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THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY

Autonomous College Affiliated to University of Mumbai
Approved by All India Council for Technical Education(AICTE) and Government of Maharashtra(GoM)

Conferred Autonomous Status by University Grants Commission (UGC) for 10 years w.e.f. A.Y 2019-20
Amongst Top 200 Colleges in the Country, Ranked 193rd in NIRF India Ranking 2019 in Engineering College category
• ISO 9001:2015 Certified • Programmes Accredited by National Board of Accreditation (NBA), New Delhi
• Institute Accredited by National Assessment and Accreditation Council (NAAC), Bangalore

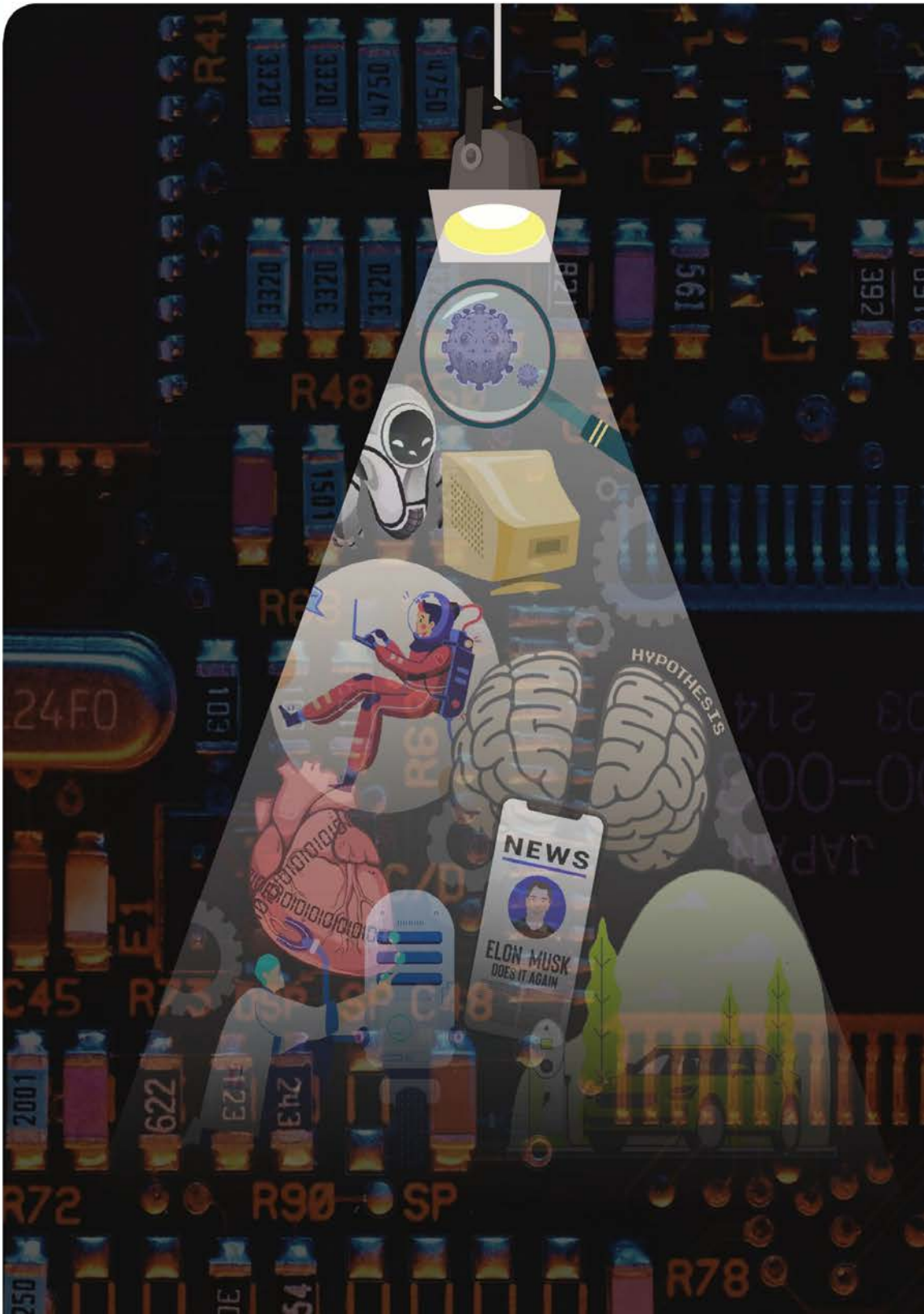
Estd. in 2001

"Autonomous Status" by University Grants Commission (UGC) for 10 years w.e.f. AY 2019-20 to AY 2028-29.

ISO 9001:2015 Certified Institute | NBA Accredited Programs | NAAC Accredited Institute with 'A' Grade | AICTE-CII Survey rating in Platinum category for Industry linkages | Among Top 200 Colleges in the Country Ranked 193rd in NIRF India Ranking 2019 in Engineering Category | 68th & 78th in All India Rank by Outlook survey published in June 2019 & May 2018 respectively

ES&H DEPARTMENT'S

THE BUZZ



VICE PRINCIPAL

Learning is a continuous and never-ending process in any individual's life. It begins when a child is born and develops through experiences. Learning in a student's phase cannot be bounded by the four walls of a classroom. The entire learning experience encompasses having a comprehensive understanding of learner's surroundings. The optimum method of learning, therefore, isn't restricted to the knowledge gained by conventional means of books but necessitates the engagement of students.

Rekindling the spark of innovation and fostering curiosity in the young minds which holds pivotal significance in today's rapidly advancing world. A departmental magazine precisely assimilates not only disseminating knowledge but also introduces a whole new captivating and enthralling realm of contents, wherein students get to explore their interests and feed their curiosities.

The Byte aims at incorporating student's ideas and encourages their active participation to facilitate the learning process. The Byte, published by the Department of Engineering Sciences and Humanities, has established a significant benchmark in showcasing the unveiled inherent talent of the students by giving them an unparalleled opportunity and an excellent platform to not only express their ideas and creative potentials but also voice out their personal opinions on the topics which hold utmost relevance in a student's life.

The Byte, unlike other technical magazines, hasn't restricted itself only to the domains of science and technology but has also incorporated other prominent domains, providing students the feasibility to explore inter-disciplinary aspects of topics and stimulate their inner inquisitiveness. The platform provided to the Editorial Committee has been well utilized in harnessing the capabilities of all the vibrant students. I extend my heartfelt congratulations to the entire Editorial board for presenting before us this eagerly awaited college magazine, fulfilling not only the arduous criteria of punctuality but also procuring content of paramount excellence.

- Dr. Deven Shah

FE INCHARGE

Department of Engineering Science and Humanities plays an extremely crucial role in an engineering college. It firmly believes in the overall holistic development of an individual and does not restrict itself to one particular domain or branch. Instead, the department profoundly focuses on creating an environment which caters and facilitates learning for all the students across all the branches. It has been successful in organizing various events and activities for all the students which help them in exploring their domains of interest.

The department firmly believes in outcome based learning. Every activity that occurs in our college is for a purpose. Therefore, we have come up with our oldest magazine of ES&H department - The Byte.

The Byte is one such initiative where the students get platform to showcase their latent talents and bring them in the limelight. The Byte focuses on informing and describing latest technologies, engaging and inspiring a diverse set of readers.

I am pleased to see the enthusiastic responses received from the eminent members of the department and first year students and take immense pride in publishing this magazine, procured by the dedicated efforts of the first year students themselves to work hard.

The uniqueness of each and every student is elaborated through the articles they have written. The process of making the magazine made these students to research on various topics enhancing their knowledge and elevating it to a new level of fineness. I am extremely proud that such students are a part of my department and they have transformed into great achievers by committing themselves to work hard.

- Dr. Vivek Mishra

ACTIVITY HEAD

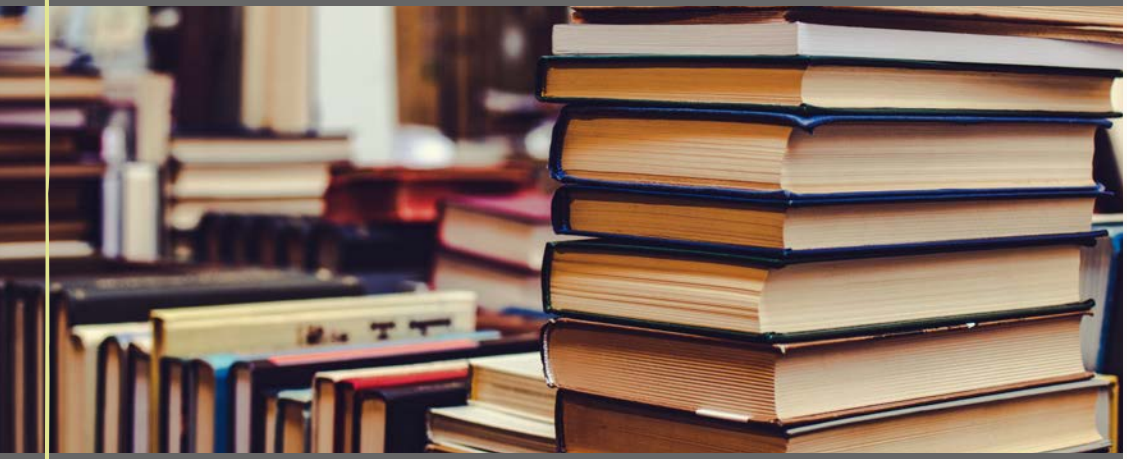
Each day is filled with new experiences through which we often learn valuable lessons and in turn, make our day better. Igniting sparks of creativity, ideas and supporting innovation is also the new way of proceeding with acquiring knowledge. TCET believes in an all-round development of aspirants for research and writing. Not only books, but articles are also a better way to induce imagination in our minds. I'm delighted to present you The BYTE Magazine by Engineering Sciences and Humanities, 2020 Edition. It is not only important to showcase students' creativity but also to make the readers curious and this can be done by expressing their ideas Technical articles on-going developments in Technology.

The BYTE purely focuses on development of interdisciplinary and complex problems, to which the solutions must also be found in the same way.

It's indeed due to the hard work of The BYTE Team and their true determination that this magazine is growing. Hard work is also the spirit of success and development. TCET provides an opportunity to the students to work hard and scale the extra mile. I congratulate all the members involved in the editorial committee of The Byte for executing such an incredible magazine. I assure you that the mix of curiosity and intellect will bring you a fine article which in turn, would make you wiser than the other engineering graduates.

- Dr. Rajni Bahuguna

ES&H DEPARTMENT



With the vision “Education is the manifestation of perfection already existing in man”, Thakur College of Engineering has established its ES&H department which is responsible for the holistic development of students. ES&H stands for Engineering Sciences and Humanities which rightly defines the purpose, work and mission of the department that is “To endeavour to provide a strong base in Engineering and Technology, where students, faculty and staff work collaboratively to expand knowledge in the basic disciplines of providing a foundation that is appropriate to their career goals, equipping well with knowledge and skills that will allow them to function as responsible and contributing members of society.”

The department ensures that each student is provided with various opportunities to explore themselves as not only an academic being but as a candidate fit for decoding any kind of obstruction in their way.

“The department of Humanities and Sciences shall strive to provide powerful educational effectiveness by linking facts, theory, inquiry, discovery and solutions to real world problems thereby providing a sound foundation to the undergraduate students.”

As our former president, late Dr. APJ Abdul Kalam rightly said "Educationists should build the capacities of the spirit of inquiry, creativity, entrepreneurial and moral leadership among students and become their role model." ES&H department of our college following the same organizes various events all year round with different genres such as technical, creative, performing arts, scientific, vocational and many more. This semester we got to experience and explore the industrial side by means of IV, a trip to Agra-Delhi-Chandigarh-Fatehpur Sikhri, few of the hubs of main industries in India. To develop the skill set of analysis, curiosity, demonstration, presentation and rest followed, introduction of subjects like ABL, EPC, PS, have proven to be predominant in giving an in-depth experience of one’s all round development. In order to provide an edge to their students organisation of an International and National level conference MULTICON-W was done. It gave the new blood of First Year a direction for developing their skills by analysis of their interests and to face the forthcoming. Besides this the daily initiatives and activities show the ES&H departments efforts to give the students every possible opportunity to learn and show them that though education has a syllabus but knowledge is not restricted and hence to open ourselves as now not the sky but the universe is the limit.

EDITOR'S DESK

NO ONE CAN WHISTLE A SYMPHONY. IT TAKES A WHOLE ORCHESTRA TO PLAY IT.

NONE OF US IS AS SMART AS ALL OF US.

THE BYTE

THE BYTE

The art of working together

The show had to go on, the backstage is the real trial of staging and the BYTE core team editors were out with the old and in with the new. Our main focus rested on delivering all the research work of our fellow mates in the noblest way possible such that it meets the degree of excellence of The BYTE magazine and reckons to the presupposition of our upper hand, the audience. The BYTE magazine tugged at our heartstrings and we were primed with high spirits and vigor to commence in this journey. This expedition taught us to be more solicitous, modest and our cognizance took a raise as we devoured the ethical and backbreaking research by our peers. There isn't such thing as a free lunch and assuredly this breakthrough wasn't easy. The committee faced countless challenges as the forged ahead but that didn't nether the buoyant approach of the committee.

It takes two flints to make a fire. The strength of the team is each individual member. Unity is in Adversity. The strength of each member is the team. The magazine isn't just a drop in the ocean, it's another milestone for the years down the lane and years to come. As we turn over, this THE BYTE edition is a landmark that perched amidst hard times of the world. As the Byte magazine passes yet another edition, we rest assure you that we have strived to maintain the dignity and the pride of the magazine, a heart-warming thank you to all the people who bestowed us with their support and proposed changes in the magazine, many authors who gave way to this magazine by yielding their magnificent research work and the roof of it all, our readers for their ceaseless support.

C O N T E N T S

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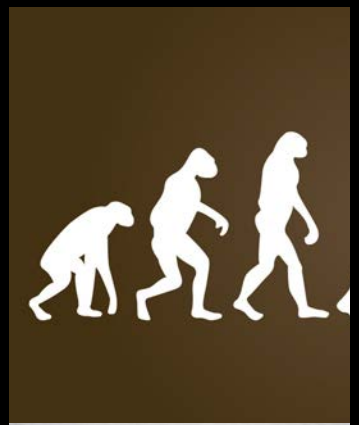
Evolution



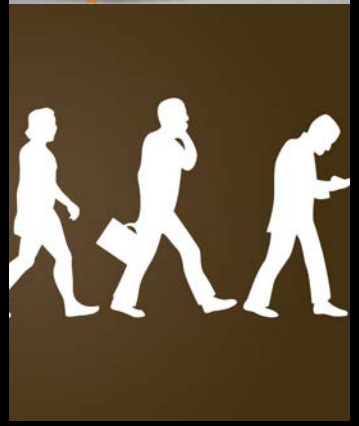
TECHNOLOGY THROUGH THE YEARS.

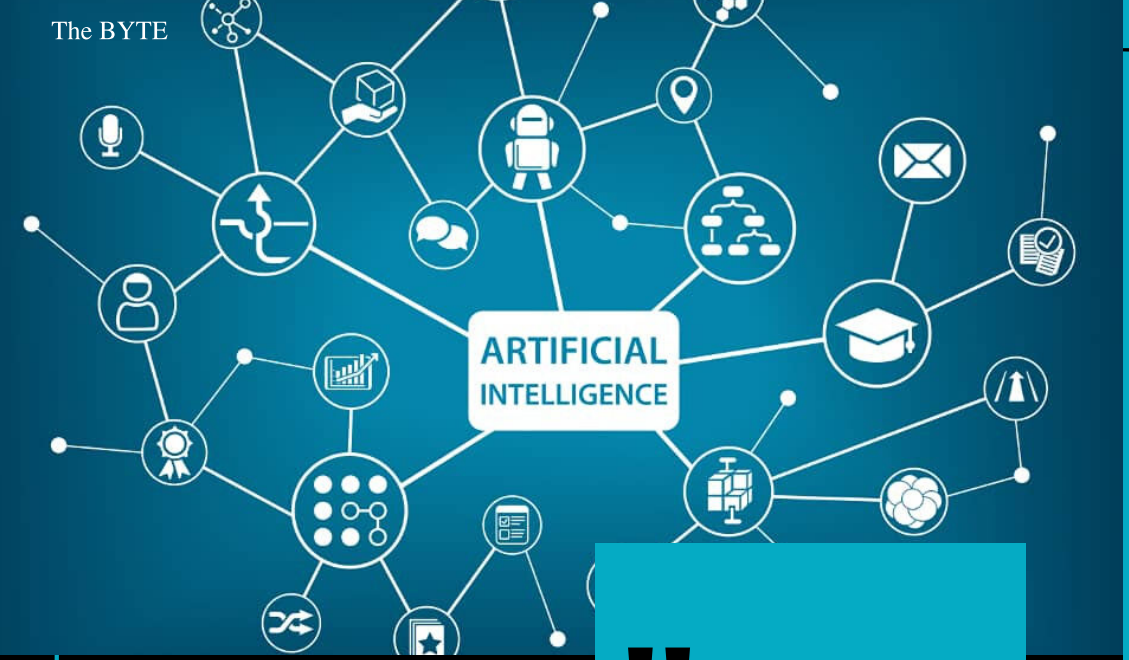
CHANGES FOR THE BETTER.

