VOLUME - 27

JAN 2025-JUNE 2025

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ELEKTOR

S V COLLEGE OF ENGINEERING

CONTENTS

SEVEN STEPS TO SUCCESS

1) Make a commitment to grow daily.
2) Value the process more than events.
3) Don't wait for inspiration.
4) Be willing to sacrifice pleasure for opportunity.
5) Dream big.
6) Plan your priorities.
7) Give up to go up.

— John C Maxwell

Vision of the Department

To prepare the learners globally competent, dynamic and multi-talented young leaders with skill set & knowledge in Electrical and Electronics Engineering field with a focus on higher education, profession- al practice, research and technical consultancy competence ethical concern.

Mission of the Department

- To prepare the learners professionally deft and intellectually adept in the field of Electrical and Electronics Engineering with an excellent infrastructure, core values and qualified & experienced teaching faculty.
- To inculcate skill, knowledge and behaviour to cater the dynamic requirements in the field of Electrical and Electronics Engineering.
- To motivate and prepare the learners for career guidance, placements and higher education with a focus on MoUs with premier institutes and industries.

About the Department

The Electrical & Electronics Engineering department was started with UG programme in 2007 with an intake of 60. The department has well talented, qualified, experienced & dynamic faculty along with skilled technical supporting staff who spearhead the process of achieving the vision of the department.

Strengths of the Department

1. In every semester Department of EEE conducts minimum of two workshops and there guest lecturers in the recent trends in Electrical Engineering to bridge the gap between Academics & Industries, and the students will be guided to do their Major & Minor projects on the same topics.
2. Every faculty member of the department attends a minimum of one faculty development program in every academic year. And most of the faculty members register for NPTEL online courses.
3. Department publishes a newsletter in every six months, which includes the activities that were done in the past two months; fortnight wall magazines based on recent advancements in the field of electrical engineering prepared by students

Message from Principal

It is with great pleasure that I extend my congratulations to the Department of Electrical and Electronics Engineering for the release of its technical magazine. This publication is more than just a collection of articles—it is a reflection of the passion, innovation, and potential that resides within our student and faculty community.

In a world where technology is advancing at an unprecedented pace, platforms like these play a vital role in bridging academic knowledge with real-world applications. The magazine showcases the department's vibrant academic culture and highlights the emerging ideas and talents that are shaping the future of engineering.

I commend the department for encouraging such initiatives and wish all the contributors continued success in their academic and professional journeys.

With best wishes,

-Dr. N. Sudhakar Reddy, Principal

Message from HOD

I am pleased to present the latest edition of the EEE Department's technical magazine, a publication that highlights the brilliant minds and progressive ideas of our student community.
In today's fast-paced world, EEE engineers are not just builders-they are change makers, driving innovation in energy systems, automation, electronics, and beyond. This magazine captures the spirit of inquiry and experimentation that is essential in our field.
I encourage all students to continue engaging with such platforms. Writing, presenting, and sharing knowledge are essential skills for a successful engineering career.
Congratulations to the editorial team, faculty guides, and all student contributors. Let this magazine be a stepping stone to even greater academic and professional accomplishments.

- Dr. V. Lakshmi Devi, HOD, Dept. of EEE

Message from Faculty Advisor

I take this opportunity to congratulate every student who contributed their work, every faculty member who mentored and guided, and especially the editorial team for their tireless efforts, patience, and perseverance in bringing out this issue with excellence. May this magazine inspire more ideas, more innovations, and more aspirations? Let us continue to explore the unknown, question the ordinary, and design a better future with circuits in our hands and purpose in our hearts.

Dr. J. A. BASKAR, EEE

GRAPHENE-BASED BATTERIES: THE FUTURE OF FAST CHARGING

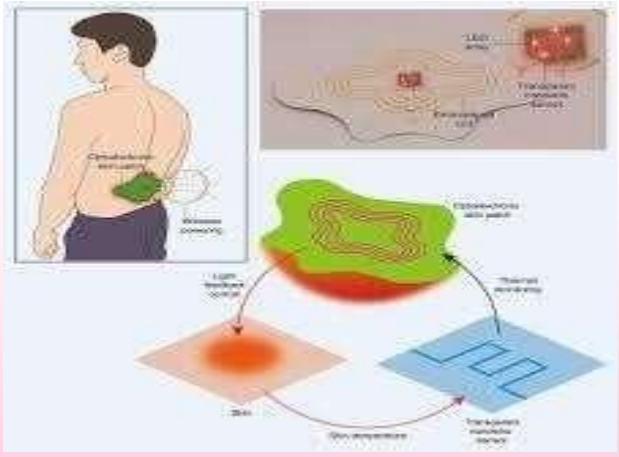
Scientists are developing ultra-fast charging batteries using graphene, a carbon material stronger than steel and lighter than aluminum. These batteries can be charged in under 5 minutes and have a longer lifespan than traditional lithium-ion cells. This innovation could revolutionize electric vehicles and portable devices.

