



# **MALLA REDDY ENGINEERING COLLEGE FOR WOMEN**

**Autonomous Institution – UGC, Govt. of India**

**Accredited by NBA & NAAC with 'A' Grade**

NIRF Indian Ranking, Accepted by MHRD, Govt. of India | Band – Excellent, National Ranking by ARIIA  
Maisammaguda, Dhulapally, Secunderabad – 500 010, Telangana

**A.Y : 2023-24 VOL.2**

Under  
Student Chapter IEEE, IETE & Technical Association Electropheenix

# **ELEKTOR**

**HALF YEARLY TECHNICAL MAGAZINE**

**DEPARTMENT OF  
ELECTRICAL & ELECTRONICS ENGINEERING**

**EEE**

### DEPARTMENT VISION

- Our vision is to empower future engineers with advanced technologies and innovative training, cultivating a dynamic learning environment that nurtures creativity, teamwork, and critical thinking. To equip students with the essential skills and knowledge to drive technological advancements, foster a sustainable future, and ensure their success while contributing to societal well-being.

### Vision



### DEPARTMENT MISSION

**M1:** To establish a dynamic learning ecosystem that prioritizes experiential learning and interdisciplinary collaboration.

**M2:** To equip future engineers with the skills and innovative solutions for success in industry, startups, and entrepreneurship, fostering creativity, critical thinking, and teamwork to drive progress and sustainability

**M3:** To provide a holistic technical education that fosters not only technical excellence but also instills values of decency, dignity and discipline shaping engineers who contribute ethically to society and the profession.

### Mission



### ABOUT THE DEPARTMENT

The Department of Electrical & Electronics Engineering is accredited by NBA, with an intake of 60 students. The Dept. has state of the art laboratories with latest software's like MATLAB, ORCAD, SCI LAB, PSPICE and Multisim. We have well qualified faculty members. Several faculty members have received their best teacher awards from institutions of International repute and have been working on research and development projects and regularly publish their work in international journals and conferences. EEE department faculty teams attained patent rights for their technological innovations. The Dept. established IEEE, ISTE student chapters under which it organizes National Level Technical Symposium -FUTURE SASTRA & State Level Technical Symposium- MEDHA every academic year. The Dept. organized National conference on "Emerging Trends in Electrical Systems & Engineering" NCETESE, International Conference on "Emerging Trends in Electrical Systems & Engineering"(ICETESE) every year since 2014, The Dept. organizes Faculty Development Programmes, Refresher courses and workshops in different streams and Student Development Programmes like Workshops, intra college conferences, Industrial visits , Guest lectures and our students actively participate in hackathon programmes conduct at state and National level. Our students are actively participated and won prizes in curricular activities organized by other colleges. The Dept. also organizes regular student seminar sessions of two hours per week for I to IV B.Tech student to enhance their all-round performance.

The Dept. also offers value added certification Courses on oxford, Microsoft, CISCO certification through Oxford University, Microsoft Innovation Centre and CISCO Networking Academy respectively. The College Offers Campus Recruitment Training Programmes in collaboration with TIME and FACE Institutions. The Department also publishes the Registered Journal "International Journal of Research in Signal Processing, Computing and Communication-System Design (IJRSCSD) with an ISSN: 2395-3187.

## PO'S

<b>PO1</b>	<b>Engineering knowledge</b>	An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling
<b>PO2</b>	<b>Problem analysis</b>	An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components
<b>PO3</b>	<b>Design / development of solutions</b>	An ability to design a complex electronic system or process to meet desired specifications and needs
<b>PO4</b>	<b>Conduct investigations of complex problems</b>	An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage</b>	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
<b>PO6</b>	<b>The engineer and society</b>	An understanding of professional, health, safety, legal, cultural and social responsibilities
<b>PO7</b>	<b>Environment and sustainability</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.
<b>PO8</b>	<b>Ethics</b>	Apply ethical principles, responsibility and norms of the engineering practice
<b>PO9</b>	<b>Individual and team work</b>	An ability to function on multi-disciplinary teams.
<b>PO10</b>	<b>Communication</b>	An ability to communicate and present effectively
<b>PO11</b>	<b>Project management and finance</b>	An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments
<b>PO12</b>	<b>Life-long learning</b>	A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning

PSO'S

The graduates of the department will attain:

**PSO1:** Analyze, Design and Implement application specific electrical system for complex engineering problems, Electrical And Electronics Circuits, Power Electronics and Power Systems by applying the knowledge of basic science, Engineering mathematics and engineering fundamentals

**PSO2:** Apply modern software tools for design, simulation and analysis of electrical systems to engage in life- long learning and to successfully adapt in multi disciplinary environments

**PSO3:** Solve ethically and professionally various Electrical Engineering problems in societal and environmental context and communicate effectively

## PEO'S

**PEO1-PROFESSIONAL KNOWLEDGE AND APPLICATION**

To develop a strong foundation in Mathematics, Science, and Engineering, and effectively apply this knowledge to real-world challenges while considering economic, environmental, social, political, ethical, health, safety, manufacturability, and sustainability constraints.

**PEO2-ENGINEERING COMPETENCE:**

To enhance their ability to identify, formulate, analyze, and solve complex engineering problems, gaining practical experience in various technologies and utilizing modern tools to meet societal and industrial needs.

**PEO3- TECHNICAL EXPERTISE**

To be proficient in designing, simulating, experimenting, analyzing, optimizing, and interpreting engineering data using multidisciplinary approaches and contemporary learning, while fostering innovation and research to ensure they are well-prepared for industry roles.

**PEO4- PROFESSIONAL AND ETHICAL DEVELOPMENT**

To be equipped with soft skills and professional attitudes, enabling them to work effectively in teams, address ethical issues responsibly, and contribute to multidisciplinary projects, with a keen understanding of the broader societal impact of their work.

**PEO5- LEARNING AND LEADERSHIP**

To thrive in an academic environment that fosters creativity, discovery, and a passion for learning, while being equipped with leadership skills, ethical guidelines, and a commitment to lifelong learning, ensuring their success in Electrical and Electronics Engineering

## MESSAGES

## Founder Chairman's Message

**Ch. Malla Reddy**

Founder Chairman, MRGI  
Hon'ble Minister, Govt. of Telangana State

MRECW has made tremendous progress in all areas and now crossing several milestones within a very short span of time and now I feel very happy to know that the students and faculty of the ECE department of MRECW are bringing out the volume-1 of the Technical magazine Elektor in A.Y 2023-24. As I understand this magazine is intended to bring out the inherent literary talents in the students and the teachers and also to inculcate leadership skills among them. I am confident that this issue will send a positive signal to the staff, students and the persons who are interested in the educational and literary activities

## Principal's Message

I congratulate the department of EEE, MRECW for bringing out the first issue of the prestigious quarterly department technical Magazine Elektor in A.Y 2023-24, I am sure that the magazine will provide a platform to the students and faculty members to expand their technical knowledge and sharpen their hidden literary talent and will also strengthen the all-round development of the students. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students but also develop a sense of belonging to the institution as well. My congratulations to the editorial board who took the responsibility for the arduous task most effectively. I extend best wishes for the success of this endeavor.

**Dr. Y. Madhatee Latha**

Principal

## HOD'S MESSAGE

It is an occasion of great pride and satisfaction for the department of EEE, MRECW to bring out the first issue of the half yearly of the Technical magazine Elektor in A.Y 2023-24, it gives me immense pleasure to note that the response to the magazine has been over whelming. The wide spectrum of articles gives us a sense of pride that our students and faculties possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing. I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

**Dr. S. Vijaya Madhavi**

HOD



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## SCIENTIST OF THE HALF YEAR

