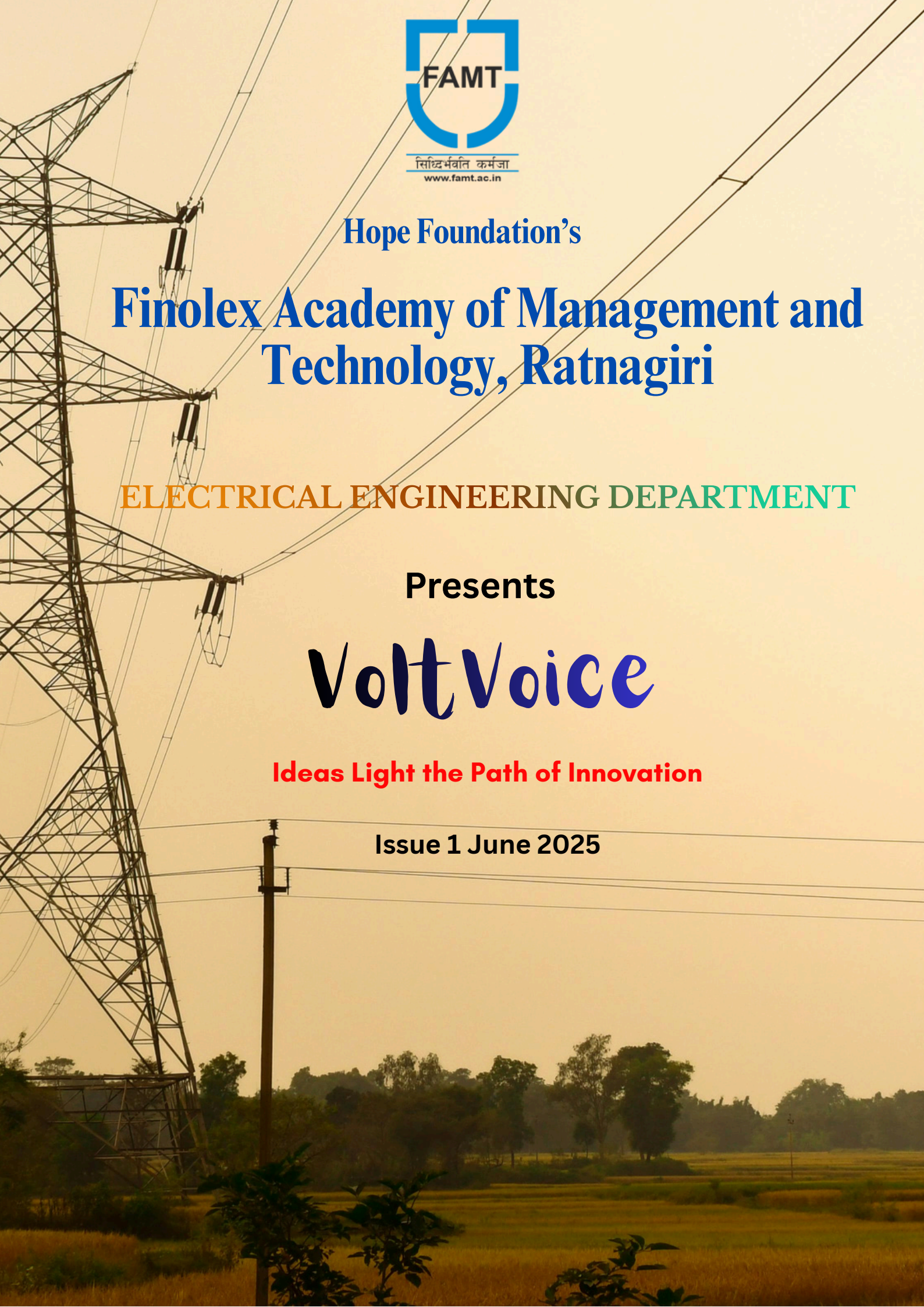

Hope Foundation's

Finolex Academy of Management and Technology, Ratnagiri

ELECTRICAL ENGINEERING DEPARTMENT

Presents

VoltVoice

Ideas Light the Path of Innovation

Issue 1 June 2025

Index

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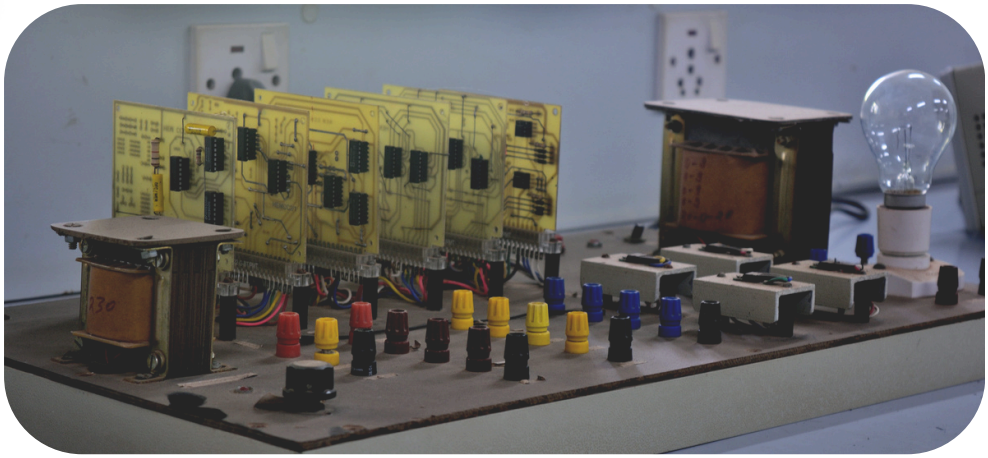
VoltVoice

Ideas Light the Path of Innovation



About Department

This new age, the age of Technology, dawned with the discovery of Electricity and the subsequent development of Electrical Engineering. Equipped with modern infrastructure and supported by a team of competent faculty members, the Electrical Department at FAMT was set up in 1997. FAMT understands the importance of Electrical Engineering and is fully capable of meeting the expectations of young aspiring Engineers.

The Electrical Engineering Department emphasizes rigorous training in analytical and experimental techniques, effectively giving students an integrated approach and a thorough understanding of how to solve problems and, more importantly, equipping them to face the challenges in Industry. These laboratories host a wide range of modern equipment. The Department is also equipped with an advanced computer centre apart from the centralized one, which houses 32 PIV PCs. Modern Engineering simulation software like MATLAB® is used to aid experiments and illustrate the theory.

The Departmental library is an additional academic resource available to students. A separate reading room is also available in the Department for students who wish to access the Departmental library. The success of the Department is reflected in the projects carried out by the students. Some of them, especially the Green House Automation, have received many national awards. Our commitment to holistic development has seen our students perform exceptionally well in many national-level and university examinations and be awarded prizes in various co-curricular activities.

HoD's Desk

It gives me great pleasure to present this year's edition of the Department of Electrical Engineering Magazine. Each year, this publication reflects our collective progress, and this edition continues to highlight the department's commitment to academic growth, innovation and all-round student development. During the past year, the department has taken several meaningful steps to strengthen its academic environment.

Our laboratories and computational facilities have been upgraded further to align with the rapidly evolving landscape of Electrical Engineering. Faculty members have actively contributed through quality teaching, research publications, workshops, and industry collaborations, ensuring that our students receive contemporary and practice-oriented learning experiences.

Students have shown exemplary participation in various activities such as PLC workshops, IoT and Proteus sessions, industrial visits and expert lectures. These initiatives provide essential real-world exposure and prepare students to meet the expectations of modern industries.

This edition of the magazine proudly presents technical articles, innovative projects, creative writing, and artwork contributed by students and faculty. The Alumni Corner continues to strengthen our relationship with former students whose professional journeys offer guidance and inspiration to the current generation.