This module focus on how technology is evolved in different aspects and made life easier.

CONTENTS:

1. Age of Technology
2. Evolution of Technology through War.





Age Of Technology

The empowered edge, practical block chain and human augmentation are just the few of the biggest trend that will create the largest opportunities over this decade. Technology predictions include the dominance of the public cloud and hype of SD-WAN. Technological innovations are continuing to influence how business and the society operate in the daily life. Unlimited amount of knowledge available at our fingertips and technological advancement are accelerating faster than ever before. Everything around us inspires us to create. Thus a lot of tech creations are inspired by nature the best of which is Sofia - a humanoid.

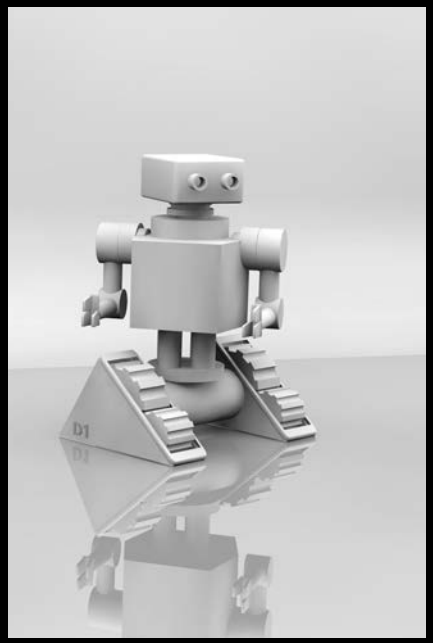
> "Automation is no longer just a problem for those working in manufacturing. Physical labor was replaced by robots; mental labor is going to be replaced by AI and software."
>
> - Andrew Yang

Today AI combines with VR and Robotics giving a huge advancement to the technical sector of the society. The application of Artificial Intelligence (AI) has relatively increased with time. Artificial Intelligence (AI), also known as machine learning is the intelligence displayed by the machines.

Through AI, the machines learn and understand their surroundings. After being exposed to various examples, these machines apply the cases to real-time problems. Artificial Intelligence helps the machine to make decisions. The ability of AI to perceive and apply cases on its own makes it more reliable. It makes the machines more user-friendly and dependable. AI is used for applications varying from small scale to large scale. Speech recognition, face recognition, virtual reality, image processing are a few of the applications.

Get high on AI

There are many new technology innovations that are changing how live our lives, but Artificial intelligence or AI, may present the most exciting changes. While AI has been around for a while now, recent improvements have made the technology much more adaptable. From SIRI to self-driving cars, artificial intelligence is progressing rapidly. While science fictions often portray AI as robots with human-like characteristics, AI can encompass anything from Google's search algorithm to IBM's Watson to autonomous weapons. AI today is properly known as narrow AI, that is designed to perform a narrow task eg only facial recognition or driving cars etc. however the long term goal of many researchers is to create general AI(AGI). While narrow AI may outperforms humans at whatever its specific task is, like playing chess or solving equations, AGI would outperform humans at nearly every cognitive task.



Modernisation marches on—technology develops with every day that passes, as does the capabilities of Artificial Intelligence, leading the world to new heights and unfamiliar waters. It is unquestionable that technological advancements have impacted how we live and think, largely for the better. Technology has made possible what was once thought unachievable in every industry you could think of. Beyond AR & VR: AI-ASSISTED MIXED REALITY is the future. AI improves Oculus which will let us experience a dream like reality. AI and VR are incredible technologies that present amazing opportunities on their own; however, bringing them together so that they work in unison will make various experiences even more interactive and engaging.

- PALAK AGARWAL
COMP A

LATEST SPECIAL

The Byte

THE WEATHER
Mumbai, Maharashtra: 29°C
Precipitation: 0%
Humidity: 63%
Wind: 13 km/hr

VOL No. 1 | Friday, April 3rd, 2019 | FIRST EDITION

EVOLUTION OF TECHNOLOGY

EXCEPTIONAL MACHINERY INVENTED DURING THE ERA OF WAR

*The **M4 Sherman** (named after the American Civil War general William T. Sherman) was one of the few iconic fighting vehicles of the Allies during WWII, and one of the most famous tanks in history.*

***Ford's Model-T**: The first automobile mass produced with interchangeable parts marketed to the middle class.*

HENRY FORD SAVES THE DAY!

We all know that humans can trace their past since they have become evolved species, but the innovations that occurred during industrialization and during the period of war are ingenious and humongous in number. Before I continue, I'd like to clarify that I do not condemn the idea of war in any way, I am just talking about some of the innovations created for winning wars that might have fallen off the radar.

Through time we have seen many inventions and transformations, from Wright Brothers' first ever plane to much advanced fighter planes, from travelling in carts and horses to electric cars, from hand woven clothes to machine made clothes, from posts to telegrams etc.

Let's start with talking about the thing which saved America and its allies on the D-Day and helped ***Henry Ford*** to rise and stay on top. The thing for which Henry Ford dedicated his life...no it's not a car, it's their ***Production Line***. H. Ford decided to make production time as small as possible so to produce cars in great numbers and at low cost. To cut more production cost he decided to standardize the parts and produce in a large number. Although the issue was the traditional production process, i.e. ***warping*** where the metal needed to be cut and shaped first which is later deformed because of the supplied heat which makes it deviate from its original structure. Under Ford, new cutting methods were developed and more precise measurements tools were developed which meant that he could replace malfunctioned parts easily. Earlier, this wasn't possible because, the parts weren't made in the production house but instead contracts were given to smaller production houses throughout the state. This meant that each lot was different and required skilled workers. But he eliminated all of that. He once said, "***Any customer can have a car painted any color that he wants so long as it is black***". Well he didn't say that because he had a certain fascination with the color black but because of the technique he used for painting, required only a specific material which was only available in the color black, at the time. The average production of his model-T was ***2.8 million*** per year which completely caught his rivals off guard. Although, some big companies survived due to their high standard and fine quality like Aston Martin and Bentley. By 1910, the production process took a total of ***93 minutes***. Now you might be thinking how did this saved America in WWII? The allies started the production of tanks once they were certain that they wouldn't defeat the Nazis without them. Lucky for the American government, they acquired the rights of Ford's efficient usage of mass production through an agreement. They wanted to put a 75mm gun on tanks which was quite an ambitious dream which they had to compromise with its maneuvers. They made its M3 variant, which was made of flat planes welded together that turned out to be a weak point of the tank. But learning from their mistakes they made the deadly ***M4 Sherman*** which had an insanely small production time of just 30 mins.

Ekranoplan in its prime

THE EKRANOPLAN

Moving on, the next invention on the list is the Soviet union's Giant which came as a shock to the American Spies. As the Cold War advanced, America started to spy on the Soviet Union for which they launched a satellite that sent pictures of the Soviet Union's warfare to America in the form of negatives. When the photos of the received reel were developed, America was stunned to see a massive plane-like structure moving at an unbelievable speed. It was ***Ekranoplanes***. It had a length of ***242 feet*** with a wingspan of ***144 feet*** and a height to tail top of ***63 feet*** - making her one of the largest operational "aircraft" ever completed. Usually when a plane tries to land, it experiences a resistive force due to the formation of an air cushion right below the plane. This, at times, destabilizes the plane while landing. Also, there were many boats which used *Hydrofoil* i.e. a wing-like structure stuck near the nose of the boat. It is used to increase the speed but due to cavitation, it can't approach the surface of the water. An inventor of Soviet Union, *Rostislav Evgenievich Alexeyev* used both of these phenomena together. He transferred the wings from beneath the water to above and changed its hydrodynamics to aerodynamics. It can fly 1-2 m above the water level and could be practically invisible to radar and sonar, even making the water mines vulnerable. The fascinating thing was the bigger they are, the more economical they become but due to the damage on the engine because of the salty water and its limited lift height it couldn't be sent to the seas. Though many believed in its idea and worked on different designs to make it possible for future use even if it was too mission specific.

TOWER THAT DELAYED WWII

The final invention was led by none other than the initial sorcerer of the WWII, Adolf Hitler and his Nazis. When in 1940 British RAF did merciless bombing on the Berlin citizens due to which Hitler prioritized the building of towers for the safety of its citizens. The structure which prolonged the WWII and didn't let the Nazis down. The anti-aircraft towers. One of them is the Zoo tower located in Berlin Zoo. It had 20 anti-aircraft guns of almost a range of 10 km and 96 rounds/min. Any aircraft which entered this range will meet its death. This basement tower had no glaring flaws. *This structure delayed their surrender for 17 days even after Soviet and American forces near the Capital.* The Soviet tried to destroy the structure by shelling 100 kg shells from Soviet bunker busters which didn't make any practical damage as the tower had 2.5 m thick steel reinforced wall. leaving them with nothing but to surround the tower and appeal for a surrender from the Nazis. *This tower was made in pairs i.e. Zoo tower, Friedrichshain tower, Humboldthain tower making a defense triangle around the capital city and the government.* Other 5 towers were created in different places in pairs of 3 and 2. Each tower had a pair tower means zoo tower had two parts: The G-tower was for attack and the L-Tower provided communication. Each tower required 1600 tons of material every day by prioritizing and using slaves as workers. Hitler made the Zoo tower in just 1 month. Every tower had its own freshwater well, enormous storage of food, underground supply of fuel and massive storage of ammunition and they also had a hospital inside it. ***15000 civilians*** could take shelter there but towards the end of the war the reported number of civilians taking shelter was 3 times the original number. The first attempt to tear it down took 25 tons of explosives but didn't make any significant damage. It came down on the 3rd attempt with *35 tons of explosives.* Other towers weren't destroyed because they were expensive and were surrounded by houses. One of them was used as a party hall, one of them was used for renewable energy station as it provides thermal insulation, and the other is used as an aquarium. These structures still stand tall even after numerous attempts of bringing them down to remind us of the scary and merciless war that destroyed the lives of many.

Even though the motive of creating these weapons was evil, but the power and skill of the inventions is commendable. To create so much from the limited resources that the inventors had then, is something we must learn. ***War is maybe good for few but the amount of mass destruction and the negative impacts it has on our planet will always exceed the benefits.*** We can only take inspiration from these inventions and create something which we can use for the greater good of the world.

Article by:
Hitansh K. Doshi
COMP- A

Space Beyond

READY TO SEE THE WORLD BEYOND EARTH?

BOOK YOUR TRIP TODAY!

This module is a quick trip to the space beyond our planet.

CONTENTS:

1. Multiverse
2. What Happens to Space-Time inside a Black Hole
3. Black Hole Information Paradox

Multiverse

Science OR Science Fiction

by Namit Singh (ELEX)

The Universe, as far as the most powerful telescopes can see (even in theory), is vast, huge and massive. Including photons and neutrinos, it contains some 10^90 particles, clumped and clustered together into hundreds-of-billions-to-trillions of galaxies. Each one of those galaxies comes with around a trillion stars inside and they're strewn across the cosmos in a sphere some 92 billion light years in diameter, from our perspective. But, despite what our intuition might tell us, that doesn't mean we're at the center of a finite Universe. In fact, the evidence indicates something quite to the contrary. If you learn anything from the Big Bang, it should be this: The Universe was not constant in space or in time, but rather has evolved from a more uniform, hotter, denser state to a clumpier, cooler and more diffuse state today. This has given us a rich Universe, replete with many generations of stars, an ultra-cold background of leftover radiation, galaxies expanding away from us even-more-rapidly the more distant they are. From both observational and theoretical point-of-view, we have every reason to believe there's plenty more, and perhaps even infinitely more.

A period of cosmological inflation, describes a phase of the Universe, where rather than being full of matter and radiation, the Universe was filled with energy inherent to space itself: a state that causes the Universe to expand at an exponential rate. Meaning, by the time 10^-34 seconds have passed, the Universe is around 1000 times its initial size; by time 10^-33 seconds have passed, the Universe is around 10^30(or 1000^10) times its initial size; The Universe could barely be larger than the part observable to us, it could be many ridiculous orders of magnitude larger than what we see.

INFLATION

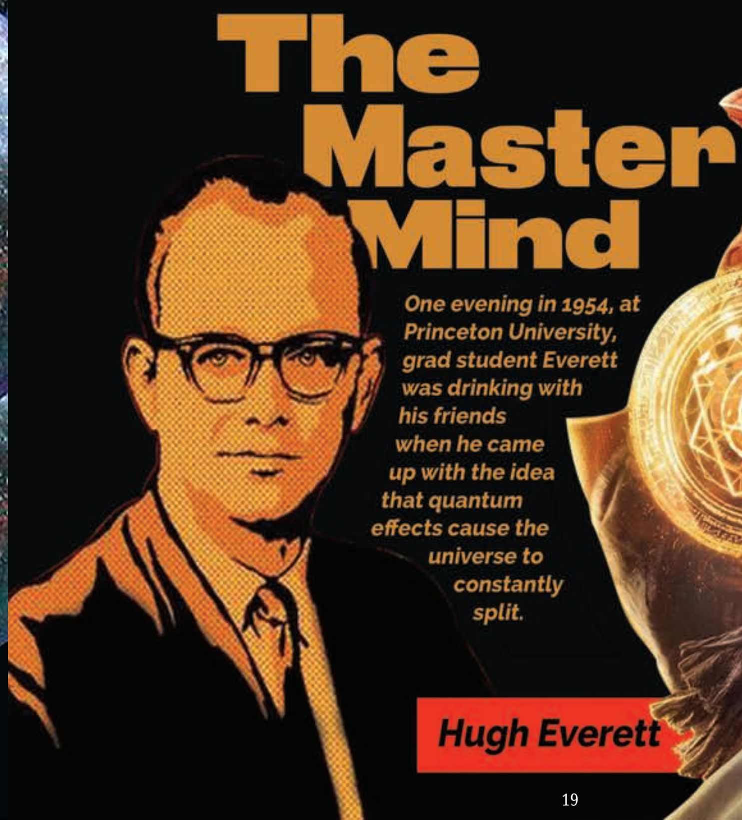
We can think about inflation as occurring at the top of a very flat hill, like a ball rolling slowly down it. As long as the ball remains near the top of the hill, rolling slowly, inflation continues, and the Universe expands exponentially. Once the ball rolls down into the valley, however, inflation ends, and that rolling behavior causes the energy to dissipate, converting the energy inherent to space itself into matter-and-radiation, taking us from an inflationary state into the hot Big Bang. Inflation isn't like a ball which is a classical field but is rather like a wave that spreads out over time, like a quantum field. This means that, as time goes on and more-and-more space gets created due to inflation, certain regions, probabilistically, are going to be more likely to see inflation come to an end, while others will be more likely to see inflation continue. The regions where inflation ends will give rise to a Big Bang and a Universe like ours, while the regions where it doesn't will continue to inflate for longer. As time goes on, because of dynamics of expansion, no two regions where inflation ends will ever interact or collide; the region where inflation doesn't end will expand between them, pushing them apart.

UNCERTAINTIES

We don't know if the regions where inflation ended are all the same, or whether they're vastly different than our own. It's conceivable that there are (unknown) physical dynamics that cause things like the fundamental constants particle masses, strengths of forces, the amount of dark energy to be exactly what they are for us in all regions where inflation ends. But it's also possible that different regions where inflation ends, what we might consider different Universe, have arbitrarily different physics. there's a Universe out there for every outcome that's conceivable. There's one where everything with a non-zero probability of having happened is actually the reality in that Universe. So realistically, we're talking about at least 10^10^50 Universes that started off with initial conditions that might be very similar to our own. That's 10^100000000000000000000000000000000000000 Universes, which might be one of the biggest numbers you've ever imagined. And yet, there are numbers that are bigger that describes how many possible outcomes there are for particle interactions. There are 10^90 particles in each Universe, and we need for all of them to have the exact same history of interactions for 13.8 billion years to give us a Universe identical to our own, so that when we choose one path over another, both Universes still wind up existing. For a Universe with 10^90 quantum particles in it, that's asking an awful lot for fewer than 10^10^50 possibilities to exist for how those particles will interact with one another over 13.8 billion years. 1000! (or (10^3)!), or 1000 factorial, which describes the number of possible permutations there are for 1000 different particles to be ordered at any instant in time. Consider, mind you, how much bigger this number is (10^3)! than (10^1000) is. But there aren't 1000

particles in the Universe, but 10^90 of them. Every time two particles interact, there's not just one possible outcome, but an entire quantum spectrum of outcomes. As sad as the case is, there are way more than (10^90)! possible outcomes for the particles in the Universe, and that number is many googolplexes times larger than a paltry number like 10^10^50. In other words, the number of possible outcomes from particles in any Universe interacting with one another tends towards infinity faster than the number of possible Universes increases due to inflation. Even setting aside issues that there may be an infinite number of possible values for fundamental constants, particles and interactions, and even setting aside interpretation issue such as whether the many-worlds-interpretation actually describes our physical reality, the fact of the matter is that the number of possible outcomes rises so quickly so much faster than merely exponentially that unless inflation has been occurring for a truly infinite amount of time, there are no parallel Universes identical to this one. ***The singularity theorem tells us that an inflationary state is past-time like-incomplete, and hence, most probably did not last a truly infinite amount of time, but rather arose some distant-but-finite point in the past.*** There are a huge number of Universes out there possibly with different laws than our own and possibly not but there are not enough of them to give us alternate versions of ourselves; the number of possible outcomes grows too rapidly compared to the rate that the number of possible Universe grows. So what does this mean for you? It means it's up to you to make this Universe count. ***Make the choices that leave you with no regrets: take the dream job, stand up for yourself, navigate through the pitfalls as best you can, and go all-out ever day of your life.*** There is no other Universe that has this version of you in it, and there is no future for you other than the one you live yourself into. Make it the best one possible.

