

आविष्कार

SEPT 2021



Technical Magazine

Department Of Electrical And Electronics Engineering
MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY, ROHINI

VISION

To produce technically competent human resource for electrical and electronics industry with high moral and ethical values.

MISSION

To ensure transformational impact on learning community and modernization in industry by providing quality education with orientation towards research and higher education, imbining the students with moral and ethical values.

M1. To emphasize quality education by imparting highest quality teaching in a conducive learning environment for the students to meet dynamic industry and global challenges. This shall enable us to be strong provider of skilled human capital to the industry, both in core and software sectors.

M2. To develop state of the art classrooms, seminar hall and modernized laboratory. All the laboratory experiments which are normally performed with the help of hardware equipment shall be backed up and boot strapped with the software experiments.

M3. To develop a strong center of excellence for technical education and research activities thereby promoting a creative environment for the students to address global challenges and excel at all levels.

M4. Inculcating the spirit of team work, innovation, entrepreneurship and motivate the students to pursue higher education for their overall development.

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Message From Founder and Chief Advisor's Desk



Dr. Nand Kishore Garg
Founder & Chief
Advisor, MATES

**" I am extremely happy to release the LIVE WIRE
Technical Magazine of the Electrical and Electronics
Engineering Department, MAIT for the session between
August 2021- September 2022.**

**This magazine, I understand has been designed to
provide a broad range of information that focuses on
the application of current technologies, research,
developments through the latest technology
innovations through the existing students and faculty
members, and their practical explanations through
industry experts.**

**I acknowledge the efforts of Prof. (Dr.) Rajveer Mittal,
Head of the Department, and his Editorial Board
Members in getting the magazine published.**

**I wish all the faculty members success and zeal to
continuously work for the betterment of society. "**

Message From Chairman's Desk



Sh. Vineet Kumar Gupta
Chairman, MATES

" I am gratified to know that the Department of Electrical and Electronics Engineering, MAIT has taken an initiative to publish the Technical Magazine in the month of September 2021.

This is productive as well as a great platform for the students, researchers, faculty members and industry experts to disseminate achievements in research and developments in computer science and technology.

I acknowledge the efforts of Prof. (Dr.) Rajveer Mittal, HOD. EEE, the Editorial Team, faculty members and the students of the departments for their efforts in publishing the Technical Magazine.

I also applaud the coordination and efforts by the editorial team to bring up the issue.

I wish them all a great success."

Message From Vice Chairman's Desk



**Prof. (Dr.) M.L.. Goyal
Vice Chairman(Academics),
MATES.**

" I am very happy that the Department of Electrical and Electronics Engineering, MAIT is releasing its Technical Magazine to commemorate technical publications and articles of faculties, Industry experts, alumni, and students for the academic year 2021-2022.

This Technical Magazine is a forum that could aptly be used to record the technical articles and research papers published by the students and faculty members. I am sure that this magazine will be informative and resourceful.

I owe my hearty appreciation to Prof. (Dr.) Rajveer Mittal, Head of the Department EEE, and her team for their sincere efforts to make the release of this magazine a reality. I wish them "The Very Best" in all their future endeavors. "

Message From Director's Desk



**Prof. (Dr.) Neelam
Sharma
Director, MAIT**

" It gives me immense pleasure to know that a LIVE WIRE Magazine September 2021 is being published by the Department of Electrical and Electronics Engineering, MAIT. It is a platform to combine the efforts of Faculty, students and the editorial team to publish their technical work going on in the department.

Industrial and productive technical material forming the contents of the magazine will definitely be a developing a tool to the readers.

I applaud the efforts of Prof. (Dr.) Rajveer Mittal, Head of the Department EEE, Editorial team members and Co-ordinators of the team to publish this issue. I wish them success for future publications. "

Message From Head Of The Department



Prof.(Dr.)Rajveer Mittal
Head of Department (EEE)