I congratulate the editorial team for their dedication and meticulous efforts in preparing this year's magazine. Their work has resulted in a dynamic platform that celebrates the achievements, creativity, and spirit of our department.

Wishing everyone continued success, growth, and an inspiring year ahead.

Warm Regards,

Dr. Jayant J. Mane
Head of Department

Editorial Board

Greetings from the Editorial Board !!

I am delighted to present the June 2025 issue of our departmental magazine VoltVoice. This edition brings together a collection of insightful articles that showcase the ideas, perspectives, and experiences of our students. Through this publication, we continue our effort to cultivate a culture of expression, analytical thinking, and academic curiosity within the Department of Electrical Engineering.

We hope that VoltVoice serves not only as a medium for sharing knowledge but also as a source of inspiration and motivation for all readers. I extend my heartfelt thanks to the Management of FAMT, our Principal Dr. Kaushal Prasad, Head of Department Dr. Jayant J. Mane and our committed student editorial team for their consistent support and hard work in bringing this edition to life. Their collective efforts have shaped this magazine into a meaningful and engaging platform.

Sincerely,
Prof. Milind Tagare
Associate Professor
Department of Electrical Engineering

Student Editorial Team

Rutuja Gunjal
Editor

Avanee Athavale
Designer

Arun Balkate
Reviewer

Institute Vision-Mission

Vision:

The academy aspires to nurture students as leaders who are in tune with global trends, equipped with engineering knowledge and practical skills, to excel in creativity and innovation in order to play their part in technological advancement of the nation.

Mission:

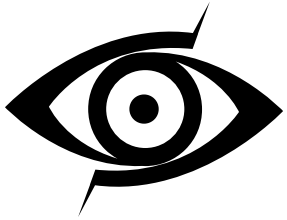
M1: To become foremost seat of advanced technical learning as a center of excellence in the region.

M2: To offer state of the art facilities and quality education at affordable cost.

M3: To inculcate in students the culture of 'Play Hard and Play Fair'.

M4: To advance sustainable development in the region through opportunities for entrepreneurship and industry-institute interaction.

M5: To create a generation of young professionals who appreciate in all its aspects the necessity of balance between technological advances and traditional values.



Department Vision, Mission, PEO & PSO

Vision:

The department shall become foremost seat by imparting advanced and progressive education in Electrical Engineering along with excellent professional skills and character to meet industrial and social challenges.

Mission:

M1: To ascertain qualitative teaching-learning process through the art of teaching pedagogy and meticulous continual assessment.

M2: To provide a supportive environment that facilitates industrial exposure to produce quality engineers who will excel globally.

M3: To promote the versatile development of students through training of soft skills.

M4: To imbibe moral, ethical and social values among students.

Program Educational Objectives (PEOs):

PEO1: Students should be able to have successful career or pursue higher studies to meet future challenges of technological development.

PEO2: Students should be able to pursue analytical and logical skills that will enable them to analyse and design Electrical Systems and its Controls.

PEO3: Students should be able to undertake research and development activities in emerging multidisciplinary fields.

PEO4: Students should be able to achieve professional and interpersonal skills by giving an opportunity as an individual as well as a team.

Program Specific Outcomes (PSOs):

PSO1: Students will be able to design, simulate and analyze electrical systems using software tools.

PSO2: Students will be able to understand, implement concepts of electrical systems through experiments and apply it to solve industry specific problems.

Growth of Solar Rooftop Systems with AI-Based Monitoring

The adoption of solar rooftop systems has grown rapidly between 2024 and 2025, driven by falling panel prices, government support, and increasing awareness of clean energy. A major development during this period is the integration of AI-based monitoring, which is transforming how rooftop solar plants are operated and maintained.

AI-enabled platforms now allow users to track the performance of their solar systems in real time. They collect data from sensors, inverters, and weather inputs to provide clear information about energy generation, voltage, current, and system health. More importantly, AI automatically detects issues such as panel faults, shading, dust accumulation, loose connections, or inverter malfunction. Early fault detection helps reduce downtime and improves the reliability of the system.