Most stories of the Marvel Comics, takes place in the Marvel Universe which is also part of a larger multiverse. The Doctor Strange series aren't complete without the multiverse theory. Infact, in it's first movie, it's mentioned that Agamotto became the first Sorcerer Supreme to detect the presence of other dimensions within the Multiverse. Although fictional, clearly the theory is widely used in the MCU and the comics.

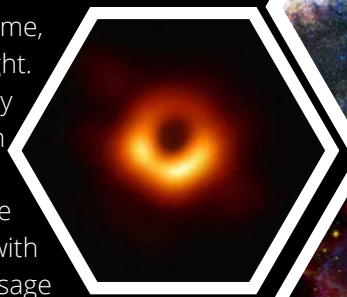


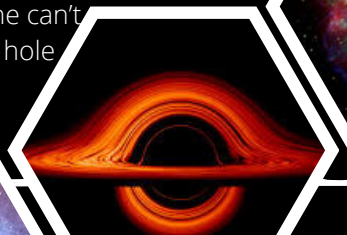
What Happens To Space-Time Inside A Black Hole?

If you're outside the event horizon, being near a black hole is no different than being near any other source of gravity. If the Sun were surreptitiously replaced by a black hole of the exact same mass – 1.99x10^30 kg, the Earth and all the planets would continue in their orbits in exactly the same fashion they're moving right now. The reason quasars do what they do, so to reason, it is because these incredibly large masses can accelerate matter near them to very rapid speeds.The matter itself forms an acceleration disk around, the black hole, where it gets accelerated to speed so great that they give off radiation of many different frequencies, including in the radio. We also see two "lobes" perpendicular to the acceleration disk, which are jets of accelerated matter getting ejected a relativistic speeds. The sources we call blazars happen to be oriented with one of the lobes/jets pointed right toward us while other active galaxies tend to be oriented otherwise. Quasars shine as brightly as they do because the things they devour get stretched apart, torn into bits of matter,heats up and has no choice but to emit radiation. And they're visible from such great distances because these are black holes hundreds of millions or even billions of times the mass of our Sun, devouring millions the mass of our Sun, devouring millions of solar masses worth of matter but not devouring tens or hundreds of millions more...

According to Einstein's General Theory Of Relativity, any massive object actually distorts the space-time around it, including our Sun, Earth, or even us. A black hole is an extreme case in the sense that at its singularity the curvature of space-time becomes infinite, preventing even light to escape. The boundary beyond which light cannot escape the black hole's gravity well is known as the event horizon, while its radius is called the Schwarzschild radius. Once particles and light-rays go past the event horizon their light cones "tip over" and point to the singularity, which now represents all future-directed paths with no escape possible. Many people are fascinated by the famous "event horizon" of a black hole, the boundary of the region out of which nothing can escape. The mechanism that gives it this property is strange and amazing it has to do with the idea of causality.

Merlin from the King Arthur legends was supposed to have lived his life backwards the first thing he experienced was his death and the last was his birth, hence his ability to foretell the future. To us, however, time feels as though it flows only forward. This feeling actually comes from the more general property of causality. In a region like the one here on Earth, you can only remember events that meet two criteria: (1) It has to have been in the past, land (2) It has to have happened at a distance no more than what light could have travelled since it happened. The second rule is just the familiar light speed limit. The first is called causality, and it's why you won't meet anyone like Merlin here at home. Here comes the strange part. General relativity (the same theory supported by so many experiments and needed to make the GPS system work predicts that , simply by compressing any piece of matter down enough to make a black hole, you create a region where this just isn't true. Inside the event horizon, time and space change places. Therefore the new restrictions go like this: in order for you to remember something, (1) It has to have happened farther from the center of the black hole than where you are now, and (2) If T is the time that it would take light to travel to you from the location of the event, then it happened either no more than T hours ago or T hours into the future. I recommend thinking about this at least until your head starts to hurt. First of all, note that restriction 1 prevents you from moving away from the center of the black hole, and therefore from going back across the event horizon. Also note that it says "farther", not "at least as far". This means that not only can't you move away from the center, you can't even stand still. Also we see that everyone inside the event horizon is a psychic. This happens because light can travel to you from events in future, so you can quite literally see them.You can't see anything closer to the center than you are because light can't travel away from the center. If you look away from the center, though, you see two images of everything one from T hours in the past and one from T hours in the future. For nearby objects, these two images will look just the same, since T will be very small due to the large speed of light. For faraway objects, though, they could be completely different. For instance,if both you and Tolstoy were in a black hole and were separated by 3 light years, you could be watching him start and finish War and Peace at once.At that point in time,he would only be done with half of the book.You'd want to try sending him a message with the text of the book, but you couldn't because he can't see you since you're closer to the center of the black hole than he is.

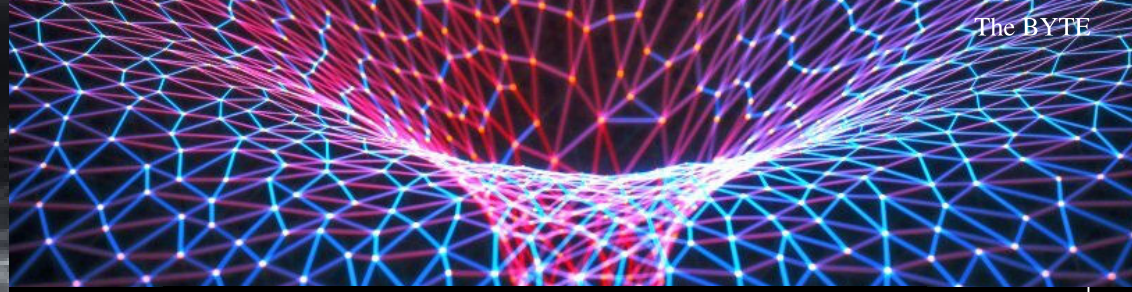




- NAMIT SINGH
ELEX

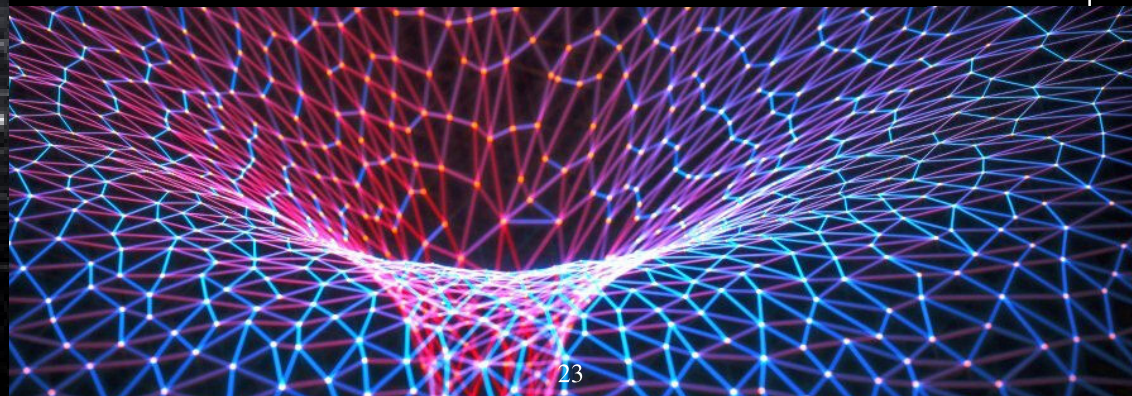
BLACKHOLE INFORMATION PARADOX

WHERE THE ANSWER TO WHAT THE UNIVERSE IS LIES



QUANTUM INFORMATION

Quantum information is basically information of the state of a quantum system. It focuses on Quantum property of a particle like spin, position and velocity. Every object is composed of particle with unique Quantum property. In Physics, just as there is the principle of conservation of energy here in quantum we have conservation of quantum energy theorem. The statement for the same states that information (entropy) is neither created nor destroyed. When you destroy object beyond recognition its Quantum information is never permanently deleted and theoretically knowledge of the information can be recreated of the same object from its particle component.



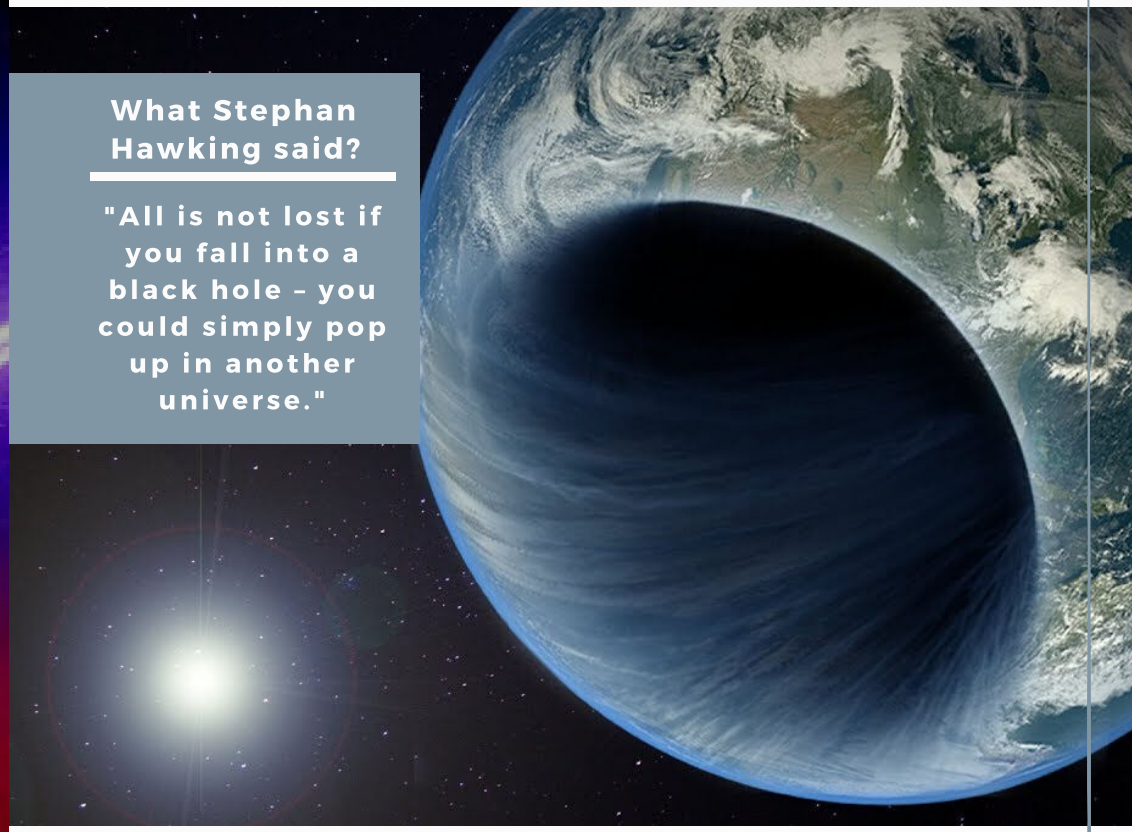
WHAT IS A BLACK HOLE-

Most of the recent research is concentrated on this region, but one as a commoner wonders “What is black hole?” A sufficiently compact mass can deform space-time to form a black hole. Even Light cannot pass through a black hole. Let say, if you have a star with 20 times mass of the sun's core, which is equivalent to three solar masses, it will form a black hole with other 17 solar masses blasted into space by Supernova. Core’s own gravity collapses into a neutron star. Eventually, the neutron star following the same, collapses under its own gravity and forms a black hole. Boundary of a black hole is called an Event Horizon and here the escape velocity is equal to the speed of light (theoretical calculations) or even more. Around black hole there is a photon sphere where light will Orbit. In the center of a black hole is a gravitational singularity, a one-dimensional point which contains a huge mass in an infinitely small space. Accretion disk is a structure formed by diffused material in orbital motion around a black hole.

HAWKING RADIATION-

Hawking radiation is black-body radiation due to quantum effects near the black hole. It decreases mass and rotational energy of black holes. When vacuum fluctuation (temporary change in energy of space which leads to creation of particle and antiparticle) of space-time occur near Event Horizon cause creation of particle and antiparticle pair. Antiparticle falls into black hole and the other escapes. This reaction of particle and antiparticle leads to reduction in mass of black hole but for an outside observer it seems like black hole emitted a particle. Evaporation of a black hole by Hawking radiation is an incredibly slow process (It would take approximately 10^64 years for one solar mass black hole to evaporate).

Black Hole Information Paradox



What Stephan Hawking said?

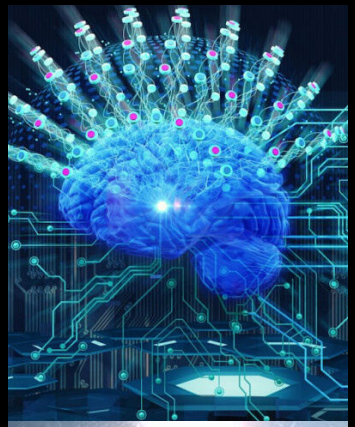
"All is not lost if you fall into a black hole - you could simply pop up in another universe."

When an element is thrown in the black hole or gets sucked into the black hole by its gravitational pull, its Quantum information is directed towards the surface layer which is called Event Horizon, resulting in the black hole getting larger. Contrasting with this the Hawking radiation states that black holes are gradually evaporating over incredibly large time losing their mass with Quantum information of particle within it.

Does that mean black holes erase information? The Information Paradox is one of the biggest questions in science, making the physicist more and more curious. The answer of this paradox could lead to change understanding of universe in a manner we would have never known of.

TEJAS BORKAR
COMP A

Technology Today



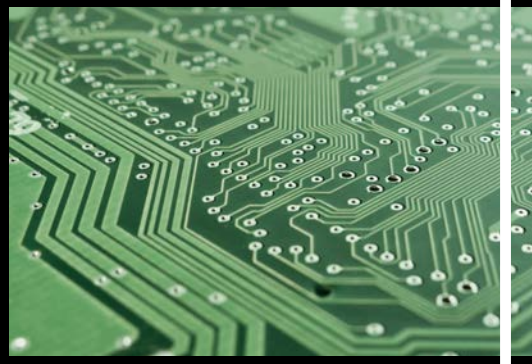
DIGITALLY YOURS.

MAKING 'IT' HAPPEN.

This module is the collection of the latest development in the field of Engineering & Technology.

CONTENTS:

TECHNOLOGY HELPS PEOPLE, HELP PEOPLE

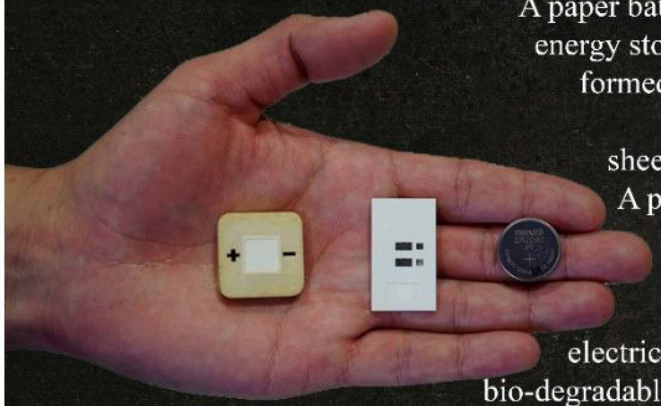


Technology today is about intersection of technology and our everyday lives. Ancient and modern civilization both have been benefited from technology, inventions and innovations. Since every technology invented by humans reflects their very need, the society and technology have become inseparable from each other. As humans venture into the future, technology is unfurling increasingly and affecting almost every aspect of human life. Today technology is allowing more efficient use of scarce resources which is leading to a tremendous effect on our monetary system. Technological growth is closely linked to the expansion of scientific research and knowledge. In the last 50 years, thanks to the exponential increase in computing power and microchip design and manufacture, there has been unprecedented innovation and technological growth in nearly every field of human endeavour from health and transport to industrial production and education.

