Department of Electrical And Electronics Engineering

VIDYUTH
-Explore-Create-Inspire-

Technical Magazine

JAN - JUN 2021

EDITORIAL BOARD

INSTITUTION

Vision of the Institute:

To be a premier center of learning in Engineering and Management education that evolves the youth into dynamic professionals with a social commitment

Mission of the Institute:

M1: To provide quality teaching- learning practices in engineering and management education by imparting core instruction and state-of-the-art infrastructure.

M2: To engage the faculty and students in acquiring competency in emerging technologies and research activities through Industry Institute Interaction.

M3: To foster social commitment in learners by incorporating leadership skills and ethical values through value-based education

DEPARTMENT

Vision of the Department:

"To be recognized for producing meritorious electrical engineers with research proficiency and social commitment".

Mission of the Department:

M1: Impart quality education with practice-based learning in producing electrical engineers with ethical values.

M2: Encourage the faculty and students to acquire mastery in cutting edge technologies.

M3: Implement research activities with social commitment.

Program Educational Objectives (PEOs)

PEO-I : Acquire a profound knowledge for a successful career in electrical engineering and allied fields

PEO-II :Pursue higher education and involve in research activities of electrical and electronics engineering.

PEO-III : Exhibit intellectual skills ethically and pursue life-long learning with social commitment.

EEE PBRVITS | **DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

Program Outcomes (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1 : Analyze industrial electrical challenges by applying knowledge of fundamental electrical circuits, electronics and drives

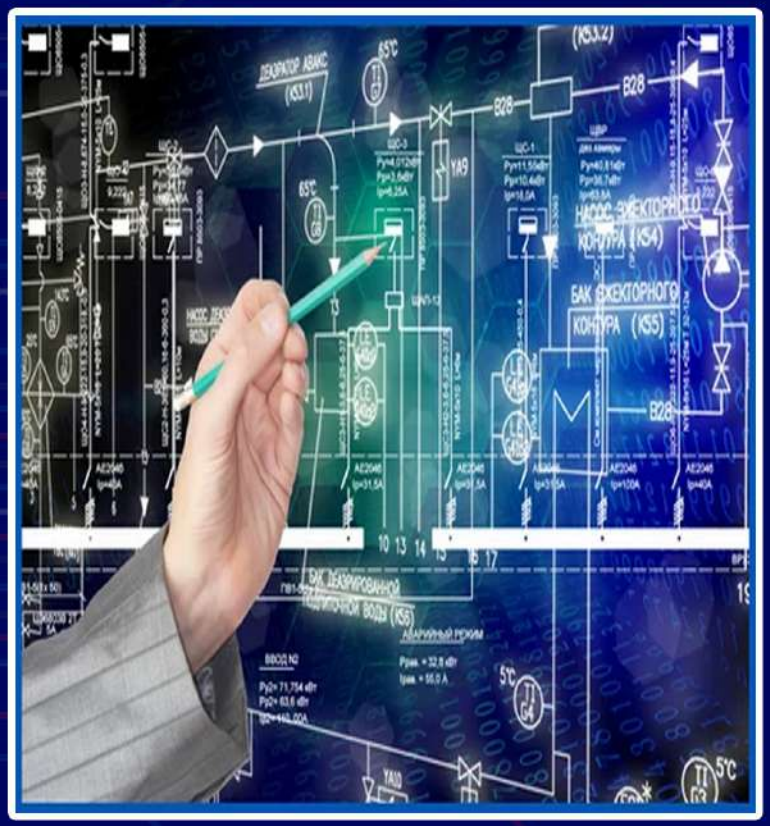
PSO-2 : Apply standard practices in electrical power and control systems with safety and societal considerations.

DEPARTMENT PROFILE

The Department of Electrical and Electronics Engineering (EEE) was established in the years 1998–99 with an intake of 60 and currently running with an intake of 120. It is 21 years old now and one of the most well-established departments in our Institution. It is also offering one post graduate programme with the specialization of Power Electronics with an intake of 30 students.

The Department is known for its esteemed faculty members who are renowned for their path- breaking contributions in the field of electronics and communications. It is well equipped with laboratories, audio-visual facilities and software tools such as Multi Sim, Model Sim, Lab View, HFSS, MATLAB, and Xilinx.