"म दुनिया में कहीं भी रहे पर यह सत्य है कि हम वास्तविक दुनिया में बड़े हुए हैं हमारा वास्तविकता से सामना वास्तव में ही हुआ है... कपड़ों में सलवटे नापड़ने देना और रिश्तों में औपचरिकताका पालन करना है ऐसा हमें जमा ही नहीं ...
सुबह का खाना और रात का खाना इसके सिवा टिफिन क्या था हमें मालूम ही नहीं...
हम अपने नसीब को दोष नहीं देते... जो जी रहे हैं वह आनंद से जी रहे हैं और यही सोचते हैं... और यही सोच हमें जीने में मदद कर रही है... जो जीवन हमने जिया... उसकी वर्तमान से तुलना हो ही नहीं सकती...
हम अच्छे थे या बुरे थे नहीं मालूम पर हमारा भी एक जमाना था और सबसे महत्वपूर्ण आज निसंकोच ,
हृदय के गहन तलसे अपने साक्षात देवी- देवता तुल्य, प्रातः स्मरणीय माताजी पिताजी भाई एवं बहन को कहना चाहता हूं कि मैं आपके अतुल्य लाड , प्यार , आशीर्वाद , लालन-पालन व् दिए संस्कारों का ऋणी हूँ और सदा रहूंगा ।
खुद ही स्कूल जाना पड़ता था क्योंकि साइकिल बस से भेजने की रीत नहीं थी, स्कूल भेजने के बाद कुछ अच्छा बुरा होगा ऐसा हमारे मां-बाप कभी सोचते भी नहीं थे..."

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FACULTY CORNER

Creating New Business Opportunities Mr. Ravi Sharma, Asst. Professor, EEE Department



Although the electric vehicle industry as a whole opened more options for people with entrepreneurial mindsets, the same may be true for the battery shortage issue. After all, most businesspeople know the importance of coming up with ideas that solve identified problems.

One of the options is to build more battery factories in the United States. That would reduce dependence on China, which currently dominates the lithium-ion battery market. According to one industry source, only 23% of the world's raw battery materials come from China.

However, the Asian nation still accounts for 80% of overall production due to its success in chemically producing battery-grade materials. Setting up factories in the United States makes sense, but it's also not straightforward. Dr. Francis Wang, CEO of battery technology company NanoGraf, admitted, "We don't have a supply chain in the United States. I think we're trailing behind." He continued, "The battery business is a tough business. It's incredibly capital-intensive. It costs millions, if not billions, of dollars to get a factory off the ground. The margins are pretty tight. Razor-thin. And there is a tremendous amount of risk."

Making Old Batteries Into New Ones

A new startup called Redwood Materials could provide an alternative until more U.S. factories get built. Rather than creating batteries, this business model focuses on recycling them. Company leaders envision a closed-loop battery supply chain that supports sustainability while addressing the materials shortage.

One challenge is that there are not enough EVs in junkyards yet to source the company's needs. For now, one of its workarounds is to get batteries from consumers. That makes sense, especially since most people have at least a few lithium-ion phone batteries associated with smartphones they no longer use. The Redwood Materials process involves heating the batteries to 2,700 degrees Fahrenheit to turn the metal into a hot liquid. Then, supplementary chemical processes reduce the metal into ultra-concentrated forms of lithium, cobalt, and nickel. It's too early to say how much pioneering approaches like that one could address the battery shortage, but that's an example of what's possible.



Haptic Technology, Modalities and Application

Mr. Ashok Goyal, Assistant Professor, EEE Department

Haptic technology is the use of tactile sensations to stimulate the sense of touch in a user experience. For example, direct applications of haptic solutions frequently include phone and game controller vibrations. Haptic science also involves any tactile feedback such as air pressure or sound waves.

Also known as 3D touch or kinaesthetic communication, this technology creates experiences using vibrations, motions, and other forces. Since touch is the most fundamental method of interaction, leveraging sensation within your products is fast becoming the newest approach for creating memorable brand experiences.

It is helpful to distinguish between haptic technology and two similar terms—haptics and haptic feedback.

- Haptic technology refers to the technical applications (virtual or physical) that create tactile stimulations.
- Haptic feedback comprises the methods in which haptic technology communicates tactile information to users.
- Haptics is the overarching umbrella term that describes the science of haptic feedback and haptic technology, in addition to neuroscience and physiology of touch.

Immersion Corporation is a pioneer in haptic technology that powers over 3 billion devices worldwide. One study on haptics demonstrated that participants could recall objects purely through touch 94% of the time. As the global user base grows, haptics will continue to expand across multiple applications.

The four primary haptic modalities—vibration, button stimulation, thermal, and kinesthetic. Ø
Vibration

Most haptic experiences focus on vibration-centric feedback. Technology such as linear resonant actuators (LRA) and eccentric rotating mass (ERM) create much of the haptic experiences you encounter for mobile and wearable devices (think of the vibration included with a game controller).

Ø Button stimulation

Smart screens don't naturally offer tactical feedback and versatility like mechanical buttons. And so, we can expect simulated buttons to become more popular, like the technology in the Apple Force Touch trackpad. Buttons can use haptic and audio feedback to mimic the feeling of a mechanical pressure pad under your finger.

USES OF HAPTIC TECHNOLOGY

Haptic technology offers numerous potential advantages. Here are several use cases for touch-based solutions that can tap into the benefits of haptics to offer a better user experience.