Although there have been many examples how advancement in technology has changed our lives, Artificial Intelligence (AI) is a classic one. Who would have imagined that a machine could be so capable of thinking and behaving like us that it would be fit to work independently?

To top it all, AI is far more efficient less error prone to us. Computers with AI are already correctly identifying human emotions through observing facial expressions and body movements. Some robots are able to mimic human emotions. This is called effective computing, sometimes called artificial emotional intelligence, and refers to the study and development of systems and devices that can recognize, interpret, process, and simulate human affects. There is no denying that the future of technology will continue to revolutionize our lives. In a few years, driverless cars may be the norm for everyone, and robots will be commonplace in factories. Future technology is sure to transform our lives in unbelievable ways, but here we highlight the many common ways technology is changing our lives today.

PAPER BATTERY

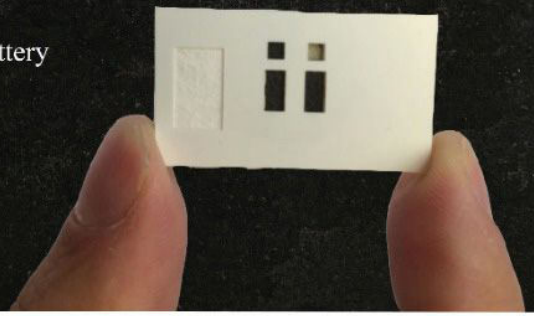


A paper battery is a flexible, ultra thin, energy storage and production device formed by combining carbon nano tubes with a conventional sheet of cellulose based paper. A paper battery can work both as high energy battery and super capacitor, combining two different electrical nature. Paper batteries are bio-degradable, light weighted, non-toxic, flexible, and have potential.

The creation of paper battery drew from diverse pool of discipline, requiring expertise in material science, energy storage and chemistry. In august 2007, at Ransselaer polytechnic institute led by Drs. Robert Linhardt, John Howard, Broadbent, Pulicked M. Ajayan, Omkaram Nalamasa with appointment in material science and engineering developed the paper battery also known as nano composite paper. In 2009, Yi Cui and his team at Stanford University succesfully made an actual prototype that gave a terminal voltage of 1.5V.

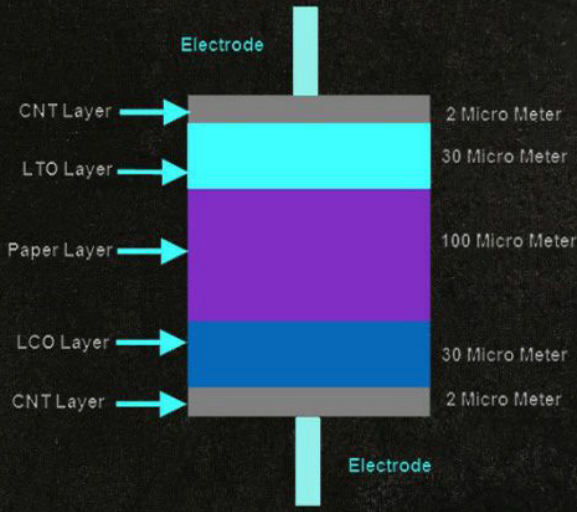
THERE ARE MANY ADVANTAGES OF USING A PAPER BATTERY

>They can be used both as a battery as well as a capacitor.
>They can be recharged.
>They are highly efficient.
>They are non toxic.
>They last longer then a conventional battery.



THERE ARE MANY PROBLEMS WITH CONVENTIONAL BATTERIES

> They have lower specific power compared to otherfuels.
> Their weight and size is more then a paper battery.
> They take longer period of time to recharge.
> They are hazardous to environment.
> They can explode, can carrode, and can leak chemicals.



THERE ARE A FEW DISADVANTAGES OF PAPER BATTERY

> They are prone to tearing.

>Nano tubes made from carbon and are expensive because they are made by a procedure called electrolysis.

IN THE ERA OF MAKING TECHNOLOGY NOT HARMFUL TO ENVIRONMENT, PAPER BATTERY IS THE EFFECTIVE WAY TO START IT

- SHRUTI DUBEY
COMP A

5G

NETWORK FASTER,EFFICIENT AND MORE RELIABLE

EVERYTHING YOU NEED TO KNOW ABOUT 5G

WHAT IS 5G?

A: 5G is the 5th generation mobile network. It will take a much larger role than previous generations.
5G will elevate the mobile network to not only interconnect people, but also interconnect and control machines, objects, and devices. It will deliver new levels of performance and efficiency that will empower new user experiences and connect new industries. 5G will deliver multi-Gbps peak rates, ultra-low latency, massive capacity, and more uniform user experience.

HOW DOES IT WORK?

A: Like 4G LTE, 5G is also OFDM-based and will operate based on the same mobile networking principles. However, the new 5G NR (New Radio) air interface will further enhance OFDM to deliver a much higher degree of flexibility and scalability. 5G will not only deliver faster, better mobile broadband services compared to 4G LTE, but it will also expand into new service areas, such as mission-critical communication and connecting the massive IoT appliances. This is enabled by many new 5G NR air interface design techniques, such as a new self-contained TDD sub frame design.

BENEFITS OF 5G?

A: 5G is a new kind of network: a platform for innovations that will not only enhance today's mobile broadband services, but will also expand mobile networks to support a vast diversity of devices and services and connect new industries with improved performance, efficiency, and cost. 5G will redefine a broad range of industries with connected services from retail to education, transportation to entertainment, and everything in between. We see 5G as technology, as transformative as the automobile and electricity.Through landmark 5G Economy study, we found that 5G's full economic effect will be across the globe by 2035, supporting a wide range of industries and potentially producing up to $12 trillion worth of goods and services. The study also revealed that the 5G value chain (OEMs, operators, content creators, app developers and consumers) could alone generate up to $3.5 trillion in overall aggregate revenue by 2035 and support up to 22 million jobs, or more than one job for every person in Beijing, China. Of course, there are many emerging and new applications that are yet to be completely defined or even known today. That is why only time will tell what the full "5G effect" is going to be.

HOW FAST IS IT?

A: Per IMT-2020 requirements, 5G is expected to deliver peak data rates up to 20 Gbps. Qualcomm Technologies' first 5G NR modem, the Qualcomm Snapdragon X50 5G modem, is designed to achieve up to 5 Gbps in downlink peak data rate. But there is more to 5G than just its speed. In addition to higher peak data rates, 5G will provide much more network capacity by expanding into new spectrum, such as millimeter wave (mm Wave). 5G will also deliver much lower latency for a quicker immediate response, and an overall more uniform user experience so that the data rates stay consistently high even when users are moving around. Moreover, the new 5G NR (New Radio) mobile network will be backed up by Gigabit LTE coverage foundation, which will provide ubiquitous Gigabit-class connectivity.

KEYS GIVING IT AN EDGE

A: 5G is bringing a wide range of technology inventions in both the 5G NR (New Radio) air interface design as well as the 5G Next Gen core network.The new 5G NR air interface introduces many foundational wireless inventions, and in our opinion, the top five are:

1)Scalable OFDM numerology with 2n scaling of subcarrier spacing

2) Flexible, dynamic, self-contained TDD subframe design

3) Advanced, flexible LDPC channel coding

4) Advanced massive MIMO antenna technologies

5) Advanced spectrum sharing techniques

"ONLY THING CONSTANT IS CHANGE"

WHAT SERVICES AND USE CASES DO YOU SEE FOR 5G?

A: In general, 5G use cases can be broadly categorized into three main types of connected services:

1) Enhanced Mobile Broadband: 5G will not only make our smartphones better, but it will also usher in new immersive experiences, such as VR and AR, with faster, more uniform data rates, lower latency, and cost-per-bit.

2) Mission-Critical communications: 5G will enable new services that can transform industries with ultra-reliable/available, low latency links—such as remote control of critical infrastructure, vehicles and medical procedures.

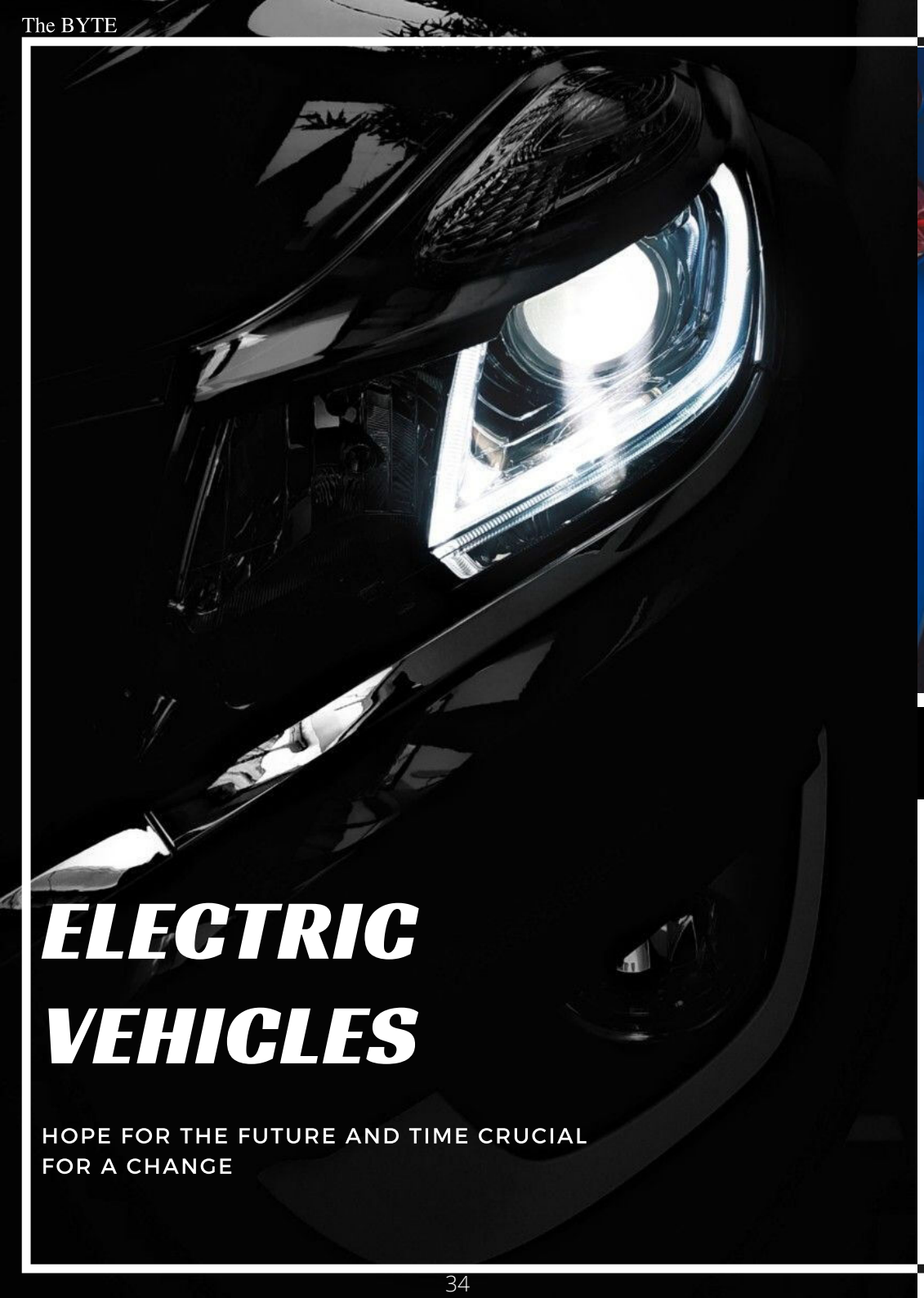
3)Massive Internet of Things: 5G will seamlessly connect a massive number of embedded sensors in virtually everything through the ability to scale down in data rates, power and mobility to provide extremely lean/low-cost solutions.

WHAT ARE THE DIFFERENCES BETWEEN 4G AND 5G?

A: There are several differences between 4G vs 5G:

- 5G is a unified platform that is more capable than 4G
- 5G uses spectrum better than 4G
- 5G is faster than 4G
- 5G has more capacity than 4G
- 5G has lower latency than 4G

ARTICLE BY - DIMPLE CHOUDARY COMP A

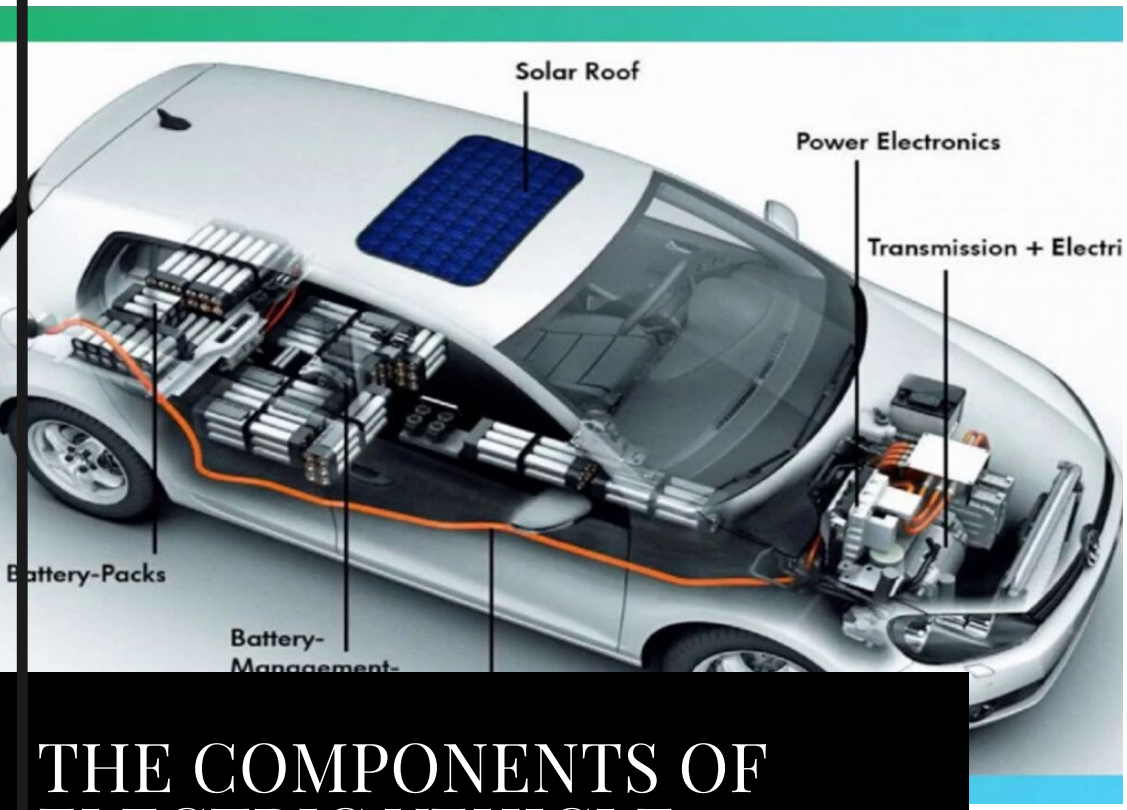


ELECTRIC VEHICLES

HOPE FOR THE FUTURE AND TIME CRUCIAL FOR A CHANGE

Driving Eco-Friendly

Starting off with a gentle reminder- earth is drowning. Humans are turning inhumane towards nature. Where we, individuals try to make our lives better, the mother earth and her creations strive for a life, just a peaceful life. Let's get lavish by heart and not by status, for the environment. Climate change is upon us and there's no denying that, folks. Trying to figure out the ways to save the nature, we have- using recyclable stuff, printing as little as necessary, not throwing your notes away, saving electricity, conserving water,etc; which will further help in the reduction of various types of pollution.One of the major causes of environmental hazards is the use of petroleum. The environmental impacts of petroleum re mainly negative, because of its toxicity which contributes to air pollution, acid rain , oil-spills.It is primarily limited, non-renewable form of energy. Petroleum products include transportation fuels, asphalt, road oil, chemical, plastics and synthetic materials. Here's introducing to you to one of the hottest topics trending in the world right away. It's all about the Electric Vehicles that run on electricity instead of petroleum! Kudos to Robert Anderson who developed the first crude electric vehicle, so to the electricity inventor, Benjamin Franklin first. Without a hint of doubt, Electric vehicles, moreover cars, are gonna be the future of the automobile industry. As honorable minister Piyush Goyal says that by 2030, every single vehicle in India would be electricity-driven, be it trucks or scooters, Norway promises to do so in less than 5 years from now.



THE COMPONENTS OF ELECTRIC VEHICLE

An electric car consists of the following components -

1. Battery – to provide electricity to power the vehicle.
2. Charge port – to insert the charger through it.
3. DC convertor – to convert the input AC supply to DC supply.
4. Electric traction motor – using power from the traction battery pack this motor drives the vehicles wheels.
5. On board charger – coverts electricity to DC supply.
6. Thermal system – maintains temperature required for smooth working.
7. Transmission – transfers mechanical power from the electric traction to drive the wheels.
8. Induction motor – has its main components as stator and rotor.

