May, Mumbai became the first city to have a margarita pizza delivered via drone. Flying over the traditional lunch delivery system—the army of dabbawalas who shuttle lunchboxes to offices all over the city—the pizza-drone, which was launched from Francesco’s Pizzeria, made sense in a city known for its history of atypical and innovative delivery solutions. Under current regulations, the use of drones for commercial purposes is still illegal in India. Francesco’s Pizzeria sidestepped the law by delivering the pie to the owner’s ‘friend’— not a ‘customer’—and thus technically did not engage in a commercial transaction.

Perhaps inspired by the delivery of the margarita pizza, e-retail behemoth Amazon plans to use Mumbai and Bangalore as the trial launch pad for their PrimeAir delivery system. Drones are becoming serious business in India, both in the commercial and military spheres. As the country becomes a big player in the drone game, here’s what you need to know:

MILITARY DRONES IN INDIA:

India first used military drones during the 1999 Kargil War with Pakistan. Army search and reconnaissance missions proved to be incredibly difficult, if not nearly impossible, without air support. The Indian Air Force deployed manned English Canberra PR57 aircraft for photo reconnaissance along the Line of Control, but this system proved highly inefficient and strategically weak over the mountainous Kargil terrain

After India lost a Canberra PR57 to Pakistani infrared homing missiles, Israel discreetly supplied the Indian Air Force with IAI Heron and Searcher drones, which were useful for acquiring target information along the Line of Control.



Since Kargil, India has procured a number of Israeli military unmanned aircraft. India's current arsenal includes the Israel Aerospace Industries Harpy and Harop unmanned combat aerial vehicles, and IAI Searcher and Heron unmanned aerial vehicles. In 2009, the Indian Air Force purchased 10 Harops in a \$100 million contract with Israel Aerospace Industries. In February 2013, the Indian Air Force made a \$280 million deal with Israel Aerospace Industries for a new series of Heron medium-altitude, long-endurance drones.

In late 2013, India's Ministry of Defense rejected an offer by Israel Aerospace Industries and India's Defense Research and Development Organization (DRDO) to jointly develop a new version of the Heron UAV. According to Israeli officials, India turned down the offer because of an internal struggle among Indian Defense officials, many of whom, they said, would rather stimulate India's domestic drone program than team up with Israel Aerospace Industries (this could not be confirmed). Israeli sources estimated the potential value of the project at several hundred million dollars.

India's Defense Research and Development Organization has also developed its own domestic UAV program. The project aims to develop a domestic arsenal to replace and augment the existing fleet of IAI vehicles. Here is a list of completed and pending DRDO projects:

DRDO Lakshya: a target drone used for discreet aerial reconnaissance and target acquisition. It is launched by solid propellant rocket motor and sustained by a turbojet engine in flight.

DRDO Nishant: primarily designed for intelligence-gathering over enemy territory and also for reconnaissance, training, surveillance, target designation, artillery fire correction, and damage assessment. The Nishant has completed its developmental phase and user trials.

DRDO Aura: similar to the Lockheed Martin RQ-170 Sentinel, a stealth drone that will be capable of releasing missiles, bombs, and precision-guided munitions. The details of the Aura project are still, for the most part, classified. Aura projected test date is set to be sometime in 2016.



DRDO Ruštom: Modeled after the American Predator UAV, the Ruštom is a Medium-Altitude Long-Endurance (MALE) system. Like the Predator, the Ruštom is designed to be used for both reconnaissance and combat missions. The Ruštom is still in prototype stage and is expected to replace and supplement Israeli Heron model UAVs in the Indian Air Force.

CIVILIAN DRONES IN INDIA:

In August, The Economic Times, reported that Amazon Prime Air deliveries would be made in the cities of Bangalore and Mumbai before the Hindu festival of Diwali; the festival occurred in October, but no customer deliveries have been made to date.

Following Amazon's announcement, this past October the Directorate General of Civil Aviation announced that until proper rules and regulations are formulated, the use of drones by civilians will be illegal. The DGCA made an announcement on October 7th 2014: "Till such regulations are issued, no non government agency, organization, or an individual will launch a UAS in Indian Civil Airspace for any purpose whatsoever." No date has been given for these regulations. (This announcement likely explains Amazon's failure to begin testing Prime Air.)

In spite of the uncertain regulatory future, domestic startups are producing and using drones for both security and commercial purposes. Drones have been used to provide services ranging from disaster relief, security and surveillance, and aerial photography. Here is a list of notable Indian drone startup companies:

Social Drones: A startup that "designs and manufactures user friendly, easy to use, highperformance drones for social and unconventional applications." Social Drones made news when its drones were used to provide disaster relief in Uttarakhand after severe flooding in 2013. The company's drones were used to airdrop first aid kits to areas where relief efforts had been stalled, as well as to areas that were deemed unsafe for conventional relief methods



Airpix: specializes in aerial photography and video production. Clients include real estate agents, tourism organizations, to journalists in disaster zones. After floods ravaged the Indian state of Uttarakhand in June of 2013, Airpix drone photography was used in a campaign to rebuild Uttarakhand and to spread awareness about infrastructural deficiencies in the mountainous state.

Garuda Robotics: started by 20-year old college drop-out, Pulkit Jaiswal, Garuda produces software to gather and analyze data collected by drones. The company also produces software to control unmanned aircraft. Garuda markets its products for a variety of uses that range from land and agricultural surveys to security, search and rescue, and logistics.

Edall Systems: a Bangalore-based company that provides engineering, design and manufacturing services, drone development, and unmanned aerial vehicle training programs for students and professionals. The company also builds parts for India's National Aerospace Labs, as well as the Defense Research and Development Organization.

IdeaForge: recently developed the Netra UAV in collaboration with the DRDO. The Netra UAV is a surveillance quadcopter drone used primarily by India's Central Reserve Police Force and the Uttar Pradesh Special Task Force. Although IdeaForge primarily focuses on security and surveillance services, it also provides a services such as geographical mapping and surveying, oil and gas pipeline monitoring, aerial cinematography, crowd management, real estate photography, and event management.

Aurora Integrated Systems: a Bangalore-based company that provides drone technology to India's Defense Research and Development Organization as well as directly to the Indian Army. The company's fleet includes the Urban View, a lightweight reconnaissance drone, and the Altius MK-II, a medium-range, medium-altitude autonomous vehicle that can be used for surveillance, target acquisition, and reconnaissance.



PRATI KSHA YADAV
BE EXTC B

IMPLEMENTATION OF EMOTION BASED MUSIC PLAYER FROM FACIAL IMAGE USING SVM.

INTRODUCTION:

In today's world, with the advancements in the areas of technology various music players are deployed with features like reversing the media, fast forwarding it, streaming playback with multicast streams. Although these features satisfy the basic requirements of the user, yet one has to manually surf for the song from a large set of songs, according to the current circumstance and mood. Manual segregation of a playlist and annotation of song, in accordance with the current emotional state of user is labor intensive and time consuming. Sometimes If user not getting a song based on his/her mood he/she will may get irritate. To overcome all this, our project will play a suitable music after capturing the image of the facial expression and detecting the correct emotion in it.