Product design

Through touch optimization, haptic technology can improve the user experience in many ways. Haptics will also play a prominent role in automotive infotainment systems. Touch screens can become more responsive and provide multiple settings based on the driver's preference. Other additional automotive applications include pedal feedback and steering wheel enhancement.

Wellness

The advances in wearable haptics offer great opportunities within the healthtech industry. Real-time haptics gathers biometric data and can adjust the user experience to suit the user. Better feedback and data collection will make it possible for enhanced user experiences and improved health outcomes. Touch Points reports that its wearable devices can reduce stress by 74% in 30 seconds. Companies involved with posture correction, such as ergonomic furniture makers, app creators, or chiropractors, can take advantage of these improvements in the technology.

Industrial training

With haptic feedback, your training environments can simulate real work environments and labor conditions with improved accuracy. Users can partake in virtual training scenarios, using haptics to get a lifelike experience in a safe, offline environment. From training in maintenance, safety procedures, assembly line usage, and machinery operation and product testing, there are many uses for haptics that can allow users to train without any risks to themselves or company property.

Accessibility

You can improve the accessibility of your products and services for the visually disabled. Haptic technology allows users to create virtual objects, interact with products, and approximate the appearance of an object via touch-based sensory input. For example, the 2.5D display from a Stanford team helps visually impaired people accomplish visual tasks. Not only will these solutions open up new potential markets and aid those with restricted accessibility, but they will ensure your company stays compliant with access regulations.

Smart Grid and Its Importance

**Ms. Ayushi Aggarwal, Assistant Professor,
EEE Department**



The smart grid is called as one of the best utilization in the computer intelligence sector that also proves the ability for networking. There are many features that discriminate against the conventional electricity distribution system. Since the invention of the smart grid electricity system, operation and maintenance have been drastically easy for the companies. Although, each component of the smart grid is able to listen and talk that provides an efficient operation during the distribution of the electricity. Apart, it also plays a vital role in accomplishing automation purposes. The utilization of smart grid technology has been increased in the contemporary scenario when everyone enjoys uninterrupted services all the time so there are a lot of companies that are implementing the same technology for efficient operation. If any user is inconvenient during the operation, the electricity company knows instantly the affected area through the smart meter assistance. Although, the smart grid technology also enables the transformers from the IP address that helps companies for two-way communication. Here, through smart grid technology, the company can manage the distribution of electricity efficiently. A company in the United States also provides the various types of technologies for the advancement in the smart grid sector so the world can take benefit from the same in a great manner. After the advancement of the SmartGrid, companies will be benefitted from the integrated and automated transmission between the various elements of the electric grid. Besides, sensing and computations will also be made by the electricity companies drastically with the automated controls. Management of the dashboard with the decision support software will also be improved after the improvisation in smart grid technologies. Unique Identifier (UID) is the vital thing that can be used for the identification of any entity and the smart grid is enabled with the Internet of Things (IoT) that makes it able to communicate over the system all the time.

It is vital to know about the Smart Grid technology before starting the importance of it. The smart grid is the smart electrical network that is also known as the combination of the electrical network as well as smart digital transmission technology. Nowadays, various companies are implementing the technology which is proficient in producing an electrical network through various distributed sources to the customers. These sources may be turbines, solar power systems, and others. During the composition of the smart grid technology, various components like intelligent appliances, smart substations, smart power meters, and super-conducting cables are being used with a wide range of technologies that help in organizing it as a smart tool for the companies.

STUDENT CORNER

Wireless Power Transfer

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Wireless power transfer (WPT), in general, has been around us for a long time for purposes such as telemetry, satellite communications, and radio frequency identification (RFID) tags.

WPT is the transmission of electrical power without wires and is primarily based on technologies the use of time-varying electric, magnetic, or electromagnetic fields. It is beneficial to power electrical gadgets that are inconvenient, or no longer possible, as is the case of body-embedded sensors, actuators, and communication devices. Most of these functions transfer low amounts of power, in the vary of microwatts to milliwatts, for data transfer. WPT has lately been the centre of attention of industrial traits for higher-power applications, from a few watts to countless kilowatts, over average distances. The most frequent approach of high power. It is inductive coupling which was once invented by Nikola Tesla more than a century ago. The current developments in the semiconductor industry for high frequency and high-power applications have paved the route for high-power inductive WPT improvements. Inductive WPT presents various advantages over the wired connection and is utilized for several purposes such as wearable electronics, health care, and the car industry. This chapter begins by way of reviewing more than a few techniques of WPT, accompanied by the sketch and evaluation of inductive WPT. The overall inductive WPT is studied step by step and component by component; therefore, it is recommended to refer to the references for targeted analysis and information.