For Electrical Engineering students, this trend is especially relevant because it brings together renewable energy, power electronics, IoT, and basic machine learning concepts. Many colleges and industries now use AI-based dashboards for monitoring rooftop plants, creating new learning and project opportunities.

Tejashri Dalavi - BE Electrical Engg.

High-Efficiency BLDC Motors Gaining Popularity

Brushless DC (BLDC) motors have gained significant attention in 2024–2025 due to their high efficiency, reliability, and low maintenance requirements. Unlike conventional brushed DC motors, BLDC motors use electronic commutation instead of brushes, which reduces friction, eliminates sparking, and increases the overall lifespan of the motor.

These motors are now widely used in electric scooters, e-bikes, ceiling fans, washing machines, drones and industrial automation systems. The main advantages driving their popularity include higher efficiency, better speed control, quieter operation and compact size. With government initiatives promoting energy-efficient appliances and electric mobility, BLDC motors have become a preferred choice for both manufacturers and consumers.

Many projects focus on speed control, torque optimization, and energy-efficient applications, making BLDC motors an exciting and practical area in modern electrical engineering. Advances in high-power-density designs and integration with regenerative braking and IoT-based monitoring are further enhancing their performance and opening up new possibilities in smart and sustainable motor applications.

Aditya Gaikwad - BE Electrical Engg.

Smart Meters 2.0 : Expanding the Role of Digital Metering

The latest generation, or Smart Meters 2.0, comes with features like:

- **Remote disconnection and reconnection**
- **Tamper detection**
- **Voltage and current quality monitoring**
- **Integration with mobile apps and cloud platforms**

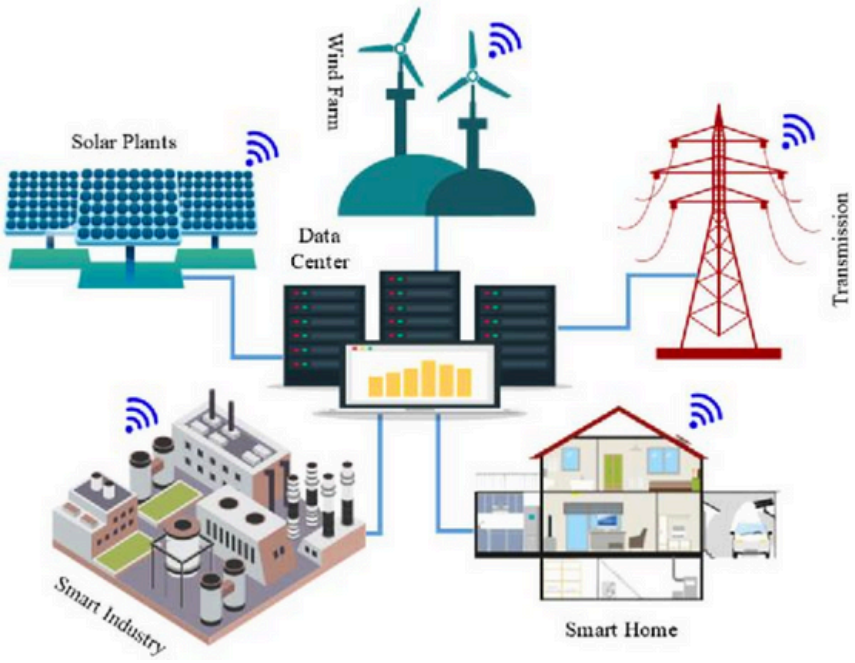
These capabilities allow utilities to manage loads better, detect faults quickly, and improve billing accuracy. For consumers, smart meters provide detailed insights into electricity usage, encouraging energy-saving habits and reducing wastage.