HOW DOES IT WORK?

Having discussed the components of an electric vehicle, moving on to how they work. The working of an electric vehicle is very simple. The induction motor is known to be the powerhouse of the vehicle, invented by sir Nikola Tesla. The three phase alternating current is input in the stator, which produces a rotating magnetic field, which in turn induces current on the rotor parts to make it turn. The beauty of an induction motor is that its speed depends upon the frequency of the AC power supply. Hence, the motor speed can vary in the range of 0-18,000 rpm. But where does the motor receive power from? It is the battery pack. The pack produces dc power which is converted into ac by using an inverter. The inverter also controls the device speed, by controlling the frequency of ac supply. Hence inverter is the brain of the electric car. Next, battery packs are the collections of around 7000 carbon lithium ion cells which ensures an even temperature distribution. These cells are connected in series and parallel combinations. The coolant is passed through the inverter. The battery pack is placed closer to the ground level. By changing the direction of power phase, the vehicle is put into reverse gear.

INDIA ON EV

India is already trying and has achieved much in case of electric vehicle and its usage. As of now, around 1 lack models of electric cars have been sold in India.
How to promote the idea of using an electric car in India:-
-Just install as many as charging stations as possible in most of the areas, covering remote areas too.
-Better install charging plots in each society for the members and book slots for charging.
-Government should provide economical help to its people for buying cars.
Up next are top 3
upcoming electric vehicles in India
1. MG E-ZS
-Launched on 5th of December.
-Costing up to 20-25 lacks.
-44.5 kwh lithium ion battery.
-Even on 0 rpm peak torque guaranteed.
-300-350 kilometers range on single charge.
-DC fast charger will take only 40 minutes to charge from 0 to 80%.

2. TATA Nexon electric
-debuted on 15th of December.
-import of battery from China.
-range of 300 kilo meters.
-feasible due to low cost.
-costs up to 14-15 lacks.
- has charger and a fast charger.

3. Mahindra KUV 100 electric
-debut in second half of 2020.
-has up to 40 kw power.
-15.9 kwh lithium ion battery.
-charges completely by 5.5-6 hours.
-120 kilo meter range.
-costing around 10 lacks.

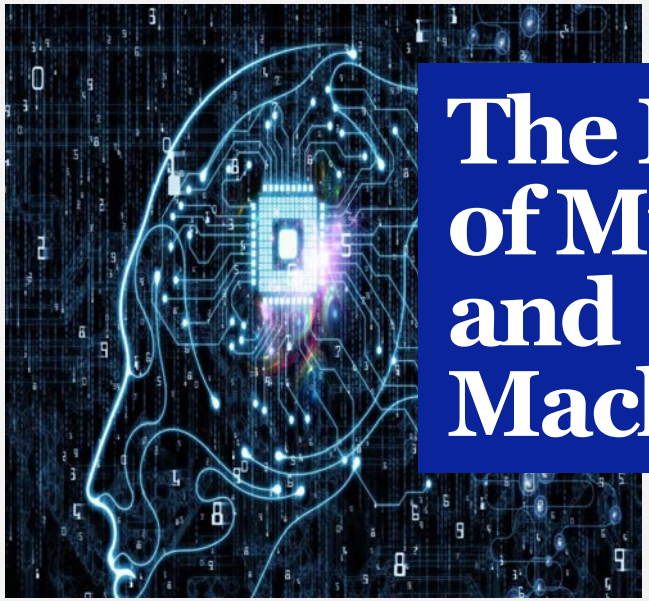
SOME QUERIES RELATED TO EV

Some common myths about electric vehicles [answered]
1. Takes too long to charge,whereas fuelling can be done within minutes.
- Sure, it takes almost 8 hours to charge completely, so why don't you put it on charge before going to bed every night? Or while outing, when you are too tired and take a break?
- Dc fast chargers have helped charge vehicles within 40 minutes too.
2. What happens when the power is out?
- It is too rare to be discussed in detail.
-If the power is out, how are you going to charge your fuel system also?
3. Batteries don't last and are expensive for replacement.
- Tesla cars result in 95% battery capacity after a ride of 50,000 miles.
- And 90% after another 150,000 miles.
- Also has an 8- year battery warranty.
- 85 kw hour battery costs 12,000 $ for replacement.
- Soon it is promised to reduce the replacement cost up to $100 per mile
4. Long trips aren't pretty appropriate using ev
- They are though, only thing is you have to charge completely before using them.
- They have a capacity of running straight for 300 kilo meters in one time charging.
5. What about fire hazards?Aren't you driving a bomb on wheels?
- Gasoline cars are about 11 times more likely to catch fire than Electric Vehicles, shocked?
On a concluding note, I would like to ask this- Are we, Indians ready for the drastic yet mandatory change in our transportation system? Are we going to see an electricity driven transport in India, soon? Would there be enough charging stations in India? How are we going to deal with crores and crores of car scrap generated while replacing them with electric cars?

ARTICLE BY -
Roshini Ravindra Kini
E&TCA

NEURAL LINK

Science behind it



The Link of Mind and Machine

Over several decades have been incorporating the idea of controlling by mind through scientific fiction, this article brings theory to life.

Neurotechnology only started a few years after man first set foot on the moon – perhaps reflecting the need for a new big challenge after such a giant leap for mankind, and the brain-computer interfaces were indeed pure science fiction at the time. Neurotechnology was born in the 1970s when Jacques Vidal proposed that electroencephalography (EEG), which tracks and records brain-wave patterns via sensors placed on the scalp (electrodes), could be used to create systems that allow people to control external devices directly with their mind. The idea was to use computer algorithms to transform the recorded EEG signals into commands. Since then, interest in the idea has been growing rapidly.

The combination of humans and technology could be more powerful than artificial intelligence. For example, when we make decisions based on a combination of perception and reasoning, neurotechnologies could be used to augment our perception. This could help us in situations such when seeing a very blurry image from a security camera and having to decide whether to intervene or not. Computers and brains already talk to each other daily in high-tech labs. Despite investments, the transition from using the technology in research labs to everyday life is still slow. The EEG hardware is totally safe for the user, but records very noisy signals. Also, research labs have been mainly focused on using it to understand the brain and to propose innovative applications.

Other very promising initiatives, such as using commercial EEG systems to let people drive a car with their thoughts, have remained isolated. A new 'Neural Lace' technology involves implanting electrodes in the brain to measure signals. This would allow getting neural signals of much better quality than EEG – but it requires surgery. The project might seem ambitious, considering the limits of current technology. What we really need to make the technology reliable is more accurate, non-invasive techniques to measure brain activity. We also need to improve our understanding of the brain processes and how to decode them. Indeed, the idea of uploading or downloading our thoughts to or from a computer is simply impossible with our current knowledge of human brain

Merging mind and machine

"NEUROTECHNOLOGY IS THE BEGINNING OF SYMBIOSIS WITH ARTIFICIAL INTELLIGENCE."- ELON MUSK

Many processes related to memory are still not understood by neuroscientists. The most optimistic forecasts say it will be at least 20 years before brain-computer interfaces will become technologies that we use in our daily lives. A US survey last year by the Pew Research Center found that people are generally "more worried than enthusiastic" about breakthroughs that promise to integrate biology and technology, such as brain chip implants and engineered blood.

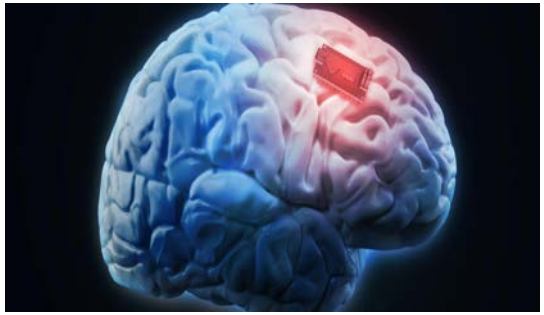
It is believed that in the future we'll all be less biological, because humans are always evolving, and the next step of our evolution will be the internal implementation of technology. The human-robot hybrid won't be a monstrosity of metal. It'll just be a chip in your brain instead of a smartphone in your hand. If their approach to human-computer collaboration is successful, it could generate a new approach to fundamental understanding

"Down the road with neural link you can upload any subject instantly, just like matrix."

According to reports, technology will become even more pronounced, with machines becoming as intelligent as humans, narrowing the gap that separates human and machines. Apparently, the future will see both technology and humanity symbiotically and literally fuse – envisaged or conceived as "Merge".

how cancer patients are treated, but also how innovation and discovery are pursued in countless other domains. The hope is that we may one day be able to operate spaceships with our thoughts, upload our brains to computers and, ultimately, create cyborgs.

"WE ARE AT THE BRINK OF THE NEXT EVOLUTION AND TECHNOLOGICAL DEVELOPMENT IS THE LIBERATOR OF ADVANCEMENT. HOWEVER, IT IS NOT THE DRIVER, THE DRIVER IS US."



Fun Fact

There as many neurons in your brain as many stars in the galaxy.

Article by –
Nipun Agarwal
COMP A

The BYTE

QUANTUM SENSORS

So in today's world where we all are busy in finding out new technologies, there are a few which can be improved or upgraded. Like our topic of quantum mechanics, many of us still find it a bit boring but believe me if you ever explore it, you will find out your interest here, I guess as you're reading this article.

Sensors can be found in our regular day to day existences, from advanced mobile phones, automobile to industrial applications in assembling, building and imaging. When cooled to temperatures close to absolute zero, molecules uncover their wave-like nature and quantum mechanical laws supplant those of classical mechanics. By utilizing finely controlled lasers and attractive fields, researchers can chill little group of molecules off to the most minimal temperatures known to man – only a couple of billionths of a degree above absolute zero. We utilize the quantum mechanical nature of the particle to utilize the superposition standard, making extraordinary sensors which can offer countless advantages.

Quantum Sensors is a part of quantum mechanics which deals with measurements that can be done beyond classical sensors, isn't it interesting? Let's go deeper in it.....

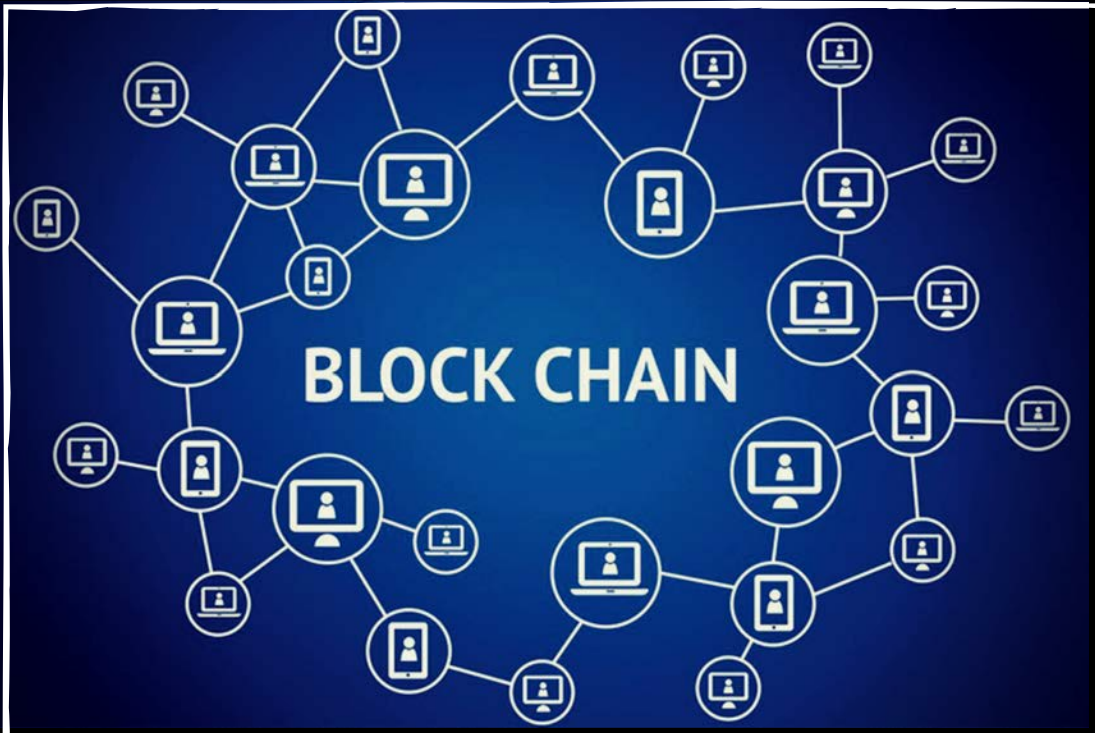
Basically a Quantum sensor is "a device or more precisely a quantum device that responds to a stimulus." that's the perfect definition of what we are going to discuss today, but believe me these two lines have a great meaning in-depth. For an instance let's assume to boost out your interest : A world where you can find out exactly what lies under your feet, get advanced warning of volcanic eruptions, look around corners or into rooms, and detect initial signs of multiple sclerosis, doesn't these things sound interesting?

They do..... Quantum sensors rely on the often baffling behaviour of subatomic particles, where the classical assumptions of Newtonian physics cease to exist.

Thanks to Prof Bongs' Birmingham team for inventing quantum gravity sensors or gravimeter that is twice as sensitive and ten times as fast as current equipments. By their efforts today instead of digging out to find what is underneath the ground, we use these gravimeters. Gravimeters is so sensitive that it can detect the tiny fluctuations in gravity that result from such relatively small underground structures, ending up to some of the great findings. On the technical side it uses rubidium atoms cooled by lasers to just above absolute zero (-273C) that are propelled upward in a vacuum and then measured as they fall back under gravity.

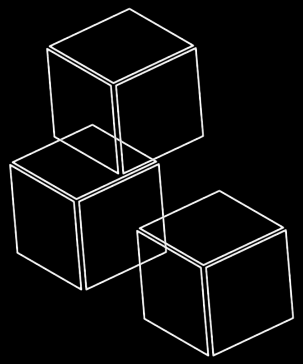
Apart from this, Quantum sensors are also used in Cars nowadays, haven't you ever heard about the car sensor which shows the driver the surrounding of the car and even helps while parking. Glasgow's gravimeter uses the light beam to fall on an object, the light will bounce off walls so long as you have the geometry right, then you can build the 3-D image using the data, which enables us to see around the corners without moving/turning around.

-Neha Vinamra
ELEX



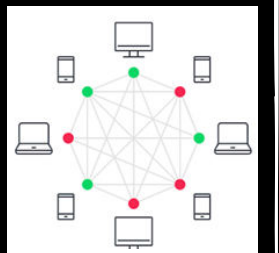
LET'S LINK IT UP

WHAT IS "BLOCKCHAIN TECHNOLOGY"?



Blockchain is a string of record of data that is connected to each other using cryptography. It is essentially used as its design is resistant to tampering, backdating and modification.

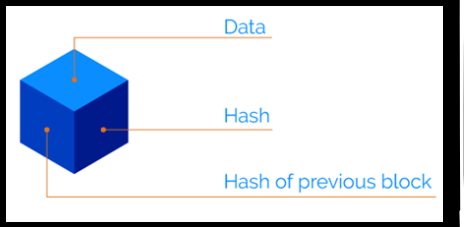
The architecture of blockchain implements a decentralized system of interconnected computers called nodes. It is easy for new nodes to join and Transfer of data is relatively smooth as the block can take different paths to reach each node. One faulty node does not bring the entire system down.



Architecture of a Blockchain (Decentralised system)

Data is stored in blocks. Each block has three critical parts: hash of the block, data and hash of the previous block. Hash, a unique string of 64 character and 264 bits long, is an address for the block. The information is stored in a block and added to the blockchain only when a consensus is formed by the participants. This prevents from giving any one institute the full authority or information. The hash of all block is distributed among all the members of the blockchain.

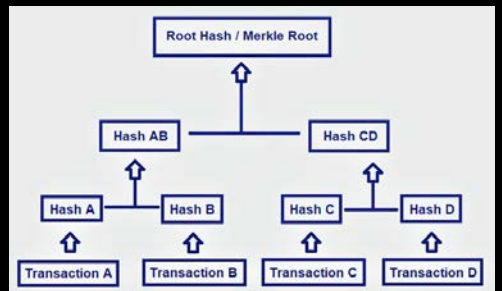
The ledger of all nodes is updated with information that being uploaded into the network. This way, the history of entire transaction rests with all participants of the blockchain. Blockchain is frequently referred to as 'Distributed Ledger Technology' as the information is distributed.



