MINCHU Newsletter
Department of Electrical & Electronics Engineering

Volume 13 | Issue 1 | FEBRUARY 2026

Vision and Mission of the Institute

Vision

- To be one of the premier institutions of Engineering and Management education through excellence in academics, research, innovation and entrepreneurship with global standards.

Mission

- To impart world class value-based education in Engineering and Management.
- To provide thrust for research activities by establishing centres of excellence in sustainable innovative technologies and collaborate with industries to carry out interdisciplinary research.
- To generate highly skilled and competent manpower with leadership qualities, team spirit and concern for society and environment.
- To nurture organizational culture conducive for faculty to be competent and set higher standards.

Vision and Mission of the Department

Vision

- To be a renowned department in Electrical and Electronics Engineering through excellence in academics by promoting sustainability, technological innovations and entrepreneurship.

Mission

- To provide high-quality technical education in Electrical and Electronics Engineering, fostering innovation and a commitment to lifelong learning.
- To conduct interdisciplinary research in sustainable technologies through collaborations with industry and centers of excellence.
- To cultivate teamwork and leadership qualities, empowering students to excel as successful professionals or entrepreneurs.

Program Educational Objectives (PEOs)

After two/three years of graduation, the graduates will have the ability to:

· Design and develop sustainable solutions to real-world problems through research and innovation, either as a professional or an entrepreneur.

· Adapt to technological advancements through lifelong learning to achieve organizational goals.

· Demonstrate leadership qualities and social responsibility to effectively lead and manage diverse teams and projects.

CONTENTS

James Clerk Maxwell is the Scottish visionary who revolutionized physics by formulating Maxwell's Equations, the mathematical foundation of all Electrical Engineering.

By unifying electricity, magnetism, and light into a single electromagnetic field theory, he paved the way for the invention of radio, television, and telecommunications. Often cited as the bridge between Newton and Einstein, his work transformed the world from one of mechanical components to a globally connected era of electronics and information technology.

B. N. M. Institute of Technology

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EDITOR'S DESK

Hello Readers!

It gives us immense pleasure to welcome you to this edition of Minchu, the biannual magazine of the Department of Electrical and Electronics Engineering, BNMIT. True to its name, Minchu—meaning spark in Kannada—represents the spark of curiosity, creativity, innovation, and passion that continues to energize our department and its students.

More than just a magazine, Minchu is a reflection of the vibrant spirit of our EEE family. Within these pages, you will find a blend of technical insights, creative expressions, student achievements, memorable events, and inspiring ideas that capture the essence of life beyond classrooms and laboratories.

Every article, achievement, and contribution featured here tells a story—of learning, teamwork, perseverance, and growth. It is a platform where budding engineers not only showcase their technical knowledge, but also express their imagination, perspectives, and individuality.

As you turn these pages, we hope Minchu informs, inspires, and ignites new thoughts in every reader. After all, every great innovation begins with a spark.

Happy Reading!