The main objective of this work is to develop an intelligent system that can easily recognize the facial expression from an input image and accordingly play a music track based on that particular expression/emotion recognized.

Relevance to society: If we see in today's generation people are more likely to undergo stress, depression, mood related concerns hypertension ,so to deal with that people go for music therapy treatment. So it is not possible for common man to take music therapy sessions because it is costly. Music therapists deal with the emotional well-being of a person and play the song according to their mood. Our project also deals with the same, it will detect the emotion and play the song accordingly

LITERATURE SURVEY:

1. Sushmita G. Kamble and A.H. Kulkarni in their paper titled 'Facial expression based music player' proposed a system in which they used PCA (principal component analysis) approach for feature extraction. To classify and recognize the expression of person Euclidean distance classifier was used. After classifying the emotion the songs belonging to that category were played. The overall accuracy they achieved was 84.42%.



2. Aurobind V. Iyer, Viral Pasad, Karan Prajapati in their paper titled ‘ Emotion based mood enhancing music recommendation’ proposed a system in which they used Viola Jones algorithm for face detection & fisherfaces classifier for emotion classification. After classifying the emotion the songs belonging to that category were played. The overall accuracy they achieved was 80%.

3. S L Happy and Aurobinda Routray in their paper titled ‘Automatic facial expression recognition using feature of salient facial patches’ proposed a system in which they used Local Binary Pattern (LBP) and facial landmark detection for emotion recognition. The database used for testing the model was cohn-kanade database and JAFFE database. The overall accuracy they achieved was 94.14%.

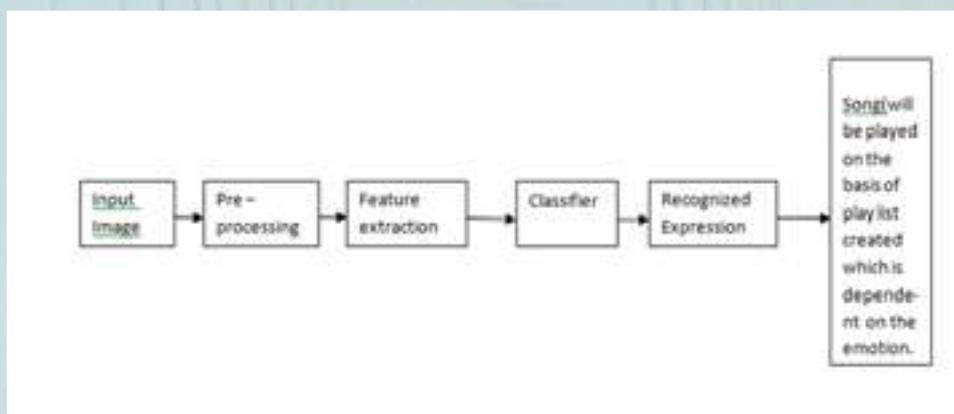
4. J. Jayapradha Soumya Sharma and Yash Dugar in their paper titled ‘Detection and recognition of human emotion using Neural network’ proposed a system in which they extract the Haar Cascade Features of a face using Viola Jones algorithm. The emotion is verified and recognized using Deep Learning network. The database used for testing the model was FER2013 dataset. The accuracy was found out to be different for different emotion (Happy=67%, Neutral=72%, sad=71%).

5. Deepak Ghimire, Sung wan Jeong , Joonwhoan Lee, Sang Hyun Park in their paper titled ‘Facial Expression Recognition based on Local Region Specific Features and SVM’ proposed a system in which they used Local binary Pattern , Normalized central moments (NCM) descriptor as geometric descriptors for feature extraction and SVM classifier for emotion classification which was detected. The database used for testing the model was CK+ dataset. The overall accuracy they achieved was 94.14%.



PROPOSED BLOCK DIAGRAM:

The proposed system is as shown below in the figure. The block diagram consists of pre processing stage ,feature extraction, classification following which music player will play appropriate music.



1.INPUT IMAGE:

To start with , firstly we have to acquire image from sources such as camera or take the input from the database which are available online.

2.PRE PROCESSING STAGE :

Pre-processing is mainly done to eliminate the unwanted information from the image acquired and fix some values for it, so that the value remains same throughout. In the pre-processing phase, the images are converted from RGB to Gray-scale and are resized to 256*256 pixels. The images considered are in .jpg format, any other formats will not be considered for further processing. During pre-processing, eyes, nose and mouth are considered to be the region of interest. It is detected by the cascade object detector which utilizes Viola Jonas algorithm.

3.FEATURE EXTRACTION:

This step is critical step as it extracts the features using the applied feature extraction algorithm. The steps performs compression of information, reduction of irrelevant features as well as removing the noise of the data.After this the facial region is converted into a vector with a given dimension in which the facial features correspond to their locations.

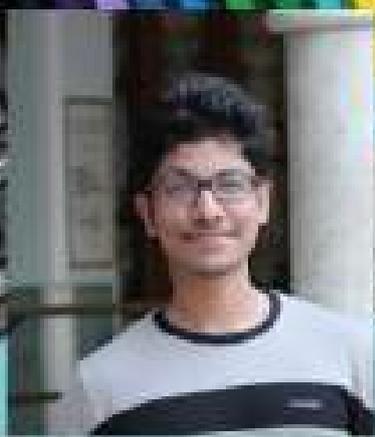


4.CLASSIFIER.

After the feature extraction is done, analysis of the features is done by the classifier. During classification, model is trained, then the model is tested against a given input image. All the previous steps like preprocessing and feature extraction are performed again. If it works perfectly the model is correctly able to determine the person's emotion. One such example of a classifier is Support Vector Machine (SVM).

EXPECTED RESULT:

Suitable music will be play ed at the output depending upon the emotion detected. On successful completion, we shall also attempt to go one step further and provide the uses a playlist of songs that will enlighten his/her mood.



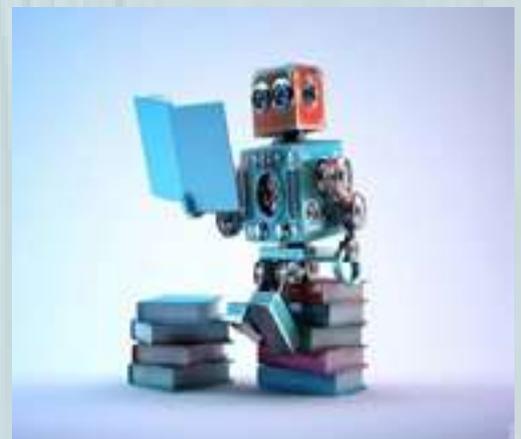
Rishabh Tiwari
TE EXTC B

IMPORTANCE OF MACHINE LEARNING

From Apple to Google to Toyota, companies across the world are pouring resources into developing AI systems with machine learning. This article explains what the concept really means.