We offer our students an excellent educational experience that combines intellectual rigor and cross-disciplinary breadth. The course contents are periodically updated to introduce new scientific and technological developments. Power Electronics design, Power technologies, hands-on programming, a research focus, and entrepreneurship skills are all part of our signature educational curriculum. The EEE domain is often regarded as a challenging culmination of hardware and software. Our curriculum focuses primarily on the knowledge and skills that emerging engineers need.



PROFESSOR DESK

Welcome to the Department of EEE at PBR VITS, Kavali. This magazine will be covering activities conducted by VIDYUTH and technical articles written by students. I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind.

I would like to thank the editorial team members for bringing out this magazine regularly. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.

Dr. V. MadhuSudhana Reddy
Professor & HOD, EEE.

UNLOCKING THE POTENTIAL OF METAVERSE

The Metaverse is a term that has been used to describe a virtual world where people can interact with each other in a virtual space. This space is created through the use of virtual reality (VR) technology and allows people to explore and interact with a digital environment [1]. The potential of the Metaverse is enormous, and it has the power to revolutionize the way we live and work. One of the main benefits of the Metaverse is that it provides a new way for people to connect and collaborate with each other. This can be particularly beneficial for businesses, as it allows employees to work together in a virtual space, regardless of their physical location. This can lead to greater productivity and collaboration, as well as cost savings for businesses. The Metaverse can also be used as a tool for education and training. Virtual classrooms and training programs can be created, allowing students and employees to learn in an immersive and interactive environment. This can lead to better retention of information and a more engaging learning experience. Another potential use for the Metaverse is in entertainment. Virtual concerts, games, and other experiences can be created, allowing people to experience things that would not be possible in the physical world. This can also create new opportunities for artists and creators to monetize their work.

However, there are also some concerns surrounding the Metaverse, particularly around issues of privacy and security. As more and more of our lives move online, it is important that we are able to protect our personal information and data. It is also important that the Metaverse is accessible to everyone, regardless of income or background. Overall, the Metaverse has the potential to revolutionize the way we live and work, but it is important that we approach its development in a responsible and ethical way. By doing so, we can unlock its full potential and create a better future for everyone.

AKKUPALLI RAGHU VAMSI YADHAV
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THE NEW GEN POWER HUB

The piezoelectric effect is the induction of an electric charge in response to an applied mechanical strain. It is a reversible process that results from the linear electromechanical interaction between the mechanical and electrical states in crystalline materials with no inversion symmetry. Lead Zirconium Titanate sensors or PZT sensors are the most common and economical manmade materials used for energy conversion processes, and the use of the HX711 transducer has enhanced the efficiency. Research has been conducted on energy scavenging techniques, such as a focused spring action between two tiles, which converts mechanical input onto the transducers and converts this input into electrical output. Results showed 600μ W harvested from the 10Hz frequency and 10cm amplitude linear motion. The piezoelectric pre-stressed bending mechanism for Impact Driven Energy Harvester is designed to increase the output wattage and maximize the output voltage. A 3D model with a middle hole has been designed to give space and support to the piezoelectric transducer during the bending process, which increases the electrical energy that had been generated. The output voltage for the 3D model without the middle hole or 0 mm in diameter only produces 5.40V in AC form. The author tried to increase the impact by using a spring retention action to increase the frequency in order to improve its efficiency. The scope of this testing is to enhance the voltage output of the piezoelectric transducer before it is further used for footstep application. After the use of the device, the output voltage is 34.4V. The idea of energy harvesting has caught many people's interest, with ideas such as shoes that convert walking movements into heat, cell phones that charge themselves from body movements, roads that power streetlights, contact lenses that capture energy when you blink, and even gadgets that make energy from the pressure of falling rain. However, the amount of energy you could recover and the efficiency gain you would make for the money spent are minuscule. To save energy from cars, it is important to address the inefficiencies of car transportation much earlier in the process.