– Minchu Editorial Team

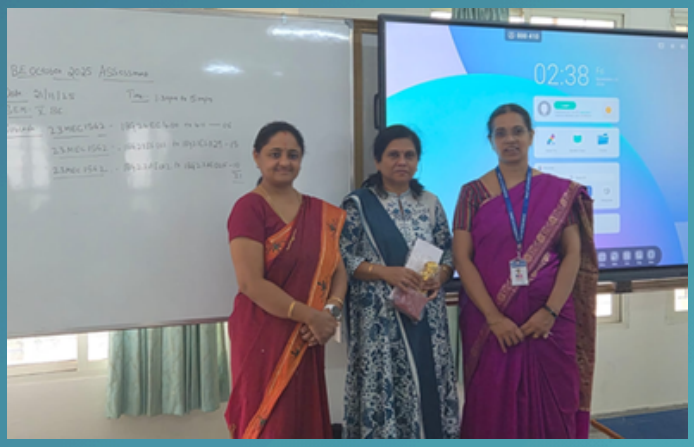
ABOUT THE DEPARTMENT

Ever since its inception in the year 2002, the Electrical and Electronics Department of BNMIT has got name in the state. The Department of Electrical and Electronics Engineering offers an Undergraduate Program in Electrical and Electronics Engineering, M.Sc. (Engineering) by Research and Doctoral degree. The faculty of Electrical and Electronics Engineering are highly acclaimed individuals with the skill set, covering wide areas of industrial and applied research. They ensure that the courses foster deeper learning and increased engagement amongst the students. Such commitment from our fraternity not only gives our graduates an edge in deciding which career path is right for them but also guarantees that by the time they graduate, they will have hands on, real-world experience in Electrical and Electronics Engineering. The students are highly motivated by the project funding provided by the New Gen IEDC from the Department of Science and Technology, Govt. of India. Industrial personnel are frequently invited by the department to train the students with the latest skillset. The Department of EEE has been accredited by the National Board of Accreditation (NBA) which is an additional feather on its crown

DEPARTMENT ACTIVITIES

Memorandum of Understanding with M/s Venjay Technologies Pvt. Ltd. on 17/12/2025

Memorandum of Understanding with M/s BESCOM, Bengaluru on 18/12/2025

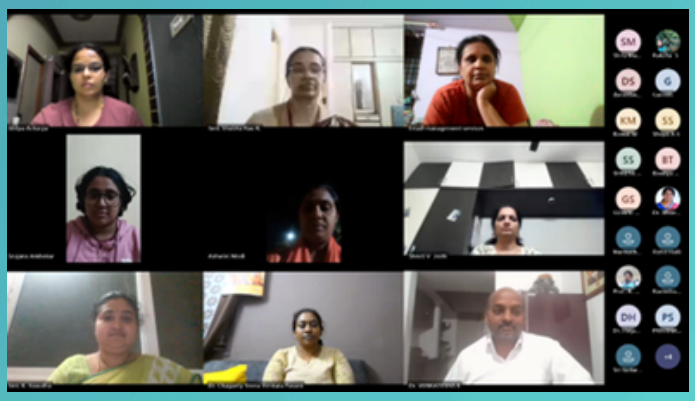


Technical Talk on “Mobility Trends: What Engineers Must Know

National Level Hackathon organized by BNMIT IEEE Power and Energy Society (PES) student chapter

Student Development Program (SDP) on Hands-On Training In Association with National Instruments-LabVIEW Graphical System Design

Engineering Project Exhibition for BNM School Students



5 Day Online National Workshop on Applied AI & ML Electrical Systems: Learn, Analyze and Innovate

3-week Internship Program on: "Electric Circuit Design: Simulation with MATLAB/Simulink and Implementation using Embedded Systems" 21 July 2025 – 07 August 2025

TECHNICAL ARTICLES

Nuclear Energy: A Reliable Power Source for the Future Electrical Engineer

The growing demand for electrical energy and the need for clean power generation have made nuclear energy an important part of modern power systems. From an Electrical Engineering student's perspective, nuclear energy is not just about atomic reactions, but about efficient power generation, voltage control, protection systems, and reliable grid integration. It combines concepts from electrical machines, power systems, control engineering, and high-voltage transmission into one advanced technology

Nuclear energy is produced through nuclear fission, where heavy atoms such as uranium-235 split and release a large amount of heat. This heat is used to convert water into steam, which drives a turbine. The turbine is connected to a synchronous generator that converts mechanical energy into electrical energy. The generated voltage is then stepped up using transformers and transmitted through high-voltage transmission lines to the power grid.

Thus, a nuclear power plant follows the same energy conversion process as a thermal power plant, but with significantly higher energy density and lower carbon emissions.Electrical engineers play a major role in the operation of nuclear power plants. The generators used in these plants are typically large-capacity synchronous machines ranging from 500 MW to 1500 MW. Maintaining voltage stability, frequency control, and synchronisation with the grid are key responsibilities. Since nuclear plants operate as base-load stations, they run continuously for long durations, making reliability extremely important. Proper excitation systems and automatic voltage regulators are used to ensure stable operation. Control and instrumentation systems are vital in nuclear power plants, where electrical engineers ensure safe and efficient operation by designing automated monitoring, protection, and control systems for parameters like temperature, pressure, and reactor power, while also managing power transmission through high-voltage networks, switchyards, transformers, relays, and circuit breakers for reliable power evacuation and fault protection.