Artificial intelligence, which has been around since the 1950s, has seen ebbs and flows in popularity over the last 60+ years. But today, with the recent explosion of big data, high-powered parallel processing, and advanced neural algorithms, we are seeing a renaissance in AI--and companies from Amazon to Facebook to Google are scrambling to take the lead. According to AI expert Roman Yampolskiy, 2016 was the year of "AI on steroids," and its explosive growth hasn't stopped.

While there are different forms of AI, machine learning represents today's most widely valued mechanism for reaching intelligence.





WHAT IS MACHINE LEARNING?

Machine learning is a core sub-area of artificial intelligence; it enables computers to get into a mode of self-learning without being explicitly programmed. When exposed to new data, these computer programs are enabled to learn, grow, change, and develop by themselves.

SAS, a North Carolina-based analytics software developer, uses this definition: “Machine learning is a method of data analysis that automates analytical model building.” In other words, it allows computers to find insightful information without being programmed where to look for a particular piece of information; instead, it does this by using algorithms that iteratively learn from data.

While the concept of machine learning has been around for a long time, (an early and notable example: Alan Turing’s famous WWII Enigma Machine) the ability to apply complex mathematical calculations to big data automatically—iteratively and quickly—has been gaining momentum over the last several years.

So, put simply, the iterative aspect of machine learning is the ability to adapt to new data independently. This is possible as programs learn from previous computations and use “pattern recognition” to produce reliable results.

WHY MACHINE LEARNING?

To better understand the uses of machine learning, consider some of the instances where machine learning is applied: the self-driving Google car, cyber fraud detection, online recommendation engines—like friend suggestions on Facebook, Netflix showcasing the movies and shows you might like, and “more items to consider” and “get yourself a little something” on Amazon—are all examples of applied machine learning.

All these examples echo the vital role machine learning has begun to take in today’s data-rich world. Machines can aid in filtering useful pieces of information that help in major advancements, and we are already seeing how this technology is being implemented in a wide variety of industries



The process flow depicted here represents how machine learning works.

With the constant evolution of the field, there has been a subsequent rise in the uses, demands, and importance of machine learning. Big data has become quite a buzzword in the last few years; that's in part due to increased sophistication of machine learning, which helps analyze those big chunks of big data. Machine learning has also changed the way data extraction, and interpretation is done by involving automatic sets of generic methods that have replaced traditional statistical techniques.

USES OF MACHINE LEARNING

To understand the concept of machine learning better, let's consider some examples: web search results, real-time ads on web pages and mobile devices, email spam filtering, network intrusion detection, and pattern and image recognition. All these are by-products of applying machine learning to analyze huge volumes of data.

Traditionally, data analysis was always being characterized by trial and error, an approach that becomes impossible when data sets are large and heterogeneous. Machine learning comes as the solution to all this chaos by proposing clever alternatives to analyzing huge volumes of data. By developing fast and efficient algorithms and data-driven models for real-time processing of data, machine learning is able to produce accurate results and analysis.

POPULAR MACHINE LEARNING METHODS

How exactly do machines learn? Two popular methods of machine learning are supervised learning and unsupervised learning. It is estimated that about 70 percent of machine learning is supervised learning, while unsupervised learning ranges from 10 – 20 percent. Other methods that are less-often used are semi-supervised and reinforcement learning.

SUPERVISED LEARNING

This kind of learning is possible when inputs and the outputs are clearly identified, and algorithms are trained using labeled examples. To understand this better, let's consider the following example: an equipment could have data points labeled F (failed) or R (runs).



The learning algorithm using supervised learning would receive a set of inputs along with the corresponding correct output to find errors. Based on these inputs, it would further modify the model accordingly. This is a form of pattern recognition, as supervised learning happens through methods like classification, regression, prediction, and gradient boosting. Supervised learning uses patterns to predict the values of the label on additional unlabeled data. Supervised learning is more commonly used in applications where historical data predict future events, such as fraudulent credit card transactions.

UNSUPERVISED LEARNING

Unlike supervised learning, unsupervised learning is used with data sets without historical data. An unsupervised learning algorithm explores unprocessed data to find the structure. This kind of learning works best for transactional data; for instance, it helps in identifying customer segments and clusters with certain attributes—this is often used in content personalization.

Popular techniques where unsupervised learning is used also include self-organizing maps, nearest neighbor mapping, singular value decomposition, and k-means clustering. Basically, online recommendations, identification of data outliers, and segment text topics are all examples of unsupervised learning.

SEMI-SUPERVISED LEARNING

As the name suggests, semi-supervised learning is a bit of both supervised and unsupervised learning and uses both labeled and unlabeled data for training. In a typical scenario, the algorithm would use a small amount of labeled data with a large amount of unlabeled data.

This type of learning can again be used with methods such as classification, regression, and prediction. Examples of semi-supervised learning would be face and voice recognition techniques.



REINFORCEMENT LEARNING

This is a bit similar to the traditional type of data analysis; the algorithm discovers through trial and error and decides which action results in greater rewards. Three major components can be identified in reinforcement learning functionality: the agent, the environment, and the actions. The agent is the learner or decision-maker, the environment includes everything that the agent interacts with, and the actions are what the agent can do.

Reinforcement learning occurs when the agent chooses actions that maximize the expected reward over a given time. This is best achieved when the agent has a good policy to follow.

WHY DOES MACHINE LEARNING MATTER?

Aside from the tremendous power machine learning has to beat humans at games like Jeopardy, chess, and Go, machine learning has many practical applications. Machine learning tools are used to translate messages on Facebook, spot faces from photos, and find locations around the globe that have certain geographic features. IBM Watson is used to help doctors make cancer treatment decisions. Driverless cars use machine learning to gather information from the environment. Machine learning is also central to fraud prevention. Unsupervised machine learning, combined with human experts, has been proven to be very accurate in detecting cybersecurity threats.

While there are many potential benefits of AI, there are also concerns about its usage. Many worry that AI (like automation) will put human jobs at risk. And whether or not AI replaces humans at work, it will definitely shift the kinds of jobs that are necessary. Machine learning's requirement for labeled data, for example, has meant a huge need for humans to manually do the labeling.



Vedangi Padyal
TE EXTC B

SAIL FREE

Solar Powered Boats - clean and efficient

Solar powered boats get their energy from the sun. Using electric motors and storage batteries charged by solar panels and photovoltaic cells, solar powered boats can significantly reduce or eliminate their use of fossil fuels. Solar boats are uniquely suited to transform light energy into movement. Environmentally friendly solar energy is an energy efficient way to power commercial oceangoing vessels as well as leisure boats.