Wireless power transfer systems allow power to be transferred from one electrical network to any other besides the need for wires or exposed contacts. For a giant number of various applications, this characteristic is fairly advantageous, and in sure instances has enabled new applications to be realized. Further, It is poised to play a indispensable role in the global pressure to electrify transportation structures and, thus, emerge as ubiquitous for the duration of technologically superior future societies. Therefore, expertise in the place of WPT is increasingly essential for modern-day power electronics engineers

Power can be transferred over short distances (near- field transfer) by alternating magnetic fields and inductive coupling between coils, or by way of alternating electric powered fields and capacitive coupling between metal electrodes. Inductive coupling is the most frequent approach of WPT and is used in charging gadgets such as smartphones, electric powered shavers, visible prostheses, and implantable clinical gadgets (cardiac pacemakers, cochlear implants). For 20 mm distance separation and dimension of the coil pair, loop diameter, and frequency play a major role in identifying WPT performance. This system is used for the transmission of energy except a direct physical cable connection, which is beneficial for power loads where the use of cables is hazardous and inconvenient.

The magnetic resonant coupling wireless power transfer (MRCWPT) system has distinctly high transfer efficiency over relatively long distances, and the MRCWPT system has received a lot of attention.

. And the MRCWPT system is much promising in the field of charging, which has been applied in potential functions such as scientific implants, electric powered automobile charging, sensor networks and client electronics.

For conventional MRCWPT systems, each the transmitter and the receiver have the equal resonant frequency to preserve relatively high power transfer efficiency (PTE). The receiver and the transmitter work at a single resonant frequency. When the electrical energy is transmitted from the transmitter to the receiver at exceptional working frequencies and malfunctions may additionally be brought on regardless of the receivers' demands. The so, PTE of the system recorder to resolve the problem, the frequency reconfigurable MRCWPT system with extra manipulate circuits is proposed in through altering the resonant capacitance value. An efficient and reconfigurable rectifier circuit, with the capability of automatically switching from low- power to high-power operation mode, is presented. The new topology lets in the rectifier to convert RF power to DC power efficaciously over an prolonged input power range. The frequency reconfigurable science is achieved by means of varying the distance between the receiver and the transmitter of the MRCWPT system. A shape-reconfigurable MRCWPT system achieves frequency reconfigurability via exceptional constructions of resonant coils. A novel planar-spiral transmitter coil (TX-coil) with an outer-tight and inner-sparse configuration is proposed to attain a extraordinary factor and uniform magnetic field, which ensures high efficiency and improves the misalignment tolerance for several-megahertz WPT systems.

The above MRCWPT structures have the frequency reconfigurable property, however the volume and complexity of the system increase. To gain higher PTE and power receivers at different frequencies, a frequency reconfigurable MRCWPT system is introduced by adjusting the capacitance price of the adjustable capacitor related to the coil of the system.

. At present, many researchers proposed MRCWPT systems to further enhance PTE and lengthen the distance of the system. A kind of technique in which adding relay resonators is proposed.

The distance and PTE of the system are extended. Intermediate resonators arranged between the transmitter and the receiver are used to transmit the magnetic field. This approach is used to enhance the PTE of the system to maximize the advantages of magnetic field repeaters. MRCWPT systems with the metamaterial are proposed. Some MRCWPT systems with repeaters and metamaterial are analyzed for applications. The analysis indicates that the PTE of MRCWPT systems with repeaters and metamaterial is elevated in one-of-a-kind ways. The metamaterial can provide the MRCWPT system with more than a few tunable functions.

And the MRCWPT system with nonidentical coils using metamaterial is proposed. However, further investigation should be carried out about its systems using metamaterial to improve the PTE and the distance. Investigations about the metamaterial are mainly in the far field, however the metamaterial used in the MRCWPT system in the near area is lacking. Theoretical analysis and experimental investigation about using metamaterial to improve the PTE of the machine are shown. The PTE of the gadget increases from 17 to 35% by using metamaterial at the working frequency of 27.12 MHz. A maximum 25.4% efficiency enhancement is achieved when the distance between Tx and Rx coils is 15 cm, and in standard distance variation cases, the proposed two-stack hybrid metamaterial slab makes the power transfer efficiency increase. The metamaterial is used in the MRCWPT system, and the more advantageous PTE is 54.3% at a distance of 1.0 m. The overall performance of the MRCWPT system is improved by using metamaterial in the above work. However, the metamaterial is so thick and large that it limits the application of the system. The conventional metamaterial used for the system to improve the efficiency just works at only a single frequency. Also, the research about it used for frequency reconfigurable magnetic resonant coupling wi-fi electricity switch structures is lacking. This paper provides a method for enhancing the efficiency of the frequency reconfigurable wireless power transfer system dynamically by using the frequency reconfigurable metamaterial at different working frequencies. The reconfigurability is achieved by adjusting the capacitance value of the adjustable capacitor connected to the coil of the system. The conventional structures of the coil and the metamaterial are used in the system, so the universality of this method is further illustrated