Researchers across the globe are turning to **graphene**, a single layer of carbon atoms arranged in a hexagonal lattice, to develop the next generation of batteries. Unlike traditional lithium-ion batteries, **graphene-based batteries** can charge up to five times faster and store more energy while remaining compact and lightweight.

Graphene's superior conductivity and thermal performance make it ideal for high-performance applications such as **electric vehicles (EVs)**, mobile phones, and laptops. Companies like Samsung and Tesla are exploring ways to mass-produce these batteries.

Additionally, graphene batteries have **a longer life cycle**—up to 10,000 charging cycles compared to 2,000 for conventional ones. Since they do not overheat easily, they also improve safety. This breakthrough could mean that in the near future, charging your EV may take less time than filling a fuel tank.

NEURAL SENSOR PATCHES POWERED BY BODY HEAT



Biomedical engineers have invented wearable neural patches that monitor brain activity and are powered by the body's natural heat. These flexible devices eliminate the need for external batteries and can help in the diagnosis of neurological disorders through real-time data transmission.

A new class of wearable electronics is emerging: **neural sensor patches** that are powered by **body heat** instead of batteries. These ultra-thin, skin-like devices are developed using thermoelectric materials that convert temperature differences into electric voltage.

Placed on the scalp or temples, the sensors can monitor **brainwave activity**, detect fatigue, stress levels, and even early signs of neurological conditions like epilepsy or Parkinson’s disease. Data collected is wirelessly transmitted to smartphones or medical systems for analysis.

This technology is especially useful for **long-term health monitoring**, such as in remote areas or for elderly patients. Since it draws power from the body, there's no need for recharging or replacement batteries—making it eco-friendly and user-friendly.

SMART SOLAR WINDOWS THAT GENERATE ELECTRICITY

A new class of transparent solar panels can be embedded into glass windows in buildings, converting sunlight into energy without blocking the view. These "smart windows" offer dual benefits—natural lighting and renewable power generation—reducing the need for external power sources in smart homes.

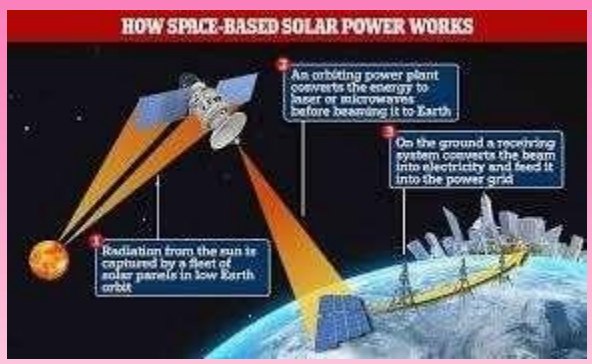
What if your building's windows could generate electricity? That's the promise of transparent solar cells now being developed by scientists in Europe and the U.S. These cells, made using organic photovoltaic materials or quantum dots, are embedded into glass to allow visible light through while capturing ultraviolet and infrared light for energy generation.

These "smart solar windows" are designed for skyscrapers and urban buildings where rooftop space is limited. The glass panels double as energy producers and thermal insulators, reducing the need for artificial lighting and HVAC usage.

Researchers predict that once commercialized, these windows can reduce building energy bills by up to 40%. Future models may integrate with building automation systems, creating self-sustaining smart structures that respond to weather and energy demands in real-time.

ENERGY-BEAMING SATELLITES TO POWER EARTH

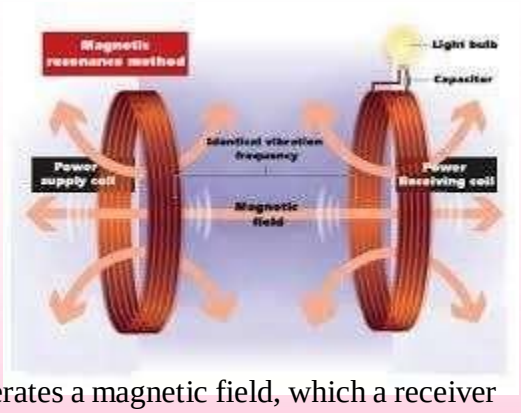
Japan is leading efforts to launch satellites capable of collecting solar energy in space and transmitting it wirelessly to Earth via microwaves. This space-based solar power technology could eventually provide a constant, weather-independent energy source for remote areas.Imagine a satellite in orbit collecting solar power 24/7 and **beaming that energy wirelessly to Earth**. This is not science fiction—Japan's space agency JAXA and other researchers are actively developing **space-based solar power (SBSP)**.