Solar powered boats in use

In 2007, five Swiss sailors piloted a solar powered boat across the Atlantic Ocean. Using solar power only (via solar panels), the “sun21” made the first motorized crossing of the Atlantic Ocean in order to promote the great potential of renewable energy for ocean navigation and to combat climate change. The “sun21” arrived in New York City on May 8, 2007, having covered 7000 sea miles.

The design of the “sun21” solar powered boat

The “sun21” is a 45.9-foot-long specially built solar powered boat known as a catamaran. On its canopy like roof are 48 silicon photovoltaic cells, which collect energy from sunlight and transmit it to a device in one of the narrow cabins. That device transmits the energy to the 3,600 pounds of storage batteries below the deck. The 11-ton solar boat was powered on the energy needed to light 10 100-watt light bulbs. The typical speed was 3.5 knots. The solar boat has two engines that can go up to 107 nautical miles a day in good weather. The “sun21” sleeps 6 people and has room for large groups for visits or short excursions. The kitchen is in one hull and the bathroom is in the other.



c

Cool designs - solar electric boats

A passenger ferry in Sydney Harbour, Australia, called the Solar Sailor, can run on wind, sun, battery, or diesel, or in any combination. It uses patented Solar Wing technology to simultaneously capture sunlight for electricity and for wind power. The wings move automatically via computer, tracking the sun for optimal solar collection and the wind for optimal sail power. If it gets really windy, the wings fold down against the solar boat. Much like a hybrid car, large batteries on board the solar energy boat store electricity generated by the diesel generators and collected by the solar panels. The electricity then powers the electric motors.

Both passengers and the environment benefit from this new design. The solar boat is very quiet; there are no fumes, low vibration, no greenhouse gas emissions and no water pollution. BBC's Tomorrow's World described Solar Sailor's technology as "possibly the greatest evolution in boats since the advent of steam."



Two of these solar powered ferries (using the same design as the Sydney Harbour Ferry) are planned for passengers in the San Francisco Bay. They will accommodate 600 passengers each and be ready in 2009.

Solar powered boats - Solar panels for power

Solar panels are solar systems that produce electricity directly from sunlight. Solar panels produce clean, reliable electricity without consuming fossil fuels. Solar panel systems are an excellent way to generate energy in remote locations (the oceans) that are not connected to the electric grid.

The benefits of solar panels

1.) Solar panels are highly reliable and easy to maintain. Solar panels have no moving parts, so visual checks and servicing are enough to keep systems up and running. Solar panels are built to withstand hail impact, high wind, and freeze-thaw cycles. Solar panel systems can produce power in all types of weather. On partly cloudy days, they produce as much as 80% of their potential energy. Even on extremely cloudy days, they can still produce about 25% of their maximum output.

2.) Virtually no environmental impact. Solar panel systems burn no fuel and have no moving parts. They are clean and silent, producing no atmospheric emissions or greenhouse gases that are harmful to the earth

3.) Modular and flexible in terms of size and applications. Solar panel systems can be built to any size in response to the energy needs at hand. They can be enlarged or moved easily.



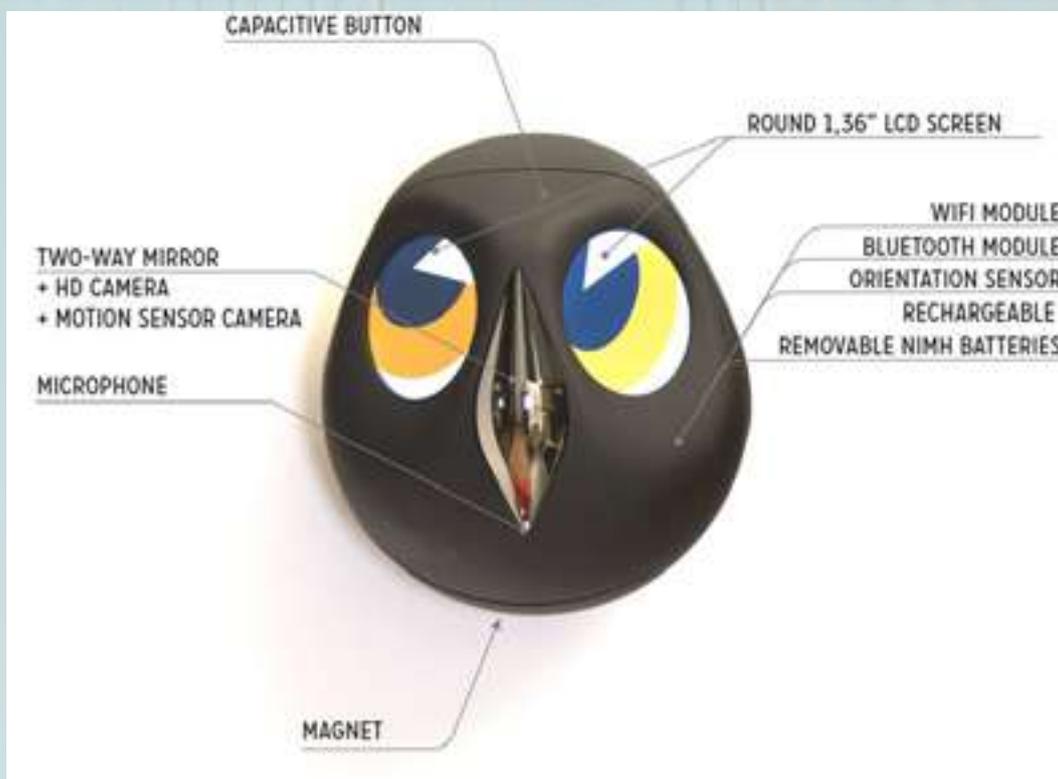
Vikas Tiwari
TE EXTC B

AN INTERACTIVE HOME MONITORING OWL

Today more and more objects are connected, but none of them truly connects with you. Ulo creates a unique bond, like no other device. It redefines the way you interact with objects: an organic communication.