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### Archimedes of Syracuse

#### **Archimedes: The Timeless Genius of Ancient Greece**

Archimedes, one of history's most brilliant minds, was a mathematician, physicist, engineer, and inventor born in the Greek city of Syracuse around 287 BCE. Renowned for his groundbreaking discoveries, Archimedes left an indelible mark on science and mathematics, shaping fields that continue to influence modern technology and thought. His eureka moment, a term now synonymous with sudden discovery, epitomizes his unparalleled ability to blend curiosity with creativity. While observing the overflow of water from a bathtub, Archimedes discovered the principle of buoyancy, providing a method to measure the volume of irregular objects. This revelation revolutionized physics and remains a cornerstone of fluid mechanics. Archimedes' contributions extended beyond theoretical knowledge. His inventions, such as war machines and the Archimedean screw, demonstrated his ability to solve real-world problems. The screw, a device designed to lift water, is still used in modern irrigation systems, exemplifying his practical genius. Perhaps his most famous work lies in mathematics, particularly in geometry. Archimedes made significant strides in understanding the properties of circles, spheres, and parabolas. His method of exhaustion paved the way for integral calculus, centuries ahead of its formal development. Despite his brilliance, Archimedes met a tragic end in 212 BCE when Roman forces captured Syracuse. Legend says he was engrossed in his work when a soldier killed him, ignoring orders to spare his life. Archimedes' legacy endures, reminding us of the power of intellect and imagination. His timeless contributions continue to inspire students and scientists alike, proving that true genius transcends the boundaries of time and place.

## FACULTY ARTICLES

## The Future of Renewable Energy Systems



### The Future of Renewable Energy Systems

As the world faces climate change and dwindling fossil fuel reserves, renewable energy systems have become the foundation of a sustainable future. Electrical engineers play a vital role in advancing technologies like solar, wind, hydro, and geothermal energy. These sources now contribute nearly 30% of global electricity, with growing targets worldwide.

#### Key Innovations Shaping the Future

1. **Energy Storage:** Advanced batteries like lithium-ion and flow systems ensure stable energy supply.
2. **Smart Grids:** AI-driven grids optimize energy flow and predict demand, enhancing reliability.
3. **Floating Solar & Offshore Wind:** These solutions tap energy from oceans and lakes, addressing land scarcity.
4. **Green Hydrogen:** Produced via renewable electricity, hydrogen offers a clean energy alternative for industries.

#### Overcoming Challenges

Issues like intermittency, high initial costs, and grid upgrades persist. Recycling solar panels and batteries also requires innovative solutions. However, the decreasing costs of renewable technologies are promising.

#### The Road Ahead

By 2050, renewables could meet 85% of global energy demand. Electrical engineers are pivotal in driving this transition, with their contributions to smarter grids, efficient systems, and sustainable innovations. Together, we can create a cleaner, greener energy future.



**Dr. Rahul Wilson**  
Department of EEE



## Electrical Engineering in Prosthetics and Assistive Device



The integration of electrical engineering with biomedical science has catalyzed groundbreaking advancements in prosthetics and assistive devices, transforming the landscape of healthcare and rehabilitation. These innovations have redefined the boundaries of human capability, offering a renewed sense of autonomy to individuals with physical impairments.

At the forefront of these advancements are myoelectric prosthetics, which harness the power of bioelectrical signals generated by residual muscle activity. Precision-engineered sensors detect these subtle electrical impulses, while advanced microprocessors interpret and translate them into fluid, lifelike movements. This remarkable interplay between biology and technology restores not only mobility but also dignity, enabling users to perform complex tasks with unparalleled ease and control.

Equally transformative are brain-computer interfaces (BCIs), a marvel of modern engineering that bridges the gap between neural activity and machine functionality. These systems allow users to command prosthetics or assistive devices through thought alone, bypassing traditional physical limitations. Such innovations rely heavily on intricate circuitry, robust algorithms, and seamless communication protocols—areas in which electrical engineers excel.