History of Blockchain

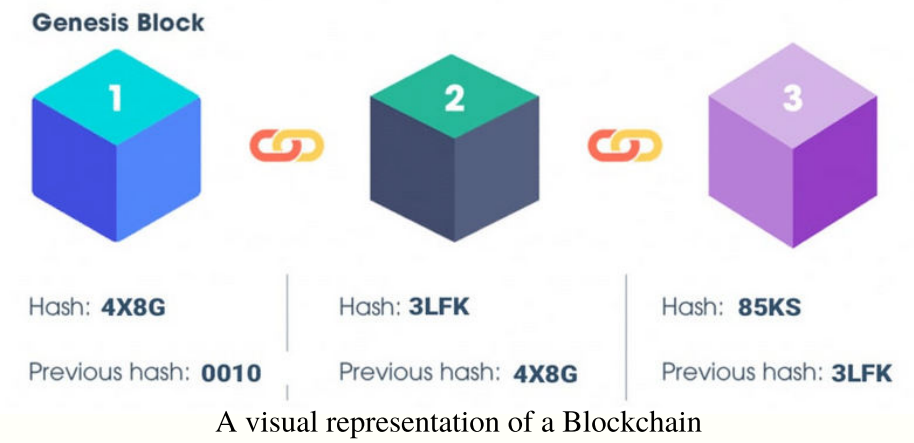
The core concept of blockchain was first introduced in 1991 by Stuart Haber and W. Scott Stornetta. They had introduced the concept of digitally timestamping the documents published on the internet in a way such that creating documents in backdate would get taxing. This would lead to lesser tampering of documents.

In 1992, the duo along with a professor in Columbia University, Dave Bayer, introduced the concept of Merkle tree to enhance its security. Merkle tree is a concept in which data from two different block is collected into one. The newly formed block can point to its initial blocks. This arrangement when materialises in series forms a tree like structure known as Merkle tree.



Visual Representation of a Merkle Tree

The concept remained remote from the mainstream. It was revived in 2008 by Santoshi Nakamoto under the name "Block Chain" which in later years emerged as "Blockchain". He implemented his upgraded design in the Bitcoin technology. Since then, the blockchain technology has ushered into the mainstream and has arisen as one of the highest demanded hard skill as of in January, 2020.



A visual representation of a Blockchain

Advantages and Disadvantages of Blockchain

Arriving to the merits of the technology, blockchain has become the talk of the business giants as it is a transparent form of keeping data safe and distributed. All information passed into the blockchain has to first get consensus from the majority participants of the chain. This helps in regulating the quality of information that is being passed into the network.

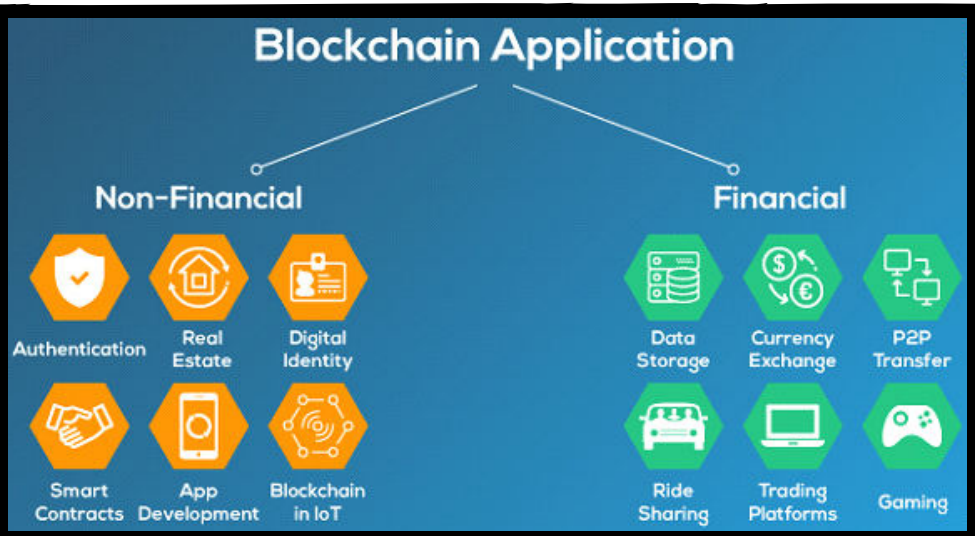
Each block added into the network is timestamped and gets a hash of its own. It is also linked to the previous block with the help of cryptography, making tampering of block impossible.

Blockchain is an append only system. This means that information can only be added into the network. In case a participant tampers the information in block, the hash of the block changes. Subsequently, the next block that consists crypted address of the tampered block becomes invalid. Hence, the blockchain is disrupted and the tampered block is easily located.

Each block also consists of a 'proof of work' that helps in adding an extra layer of security. Blockchain has helped in maintaining a centralised method of keeping track of valuable data. It is a network open to all and secures anonymity of the participants. Each transaction is technically free. However, the infrastructure may have a certain cost of operation.

It has certain demerits too. Blockchains are very power consuming. It requires participants to trust strangers to form consensus who are driving on their ethics to run the chain. Blockchains also accumulate huge amounts of data. With each transaction this volume keeps increasing. This slows the process and all participants are required to download this useless information.

Despite of several layers of security, the chain is still vulnerable to security threats. The information that is uploaded in the block cannot be edited hence it is supposed to stay there wastefully. Also, the transparency may pose certain threats in case of financial transaction. The revealing of information to all the nodes may not be relevant and safe for certain domains of business.

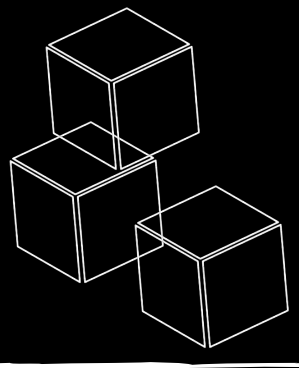


Application of Blockchain and its future

Blockchain had found its initial application in cryptocurrency. In 2013, blockchain found its application in many other business fields. It is used to keep record of deeds and other important documents. In fields like logistics, it helps in maintaining a transparent and neat record of goods.

Dubai announced that its government would go blockchain powered by 2020. This system would also help in elections as the process would be transparent and at the same time the anonymity would also be maintained.

IT giants like Microsoft are adopting the concept of blockchain in the process of verification of identity. Though it has many flaws, blockchain has still reached the pinnacle of the most demanded technology. It has become the talk of Wall Street. Blockchain is expected to do to business what internet has done to communication.



- Shailja Jadon
COMP A

TESLA'S CYBERTRUCK

New World, New Universe

The year 2019 brought a change to the technical world with the Tesla Cybertruck. Designed by ***Franz von Holzhausen***. This very invention is truly appreciable. With the complete Tesla series ***Elon Musk,*** the CEO, has again made us awestruck with the Cybertruck.

THE ORIGIN

The idea of this creation had begun in 2012-13 with the desire to build a truck with load-compensation suspension with a Ford F-250 which has notable features for today's high-tech world. In 2014 Elon Musk declared that it would probably take 4-5 years to build the product and here it is on the 21st November, the Cybertruck was unveiled. Other than the unique polygonal structure the cybertruck has many salient features.

FEATURES

It has on-board power inverters for supplying both 120- and 240-Volt electricity, allowing use of power tools without a portable generator. The exterior is sleek stainless-steel sheet metal which is bullet resistant. While the interior is designed for a seating of 6 with a 17-inch center display. Similar to other Tesla Models, the cybertruck has the self-drive feature as well.

And for the model specifications, the cybertruck doesn't fail to impress us. The payload of 3,500 lb is similar for the three different models but for Single Motor RWD, Dual Motor AWD and Tri Motor AWD the range is 400 km, 480 km and 800 km respectively.

The pros of this model are definitely overpowering the cons. The basic con for this model was the structure which was not quite appreciated for its sharp contours and unusual exterior.

Other than this, the Cybertruck is a complete success and a new innovation for this new world!

Article by:
Shambhavi Joshi
MECH - A

The sleek interior of Cybertruck.

Like any other truck, Cybertruck also has a dedicated bed or popularly know as the 'vault'. The Cabin's climate control will also be available in the vault for uses such as camping.

Vector

As you gaze into the eyes of the feeble-looking black bug in front of you, you notice something peculiar about him. He is staring back at you! Or is '*it*'?

Yup! That's true. Meet *Vector*, from *Anki*, based on designs that emerge from the amalgamation of Artificial Intelligence with Neural-Networking techniques. This tiny entity may be a no-brainer among many big-league robots that capture the market today but *Vector* does definitely make up for a neat hangout buddy. *Vector*, having human-like personality traits, is equipped enough to undertake your daily chores; from setting your alarms to remembering your day's schedule.

ABOUT

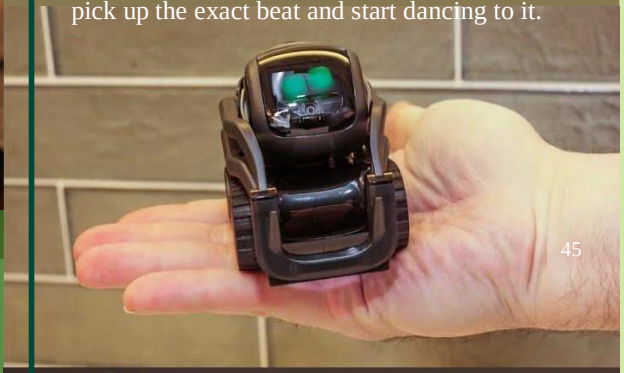
It is a character recognition robot that is to live in your home, ever on and learning. Being the first commercial robot that uses Deep Neural-Networks, it perceives and understands the world around it, thereby classifying all his actions as intentional behavior, similar to humans, and unlike other common programming structures wherein robots can only be coded to perform pre-instructed tasks or operations, hence lacking the key decision making and argument building skills that are necessary for human-like behavior. It can sense multiple inputs from his external environment, and then, only after evaluating and assessing all the factors, does he make an action decision in real time.

ABOUT ANKI

Anki is an open-source flashcard program freeware that utilizes spaced repetition. Spaced repetition has been shown to increase the rate of memorization with the word '*Anki*' standing for the latter in traditional Japanese.

WHY DOES VECTOR EVEN EXISTS?

Vector is autonomous 'Mars'-like rover; aware enough to avoid any major mishaps. *Vector* is always quite excited to help you- assign him a task and *Vector* will complete to for you. He can a setup a timer while connecting to the internet to answer your question. If you play music, he can pick up the exact beat and start dancing to it.



TECHNOLGY

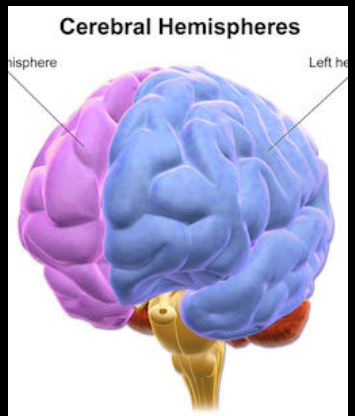
Vector comprises of nearly 700 individual pieces that need to be assembled together to create the robot. It has a microphone array which allows it to hear voices and understand their source of origin. It also uses a wide-angle camera for gaining visual input. It cannot fall off any surface because it has an inbuilt 'four-drop' sensor within that helps it map its surroundings. *Vector* has laser sensor in front. A little capacitive sensor over its head enables it to feel any padding like sensation.

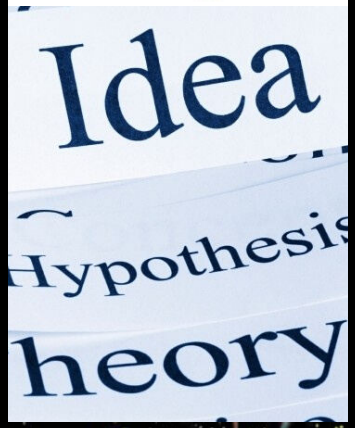
FUTURE SCOPE

It is one step closer to the sci-fi robots that everyone wills to be friends with; a glimpse of the future that every single one of us imagines in his or her lifetime. The idea of having a pet robot who has a great personality and enough understanding of the world such that you can have a good time with is quite intriguing. At the same time, it is skilled enough to know your favorite snack, time of appetite and can order for you the same at your instruction. Obviously, *Vector* is currently not capable enough to understand more complex situations such as human emotions that may require greater computational abilities and/ or superior intelligence. However, the immense success of *Vector* proves the fact that the once, so-thought, sci-fi movies and futuristic robotics are indeed the future and now seem to look possible and more practical than ever before. One can buy *Vector* online from shopping websites like Amazon for ₹20,000 apiece. Though pretty expensive, however, being the first commercial product available for retail and with the aforementioned capabilities, the price is highly justified!

An article by –HANIK JAIN COMP A

Hypothesis





WISDOM ALONE IS THE SCIENCE OF OTHER SCIENCES.

IMAGINE, INVENT, INSPIRE.

This module focus on some hypothesis related to technology, as the module name suggest.

CONTENTS:

The Split Brain Experiment

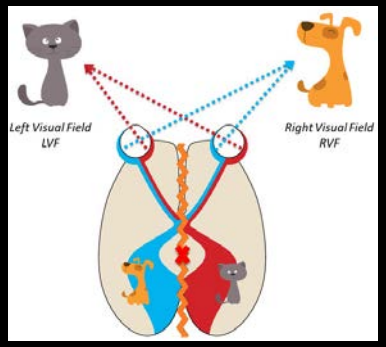
Study of unusual brain conditions as led to some of the most fascinating discoveries in neuroscience. One such rare condition is the Split-brain or callosal syndrome. It is a type of disconnection syndrome that occurs when the corpus callosum connecting the two hemispheres of the brain is severed to some extent. Corpus callosum facilitates most of the communication between the two hemispheres. Severing the corpus callosum results in the presence of two "independent brains". By studying Split-Brain patients, neuroscientists were able to understand the individual functioning of the two hemispheres of brain.

The Callosal Syndrome can be produced surgically as a last resort to treat refractory epilepsy through a procedure called "Corpus Callosotomy"

HISTORY

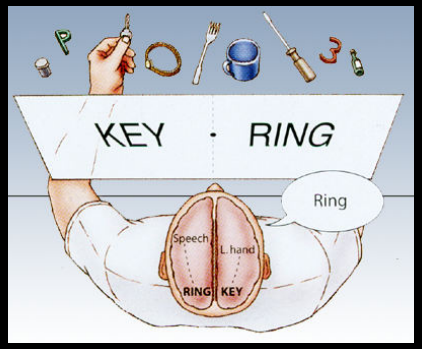
In the 1950s, Roger Sperry, a neurobiologist, performed experiments on Brain-Split patients and revealed knowledge about the left and the right hemispheres. Sperry was joined by a psychobiology PhD student, Michael Gazzaniga. Their study yielded interesting insights about the functioning of the brain

FINDINGS



With the help of these experiments it was revealed that the right hemisphere of the brain receives visual input from the left eye, and has the ability to control the left hand, and vice versa.

The left hemisphere is responsible for speech processing. Which means that if an object is shown to the right eye, the patient is able to name the object. But when an object is shown to the left eye, the subject is unable to name or describe it, but could use the left hand to draw a picture of the object. This is because the visual input from the left eye is transmitted to the right hemisphere, which does not have a region devoted to speech, but is the creative center.



Some patients experienced antagonism between their hands while trying to perform daily activities like dressing up and shopping for groceries. They would try to pick up an object with one hand, while the other hand would keep putting the object down.

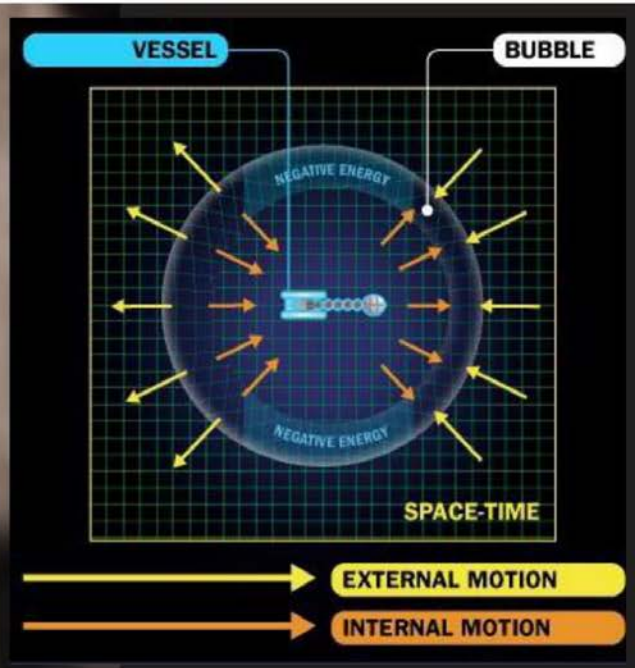
Hence, it was concluded that the hemispheres have numerous specialized functions, but cognitive load is divided across both hemispheres in a precise manner.

- Vansh Gupta
MECH A

The film interstellar portrays Humans exploring deep space. "Stuart Clark" examines the conceivable outcomes of rapidly navigating the universe utilizing wormholes, warp drives and mysterious substance called negative energy.