RESEACH PUBLICATION

Aeronautical Communication

Anmol Dureja¹ , Anshita Pandit² , Sagar Bharti³ ,Poonam Juneja⁴

A conversation between two or more airplanes is referred to as aviation communication. The design of aircraft makes it exceedingly challenging for them to see anything beyond what is right in front of them. Aircraft can effectively connect with the required employees using communication techniques like wireless radio since safety is the aviation industry's top priority. Since the aviation sector is global, many different languages are used. The International Civil Aviation Organization (ICAO) has determined that English is the aviation industry's official language. Pilots are required to take an English proficiency exam since the business recognizes that some pilots may not be native English speakers. In the early days of flying, it was believed that the sky was too vast and empty for two planes to collide. However, the catastrophic accident of two aircraft over the Grand Canyon in 1956 led to the establishment of the Federal Aviation Administration (FAA).

The Jet Age saw a boom in aviation, necessitating the development of communication technology. To communicate with pilots in the air, ground controls employed visual aids, which was once thought to be a highly challenging operation. Pilots could connect with people on the ground thanks to the development of portable radios that were tiny enough to be stored in aircraft .

Pilots could then communicate both air-to-air and air-to-ground thanks to subsequent advances. Today, a lot of different methods are used in aviation communication. Modern radio, GPS, Internet, and video systems are all standard equipment on airplanes.

Air-to-ground communication greatly improved with the invention of radar in the middle of the 1930s. Radar may be used to follow aircraft in the sky and detect their location, direction, speed, and even kind. This made it possible for pilot navigational aids and better air traffic control. It was then widely used during World War 2 for targeting for bombers. Two different radar beams might be pointed in the direction of Germany from radar sites along the British coast.

An aircraft might track one radar signal until it crossed with the other, at which point it would know to drop bombs, by aligning the two radar beams to intersect over the targeted target, such as a town or industrial.

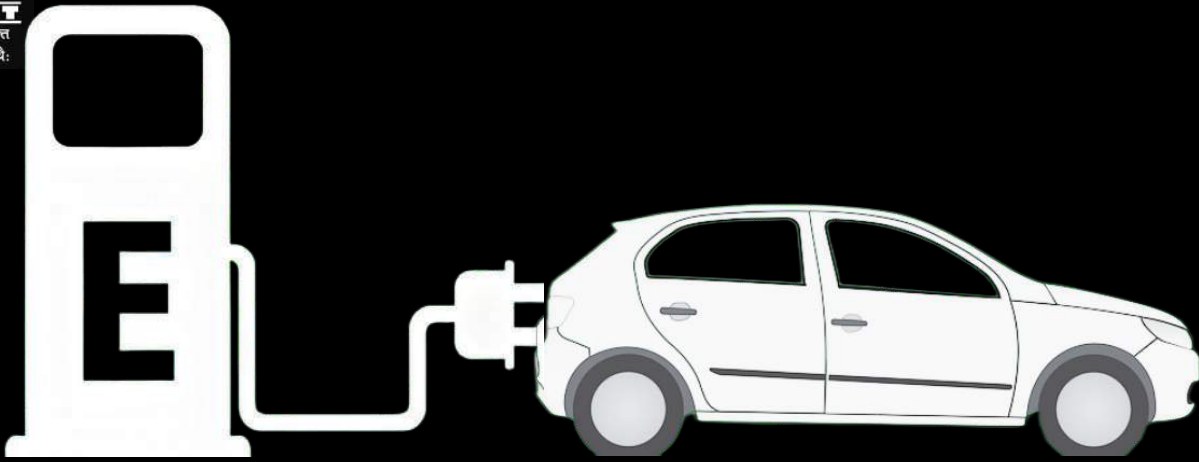
Currently aviation communication is used to reduce the risk of mishappenings by telling the pilots the latest weather conditions or the availability of runways. Sometimes flights are even redirected to some other airports. It has saved many lives till date and the engineers are still trying to improve the current technology to meet the future needs. Aviation has truly been the forefront of innovation to become one of the safest and most reliable modes of transportation in the world today and a major part of this is because of the communication system which helps in planning and getting ready for every situation.