Moreover, wearable robotic exoskeletons represent another frontier of this dynamic field. By leveraging state-of-the-art sensors, actuators, and control systems, these devices augment human strength and mobility, playing a pivotal role in rehabilitation and enhancing quality of life for those with neuromuscular disorders. As the field evolves, electrical engineering continues to push the envelope. From the integration of artificial intelligence to enable adaptive learning in devices, to innovations in energy efficiency and renewable power sources, the potential for further transformation is boundless. These advancements not only redefine technological capabilities but also inspire a deeper commitment to inclusivity and accessibility in design. In this intersection of engineering and empathy, electrical engineering is not merely a tool—it is a catalyst for empowerment, a beacon of hope, and a testament to the boundless ingenuity of human endeavor.

**Mrs.G.Sireesha**  
Department of EEE



## MULTI LEVEL CASCADED STATCOM



In the intricate realm of electrical power systems, where stability and efficiency are paramount, the **Multilevel Cascaded Static Synchronous Compensator (STATCOM)** emerges as a paradigm of technological innovation. This sophisticated device exemplifies the marriage of cutting-edge engineering and practical functionality, offering transformative solutions to the challenges of modern power distribution networks. A STATCOM, fundamentally, is a flexible AC transmission system (FACTS) device designed to regulate reactive power and stabilize voltage profiles across power grids. However, the **multilevel cascaded STATCOM** elevates this conventional architecture, integrating advanced multilevel inverter technology and a modular framework to achieve unparalleled performance and adaptability.

### Salient Features and Advantages:

- 1.Exemplary Efficiency:** By leveraging multilevel configurations, the device minimizes switching losses and thermal inefficiencies, ensuring optimal energy utilization.
- 2.Superior Voltage Waveforms:** The multilevel approach generates finely granulated voltage waveforms, significantly mitigating harmonic distortion and bolstering power quality.
- 3.Scalability and Modularity:** The cascaded design offers unmatched flexibility, enabling seamless expansion to meet varying power demands while simplifying maintenance.
- 4.Compact and Robust:** Despite its technological complexity, the system's modular structure ensures a reduced spatial footprint, ideal for both urban and industrial environments.

### Applications in Modern Energy Systems:

The multilevel cascaded STATCOM has found its niche in diverse sectors, from facilitating the integration of renewable energy sources to enhancing industrial power systems. It plays a pivotal role in mitigating the intermittent nature of wind and solar energy, thereby ensuring grid stability and resilience. Additionally, its ability to dynamically balance loads and suppress voltage flicker makes it indispensable for modern urban power networks. As the global demand for sustainable and efficient energy solutions intensifies, the multilevel cascaded STATCOM stands as a beacon of innovation. For engineers and technologists, it represents not just a tool but a transformative force shaping the future of energy infrastructure. In an era defined by technological progress, the multilevel cascaded STATCOM exemplifies the confluence of theory and application—a testament to human ingenuity in crafting solutions for a sustainable tomorrow.

**Mr.V.Naresh**  
Department of EEE



## DEMAND PREDICTION USING AI



Demand prediction, the science of forecasting future requirements for products or services, has evolved into a cornerstone of modern business strategy. With the advent of artificial intelligence (AI), this domain has been revolutionized, enabling unparalleled precision, agility, and insight.

Unlike traditional methods, AI employs advanced machine learning algorithms to decipher intricate patterns in data. By integrating historical sales, consumer behavior, market dynamics, and external variables such as weather or geopolitical events, AI delivers forecasts that are both adaptive and remarkably accurate. Moreover, its ability to process vast, multidimensional datasets in real time gives businesses a competitive edge, allowing them to anticipate demand fluctuations and act proactively.

Industries across the spectrum have embraced this innovation. Retailers leverage AI to optimize inventory, avoiding stockouts and overstocking. Healthcare providers predict medicine and equipment demand during health crises, while manufacturers streamline production to minimize waste. By enhancing resource allocation and operational efficiency, AI not only drives profitability but also ensures a superior customer experience.