Reff -[1]https://www.explainthatstuff.com/piezoelectricity.html

CHAVA MANJUSHA
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5G ANTENNA

Designing antenna arrays for 5G networks is a complex process that requires a thorough understanding of the individual antenna unit's behavior and its interaction with the surrounding environment. The process starts with assessing the antenna unit's performance on its own and then repeating the process with an infinite antenna array's periodic element. This helps engineers optimize the antenna array's properties like gain, return loss, side lobe, and beam steering. To design real-world antenna arrays, engineers must build a simulation that accurately describes the antenna units' interaction with each other and the edge of the array. This is done using the domain decomposition method (DDM), which allows engineers to assess the coupling of nearby antenna array units. Once the mesh is created, simulation software like HFSS is used to optimize the antenna's performance. This involves optimizing properties like gain, return loss, side lobe, and beam steering using the Finite Array Beam Angle Calculator. The next step is to design the power distribution circuit across the array. This involves deciding on a target phase relationship and amplitude and designing the power feed network within HFSS until the goal is achieved. Once the antenna array's power distribution circuit is optimized, engineers can connect all their work together into one simulation. They can add phase shifters to control the signal and perform a linear network analysis (LNA) to assess the return loss for this nearly completed simulation. To evaluate the antenna design's performance in its environment, engineers perform a system-level study using HFSS shooting and bouncing ray (SBR) technology [1]. This study tests the antenna's ability to send and receive signals within a large environment, such as a city block. The final result is a comprehensive and optimized antenna design that meets the demands of 5G networks. The process requires a deep understanding of individual antenna units, their interaction with each other and their environment, and the use of advanced simulation software and technology to optimize the antenna's performance.

Reff - [1] https://www.ansys.com/blog/how-to-design-antenna-array-5gapplications?

PANDALA SANDHYA
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THE FUTURE OF ORGAN PRINTING: 3D PRINTING

You might have heard of printing papers, ever heard of printing organs? Bravo! So have we reached the stage of becoming God?We will get to know this. Organ printing, also known as bioprinting, is a rapidly developing field that uses 3D printing technology to create functional living tissues and organs. The technology involves printing layers of living cells onto a scaffold to create structures that mimic the shape and function of natural tissues and organs. While still in its early stages, organ printing has the potential to revolutionize healthcare by providing a new source of organs for transplant and advancing personalized medicine. Here are some potential future developments in the field of organ printing: Improving cell viability: One of the biggest challenges in organ printing is maintaining the viability of the printed cells [1]. To function properly, the cells must be able to grow and differentiate into the various types of cells found in natural tissues and organs. Researchers are exploring ways to improve the viability of printed cells by optimizing the printing process, developing better cell preservation techniques, and using new types of bio-inks that can support cell growth. Advancing organ complexity: While current organ printing techniques can create simple structures like skin and blood vessels, more complex organs like the heart, liver, and kidneys are still a long way off. Researchers are working on ways to print multiple types of cells together to create complex tissues and organs that can function properly. This will require new techniques for printing and manipulating cells, as well as a better understanding of how cells interact and communicate with each other. Advancing personalized medicine: One of the biggest promises of organ printing is the ability to create customized organs that are tailored to each patient's unique needs. By using a patient's own cells to create the organ, the risk of rejection can be greatly reduced, and the organ can be designed to fit the patient's specific anatomy. Researchers are exploring ways to use advanced imaging techniques and computer modeling to create precise organ designs that can be printed to exact specifications. After concluding the fact, the future of organ printing is exciting and full of promise. While there are still many challenges to overcome, the potential benefits for patients and healthcare are enormous. As technology continues to evolve and improve,

we may see a day when printed organs are a routine part of medical care, providing a new source of hope for patients in need of life-saving treatments. Alas, we are not gods, but we definitely are the offspring of a god.

Reff- [1] https://fortune.com/well/2023/02/15/3d-printed-organs-may-soon-be-areality/

PVADDE AMULYA
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EMBEDDED SYSTEMS

Embedded systems are computer systems that are designed to perform specific functions and are integrated into devices or products. These systems are found in everyday objects such as cars, home appliances, medical equipment, and industrial control systems. They are optimized for low power consumption, compact size, and real-time performance, making them ideal for applications where traditional computers are not suitable [1]. The key feature of embedded systems is their ability to perform dedicated tasks efficiently and reliably. This is achieved through the use of specialized hardware and software designed to meet the specific needs of the application. Embedded systems often incorporate microcontrollers or microprocessors as their primary control unit. These devices are integrated circuits that contain a CPU, memory, and input/output peripherals, all on a single chip. Microcontrollers are designed to be low-cost, low-power, and highperformance, making them ideal for use in embedded systems. Microcontrollers can be programmed using various languages, including C, C++, and assembly language, to control the operation of the device. The code is stored in the device's non-volatile memory and executed by the CPU in real time. In addition to microcontrollers, embedded systems can also use other types of controllers, such as programmable logic controllers (PLCs). PLCs are used primarily in industrial automation and control systems. There are several challenges associated with developing embedded systems. The first is the need for high reliability and safety, particularly in applications such as medical devices and automotive systems. The second is the need for low power consumption, as many embedded systems are battery-powered or rely on energy harvesting techniques. The third is the need for real-time performance, as many embedded systems operate in environments where delays or errors can have significant consequences.