Smart meters offer an excellent opportunity to explore the intersection of power systems, embedded electronics, IoT, and communication protocols. Applications include designing low-cost monitoring systems, analyzing energy consumption patterns, and developing software for efficient energy management.

As India continues to modernize its grid and adopt Smart Grid technologies, the role of digital metering will expand further, making Smart Meters 2.0 an essential component of future power networks. This technology not only supports efficient electricity distribution but also paves the way for sustainable energy management.

Prachi Baghel - TE Electrical Engg.

IoT-Based Energy Management Systems



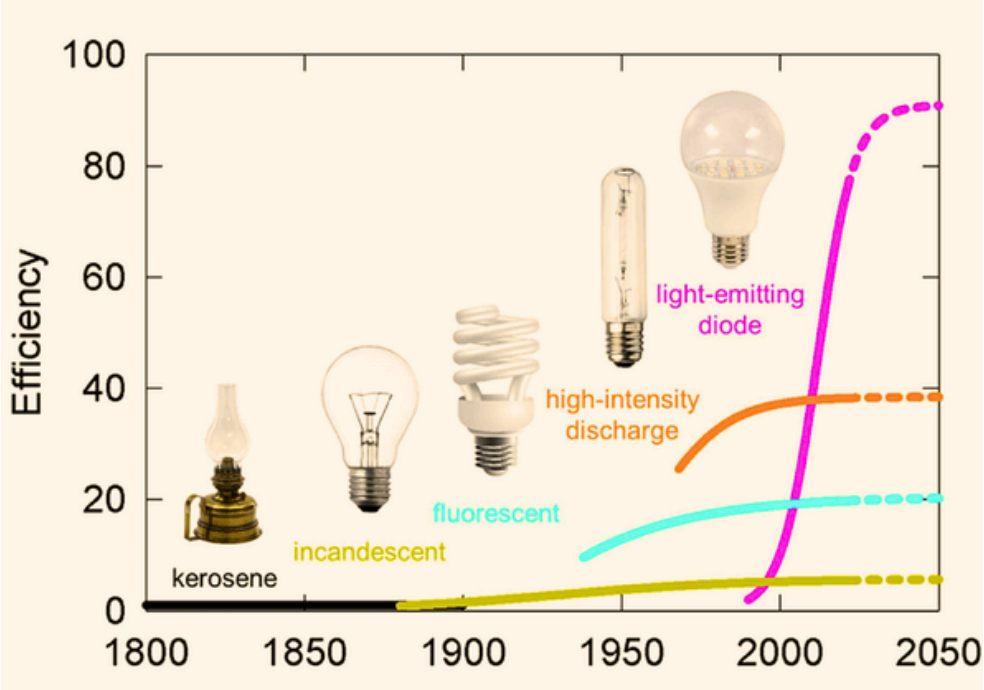
The rapid growth of the Internet of Things (IoT) is transforming the way we monitor and control electrical systems. Between 2024 and 2025, IoT-based energy management systems (EMS) have become increasingly popular in homes, industries, and commercial buildings, helping to optimize energy usage and reduce wastage.

IoT-enabled EMS use sensors and smart meters to collect real-time data on electricity consumption, voltage levels, and equipment status. This information is sent to cloud-based platforms where it is analyzed to identify energy-saving opportunities, detect faults, and manage loads efficiently. Users can monitor and control devices remotely via smartphones or web applications, making energy management convenient and effective.

IoT-based energy management systems provide valuable opportunities to explore sensor integration, microcontroller programming, wireless communication, and cloud data analytics. Applications include designing smart lighting systems, automated HVAC control and monitoring renewable energy sources.

Mahish Kadam - BE Electrical Engg.

High-Efficiency LED Lighting Systems



LED (Light Emitting Diode) lighting has become the preferred choice for homes, industries, and public spaces due to its high efficiency, long lifespan, and low maintenance. Between 2024 and 2025, LED technology saw significant improvements in brightness, color quality, energy efficiency, and smart control features.
Modern LED systems are integrated with drivers, dimming circuits, and IoT-enabled controls, allowing users to adjust brightness, schedule lighting, and monitor energy usage remotely. This makes LED lighting not only energy-efficient but also user-friendly and adaptable for various applications.