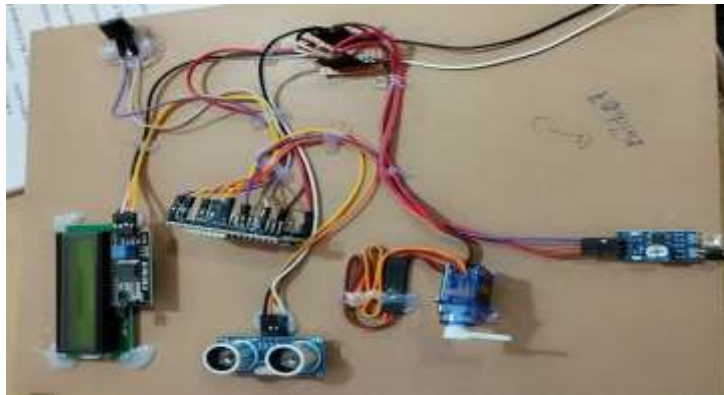
As AI continues to advance, its role in demand prediction will become even more transformative, pushing the boundaries of forecasting and empowering businesses to navigate uncertainty with confidence.

**Dr.T.S.N.G.Sarada Devi**  
Department of EEE



## STUDENT ARTICLES

## IOT BASED WASTE MANAGEMENT SYSTEM



With the rapid expansion of urban populations, waste management has become a critical challenge. Traditional methods, often based on fixed schedules, are inefficient and lead to issues like overflowing bins, wasted resources, and environmental degradation. An Internet of Things (IoT)-based waste management system provides a forward-thinking solution to these challenges, combining technology with sustainability.

This system utilizes smart sensors installed in garbage bins to monitor their fill levels in real time. The sensors transmit data to a centralized platform, enabling authorities to optimize collection schedules and routes. Alerts are generated when bins near capacity, ensuring timely disposal and eliminating unnecessary trips. This approach not only minimizes operational costs but also reduces fuel consumption and carbon emissions.

The benefits extend beyond efficiency. By preventing overflowing bins, this system enhances urban cleanliness, improves hygiene, and contributes to a healthier living environment. Additionally, the data collected can be analyzed to identify waste generation patterns, helping cities develop better sustainability strategies.

IoT-based waste management exemplifies how technology can address modern urban challenges. It paves the way for smarter cities, cleaner environments, and a future where technology and sustainability work hand in hand.

**G.Soumya**  
(22RH1A0218)  
II EEE



## TRANSMISSION LINE FAULT DETECTION



### Transmission Line Fault Detection: Ensuring Power Reliability

Transmission lines serve as the lifeline of modern power systems, ensuring the delivery of electricity over vast distances. However, these lines are frequently exposed to faults caused by environmental factors, equipment malfunctions, or external interferences. Detecting such faults efficiently is critical to maintaining the reliability and stability of power systems.

Traditional fault detection methods, often reliant on manual inspections, are time-intensive and prone to delays. Modern systems, however, utilize advanced technologies like IoT and machine learning to revolutionize fault detection. Smart sensors installed along transmission lines continuously monitor parameters such as voltage, current, and line impedance. These sensors can swiftly identify anomalies, precisely locate the fault, and notify operators in real time.

This proactive approach minimizes downtime, reduces energy losses, and ensures timely repairs, preventing widespread power outages. Additionally, some systems employ drones or robotic solutions for on-site inspections, further enhancing safety and efficiency.

The integration of advanced fault detection systems not only strengthens the reliability of power transmission but also aligns with the broader goals of sustainability and resource efficiency. By adopting such technologies, we can build a future where power systems are more robust, responsive, and resilient, supporting the growing demands of modern society.

**P.Anjali**

23WRH5A0205

II EEE





## Automation and Robotics in Power Systems



In recent years, **automation and robotics** have revolutionized the power sector, enhancing efficiency, reliability, and safety. The integration of **smart grids, AI-driven control systems, and autonomous robots** has significantly improved the way power systems are monitored and maintained.

One of the key applications of robotics in power systems is in **grid inspection and maintenance**. Drones equipped with thermal imaging cameras are used to detect faults in transmission lines, reducing the need for risky manual inspections. Similarly, autonomous robots can navigate substations to diagnose equipment health and predict failures, preventing costly outages.