With its ability to provide continuous base-load power, high grid stability, and low greenhouse gas emissions, nuclear energy remains a dependable clean energy source, making it highly relevant to electrical engineering and an important field for meeting future electricity demands.

Rishith M Kashyap
8th Sem
EEE

Dynamic Wireless EV Charging: Powering Electric Vehicles While the Road Moves Beneath Them

Electric vehicles are becoming very popular because they reduce pollution and dependence on fuel. However, one major problem with EVs is charging time and limited battery range. Drivers must stop and wait for long hours to charge their vehicles. To solve this issue, a new technology called wireless charging of electric vehicles on running roads is being developed. This system allows vehicles to charge while moving, making transportation more efficient and convenient.

Wireless charging on running roads works on the principle of electromagnetic induction. In this method, transmitter coils are embedded under the road surface, and receiver coils are placed underneath the electric vehicle. When alternating current flows through the transmitter coil, it produces a magnetic field. This magnetic field induces voltage in the receiver coil, and electrical energy is transferred wirelessly. The received power is then converted and used to charge the EV battery while the vehicle is moving. From an electrical engineering point of view, this system involves power electronics, inductive coupling, and efficient power transmission. High-frequency AC supply is used to improve energy transfer efficiency. Inverters are used to convert DC to high-frequency AC, and rectifiers convert the received AC back to DC for battery charging. Proper alignment between transmitter and receiver coils is important for maximum efficiency. Wireless charging of electric vehicles on running roads is an innovative technology with great future potential, though it comes with certain challenges. The installation cost is high because coils must be embedded beneath the roads, and power losses can occur due to air gaps and misalignment between transmitter and receiver coils. Safety is another important concern, requiring proper shielding to prevent electromagnetic interference. Additionally, efficient power transmission and well-designed control systems are necessary to ensure stable operation. Despite these limitations, this technology offers significant advantages such as continuous charging, reduced battery dependency, and improved driving convenience. With ongoing advancements in power electronics and smart grid integration, wireless EV charging systems are expected to become more efficient, practical, and supportive of clean and sustainable transportation.

Mohammed Junaid
8th Sem
EEE

5G TECHNOLOGY AND IT'S IMPACT ON SMART GRID SYSTEMS

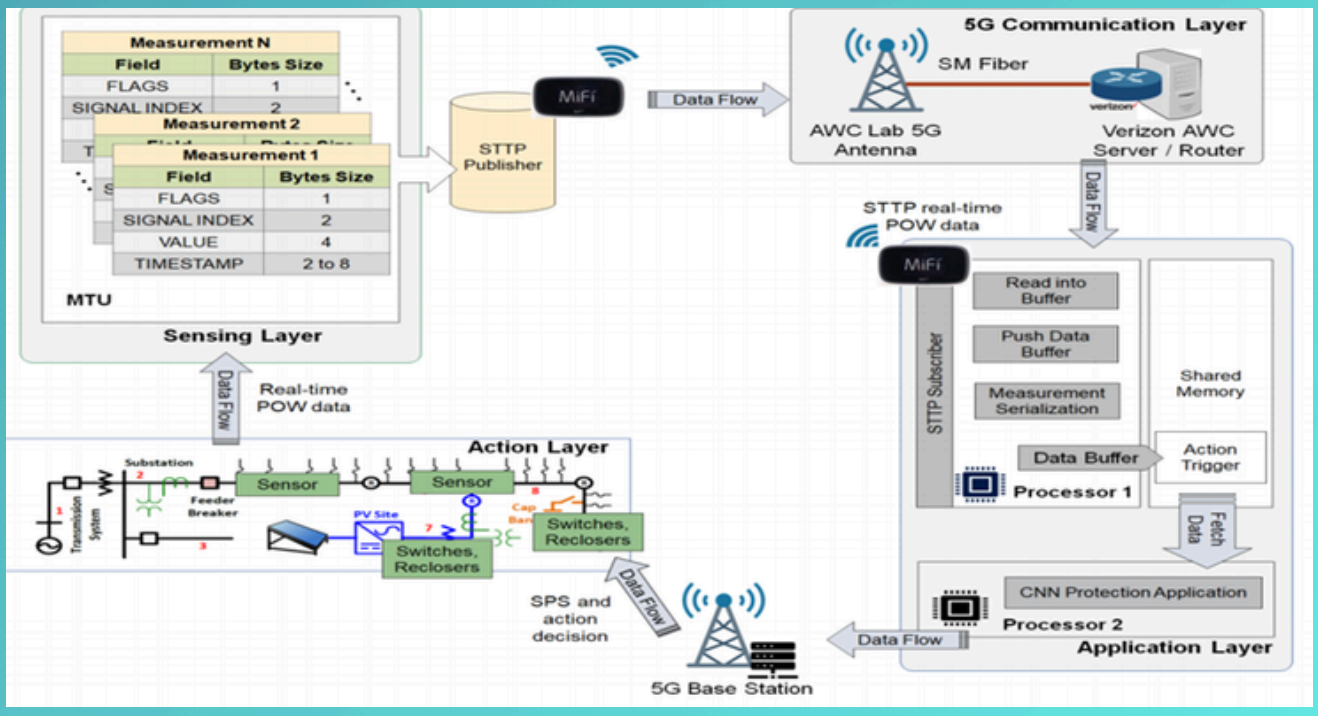
5G Technology is the latest generation of mobile networks that is designed to support modern applications such as automation, IoT, artificial intelligence and smart cities. In the power sector, 5G is playing an important role in smart grid systems. With 5G control utilities can monitor power systems instantly, detect faults quickly and reduce outages. Traditional grids often suffer from "blind spots" where data transmission is too slow to react to sudden surges or failures. 5G addresses this through three key pillars:

1.Network slicing: Utilities can reserve a dedicated slice of the network specifically for critical grid operations, ensuring interference-free data flow.

2.Ultra-low latency: Response time is under 5 milliseconds allowing for near instantaneous communication between sensors and control centres.

3.Massive IoT connectivity: 5G can support up to 1M devices per square kilometre, enabling a dense network of smart meters and sensors.

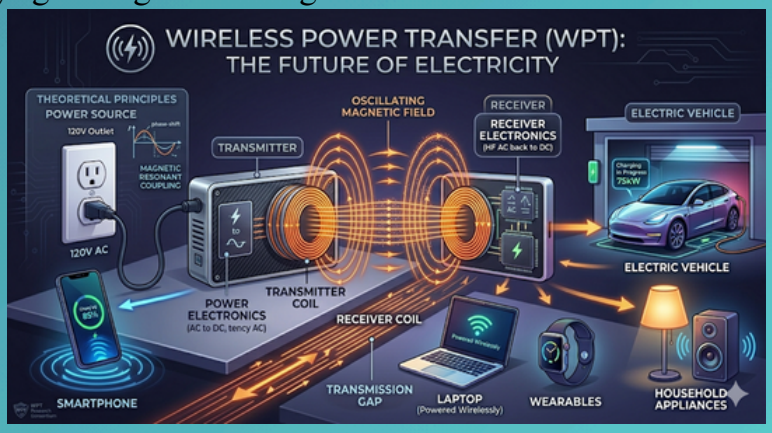
5G facilitates the rapid data exchange needed to balance these fluctuating sources with real-time consumer demand. It allows the grid to predict when to store energy in large-scale batteries and when to release it making "green" power more reliable.USA(PNNL) conducted experiments on 5G for grid use cases, focusing on cross-domain information flow and grid transmission co-simulation. Based on the reports of PNNL fig1.0 shows the data flow in the designed 5G enabled grid protection framework. In conclusion, 5G technology is a vital upgrade for the energy sector, directly addressing the limitations of traditional grids. By utilizing network slicing, ultra-low latency and massive IoT connectivity, 5G creates a more responsive and reliable infrastructure.



Ananya
2nd Sem
EEE

WIRELESS POWER TRANSFER: THE FUTURE OF ENERGY TRANSMISSION IN EEE

Imagine charging your phone without plugging it in, or powering an electric car without cables. This is no longer science fiction—it is made possible by Wireless Power Transfer (WPT), one of the most exciting and rapidly growing technologies in Electrical and Electronics Engineering (EEE).



Wireless Power Transfer allows electrical energy to be transmitted from a source to a device without physical connections. It works on the principle of electromagnetic induction. When alternating current flows through a transmitter coil, it creates a changing magnetic field.