Autonomus Underwater Vehicle

An autonomous underwater vehicle (AUV) is a robot that travels underwater without requiring input from an operator. AUVs are a smaller subset of the wider class of underwater systems known as unmanned underwater vehicles, a classification that includes non-autonomous remotely operated underwater vehicles (ROVs) – controlled and powered from the surface by an operator/pilot via an umbilical or using remote control. An AUV is more frequently referred to as an unmanned underwater vehicle in military contexts (UUV). AUVs include underwater gliders as a subtype. The first AUV was developed at the Applied Physics Laboratory at the University of Washington as early as 1957 by Stan Murphy, Bob Francois and later on, Terry Ewart. The "Special Purpose Underwater Research Vehicle", or SPURV, was used to study diffusion, acoustic transmission, and submarine wakes. Other early AUVs were developed at the Massachusetts Institute of Technology in the 1970s. One of these is on display in the Hart Nautical Gallery in MIT. At the same time, AUVs were also developed in the Soviet Union. The ocean is an environment that is saturated with seawater. Seawater has a high degree of viscosity, making it more difficult for the ocean to move than the atmosphere. The ocean's environment, where air pressure rises by one per ten metres of depth, is another amazing feature. When a result, as objects are destroyed, the water pressure increases to a point that it may be fell in the deep sea.

So many factors come in account in designing AUVs. It includes Solid pressure vessels to contain the electronics underwater as well handling the pressure from water. It contains sensors some of which are compasses, depth sensors, side-scan and other sonars, magnetometers, thermistors and conductivity probes. Some AUVs are outfitted with biological sensors

including fluorometers (also known as chlorophyll sensors), turbidity sensors, and sensors to measure pH, and amounts of dissolved oxygen. Some of the uses of AUVs are for research work, commercial work like for oil and gas industries uses AUVs to make detailed maps of the seafloor before they start building subsea infrastructure; pipelines and subsea completions can be installed in the most cost-effective manner with minimum disruption to the environment, air crash investigations, military applications etc.



HOW WILL A LITHIUM-ION BATTERY SHORTAGE IMPACT EV?

Many people are becoming increasingly interested in electric vehicles (EVs). For some, the reduced environmental impact is a primary driver. Others dislike dealing with the uncertainty of fluctuating fuel prices.

However, a possible battery shortage threatens to put the brakes on any anticipated EV boom.

Rising Vehicle Popularity Could Worsen the Problem

If a person buys one of the most widely available EVs, there's a good chance it has a lithium-ion battery.

They're among the most popular power sources for today's electric vehicles. The production of those components requires several raw materials, including lithium and cobalt. Data published in a 2020 study estimated that the lithium-ion batteries used in electric vehicles during 2019 required 19 metric kilotons of cobalt and 17 metric kilotons of lithium. Moreover, projections indicate those material demands could rise to 180 and 185 kilotons, respectively, by 2030.

These statistics emphasize why people interested in electric vehicles and their adoption rates are increasingly eager to find more widely available battery materials. However, it could take a while before those become feasible options.

A Battery Shortage Might Make EVs More Costly

The desire for bigger batteries that offer longer ranges is one of the reasons behind the forecasted increased usage of materials. Fortunately, numerous projects are underway to make charging stations accessible, including efforts to bring them directly to drivers. Even many potential EV buyers automatically view longer ranges as a superior choice. That belief accelerates the demand for manufacturers to produce larger batteries that require more materials. Consumers could experience the effects of a battery shortage, too. In March 2021, Goldman Sachs analysts noted that the three main materials used to make a lithium-ion battery have been going up since the start of the year.

They also pointed out that the trend would push battery costs about 18% higher, cutting into manufacturers' profits.

If that happens, the consumer costs of EVs would also rise, since the battery comprises as much as 60% of the vehicle manufacturing budget, the analysts said. They did not give many specifics regarding the extent of the additional cost but did offer a possible scenario. In the event that nickel prices soar to their historic peak of \$50,000 per tonne, that could make EVs \$1,250 to \$1,500 more expensive for the people who want to buy them. The bigger price tag could dampen consumer demand, but won't likely happen especially soon. People familiar with the matter believe it could occur over the next

PUSHING REASERCHERS TO DIFFERENT POWERSOURCES

As people become more concerned about the reality that a lithium-ion battery does not represent a limitless resource, that could cause researchers to prioritize coming up with newer, better batteries that don't rely on materials facing shortages. Selecting a battery as a safe and effective candidate starts with understanding its characteristics during all types of use.

For example, lithium-ion batteries have an exothermic reaction during charging that produces heat. Engineers must develop temperature management devices to stop them from overheating. Thus, finding a battery alternative is only part of the goal. Other efforts center on ensuring it performs as expected without creating hazards. However, progress is underway. In one example, researchers from the University of Texas at Austin developed a lithium-ion battery without cobalt, which they said was its least abundant material. A battery's cathode typically contains all of its cobalt.