Despite these challenges, embedded systems have become an essential part of modern life, with new applications emerging all the time. They are used in everything from consumer electronics to critical infrastructure, and the demand for skilled professionals in this field is growing rapidly.

Reff - [1] https://www.geeksforgeeks.org/introduction-of-embeddedsystems-set-1/

YADDALA SAI PRAKASH
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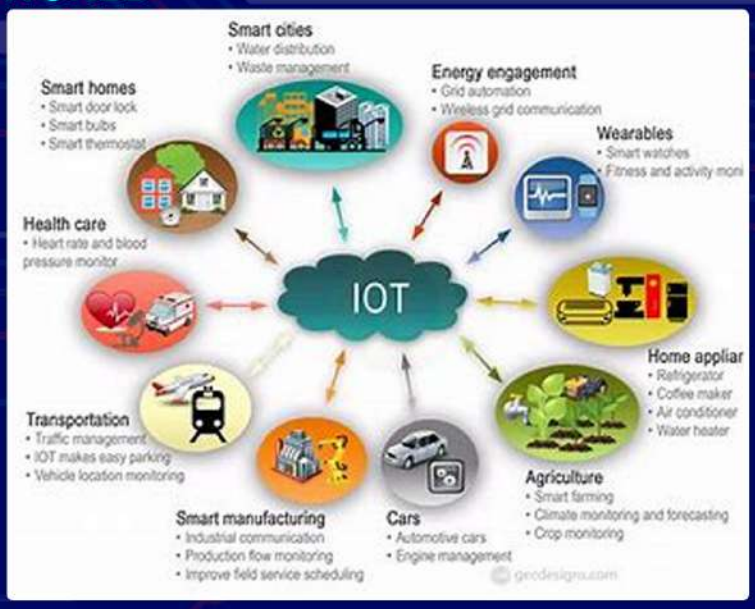
THE IMPACT OF IOT ON THE MODERN WORLD



The Internet of Things (IoT) is a rapidly growing technology that has transformed the way we live and work. This brief thesis explores the impact of IoT on the modern world by examining the various applications of this technology in industries such as healthcare, agriculture, transportation, and manufacturing [1]. IoT has found applications in various industries such as healthcare, agriculture, transportation, and manufacturing. In healthcare, IoT devices are used to monitor patient health remotely, track medication adherence, and manage chronic conditions. In agriculture, IoT sensors are used to monitor crop growth, soil moisture levels, and weather patterns to optimize crop yields. In transportation, IoT is used to monitor vehicle performance, improve traffic flow, and reduce accidents. In healthcare, IoT devices are used to collect data on patient health and provide personalized care. IoT-enabled devices such as wearable health trackers, smart beds, and smart inhalers, are used to monitor vital signs, track medication adherence, and manage chronic conditions. IoT devices are also used to monitor the health of elderly patients and improve their quality of life by providing assistance with daily tasks.IoT is also used in the development of smart hospitals, where sensors and devices are used to optimize patient flow, manage resources, and reduce the risk of infection. In agriculture, IoT sensors and devices are used to collect data on soil moisture levels, weather patterns, and crop growth to optimize crop yields.

IoT devices are also used to monitor the health of livestock, track the movement of machinery, and manage the use of water and fertilizers. IoT technologies such as precision agriculture and smart irrigation systems are transforming the way farmers work and are leading to more sustainable farming practices. In transportation, IoT technologies are used to monitor vehicle performance, improve traffic flow, and reduce accidents. IoT-enabled devices such as connected cars and intelligent transportation systems are used to collect data on vehicle location, speed, and fuel efficiency. This data can be used to optimize routes, reduce emissions, and improve safety. IoT is also used in the development of autonomous vehicles, where sensors and devices are used to navigate roads and avoid obstacles.