Automation has also transformed **power generation and distribution**. Smart grids, powered by **AI and IoT**, optimize electricity flow, reduce energy losses, and integrate renewable sources efficiently. Automated switchgear and circuit breakers ensure seamless power delivery, minimizing downtime.

Moreover, in power plants, **robotic arms and AI-driven control systems** enhance operational efficiency by monitoring turbines, boilers, and generators in real time. This reduces human intervention, leading to safer working conditions and improved performance.

With rapid advancements in **machine learning, edge computing, and robotics**, the future of power systems is heading towards **fully automated, self-healing grids** that can detect, diagnose, and fix issues autonomously. As the world moves towards sustainable energy solutions, **automation and robotics** will continue to play a crucial role in ensuring a **more resilient and efficient power infrastructure**.

**Dasari Neha**  
22RH5A0215  
II EEE



## SPACE TECHNOLOGY



Space exploration has always been a fascinating field, and electrical engineers play a crucial role in advancing this technology. From powering satellites to designing communication systems for interplanetary missions, their innovations help humanity explore the vast universe. One of the key contributions of electrical engineers is in spacecraft power systems. Solar panels, which generate electricity for satellites and space stations, rely on advanced electrical engineering for maximum efficiency. Additionally, battery storage and energy management systems ensure continuous power supply, even when the sun is not visible.

Another critical area is communication. Space missions require reliable and high-speed data transmission between Earth and spacecraft. Engineers develop antennas, radio frequency (RF) systems, and deep-space communication networks to ensure seamless connectivity over millions of miles.

Furthermore, electrical engineers contribute to propulsion systems, robotics, and automation in space technology. Innovations like ion thrusters, robotic arms on the International Space Station (ISS), and autonomous navigation for rovers on Mars all rely on electrical and electronic systems.

As space technology continues to evolve, electrical engineers will play an even bigger role in developing sustainable energy solutions, improving satellite technology, and enabling future manned missions to Mars and beyond. Their work is shaping the future of space exploration, bringing humanity closer to the stars.

**Priyanka**  
22RH1A0205  
II EEE



## Women in Electrical Engineering: Breaking Barriers



For decades, **women in electrical engineering** have faced challenges in a male-dominated field, yet they continue to break barriers and make remarkable contributions. From **Edith Clarke**, the first female electrical engineer in the U.S., to **Gitanjali Rao**, a young innovator in electronics, women have played a vital role in shaping the industry.

Despite progress, gender disparity remains a concern. However, initiatives such as **STEM education programs, scholarships, and mentorship networks** are encouraging more women to pursue careers in electrical engineering. Universities and companies are actively promoting **diversity and inclusion**, creating opportunities for aspiring female engineers.

Women are making significant strides in **power systems, robotics, renewable energy, and semiconductor technology**. Their innovations in **smart grids, AI-driven automation, and energy-efficient solutions** are paving the way for a sustainable future.

As the industry evolves, it is crucial to continue **empowering women in electrical engineering** through equal opportunities, representation, and support. By breaking stereotypes and embracing diversity, the future of engineering will be **more inclusive, innovative, and dynamic**.

**G.Sharanya**  
22RH5A0206  
III EEE



## NET ZERO ENERGY BUILDINGS



As the world moves toward sustainability, **Net-Zero Energy Buildings (NZEBS)** are emerging as a game-changer in modern architecture. These buildings are designed to **produce as much energy as they consume**, reducing dependency on conventional power sources and lowering carbon footprints.

NZEBS achieve energy efficiency through **advanced insulation, energy-efficient appliances, and smart building automation**. They generate power using **solar panels, wind turbines, and geothermal systems**, ensuring clean and renewable energy supply. Additionally, energy storage solutions, such as **batteries and smart grids**, help maintain balance between production and consumption.

One of the biggest advantages of NZEBs is **cost savings in the long run**. Although initial investments may be higher, reduced utility bills and government incentives make them financially viable. Moreover, these buildings contribute to a greener planet by **reducing greenhouse gas emissions and promoting energy conservation**.