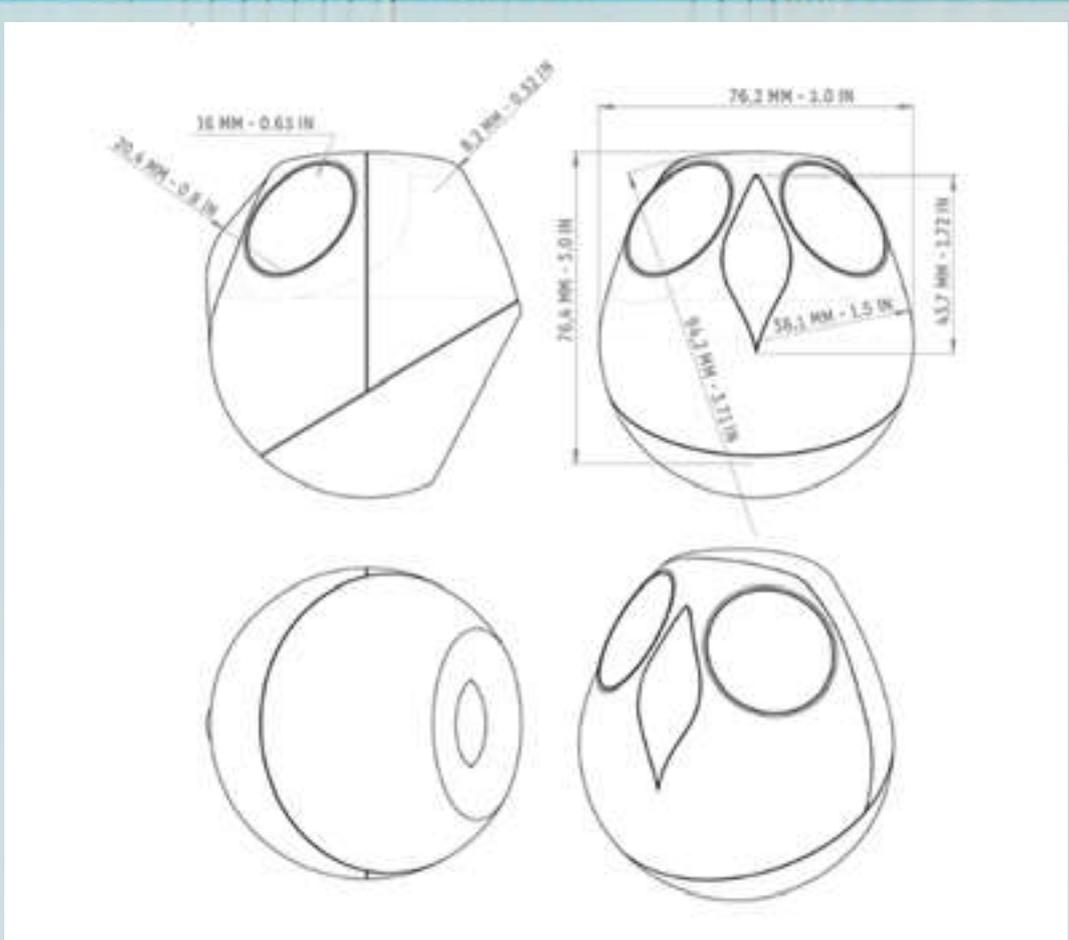


Evidence shows that a number of facial expressions are related to similar emotions across cultures. The language of our eyes is one of the most powerful and effective tools of non-verbal communication. Eye expressions are an efficient, natural and universal way to connect instantly with Ulo.



- Height: 9cm / 3,5inch
- Diameter: 9cm / 3,5inch
- Weight: 165g / 0.36 lbs (without batteries)
- Body material: ABS-PC plastics
- Screens: 2x round LCD, 220x220 resolution
- High resolution camera: 2 Mega Pixel
- Inbuilt microphone
- Processor: Qualcomm Snapdragon 212 Series (APQ8009)
- RAM: 1GB
- Internal memory: 8GB EMMC + microSD card slot (not included)
- Charging: standard micro USB charger 5V-2A
- Batteries: 3 rechargeable NiMH batteries LR06 minimum 1900 mA (not included)

Ulo needs a working wifi network to be fully functional.



S



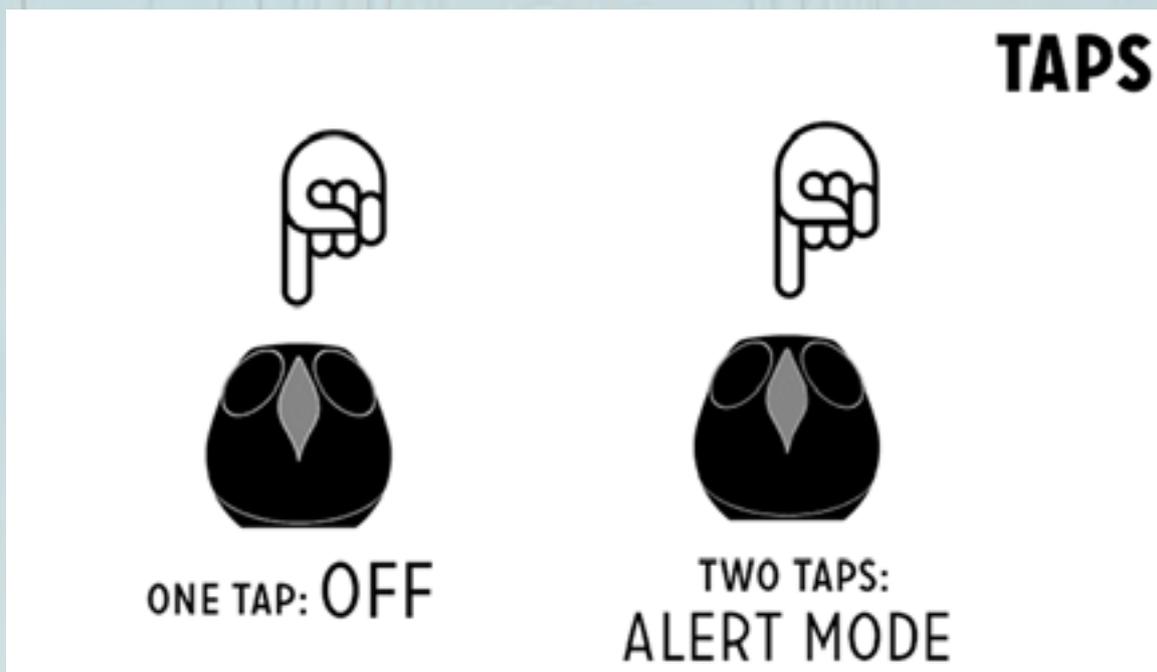
EYE EXPRESSIONS AND CUSTOMIZATION

Ulo communicates through eye expressions. A webpage allows you to customize eyes color, shape and size to match your interior and your taste. No logos or icons are displayed on the screens, but you instantly know what Ulo has in mind.

For instance, when the battery is low (under 10%) Ulo is tired,



Ulo blinks when you take a snapshot, Its eyes follow your movements and Ulo squints when someone is watching live video. Random animations add that extra spark of life which makes Ulo unique. Eye expressions are possible thanks to new round LCD screens originally manufactured for next-generation smartwatches.



This is an example of the default tap system. You can configure custom (and secret) sequences to trigger On/Off & Alert Mode functions.



ALERT MODE

A double tap on Ulo forehead will activate the Alert Mode. Once your smartphone leaves your wifi network, every movement will be recorded in an animated gif and sent via email.



Eye expressions are not displayed.

When your smartphone (and thus yourself) reconnects to your wifi network, the alert mode is disengaged.



LIVE VIDEO

It is a very simple way to check what is going on in another room or when you're away. Ulo streams directly (video & audio) on a secure webpage or mobile apps. This feature is perfect to use Ulo as a baby cam.