Reff - [1] https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/

SHAIK NAYAB RASOOL
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RENEWABLE ENERGY

CO 2 emission of India in 2015 was 2,454,968 kilo tones on an average every Indian emits 1.7 metric tones CO2 every year as of 2013 which has increased 250% from 1980.temprature of our planet is increasing rapidly and we need to put a cap on it. Looking at international picture we find that china tops the list in CO2 emission by contributing 29.1% of total emission. China and US emits 7.5 and 19.2 metric tones respectively per person which shows that these two countries are biggest emitters of CO2. Total consumption at the 111 coal fired power plants in India was an estimated 500 million tones in 2011.the modelled PM2.5 concentration due to emission from these coal fired power plants resulted in an estimated 80,000 to 115,000 premature deaths. Thermal power plants use 70% of total coal in India energy sector emits about two third of total emitted Greenhouse gases and 80% of CO2.In recent times India has shown a marvellous growth in producing power from renewable energy sources as per data of early 2017 energy produced from wind, solar, bio power and small hydro power plants. India targets to produce more than half of its power generation from renewable sources by 2027 which is highly appreciable.

A recent study reveals that that by forestation in deforested areas of 10 -15 years can combat 25% of emitted greenhouse gases

MAMIDI SIVA PRASAD
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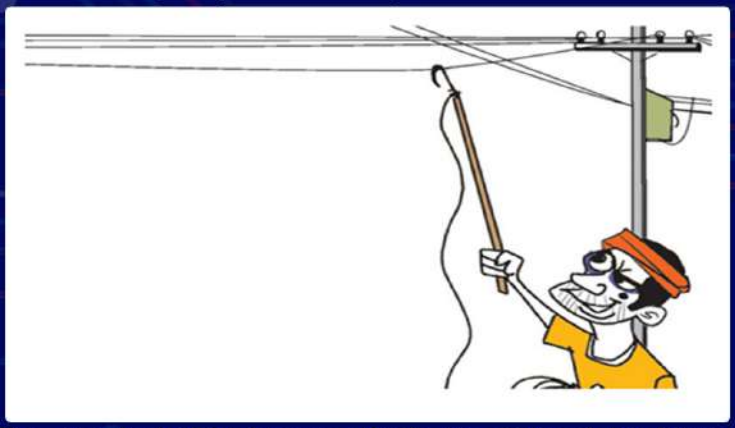
THE KNOWN POWER LOSS

Let us begin with some lesser known facts: •According to the annual emerging markets, the world losses US$89.3 billion annually due to electricity theft. The highest losses were in India ($16.2 billion), followed by Brazil ($10.5 billion), and Russia ($5.1 billion). The State Of Maharashtra, alone losses $2.8 billion per year. •India will spend 253 billion rupees to tackle the rampant theft of electricity by rolling out smart metering in cities and upgrading old distribution network, the power ministry said.



The non-technical losses which are caused by human being to access the power illegally or when power is supplied by distribution companies but they don't get paid for it is known as power thefting. Power thefting is a serious crime that affects millions of people every year and it is one of the major issues in power industry India is currently one of the biggestmpower consumers in the world, with one of the biggest power transmission networks, hence in India these days electrical power has priority for every individual and with the increasing dependency on electrical and electronic equipment, the demand of power is rapidly increasing. An increase in power demand to values greater than transformer rated power can result in different quality deviation like transformer overload, voltage unbalance and steady state voltage drop on the system bus. Power thefting is a major challenge for Indian government because as we know power sector is one of the most important sectors for the development of the country and the growth of this sector affects the overall economic condition of the nation and also it hampers the functioning of industries due to shortage and irregularity of power supply.

Ways of Power Thefting:

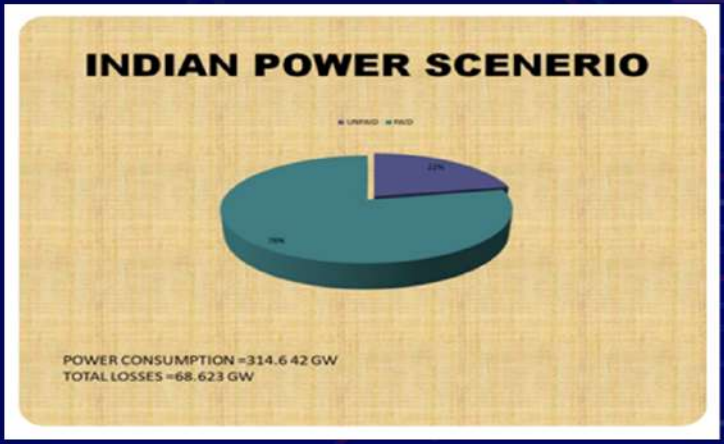
1. Direct Tapping of Power on Transmission Line
2. Energy Meter Tampering

Ways of Detection:

•Energy Meter tampering or meter bypassing can be detected by using a simple arrangement of an IR led and Photodiode.