With the increasing focus on **sustainability and climate action**, NZEBs are becoming the future of **residential, commercial, and industrial spaces**. Engineers, architects, and policymakers must collaborate to make this technology more accessible, ensuring a cleaner and more energy-efficient world.

**Veena Radharam**

20RH1A0233

IV EEE



# Robotics and Automation: The Rise of Intelligent Machines



The world is witnessing a revolution in **robotics and automation**, transforming industries and everyday life. From **self-driving cars** to **AI-powered industrial robots**, intelligent machines are reshaping the way we work, manufacture, and interact with technology.

Automation has significantly improved **efficiency, precision, and safety** across various sectors. In industries, robots perform repetitive tasks with unmatched accuracy, reducing human effort and increasing productivity. In healthcare, robotic surgery and AI-driven diagnostics are enhancing medical treatments. Even in homes, smart assistants and automated appliances make life more convenient.

The rise of **Artificial Intelligence (AI)** and **Machine Learning (ML)** has further propelled automation, enabling robots to learn, adapt, and make decisions. **Autonomous drones, robotic arms, and AI-powered customer service bots** are becoming common, proving that the future belongs to intelligent machines.

While robotics brings incredible advancements, it also raises concerns about **job displacement and ethical implications**. However, rather than replacing humans, automation is expected to create new job opportunities in robotics engineering, AI development, and data science.

With rapid technological evolution, the **fusion of robotics, AI, and automation** will continue to shape a smarter, more efficient, and innovative future. The question is no longer *if* robots will be a part of our lives but *how* we will integrate them for the benefit of society.



L.Hemalatha  
22RH5A0217  
III EEE



## Electric Vehicles (EVs) and Charging Infrastructure



Electric Vehicles (EVs) are transforming the future of transportation, offering a cleaner and more sustainable alternative to traditional fuel-powered cars. With advancements in battery technology, improved efficiency, and government incentives, EV adoption is accelerating worldwide. However, one of the biggest challenges remains **charging infrastructure**—ensuring that EV users have convenient, fast, and reliable charging options.

Charging stations are categorized into three types: **Level 1 (slow charging at home)**, **Level 2 (faster charging for public and home use)**, and **DC Fast Charging (rapid charging for highways and urban centers)**. The growth of **wireless charging** and **solar-powered stations** is further pushing the boundaries of innovation in this field. Countries are investing in **smart grids** and vehicle-to-grid (V2G) technology, allowing EVs to supply power back to the grid when needed.

Despite the progress, challenges such as high installation costs, uneven charging station distribution, and long charging times still exist. The future of EVs depends on overcoming these hurdles with **faster charging technology**, **widespread station networks**, and **increased renewable energy integration**. As EV adoption rises, the demand for efficient charging infrastructure will shape the future of mobility.

**B.Sindhu**

20RH1A0202

I V EEE



## ALUMNI TALK

"The time spent at MRECW shaped my career and character. Make the most of your journey, learn beyond books, and build memories that last a lifetime. Wishing all students great success!"

**Navyasree**

20RH1A0223

"College shaped my future with invaluable learning, incredible placement opportunities, and a vibrant, supportive environment. Truly a life-changing journey!"

**manaswini**

20RH1A0222

"My college was a place where I discovered my true potential and built unforgettable memories. The supportive environment and incredible opportunities shaped my future. Truly, *'A journey of growth, learning, and endless possibilities!'*"

**Bhagya lakshmi**

20RH1A0220

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## IMPORTANT WEBSITES

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- <http://www.electrical4u.com>
- [www.allaboutcircuits.com](http://www.allaboutcircuits.com)
- [www.powerstream.com](http://www.powerstream.com)
- [www.circuitlab.com](http://www.circuitlab.com)
- [www.ieee.org](http://www.ieee.org)
- [www.falstad.com](http://www.falstad.com)
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- <http://www.infocobuild.com/education/audio-video-courses/electronics/electronics-and-electrical-engineering.html>

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