These satellites use large **solar panel arrays** to collect solar energy and convert it into microwave or laser beams, which are then received on Earth by special antenna arrays. These beams are safe for living beings and could **provide clean, continuous energy** regardless of weather or time of day. One proposed project aims to supply **a gigawatt of power**—enough to serve a city the size of New York. Though currently in testing phases, SBSP holds massive potential, especially for **disaster relief**, remote islands, and future lunar or Martian colonies.

WIRELESS ELECTRICITY IN HOMES THROUGH MAGNETIC RESONANCE

The future of power could be completely **cordless**. Using the principle of **magnetic resonance coupling**, scientists are developing ways to wirelessly transmit electricity across short distances. A transmitter coil generates a magnetic field, which a receiver coil in a device can capture and convert into usable electricity.



Unlike traditional wireless charging that requires devices to be placed directly on a pad, this technology works **at a distance of several meters**. That means TVs, fans, phones, and lights can operate just by being in a room—no wires, no clutter.Companies like WiTricity and Ossia are already testing these systems in office setups and smart homes. It's expected that in the next decade, **power outlets may become obsolete**, and entire homes.

M CHARAN
23BFA02142

CURRENT EEE

ENERGY HARVESTING FROM VIBRATIONSUSING PIEZOELECTRIC MATERIALS

Abstract:

Piezoelectric materials generate electricity when subjected to mechanical stress. This property is exploited to harvest energy from ambient vibrations—like those on bridges, roads, or industrial machines. Applications include powering wireless sensors, wearable devices, and low- power electronics without batteries.

SUPERCONDUCTING CABLES FOR LOSSLESS POWER TRANSMISSION

Abstract:

Superconductors exhibit zero electrical resistance below critical temperatures, enabling lossless power transmission. High-temperature superconducting (HTS) cables can transmit up to 10 times more power than traditional copper cables. Projects in Germany and Japan have demonstrated HTS in urban power grids with remarkable efficiency and compact installations.

AUTOMATED FAULT LOCATION SYSTEMS IN UNDERGROUND CABLE NETWORKS

Abstract:

Underground cable faults are difficult to locate manually. Advanced fault location systems using time-domain reflectometry (TDR) and artificial intelligence help pinpoint fault distances accurately. Combined with GIS mapping and SCADA integration, these systems minimize downtime and reduce repair costs.

ENERGY-EFFICIENT COOLING SYSTEMS USING THERMOELECTRIC MODULES:

Abstract:

Thermoelectric cooling modules use the Peltier effect to transfer heat without moving parts or refrigerants. These systems are ideal for compact electronics, medical devices, and space-constrained environments. Innovations in semiconductor materials.

HYBRID RENEWABLE ENERGY SYSTEMS FOR REMOTE AREAS:

Abstract:

Hybrid systems combining solar PV, wind turbines, and battery storage provide uninterrupted power to off-grid locations. Smart energy management systems balance generation and consumption dynamically. These systems reduce dependency on diesel generators.

SMART METERS FOR REAL-TIME POWER QUALITY MONITORING

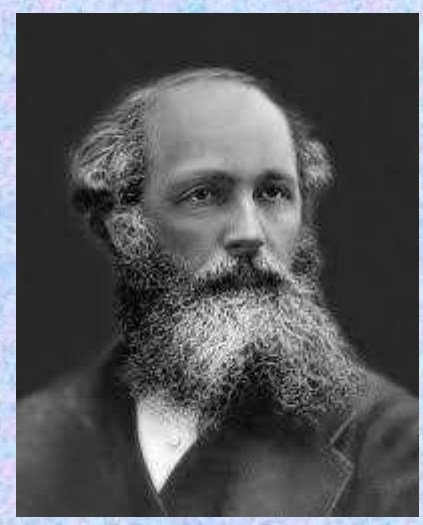
Abstract:

Smart meters equipped with advanced sensors measure not just consumption but also power quality parameters like harmonics, voltage fluctuations, and frequency stability. Real-time analytics help utilities detect anomalies, manage loads, and improve customer service with dynamic pricing.