•Power Tapping can be detected by comparing the power distributed to the lines and the power actually consumed by the load.

• Install Smart Energy Meter which is capable of detecting Meter Bypassing itself. Power scenerio in India is at a critical stage as 22% of the total power remains unpaid, the total loss of power is as high as 68.62GW, while the overall consumption of power being 314.64 GW



VAKA PRAVALIKA
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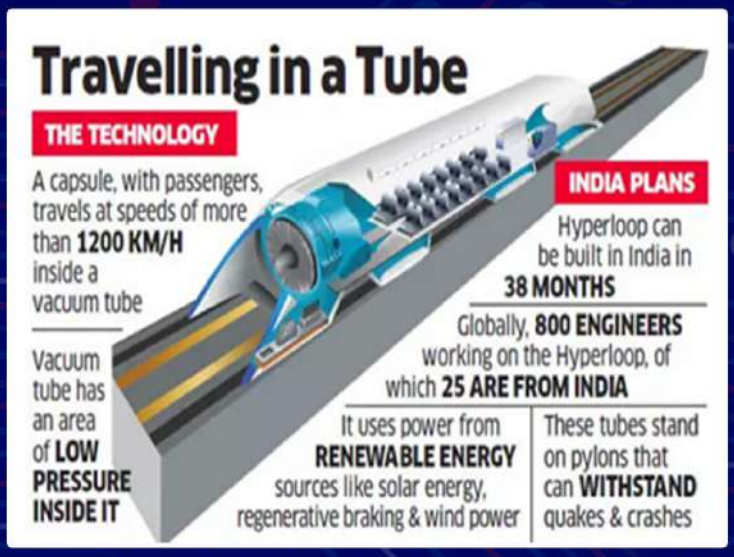
HYPER LOOP TRAIN A NEW DEFINITION OF TRAVELLING

How you react when someone says that you that you are going to be in Agra from Delhi in just 9 minutes? That means you are going to cover around 180 kilometres in just 9 minutes, that's pretty awesome we all love to travel with this magical machine which is known as Hyperloop. The concept of Hyperloop was first proposed by pioneer entrepreneur Elon Musk, CEO of Tesla Motors and SpaceX in 2013, this magical machine so called Hyperloop would transport passengers in floating pods inside low pressure tubes at speed more than 1200 kmh-1 (750 mph).



The key idea behind this is that the passenger's pods will travel inside tubes under partial vacuum, and will be accelerated to super speed using magnets. A set of fans attached to the pods will allow the train to rest on cushion of air and the most amazing and remarkable thing is that the system would be powered by the renewable source of energy, the solar panels would be placed along the length of the tube.

The Hyperloop would only use magnets for propulsion, relying on compressed air for lift. The Hyperloop train could travel with very high speed because they wouldn't have to overcome friction between the wheels and track or the air resistance that is experience at high speed in normal environment.

The Hyperloop programme is being developed in many parts of the world for its commercial use and India has also showed her interest in this project. The Tesla has been offered land free of cost near some ports by the Indian Government for its futuristic high speed train, The Hyperloop. Recently, the Indian Government offered that they can take an experiment between Mumbai and Pune as a pilot programme

In coming years, this technology will be available for commercial use and then the people can travel wherever they want without waiting for long holidays, one can be with their love ones all the time, there will be no boundaries of distance and there will no boring days because whenever, wherever you have chill just go with the speed of The Hyperloop.