INSTANT PHOTOS

Ulo captures snapshots on demand and sends it on a secure webpage, your dropbox account or directly on your email.



NIGHT VISION

Infrared night vision let Ulo see clearly in total darkness.



BUILT-IN SPEAKER

Ulo can "talk" to you with customizable sounds.



BATTERY LIFE

In Alert Mode, Ulo can last one week on a full charge. In everyday use, with eye expressions, Ulo needs to be recharged every 2 days. Of course you can also leave Ulo plugged in all the time on a USB port.



ORIENTATION

Ulo can lay on a flat surface or be hanged on a wall. A set of discrete adhesive neodymium magnet allows you to stick Ulo on every surface effortlessly.



WATERPROOF

Ulo is now waterproof!

This means you can place Ulo outside, within a reasonable temperature range (-10°C/14°F to 50°C/122°F)



COMPATIBILITY

Ulo services are accessible on a webpage, so it is compatible with every device with an internet connection and a browser.

Different emotions will overlay Ulo's eye movements, here's the first list of animations available:

- Happy / Grumpy / Surprised / Upset / Agitated / Puzzled
- Blinks / Squint
- Change Eye color / Reflects / Size

Other recipe ideas:

- If there is a birthday on my calendar today, then Ulo is happy
- If the pollen count rises above 6, then change Ulo eyes color to red
- If you have an appointment, then Ulo is puzzled (You shouldn't be home)



SECURITY

Ulo only stores a few minutes of video locally. Nothing is sent over a distant third party server.



Think of Ulo as your own personal server, so there are no extra fees.

The owl only sends data to your secure devices when needed. Each device has its own password.

Ulo is easy to set up, a detailed user guide is included in the box and video tutorials will be available online.

The alert mode can be disengaged by 3 ways : a double tap on its forehead, when Ulo recognizes you or when you tell Ulo to do so (face and voice recognition in future update).



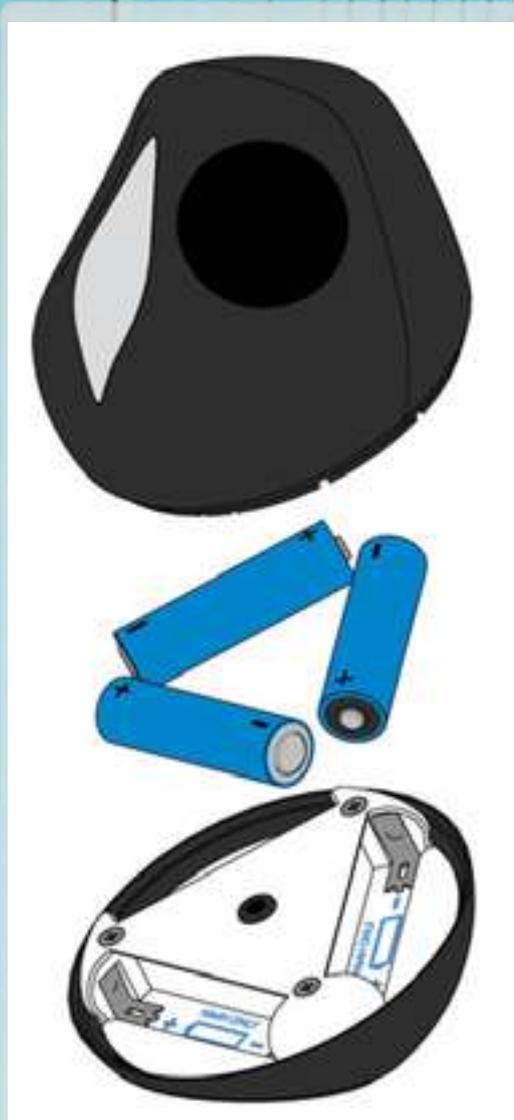
EVOLUTION

In the future, Ulo internal software will evolve.

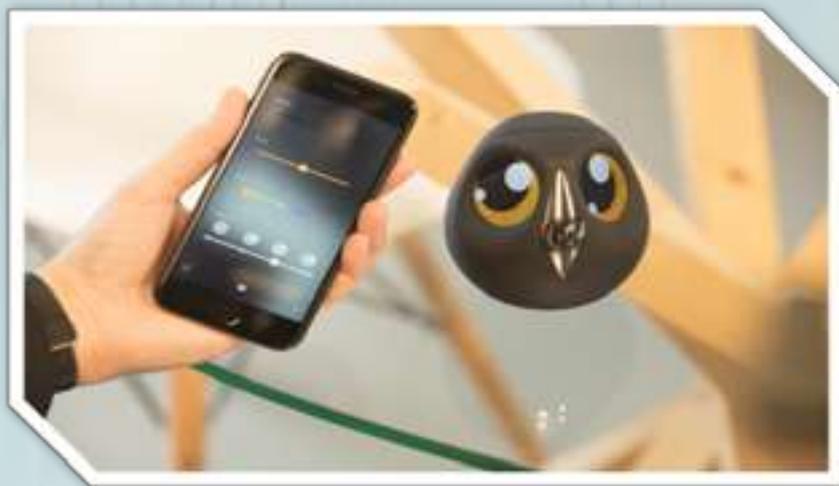
adding more random animation to the default settings and new kind of styles will be available.

Example:

- PixelArt
- Hand drawn
- Realistic
- 3D effects etc...



In everyday use, with eye expressions, Ulo needs to be recharged every 2 days. Of course you can also leave Ulo plugged in all the time on a USB port. On a full charge, Ulo can last 2 days in Alert Mode and 4 hours in Live-Stream. Ulo works with 3 rechargeable NimH batteries (LR06) minimum 1900 mA. These rechargeable batteries are not provided but can easily be found in any supermarket. You don't need to remove the NimH batteries to recharge them. Only plug Ulo to a power source.



It is a very simple way to check what is going on in another room.

Ulo streams directly on a secure webpage or its mobile app.

In this world of ever evolving Artificial intelligence where cmd has been replaced by GUI, non-interactive ATM been replaced by interactive machine's. UIo is such a technology where normal boxed and circular type CCTV can be replaced by a smart, interactive, beautiful surveillance camera. Having such a tech toy which not only surveillance but also provide notification for any strange behavior at home or two keep an eye on small kids, it is very useful technology in all the aspect of security, this is need of time. So we can do more work rather thin worrying about home.



Snehal Raj Verma
SE EXTC B

DIGITAL SHOES

If you are wondering what these kinds of technologies (Digital shoes) actually do, then let me tell you, you are not alone. Innovations in these technologies having been taking place since late 70's. Digital shoes are basically the shoes which are able to work digitally like counting the number of steps, keeping a track on the heart rate and blood pressure, also observing the running and the exercise pattern (i.e. reminding the user to increase their counts of exercise and kilometre of running everyday), breathing capacity, giving information about the your calories and lastly at the end of your routine of exercise it might just tell you what all activities you have done with the shoes on a particular day and might help you to improve mistakes or routine the next day.