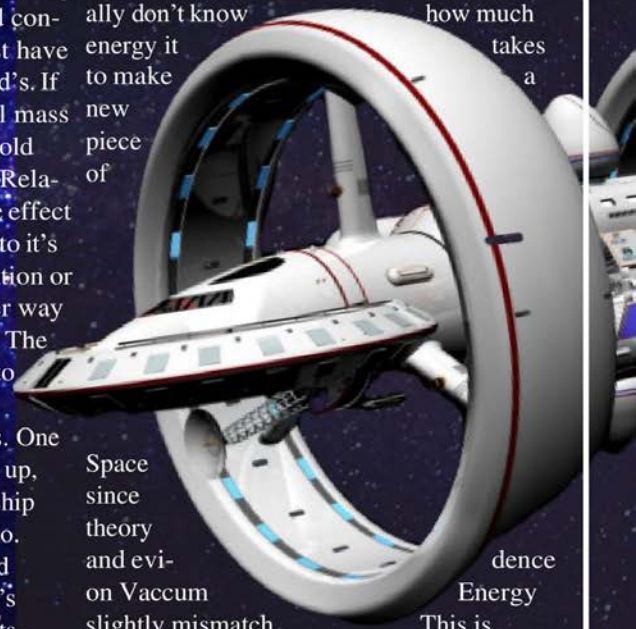
You know how & why it will be possible? Because of one dream of humans i.e Time Travel. This lead us to Travel Faster Than Light (fastest thing in the Universe). And this is possible by idea of "warp drive" which was presented by John W. Campbell in his 1931 novel "Islands of Space". By research till 20th century we have got to know that it may be possible. To talk about warp drives we need to talk a bit about general relativity. We also need to talk about mass, specifically negative mass but also in general the way mass actually has multiple traits that might not be entirely connected, like how it interacts with Gravity and inertia. Now if you've already got a good familiarity with the Alcubierre Drive from reading sci fi articles about it, you've probably heard this term and negative mass as well. But those generally don't go into much detail, and that details is what this article is all about.

The basic concept of a warp drive is very straightforward. By various proposed means, typically by using negative mass or energy as part of the process. A ship creates a bubble around itself where in front of it Space has gotten all crunched together and shrunk down, and behind it Space has gotten expanded. It warps Space-time in front and behind it and this shoves the bubble of normal Space-time between them forward and at speeds not constrained by the speed of light. "Nothing can move through Space-time faster than

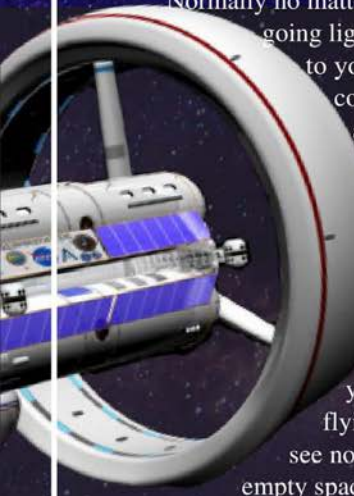


light, except space-time itself which is exempt from this and it carries the ship along". This is very handy since it not only allows you to go faster than light but jump up or down from those effective speeds without turning your crew into messy pancakes. You don't need inertial dampeners in a warp bubble because that's no change in inertia to dampen. The two key problems are of getting negative mass and getting burned to crisp inside the bubble by Unruh radiation. While an objects electric charge controls how strong the electrostatic force pull or push on things, it's still it's mass that controls how the objects inertia is effected. Also weird is that all other forces except Gravity have a positive and negative value, but mass and Gravity only seem to have a positive and attractive aspect. So it's not surprising we'd kick around the notion of a negative mass or a repulsive Gravity. But negative in what respect? We know that how mass resists change in inertia and how it emits or responds to Gravity. Could it be possible for instance to make something's inertial mass negative

only? Or even just much lower, so that a shove sends it flying away far faster than we'd expect. Or for negative inertial mass, sends it flying toward us when we push it, instead of the other way around. On the same note could we make an object respond more weakly to gravity, so we could lift very massive objects with ease or even make this negative so we can shove a ship off a planet's gravitational field instead of being pulled by it. Or for active Gravity, the aspect which pulls on stuff, could we make this repulsive instead to shove everything away from that object, or increase it to generate artifact Gravity? Pretty interesting stuff, and lowering inertial mass is sadly underused in science fiction since it not only solve the energy problem for making things go fast, but also has unintended consequences that spaceship that goes fast have access to enough energy to smash world's. If you can just lower something's inertial mass to a tiny fraction of normal, a regular old rocket engine would speed you up to a Relativistic speeds and when you turned the effect off it would stop like a brick, dropping to it's natural speed from that rocket acceleration or even lower if you could go to the other way around too and increase inertial mass. The passive gravitational mass (responds to gravity) and active gravitational mass (creates Gravity) give you similar tricks. One for active mass us letting you ramp that up, not just for handy artificial Gravity on ship but to warp space like massive bodies do. And reverse effect would let you expand space. So negative mass regardless of it's specific properties in terms of these traits would be very useful stuff regardless of it's FTL options. But that's the one that interests us for warp drive, because if you warp space enough in front you and behind you, expanding behind and contracting in front, you will start moving along, do it entirely and you will move faster than light. Now this in and of itself isn't a problem. Nothing can move through Space faster than light except space-time itself, and it can carry stuff along, like galaxies. We know that the expansion of space is accelerating faster than light due to some mysterious Energy inherent to space itself known as Dark Energy. So effectively every galaxy is an FTL spaceship from the perspective of some other galaxies, actually most of them, though of course they can't see us or us them, and this has some effects, specifically -The Unruh Effect, in terms of Event Horizons. "Accelerating observers will see blackbody radiation emited where other observers would not, such as from Vaccum". This gets around the FTL problem the same way the cosmic expansion. Of course we really don't know how much energy it takes to make a new piece of Space since theory and evidence on Vaccum Energy slightly mismatch. This is known as Vaccum Catastrophe as well as the worst theoretical Prediction in the history of Physics. Still it's theoretically possible to artificially create or delete chunks of space, the former happens constantly after all (Expanding Universe) and we can certainly contract space, Gravity does that all



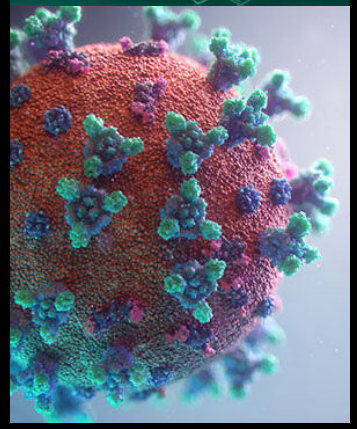
the time, I mean you're doing it just sitting there. And if negative mass or energy exists we can expand it too and while we don't have evidence indicating negative mass, we do have a bit better indications that negative Energy does. The amount of negative mass require for warp drive will be equal to the size of a large planet. But here we are having much more problems. Black hole event horizon are caused by Gravity, but as has been mentioned Gravity and acceleration act a lot like, so it's probably no surprise that acceleration can also cause an Event Horizon. An event horizon is just any place that you can't see events on the other side of. The same thing can occur with accelerating objects.



Normally no matter how fast you're going light will catch up to you, but if you're constantly accelerating it's a bit of different story, and more to the point, if you're travelling faster than light when you look out the back of your ship you won't see stars flying past. You'll see nothing, black empty space because the light they're emitting can't catch up to you anymore. Even before you get to the speed of light those particles will redshift down to near invisibility as you get faster and faster. They do the reverse in front of you, blue-shifting so much they also because invisible as they blue-shift to UV, then X-RAYS, the gamma, which is a bit of problem itself. But behind you there's an Event Horizon, you can't see or hear anything behind your ship. Okay so what? This is where the Unruh effect comes in. The concept is that a vaccum depends on the observer, like so many other things do. In Physics, Vaccum isn't quite the same as empty space. But rather a place where everything is in it's lowest possible Energy states except Higgs field. If you're accelerating and you look at it, it won't see quit cold. For 1g of acceleration, the same as normal Earth Gravity, this isn't much warmer, about a billionth of a trillionth of a degree. But if you're accelerating fast enough it can be a lot hotter, and hot things give off blackbody radiation. A vaccum isn't empty, it's full of lot stuff like virtual particles. Now acceleration and gravity are basically the same thing so it shouldn't be surprising you that this effect looks basically identical to the Hawking radiation. And infact it's often just called as "Hawking-Unruh Radiation". That Event Horizon trailing your ship doesn't just look like a black hole, it's basically really is one complete with Hawking radiation. And a whole lot of it too once you hit FTL speeds. Finazi calculated an effective temperature for this event horizon pretty close to Planck Temp (140×10^{30} Kelvin). So this black hole trailing your ship is burning at temperature that make the core of the largest hotter star look like winter in Antarctica'. So you'd be burnt to crisp. The interior of that warp bubble is getting blasted with huge amounts of Hawking radiation. So if we can come up with negative mass, if we don't need whole planets worth of it, if it turns out we can keep the field stable and either there is no Hawking-Unruh radiation burning you or if you can build one without need to pre-position mass or at least without needing a FTL ship to pre-position it, then we finally do have a working faster than light ship.

–Namit Singh
ELEX

Bio-Technology



WHEN BIOLOGY MET TECHNOLOGY

WHERE TWO EXTREMES MEET

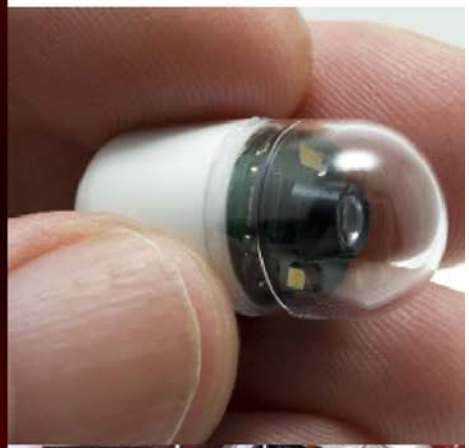
This module is the fusion of Medical Science and Technology.

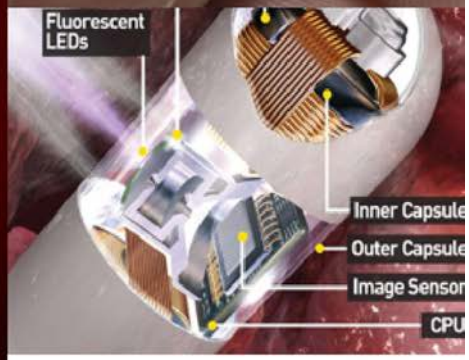
CONTENTS:

1. Capsule Endoscopy
2. Covid Cure by Nanobots
3. Curing Cancer through Tech

CAPSULE ENDOSCOPY

DIAGNOSIS AT NO RISK!!!!

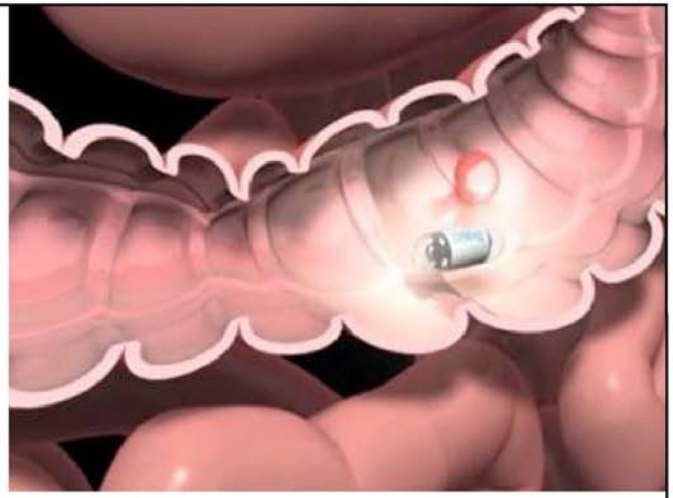




GAURAV RANA
(COMPS C)

WHAT IS CAPSULE ENDOSCOPY ?

Capsule endoscopy is a procedure of medical sciences that uses a tiny wireless camera to take pictures of your digestive tract. A capsule endoscopy camera sits inside a vitamin - size capsule that you swallow. As the capsule travels through your digestive tract, the camera takes numerous pictures that are transmitted to a recorder that you wear on a belt around your waist. Camera takes thousands of pictures that are transmitted to a recorder that you wear on a belt around your waist.

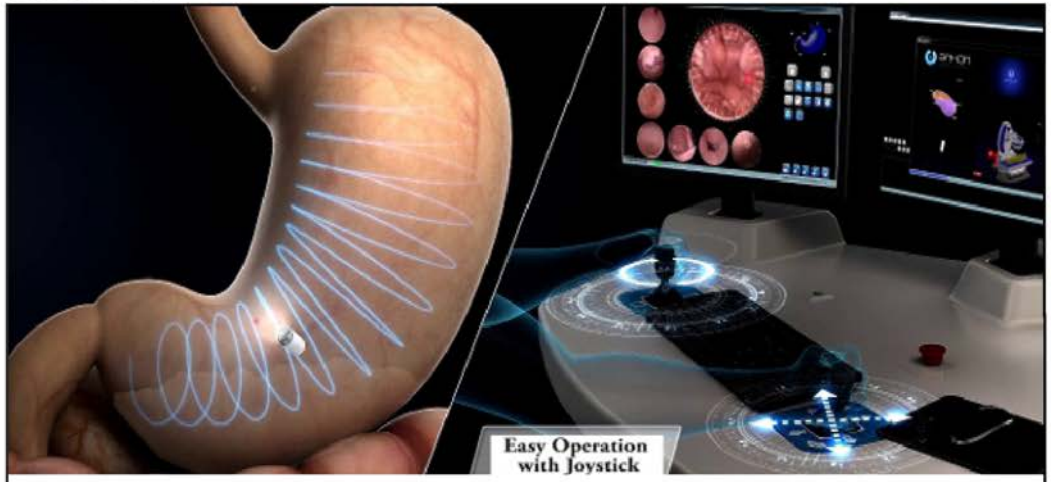


WORKING

The Pill camera used in capsule endoscopy takes thousands of color photos as it passes through your digestive tract. The images saved on the recorder are then transferred to a computer with special software that strings the images together to create a video. Your doctor watches the video to check for presence of any abnormalities in your digestive tract. It might take a few days to a week or longer to receive the results of your capsule endoscopy. Your doctor will then share the results with you.

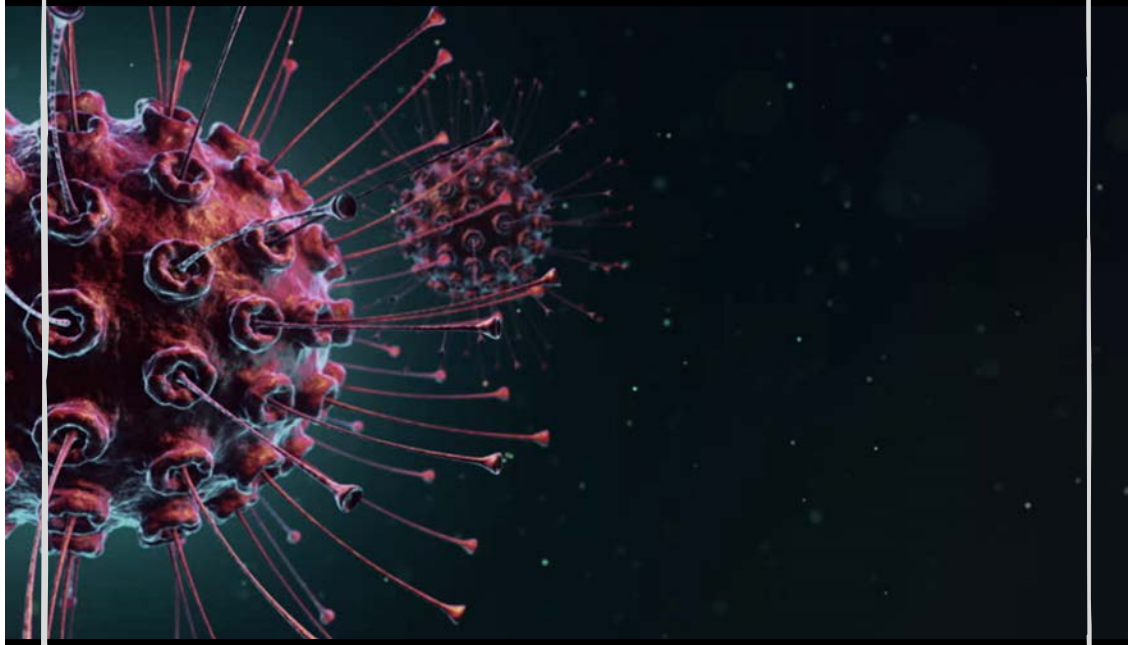
WHY DO DOCTORS RECOMMEND CAPSULE ENDOSCOPY ?