High-efficiency LED lighting reduces electricity consumption by up to 70% compared to conventional incandescent or fluorescent lamps. In industries and offices, LED systems combined with motion sensors and automated dimming provide additional savings and reduce carbon footprint.

As the world focuses on sustainable energy and smart cities, high-efficiency LED lighting continues to play a vital role in reducing energy demand while improving lighting quality. This makes it a practical and relevant topic for both academic learning and real-world applications.

Saish Padave - BE Electrical Engg.

Electrical Engineering and Its Future Scope

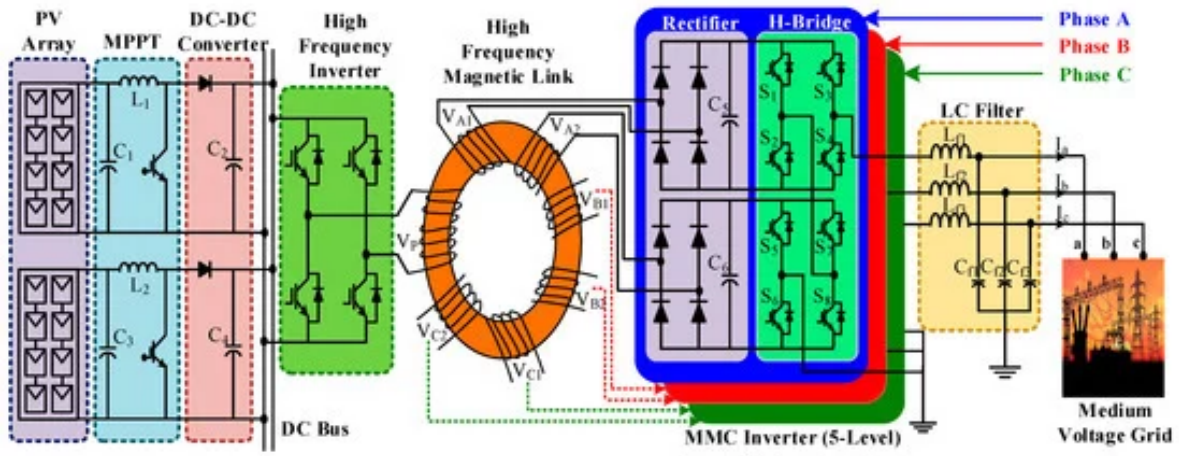
Electrical Engineering is one of the most dynamic and evolving fields of engineering, shaping the way we generate, transmit, and use electricity in our daily lives. With rapid advancements in renewable energy, smart grids, electric vehicles, automation, and robotics, the scope of electrical engineering continues to expand. Emerging technologies such as IoT, Artificial Intelligence and energy storage systems are opening up exciting opportunities for innovation and research.

The shift toward sustainable and efficient energy solutions has increased the demand for engineers skilled in designing modern power systems, energy-efficient devices, and intelligent control systems. Moreover, the integration of digital technologies with electrical networks is creating new roles in smart grid management, industrial automation, and electric mobility.

For students, this field offers a chance to work on cutting-edge projects, research, and industrial applications that have a direct impact on society. As technology continues to advance, Electrical Engineering promises a future filled with opportunities for innovation, creativity, and professional growth.

Sejal Chavan - TE Electrical Engg.

Multilevel Inverters for Renewable Integration



Multilevel inverters have become a key technology in 2024–2025 for integrating renewable energy sources such as solar and wind into the electrical grid. Unlike traditional inverters, which produce a single voltage step, multilevel inverters generate multiple voltage levels, resulting in a smoother AC output with lower harmonic distortion. This improves power quality and reduces stress on electrical equipment, making them ideal for medium- and high-voltage applications.