There are many companies in the market who have been working hard daily to make the world's most comfortable shoes with all the accessible attractive features (as mentioned above) in it. These companies are in a plan to completely replace the apps and fitbit's that are used only for this purpose. The fitbit's are worn on the hand and if it is an app then it is installed in a phone and the phone is worn on hand using phone holder straps. Whereas, if we take a look at the digital shoes it will be used as regular shoes using the reflexology points, it will be measuring everything.



Big companies such as NIKE, ADDIDAS, PUMA, DIGITSOLE, and many more have been working on it for years now, and have achieved success in creating immensely advanced technology.

Pros of this product:-

- More Immediate.
- Allows You to Stay Better Engaged With Your Environment.
- Really Comfortable.
- Potentially More Fashionable.
- More Versatile.

Cons of the product:-

- Not as Widely Accepted.
- Expensive.



Recently, athletic powerhouses such as Under Armour, Nike, Adidas and New Balance have produced special runs of sneakers with 3-D midsoles. But in about a year, footwear firms may hit a more-solid milestone: They should be able to produce short runs — including sole-tooling components, midsoles and shanks — that they’ve printed themselves for market introductions.



One of the major conclusions of the new document is that the world's footwear production stabilized at 21 billion pairs in 2012. Last year, China has strengthened its position as the largest producer in the world, now providing a share of 63 % of the total production (60.5 % in 2011) as a result of the manufacture of 13,300 million pairs of shoes.

Among major world footwear producers, India and Brazil occupy the two remaining podium place, as in the previous year. However, while India's share of production stabilized at 10.4 % (on the basis of 2,194 million pairs of footwear produced), Brazil grew by 0.3 percent (from 3.8 % to 4.1 %), in 2012 as it produced 864 million pairs of footwear.

In the list of the top ten global manufacturers of footwear, the only European country that arises is Italy, occupying the 10th position. In 2012 Italy produced 199 million pairs of footwear, reducing its relative position by one percentage point (from 1% in 2011 to 0.9 % last year).



Deeksha Sharma
SE EXTC B

SUPERCOMPUTERS

The invention of 1960s gave an awesome new capability to the scientist by the development of supercomputers: the power to re-create, virtually, the physical world on the computer screen, with a remarkable degree of precision and sophistication. Everything from weather systems to biochemical interactions to car crashes to air pollution to high speed subatomic particle collisions can now be simulated, manipulated, and observed at the scientist's will. As a result, supercomputers have led to intense levels of insight and compassion. Indeed, they have revolutionized the very development of scientific discovery itself. Scientists no longer have to bank exclusively on either experiment-based or theoretical research methodologies, but rather can employ both direct observation and mathematical replica to visualize and simulate complex phenomena.



WHAT IS A SUPERCOMPUTER?

A supercomputer is a computer that performs at or near the currently highest operational rate for computers. Traditionally, supercomputers have been used for scientific and engineering applications that must handle very large databases or do a great amount of computation (or both).



A supercomputer is a computer with an excessive level of performance compared to any general-purpose computer. Performance of a supercomputer is not measured in million instructions per second (MIPS) instead, it is measured in floating-point operations per second (FLOPS). As of 2017, there are supercomputers which can perform up to nearly a hundred quadrillion FLOPS.

Supercomputers play an important role in the various fields like computational science, and are used for a wide range of computationally intensive tasks in diverse fields. These were the first such machines that had highly tuned conventional designs that ran faster than their more general-purpose contemporaries. Through the 1960s, they began to add increasing amounts of parallelism with one to four processors being typical. From the 1970s, the vector computing concept with specialized math units operating on large arrays of data started its domination. A notable example is the highly successful Cray-1 of 1976. Vector computers remained the dominant design into the 1990s. From then until today, massively parallel supercomputers with tens of thousands of off-the-shelf processors became the norm.



ILLIAC IV was the only computer to seriously challenge the Cray-1's performance in the 1970s. This machine was the first to set an example of a true massively parallel computer, in which many processors worked simultaneously to solve different parts of a single larger problem. The ILLIAC's design was concluded in 1966 with 256 processors which offer a speed of 1 GFLOPS, compared to the 1970s Cray-1's peak of 250 MFLOPS.



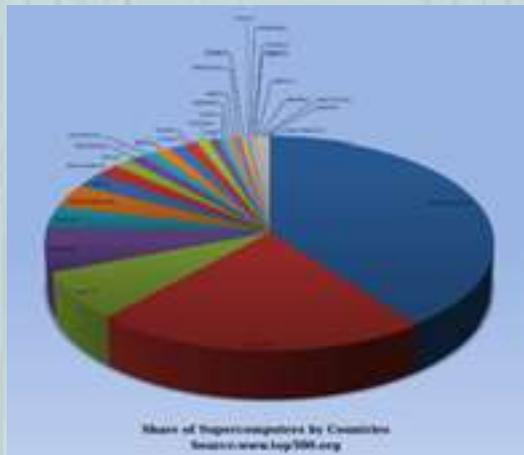
However, development problems led to building of only 64 processors, and the system could never operate faster than about 200 MFLOPS while being much larger and more complex than the Cray. Another problem that raised head was the writing of software for the system was difficult, and getting peak performance from it was a matter of serious effort. A number of "special-purpose" systems have been designed dedicated to a single problem. This allows the use of specially programmed FPGA chips or even custom ASICs, allowing better price to performance ratios by sacrificing generality.

Major transformations have taken place since the end of the 20th century in supercomputer operating systems, based on the changes in supercomputer architecture. While early operating systems were custom tailored to each supercomputer to gain speed, the trend has been to move away from in-house operating systems to the adaptation of generic software such as Linux.

Although most modern supercomputers use the Linux operating system, each manufacturer has its own specific Linux-derivative, and no industry standard exists, partly due to the fact that the differences in hardware architectures require changes to optimize the operating system to each hardware design.

Since 1993, the fastest supercomputers have been ranked on the TOP500 list according to their LINPACK bench mark results. The list does not claim to be unbiased or definitive, but it is a widely cited current definition of the "fastest" supercomputer available at any given time.

This is a recent list of the computers which appeared at the top of the TOP500 list, and the "Peak speed" is given as the "Rmax" rating.



Distribution of TOP500 supercomputers among different countries, as of November 2015

DECADE	USES AND COMPUTER INVOLVED
1970s	Weather forecasting, aerodynamic research (Cray-1).
1980s	Probabilistic analysis, radiation shielding modelling (CDC Cyber).
1990s	Brute force code breaking (EFF DES cracker).
2000s	3D nuclear test simulations as a substitute for legal conduct Nuclear Non-Proliferation Treaty (ASCI Q).
2010s	Molecular Dynamics Simulation (Tianhe-1A)



Harshada Hariyan
SE EXTC A

INTERNET OF THINGS (IOT)

Internet, a revolutionary invention, is always transforming into some new kind of hardware and software making it unavoidable for anyone. The form of communication that we see now is either human-human or human-device, but the Internet of Things (IoT) promises a great future for the internet where the type of communication is machine-machine (M2M). This article aims to provide a comprehensive overview of the IoT. Also, it describes a six-layered architecture of IoT and its applications.