However, the option developed in this research was 89% nickel, along with manganese and aluminum. The primary use of nickel for the cathode should lead to longer driving distances, the researchers said. They also noted that cobalt is the most expensive material used for a cathode. It's costlier than the combined costs of nickel, manganese, and aluminum and can account for nearly a third of many lithium-ion battery cathodes, they said. Thus, this achievement could pave the way for battery alternatives with superior performance and reasonable production costs. If so, that's a mutually beneficial situation for EV owners and manufacturers.

LIST OF EVENTS ORGANISED

S.No.	Date Of The Event	Name Of The Event	No. Of Participants
1.	11th December, 2021	Inauguration Of The Society	150+
2.	14th December, 2021	Logo Making Competition- Unwind Reminder	39
3.	13th January, 2022	Poster Making Competition	45
4.	22nd March, 2022	Meme Template Making Competition	30+
5.	15th April, 2022	Debate Competition	60
6.	20th May, 2022	Electrical Quiz- Electrialla	50

Inauguration Of The Society

The virtual curtains rose on December 11, 2021, as Maharaja Agrasen Institute of Technology proudly inaugurated "Electrotech," the official society of the Electrical and Electronics Engineering (EEE) Department. The online event, hosted at 4:00 pm, marked a significant milestone in fostering innovation, collaboration, and academic excellence within the department.

The inauguration commenced with a warm welcome by Dr. Rajveer Mittal, who highlighted the society's mission to create a platform for students to explore, innovate, and excel in the dynamic field of electrical and electronics engineering. The online platform seamlessly connected students, faculty, and esteemed guests, fostering a sense of community despite the virtual setting. Distinguished guest speakers, including industry experts and alumni, shared their insights on the evolving landscape of EEE and the role Electrotech could play in shaping future professionals. A virtual ribbon-cutting ceremony symbolized the official launch of Electrotech, inaugurated by Dr. Rajveer Mittal and Ms. Poonam Juneja.

The event featured engaging presentations, showcasing the society's planned activities, workshops, and collaborative projects. Attendees were encouraged to actively participate, providing a glimpse into the exciting journey that Electrotech promises for its members.

The online platform allowed for real-time interaction through a Q&A session, where participants posed questions and received valuable insights from the speakers. The inauguration concluded on a high note, with an invitation for students to join Electrotech's committees, contributing to the society's growth and success.

The virtual inauguration of Electrotech exemplified Maharaja Agrasen Institute of Technology's commitment to adapting and thriving in the digital era. As Electrotech begins its journey, the EEE Department looks forward to a future marked by innovation, learning, and collaboration within the dynamic realm of electrical and electronics engineering.

Logo Making Competition- Unwind Reminder

Electrotech, the innovative organization promoting excellence in electrical engineering, hosted the "Unwind Remainder" Logo Making Competition on 14th December 2021 at Maharaja Agrasen Institute Of Technology. The event provided a creative platform for students to showcase their artistic prowess with a focus on the theme of electrical components. Enthusiastic participants demonstrated their design skills by crafting logos that encapsulated the essence of electrical components. The competition, aptly named Unwind Remainder, encouraged participants to think outside the box and creatively represent the intricacies of electrical engineering in a single, impactful logo.

Theme Exploration:

The theme of electrical components inspired a diverse array of interpretations, with participants incorporating symbols, circuit elements, and innovative representations of wires and devices. The logos reflected the fusion of creativity and technical precision, showcasing the participants' ability to communicate complex ideas visually.

Judging and Criteria:

A panel of judges, including faculty members and design professionals, evaluated the logos based on creativity, relevance to the theme, and visual appeal. The judging process proved challenging due to the high quality and diversity of submissions.

Conclusion:

Unwind Remainder proved to be a successful convergence of art and electrical engineering, highlighting the students' ability to communicate complex concepts through visual representation. The competition not only celebrated creativity but also underscored the dynamic intersection of technology and design within the MAIT community.

Poster Making Competition

Electrotech, a trailblazing organization fostering innovation, successfully organized a Poster Making Competition on 13th January 2022 at Maharaja Agrasen Institute Of Technology. The competition provided a platform for students to showcase their artistic skills and explore the theme, "The Evolution and Improvement in Wireless Communication."

Talented students from various disciplines enthusiastically participated, transforming their visions of wireless communication progress into vibrant and insightful posters. The diversity of interpretations and artistic styles showcased the creativity flourishing within the MAIT community.