J KOWSALYA
23BFA02090

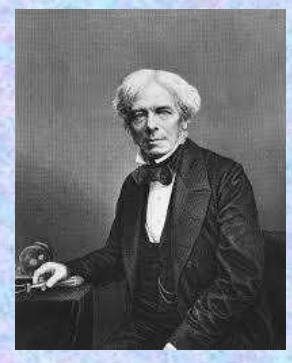
Mega Minds

James Clerk Maxwell (1831–1879):



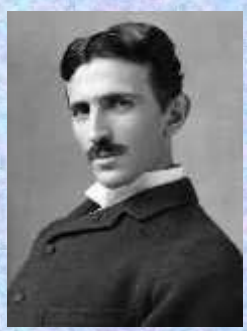
Maxwell was a Scottish physicist best known for formulating the classical theory of electromagnetic radiation. His **Maxwell's equations** united electricity, magnetism, and light into a single theoretical framework, laying the foundation for modern physics and electrical engineering.

Michael Faraday (1791–1867):



Faraday made fundamental discoveries in **electromagnetic induction**, diamagnetism, and electrolysis. His invention of the **Faraday Cage** and early experiments with electric motors made him a pioneer in practical electricity.

Nikola Tesla (1856–1943)) :



Tesla was a Serbian-American inventor known for his contributions to the development of **alternating current (AC)** electricity. He developed the Tesla coil, wireless communication principles, and advanced AC generators and motors.

Hans Christian Oersted (1777- 1851)

Hans Christian Oersted was a Danish physicist and chemist who revolutionized the arena of electromagnetism by discovering that the electric currents can produce magnetic fields. His 1820 discovery of piperine, the pungent compo- nent that causes the hotness of pepper, and his 1825 for- mulation of metallic aluminum, are considered significant contributions in the history of chemistry. Ørsted's discovery showed, for the first time, that electric and magnetic forces were interconnected, which greatly influenced later scientists, especially **James Clerk Maxwell**, in formulating the full theory of electromagnetism. His findings also paved the way for inventions such as the **electric motor**, **generator**, and **transformer**—technologies central to modern electrical engineering.

André-Marie Ampère (1775–1836) :

A founding figure of classical electromagnetism, Ampère discovered the relationship between **electric current and magnetic fields**. The unit of electric current, the **ampere**, is named after him

G YAMUNA
22BFA02039

Perovskite Solar Cells Reach Record Efficiency of 33%

Source: National Renewable Energy Laboratory (NREL)

Summary: Perovskite-silicon tandem solar cells have reached a conversion efficiency of 33%, breaking previous records. These lightweight, low-cost cells are suitable for rooftops, satellites, and portable solar devices—pushing the boundaries of renewable **energy performance.**

New possibilities for solar power

Source: Queen's University

Summary: Researchers have made a significant breakthrough in solar technology. A newly devel- oped solar photovoltaic thermal system (PVTs) generates both electricity and heat. Solar PVTs are normally made with crystal silicon cells which generate electricity, but little heat. The research shows increased heat generation because of higher operating temperatures and 10 per cent more solar electric output.

Wearable electronics: Transparent, lightweight, flexible conductor could revolutionize electronics industry

Source: University of Exeter

Summary: The most transparent, lightweight and flexible material ever for conducting electricity has just been invented. Called Graph Exeter, the material could revolutionize the creation of wearable electronic devices, such as clothing containing computers, phones and MP3 players. GraphExeter could also be used for the creation of 'smart' mirrors or windows, with computer- ised interactive features. Since this material is also transparent over a wide light spectrum, it could en- hance by more than 30% the efficiency of solar panels.

Faster, cheaper way found to cool electronic devices

Source: North Carolina State University

Summary: Researchers have developed a more efficient, less expensive way of cooling electronic devices – particularly devices that generate a lot of heat, such as lasers and power devices. The tech- nique uses a "heat spreader" made of a copper- graphene composite, which is attached to the elec- tronic device using an indium-graphene interface film "Both the copper-graphene and indium- graphene have higher thermal conductivity, allow- ing the device to cool efficiently,"

Pocket microscope with accessory for ordinary smart phone

Source: VTT Technical Research Centre of Fin- land

Summary: Engineers have developed an optical accessory that turns an ordinary camera phone into a high-resolution microscope. The device is accu- rate to one hundredth of a millimeter.

K KUSHAL KUMAR
22BFA02084