NATAKARANI AJAY
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WE ARE THE CHANGE

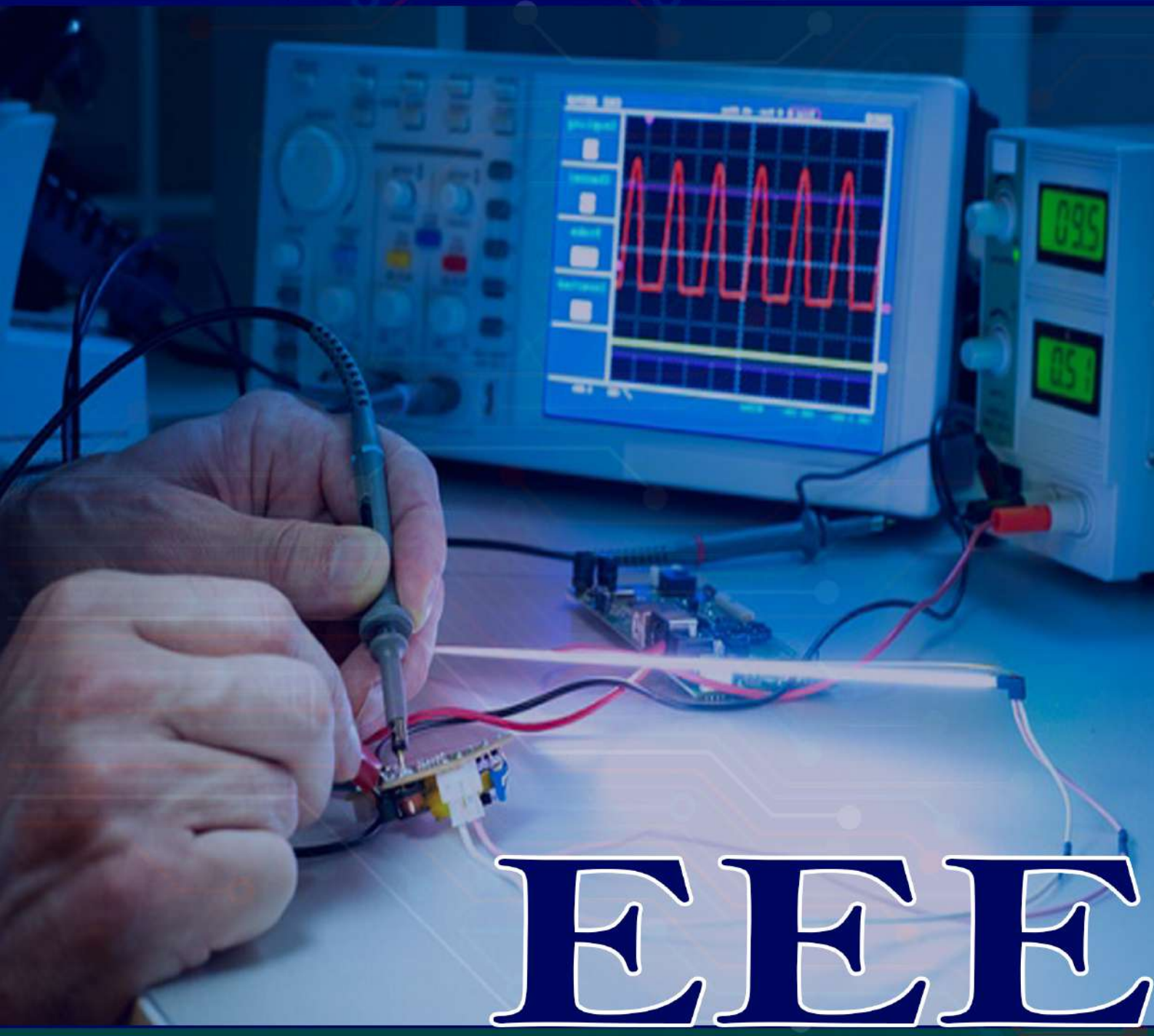
Be the change you wish to see,
Be the change in all you see.
Rather than to lay things fresh,
Enhance them to refresh.
At every stride a hardship new,
A call out new, a challenge new.
Stride it hard and get it through,
See it, make it, and face it through.

We have spent years alive,
But always been deprived.
We need to be the reason,
And not change like a season.
We got to take it...TAKE IT!
My dear brothers and sisters,
It's time to make a change within.
But, for the life, you wish to see,
A life you wish to live in.

Be the change you wish to see,
A change from within.
Every hurdle overcoming,
Every success encompassing...
Oh yes, together we can be the change,
I know that we can be the change.
It's never too late
Oh! I know it's never too late

I wish that we could someday,
Find the strength to make a change
Before it gets too late.
Be the change you wish to see,
Be the change in all you see,
Be the change you wish to be,
A CHANGE from within

THUPILI PRAVEEN
(19731A0238



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