Capsule endoscopy helps doctors see inside your small intestine which is an area that isn't easily reached with the more-traditional endoscopy procedures. Traditional endoscopy involves passing a long, flexible tube equipped with a video camera down your throat or through your rectum.



USES OF CAPSULE ENDOSCOPY

- For finding the cause of gastrointestinal bleeding. The most common use of capsule endoscopy is to find cause of gastrointestinal bleeding. The most common reason for doing capsule endoscopy is to explore unexplained bleeding in the small intestine.
- Used for Diagnosis of inflammatory bowel diseases, such as Crohn's disease. Capsule endoscopy can reveal areas of inflammation in the small intestine.
- Can be used to diagnose cancer. Capsule endoscopy can show tumors in the small intestine or other parts of the digestive tract.
- Used to diagnose celiac disease. Capsule endoscopy is sometimes used in diagnosing and monitoring the immune response to eating gluten.
- To examine your esophagus. Capsule endoscopy has also been approved to evaluate the muscular tube that connects your mouth and your stomach (esophagus) to look for abnormal, enlarged veins (varices).
- Used as a screen for polyps. People who have inherited syndromes that can cause polyps in the small intestine might occasionally undergo capsule endoscopy.



NANOBOTS FOR COVID-19?

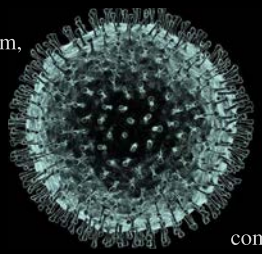
Nanorobotics is the technology of creating robots at or close to the microscopic scale. The nanobots range in size from 0.1-10 micrometers and they work at atomic, cellular and molecular level. They're about 20 times smaller than the width of human hair and can travel upto 35 micrometers per second in the blood when powered by ultrasound.

COVID-19

The disease is caused by SARS, first identified in Wuhan, Central China, has spread globally since, resulting in the 2019-20 Coronavirus pandemic, declared by the WHO.
The particles of SARS-CoV-2 are spherical and have proteins called spikes protruding from their surface.

HOW DOES THE VIRUS INFECT

The droplets transmitted into the air by an infected person by coughing or sneezing, when taken in by a bystander through their eyes, nose or mouth, causes the transmission of the virus. The virus in these droplets, having entered the system, travel rapidly to the back of the nasal passage upto the mucous membranes in the back of the person's throat, affixing to a particular receptor in the cells.



The virus has spiked proteins surrounding it's surface which help them to latch onto the human cells and then undergo a structural change, allowing the membrane of the virus to fuse with the membrane of the cell, facilitating the virus's genetic material to enter the human cell.
The genetic material then tends to hijack the metabolism of the human cell and employ it to help the virus multiply itself.

WHY NANOBOTS

In a research, where nanobots were used to treat a blood sample that was adulterated with MRSA and toxins, when checked after five minutes, was found to have three times less toxins than before. The concept behind a nanobot is that the pill that a patient may take to treat his illness, would contain actual working nanobots inside it instead of the chemicals. Quite a lot of doctors and engineers believe that nanobots are precise and more systematic than the traditional means of administering the medication to the diseased area.

For an instance, if an antibiotic is injected into the patient's body, his blood stream dilutes the antibiotic and eventually only a small part of the dosage reaches not only the site of the disease but also the other parts of the body through the blood where it might prove to be dangerous. But now imagine having a team of nanobots getting straight to the site of the disease and releasing its dose of medication.

The nanobots consist of:

1. A nanobiosensor which will have the antibody of the protein that consists in the spikes protruding from the surface of the virus, tagged on its surface by virtue of which it comes in contact with the cell which has been infected.
2. A nanochip that receives the signals from the nanobiosensor.
3. A nanotube
4. A nanocontainer

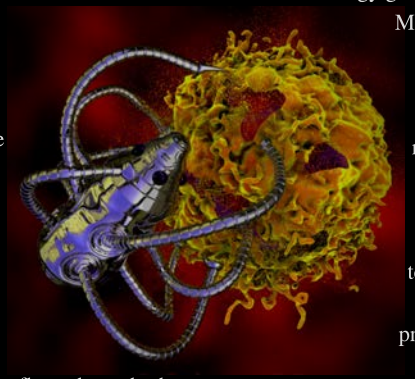
HOW DOES A NANOBOT WORK

The nanobots are outfitted with a sensor to guide them to the cells that need to be encountered. The nanobiosensor identifies the particular compound. Since the viral proteins will be found only in the cell membranes of the infected cells, the antigen-antibody reaction will only take place on the infected cells hence sparing the healthy cells from any kind of damage. The antigen-antibody reaction will thereon give a positive signal and on receiving it, the nano-robot will inject its nanotube into the nucleus of the infected cell and release the DNase and RNase enzymes.

The DNase cleaves the entire genomic DNA containing the viral genome into single nucleotides which leads to the loss of sequence of the viral genome due to which cell loses its viral effect. After the whole genomic DNA digests, the cell undergoes normal programmed death called apoptosis. Apoptosis defines a process wherein the contents of a cell are packed into small membranes for "garbage collection" by the immune cells. With more and more cells being produced every second, apoptosis maintains the balance in the body.

ARCHITECTURE OF A NANOBOT

The way a nanorobot moves in a liquid environment is the main consideration during the design. It is important that the device is able to have a smooth trajectory path while navigating in the blood environment and at the same time does not cause any damage to other cells. The tentacles need to have a very high responsive rate in order to move its tentacles forward just in time to capture the diseased cell. The body of the nanorobot will be constructed from carbon nanotube due to its intrinsic property where they tend to absorb near infrared light waves, which pass harmlessly through human cells. Ultrasonic sensors are attached around the body of the nanorobot for collision avoidance purposes. This is to prevent nanorobot from knocking onto each other as well as other cells in the blood vessels.
The initial design cost of the nanobot is very high because it is constructed out of gold and silicon and after the construction of the nano parts, their assembly requires a special machinery since it cannot be done by hands which adds onto the cost.



NANOBOT: FUTURE OF MEDICAL SCIENCE

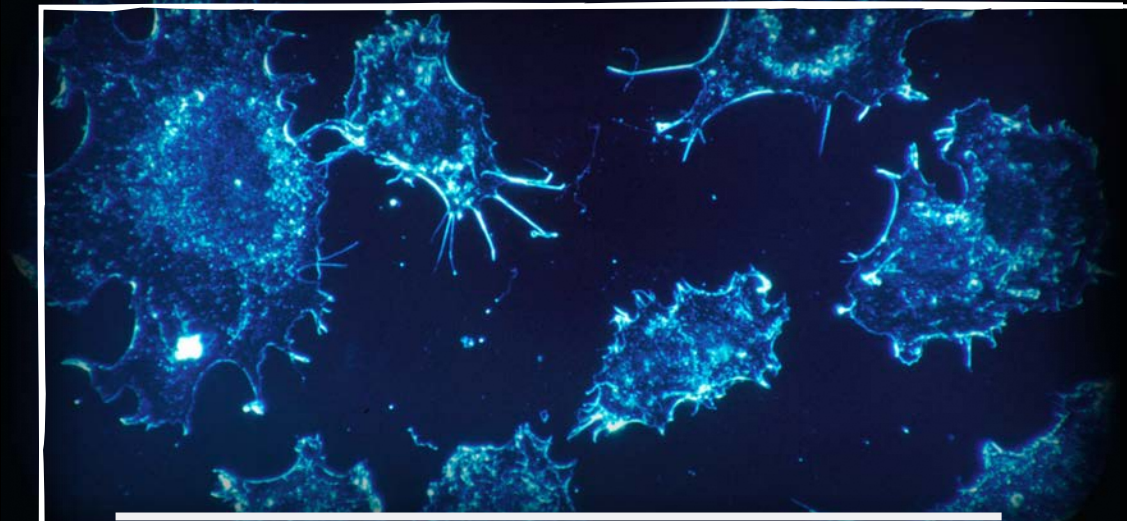
The nanobots can programmed to flow through the bloodstream and decomtaminate it from any bacteria that might be thriving inside the the body. It could be programmed to remove microscopic particles of cholesterol, kidney stones or Adipocytes. They can also be used to treat HIV and cancer cells. A health sensor is another one of their applications wherein they can monitor our blood and notify us on any aberration. Nanobots can be detected by radioactive dyes, ultrasound, MRI or microwaves and hence they can be easily traced inside the body. They can be used for performing eye surgeries. In addition to removing plaque from arterial walls, they could also be used to find areas of arterial weakness. Nanorobots may also be employed to detect specific chemicals or toxins and could give early warning of organ failure or tissue rejection.

According to scientists, nanobots can completely replace pacemakers by treating the heart's cell directly. Research regarding nanobots in medicine offer several opportunities such as artificial antibodies, artificial white blood cells (WBCs) and red blood cells (RBCs), and antiviral nanobots. The major advantage that nanobots provide is that they are extremely durable. Theoretically, they can operate for years without any damage owing to their miniature size, which reduces mechanical damage.

CONCLUSION

This is just a theoretical justification. But the recent advancement in the field of nanotechnology gives the hope of effective use of Medicine. In the same ways that technology research and development drove the space race and nuclear arms race, a race for nanobots is occurring. There is plenty of ground allowing nanorobots to be included among the emerging technologies. In the next ten or so years, your blood will probably be streaming with tiny nanorobots there to help keep you from getting sick or even transmit your thoughts to a wireless cloud. They will travel inside of you, on a molecular level, protecting the biological system and ensuring that you have a good and long life. The future is closer than you may think

Article by:
Shrusti Gupta
IT A



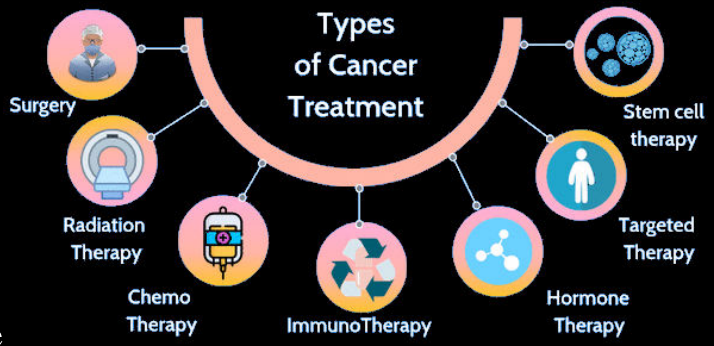
Curing Cancer through Technology

ABOUT CANCER

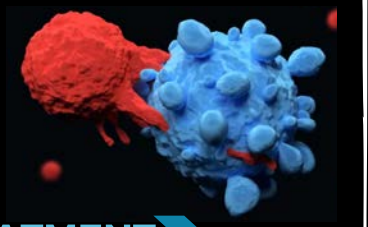
Cancer is not a disease but a set of diseases that occur due to abnormal growth of cells. When cells multiply faster than they die, the extra cells become a tumor. There are about 100 different types of cancer. Billions of people suffer from one or more type. Some of the common types of cancers are lung cancer, breast cancer, leukemia and liver cancer. Fallopian tube cancer, gallbladder cancer and heart tumor are some rare forms of cancer.

COMMON TREATMENTS

- Surgery
- Radiation
- Chemotherapy
- Immunotherapy
- Hormone therapy
- Targeted therapy
- Stem cell therapy
- Precision medicine



Nowadays, immunotherapy is becoming very effective. In immunotherapy, the person's immune system is strengthened to be able to fight the cancerous cells.



ADVANCED DIAGNOSIS AND TREATMENT

VMAT Radiation Therapy

VMAT is a new Intensity-Modulated Radiation Therapy (IMRT) treatment technique that combines the fully digital linear accelerator, 3D imaging, and advanced treatment planning expertise. This powerful trio delivers focussed radiation for short time with minimum dose to the targeted organ, sparing the surrounding critical organs and normal healthy tissues, hence ensuring the safety of patient and the treating team. Minimum target will reduce the chances of the other normal cells getting destroyed.

Linear Accelerator

Technologically advanced Linear Accelerator with amorphous silicon portal imaging and dynamic collimator can deliver Intensity Modulated Radiation Therapy (IMRT). It can precisely target higher tumoricidal dose to the tumor while keeping the radiation dose lower to the near by normal and critical organs at the same time. The dosage of radiation, if kept less, will thus prevent future cause of cancer or cancer on surrounding parts.

Magnetic Resonance Imaging

Magnetic Resonance Imaging (MRI) makes use of magnetic and radio waves to produce detailed cross-sectional images of the inside of the body. As there is no use of x-rays, there is no exposure to radiation, making it a very safe method with no side effects. Hence, there is less probability of future cause of cancer.

Shruti Dubey
COMP A

PROTECT YOURSELF ● PROTECT YOURSELF ● PROTECT YOURSELF ● PROTECT

CORONA

WHO Guidelines:

- Regularly and thoroughly clean your hands with an alcohol-based hand rub or wash them with soap and water.
- Maintain at least 1 metre (3 feet) distance between yourself and others.
- Avoid going to crowded places.
- Avoid touching eyes, nose and mouth.
- Make sure you, and the people around you, follow good respirato ry hygiene.
- Stay home and self-isolate even with minor symptoms such as cough, headache, mild fever, until you recover.
- Keep up to date on the latest information from trusted sources, such as WHO or your local and national health authorities.

Thank You 3000

GRATITUDE IS OUR ATTITUDE.

ONE FOR THE TEAM.

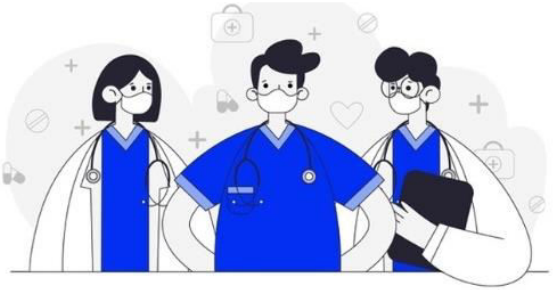
"Saying thank you is more than good manners, it is good spirituality." —Alfred Painter. This section of the magazine is dedicated to thank others who helped us achieve all of this.

CONTENTS:

THANK YOU

Thank you for working day and night during this pandemic. We appreciate that you're risking your health to care for humanity. We are staying home to do our part. As COVID-19 continues to impact communities around the world, people are coming together to help one another now more than ever. United we stand: Six feet apart. You are true heroes and should be recognized as such. Love and blessings to you all. Stay safe and know that we are all thinking of you. Remember, when you feel like all hope is gone, look within, be strong and you will finally see the truth.

The hero is inside you.



ISTE

INDIAN SOCIETY FOR TECHNICAL EDUCATION

"EVEN THOUGH WE WOULD SPAM THEIR PHONES WITH CONSTANT MESSAGING THEY WOULD REPLY WITH THE SAME PATIENCE AND ENTHUSIASM."

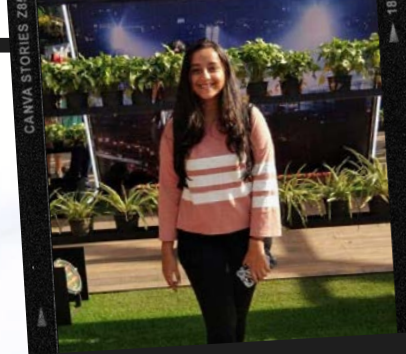
When we, the now core of The Byte Magazine were selected, just as our magazine then we were completely blank. With a huge responsibility ahead of us we were in need of a guide or mentor. That was when we were introduced to these wonderful people who would turn out to be not only our seniors but also friends.

"WE ARE THE ISTE, WE ARE HERE TO HELP."

Special shout out to Ms. Udita Mathur and Mr. Shivanshu Shrivastava for not only introducing the concept of magazine but also giving us the opportunity to explore and add our own inputs .They had literally transformed into our 3 AM friends in the last finishing days of our magazine. The past few months of The Byte Magazine have given us various opportunities to prove ourselves, an incredible and unforgettable experience, some core members who would turn out to great friends and an aroused spirit of sometimes going beyond the limit. None of this would have been possible without the ISTE members. Just as it is said, "You just have to have the guidance to lead you in the direction until you can do it yourself." We got ours from you.

- THE BYTE Core

THE BYTE CORE 2020



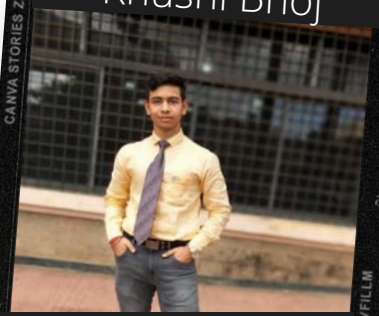
Janani Menon

Mayur Chavan

Akshata Sharma

Rohan R. Dalvi

Khushi Bhoj



Parth Agarwal

A team above all. Above all a team.

THE BYTE CORE 2020

Monica Gullapalli

Saket Pradhan

Shrusti Gupta

Harneet Kaur Dehiya

Nabil Khatri

Akshata Koltharkar

Coming together is the beginning. Staying together is progress. Working together is success.