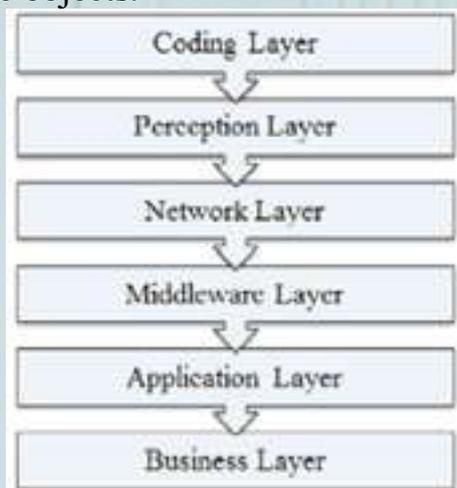
With the continuous advancements in technology a potential innovation, IoT is coming down the road which is burgeoning as an ubiquitous global computing network where everyone and everything will be connected to the Internet. IoT is continually evolving and is a hot research topic where opportunities are infinite. Imaginations are boundless which have put it on the verge of reshaping the current form of internet into a modified and integrated version. The number of devices availing internet services is increasing every day and having all of them connected by wire or wireless will put a powerful source of information at our fingertips. The concept of enabling interaction between intelligent machines is a cutting-edge technology but the technologies composing the IoT are not something new for us . IoT, as you can guess by its name, is the approach of converging data obtained from different kinds of things to any virtual platform on existing Internet infrastructure. The concept of IoT dates back to 1982 when a modified coke machine was connected to the Internet which was able to report the drinks contained and that whether the drinks were cold. Later, in 1991, a contemporary vision of IoT in the form of ubiquitous computing was first given by Mark Weiser.



However in 1999, Bill Joy gave a clue about Device to Device communication in his taxonomy of internet. In the very same year, Kevin Ashton proposed the term "Internet of Things" to describe a system of interconnected devices. The basic idea of IoT is to allow autonomous exchange of useful information between invisibly embedded different uniquely identifiable real world devices around us, fueled by the leading technologies like Radio-Frequency IDentification (RFID) and Wireless Sensor Networks (WSNs) which are sensed by the sensor devices and further processed for decision making, on the basis of which an automated action is performed.

THE SIX LAYERS OF IOT ARE DESCRIBED BELOW:

CODING LAYER: It is the foundation of IoT which provides identification to the objects of interest. In this layer, each object is assigned a unique ID which makes it easy to discern the objects.



PERCEPTION LAYER: This is the device layer of IoT which gives a physical meaning to each object . It consists of data sensors in different forms like RFID tags, IR sensors or other sensor networks which could sense the temperature, humidity, speed and location etc of the objects. This layer gathers the useful information of the objects from the sensor devices linked with them and converts the information into digital signals which is then passed onto the Network Layer for further action.



Network Layer: The purpose of this layer is receive the useful information in the form of digital signals from the Perception Layer and transmit it to the processing systems in the Middleware Layer through the transmission mediums like WiFi, Bluetooth, WiMaX , Zigbee, GSM, 3G etc with protocols like IPv4, IPv6, MQTT, DDS etc .

MIDDLEWARE LAYER: This layer processes the information received from the sensor devices. It includes the technologies like Cloud computing, Ubiquitous computing which ensures a direct access to the database to store all the necessary information in it. Using some Intelligent Processing Equipment, the information is processed and a fully automated action is taken based on the processed results of the information.

APPLICATION LAYER: This layer realizes the applications of IoT for all kinds of industry, based on the processed data. Because applications promote the development of IoT so this layer is very helpful in the large scale development of IoT network. The IoT related applications could be smart homes, smart transportation, smart planet etc.

BUSINESS LAYER: This layer manages the applications and services of IoT and is responsible for all the research related to IoT. It generates different business models for effective business strategies.

Most of the daily life applications that we normally see are already smart but they are unable to communicate with each other and enabling them to communicate with each other and share useful information with each other will create a wide range of innovative applications. These emerging applications with some autonomous capabilities would certainly improve the quality of our lives. A few of such applications are already in the market, let's take the example of the Google Car which is an initiative to provide a self-driving car experience with real-time traffic, road conditions, weather and other information exchanges, all due to the concept of IoT. There are a number of possible future applications that can be of great advantage. So some of the applications of IOT are listed below:



SMART TRAFFIC SYSTEM- Traffic is an important part of a society therefore all the related problems must be properly addressed. There is a need for a system that can improve the traffic situation based on the traffic information obtained from objects using IoT technologies. For such an intelligent traffic monitoring system, realization of a proper system for automatic identification of vehicles and other traffic factors is very important for which we need IoT technologies instead of using common image processing methods . The intelligent traffic monitoring system will provide a good transportation experience by easing the congestion. It will provide features like theft-detection, reporting of traffic accidents, less environmental pollution. The roads of this smart city will give diversions with climatic changes or unexpected traffic jams due to which driving and walking routes will be optimized. The traffic lighting system will be weather adaptive to save energy. Availability of parking spaces throughout the city will be accessible by everyone.

SMART ENVIRONMENT- Prediction of natural disasters such as flood, fire, earthquakes etc will be possible due to innovative technologies of IoT. There will be a proper monitoring of air pollution in the environment.

SMART HOME- IoT will also provide DIY solutions for Home Automation with which we will be able to remotely control our appliances as per our needs. Proper monitoring of utility meters, energy and water supply will help saving resources and detecting unexpected overloading, water leaks etc. There will be proper encroachment detection system which will prevent burglaries. Gardening sensors will be able to measure the light, humidity, temperature, moisture and other gardening vitals, as well as it will water the plants according to their needs.

With the incessant burgeoning of the emerging IoT technologies, the concept of Internet of Things will soon be inexorably developing on a very large scale. This emerging paradigm of networking will influence every part of our lives ranging from the automated houses to smart health and environment monitoring by embedding intelligence into the objects around us. Researches are already being carried out for its wide range adoption, however without addressing the challenges in its development and providing confidentiality of the privacy and security to the user, it's highly unlikely for it to be an omni-present technology.

TOPPERS

BE

Jatin Rai	10.00
Shriya Shah	9.96
Vishal Singh	9.86
Pratiksha Yadav	9.86
Kusum Mishra	9.86

TE

Pransu Shrivastav	10.00
Jyoti Tiwari	9.84
Prachi Thakur	9.68

SE

Sonal Singh	9.30
Rohit Gupta	9.26
Gagan Jain	9.11



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