These inverters are widely used in solar farms, wind power plants, and industrial drives, where efficient and stable energy conversion is critical. They allow for higher voltage operation without the need for bulky transformers, reducing system size and improving reliability. Advanced control techniques in multilevel inverters also enable better voltage regulation, reactive power support, and seamless integration with the grid.

The increasing adoption of renewable energy has made multilevel inverters an essential component of modern power systems. By providing efficient, high-quality AC power and supporting sustainable energy generation, these inverters are helping build smarter and more resilient electrical grids for the future.

Shubham Kale - BE Electrical Engg.

Driving the Future: How MATLAB Stateflow and HIL Power EV Innovation

Electric vehicles are no longer a thing of the future—they are already running on Indian roads. From electric scooters in cities to electric cars by major manufacturers, the EV revolution is happening right now. Behind this visible change lies a world of intelligent design, simulation, and testing. Two powerful technologies quietly supporting this revolution are MATLAB Stateflow and Hardware-in-the-Loop (HIL) simulation.

"The real innovation in electric vehicles happens long before the vehicle hits the road— inside simulation models."

Smart Design Begins with Simulation -

An electric vehicle is not just a motor and a battery. It is a complex system where the battery management system, motor controller, inverter, charging unit, and safety logic must work together in perfect coordination. Designing such systems directly on hardware is risky, expensive, and time-consuming. This is where MATLAB and Simulink come into play. Engineers first develop and test EV subsystems in a virtual environment. They can analyse performance, detect design issues early, and optimise control strategies long before the physical prototype is built. This approach, known as model-based design, has become the backbone of modern EV development.

"Model-based design helps engineers find problems on the computer, not on the test track."

Driving the Future: How MATLAB Stateflow and HIL Power EV Innovation

Stateflow: Teaching Vehicles How to Think

While Simulink handles mathematical modelling and control algorithms, Stateflow focuses on decision-making logic. In simple words, it helps engineers define what the system should do and when.

"*Stateflow turns complex control logic into clear, visual decisions.*"

Hardware-in-the-Loop: Testing Without Risk

After simulation, systems must be tested under real-world conditions. However, testing extreme or fault conditions on actual vehicles can be dangerous. This is where Hardware-in-the-Loop (HIL) testing proves invaluable.

In HIL testing, the actual controller is connected to a real-time simulator that behaves like a real EV. Engineers can safely test abnormal conditions such as battery failure, sensor faults, or sudden load changes—without risking costly hardware damage.

"*HIL allows engineers to test the impossible—safely and repeatedly.*"

Indian EV Industry and Advanced Tools:

Leading Indian EV manufacturers such as Tata Motors, Mahindra Electric, Ather Energy, and Ola Electric actively use MATLAB, Simulink, and HIL setups in their R&D divisions. These tools help them shorten development cycles, improve safety standards, and meet global quality benchmarks.

"*From startups to giants, Indian EV companies trust simulation before production.*"

Driving the Future: How MATLAB Stateflow and HIL Power EV Innovation

Why MATLAB Skills Matter Today:

For today's engineering students, MATLAB is no longer just a classroom tool. It is a career-enabling skill. Knowledge of MATLAB, Simulink, Stateflow, and HIL concepts prepares students for industries such as electric vehicles, renewable energy, automation, and robotics.

"Learning MATLAB today is an investment in tomorrow's engineering career."

Conclusion:

As India moves steadily towards sustainable mobility, tools like MATLAB Stateflow and Hardware-in-the-Loop are silently shaping the vehicles of tomorrow. They help engineers design smarter systems, test them safely, and deliver reliable electric vehicles to the market. For students and young engineers, mastering these tools means becoming part of the EV revolution from the inside.

"The future of mobility is electric—and it is built in simulation."

Advait Halbe

Senior Engineer

Functional Safety Software Developer

Bosch Global Software Technologies

Batch 2018-19

FAMT

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Hope Foundation's

Finolex Academy of Management and Technology, Ratnagiri

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