Poster Designs:

The entries exhibited a remarkable range of artistic expression, incorporating technological elements and visual narratives to depict the evolution of wireless communication. Each poster told a unique story, highlighting the transformative journey from past to present and envisioning the future of wireless technology.

Judging and Criteria:

A panel of judges, comprising faculty members and industry professionals, evaluated the entries based on creativity, relevance to the theme, and artistic merit. The competition was stiff, reflecting the high caliber of submissions.

Conclusion:

Electrotech's Poster Making Competition was a resounding success, combining artistic expression with technological exploration. The event not only celebrated the creative spirit of MAIT students but also highlighted the significance of visual storytelling in communicating the evolution of wireless communication.

Meme Template Making Competition

Electrotech, an organization dedicated to promoting creativity and innovation, successfully organized the MAIT Meme Making Competition on 22nd March 2022 at the Maharaja Agrasen Institute Of Technology. The event aimed to provide a platform for students to showcase their wit and humor through the art of meme creation.

The competition witnessed enthusiastic participation from MAIT students across various disciplines. Both individual participants and teams brought their A-game, contributing to the vibrant and energetic atmosphere of the event.

A panel of experienced judges, including faculty members and industry professionals, evaluated the memes based on creativity, originality, and humor.

The diverse range of memes presented made the judging process both challenging and enjoyable.

Winners and Prizes:

The winners were announced amid cheers and applause. Electrotech awarded exciting prizes to the top three participants and recognized special achievements for the Best Theme, Most Creative, and Audience's Choice categories. The prizes added an extra layer of excitement to the event.

Conclusion:

The MAIT Meme Making Competition organized by Electrotech not only showcased the incredible talent and creativity of the participants but also demonstrated the importance of humor in fostering a positive and collaborative environment. The event left a lasting impression on everyone involved, contributing to the vibrant culture of Maharaja Agrasen Institute Of Technology.

Electrotech extends its gratitude to all participants, sponsors, judges, and volunteers who made this event a resounding success. We look forward to hosting more engaging and innovative events in the future.

Debate Competition

Introduction:

On April 15, 2022, the EEE Department at Maharaja Agrasen Institute of Technology, spearheaded by Electrotech, organized the "Electrical Engineering Community" Debate Competition. This event served as a platform for participants to engage in intellectually stimulating discussions revolving around the dynamics of the electrical engineering community.

Event Overview:

The Debate Competition, guided by Ms. Monika Bhardwaj and skillfully coordinated by Poonam Juneja, aimed to encourage critical thinking and articulate discourse among participants. The discussions were centered on various pertinent aspects of the electrical engineering field, providing a platform for participants to showcase their knowledge, analytical skills, and perspectives.

Key Highlights:

Relevant Discussions: Participants engaged in lively debates and discussions focusing on various facets of the electrical engineering community, such as emerging technologies, industry trends, challenges, and innovations.

Showcasing Knowledge: The competition provided a platform for participants to present their arguments, backed by research and understanding, fostering a culture of informed debate and intellectual exchange. Academic Excellence and

Holistic Development: The competition underscored the department's commitment to promoting academic excellence and holistic student development by encouraging critical thinking, effective communication, and a deeper understanding of the field.

Electrical Quiz-Electrilla

Electrotech, a dynamic organization dedicated to promoting knowledge and innovation in the field of electrical engineering, successfully organized "Electrilla" - The Electrical Quiz on 20th May 2022 at Maharaja Agrasen Institute Of Technology. The event aimed to test and celebrate the electrical prowess of the students.

Enthusiastic participants, both individuals and teams, flocked to showcase their electrical knowledge. The quiz attracted students from various disciplines, creating a diverse and competitive environment.

Quiz Structure:

The quiz, meticulously crafted by Electrotech experts, consisted of challenging questions covering a spectrum of electrical engineering topics. The participants were tested on their understanding of circuits, theories, and real-world applications.

Winners and Prizes:

The winners were announced amidst cheers and applause. Electrotech awarded prizes to the top-scoring participants and teams, recognizing their exceptional knowledge and quick thinking in the world of electrical engineering.

Conclusion:

"Electrilla" proved to be a successful and engaging event, underscoring the commitment of Electrotech to promote knowledge and camaraderie among students. The quiz not only challenged participants but also fostered a sense of community and shared enthusiasm for electrical engineering at Maharaja Agrasen Institute Of Technology.

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FACULTY OF EEE DEPARTMENT

VISION

**TO PRODUCE TECHNICALLY COMPETENT
HUMAN RESOURCES FOR THE ELECTRICAL AND
ELECTRONICS INDUSTRY WITH HIGH MORALS AND
ETHICAL VALUES**

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