This magnetic field induces a voltage in a nearby receiver coil, thus transferring energy wirelessly.There are several methods of WPT. Inductive coupling is widely used for short-range applications such as smartphone charging pads. Resonant inductive coupling improves efficiency and range by tuning both coils to the same frequency. For long-distance applications, microwave and laser-based power transfer methods are being researched, opening possibilities like space-based solar power transmission.

The applications of WPT are transforming modern life. Wireless charging is already common in smartphones, wearables, and earbuds. In the automotive industry, electric vehicles can be charged wirelessly, reducing the need for bulky cables. In the medical field, implanted devices such as pacemakers can be powered without surgery to replace batteries. Industrial automation also benefits from WPT by enabling power delivery in hard-to-reach or hazardous environments.The advantages of wireless power transfer include increased convenience, improved durability due to the absence of connectors, enhanced safety, and aesthetic benefits. However, challenges remain, including energy losses, efficiency limitations over distance, and higher implementation costs.

Despite these challenges, continuous advancements in materials, circuit design, and electromagnetic theory are making WPT more efficient and practical. As research progresses, wireless power transfer is expected to revolutionize how we interact with electrical energy, making a truly wireless world possible.

In conclusion, Wireless Power Transfer is not just a technological trend—it is a transformative innovation that is reshaping the future of energy systems. For EEE students, understanding WPT opens doors to exciting careers and groundbreaking developments in the field.

Applications of this field are:

- Charge electronics like smartphones and toothbrushes on cable-free pads.
- Power medical implants like pacemakers through the skin without surgery.
- Recharge electric vehicles automatically by parking over magnetic floor mats.
- Run warehouse robots and factory sensors where moving wires would break.
- Keep drones flying longer by beaming energy to them using lasers.

Anupriya R
2nd Sem
EEE

E100 Drive in India

In recent days there is disruption of oil supply to West Asian countries due to two countries war, it exposes India's dependability on oil imports. Oil import dependability can be reduced by Adopting E100 Initiatives. The E100 initiative is India's ambitious push to adopt 100% ethanol as a standalone automotive fuel. Very recently Union Govt initiative to push E100 across country had grabbed an attention globally. Only BRAZIL had achieved E100 so far, they had started the initiative in 2003 it self. Moving beyond the nationwide E20 (20% ethanol blend) mandate achieved in March 2025. Formally launched as a pilot in Pune, E100 is now available at over 400 retail outlets across states like Maharashtra, Karnataka, Uttar Pradesh, and New Delhi.

Impact on the Indian Economy

The primary economic driver for E100 is energy self-reliance.

· Reduced Import Bills: India currently imports approximately 87% of its crude oil, costing around ₹22 lakh crore annually. High-level blending aims to drastically cut this foreign exchange outflow.

· Oil Imports will contribute 0.25% to GDP which is very high impact on countries development and infrastrure building.

· Agricultural Income: The initiative transforms farmers from Annadatas (food providers) to Urjadatas (energy providers). Oil Marketing Companies (OMCs) have already paid over ₹87,000 crore directly to farmers for ethanol supplies since 2014.

· Rural Industrialisation: The demand for E100 is driving the establishment of new grain-based distilleries and 2G (second-generation) ethanol plants, creating jobs in rural areas.

Infrastructure & Vehicle Costs: A significant challenge is the requirement for Flex-Fuel Vehicles (FFVs). These vehicles, capable of running on any blend from E20 to E100, currently cost roughly ₹3–4 lakh more than standard petrol versions due to corrosion-resistant components and advanced engine sensors.

Environmental Effects:

E100 serves as a cleaner, renewable alternative to fossil fuels with several ecological benefits and some trade-offs.

· Lower Emissions: Ethanol contains oxygen, which helps engines burn fuel more completely. This significantly reduces tailpipe emissions of Carbon Monoxide (CO), Hydrocarbons (HC), and Nitrogen Oxides (NOx).

· Carbon Sequestration: As a plant-based biofuel, the CO2 released during combustion is largely offset by the CO2 absorbed by the crops (like sugarcane and maize) during growth.

· Waste Management: The "Repurpose Used Cooking Oil" (RUCO) and "GOBAR DHAN" schemes integrate with the E100 vision to convert waste into fuel, promoting a circular economy.

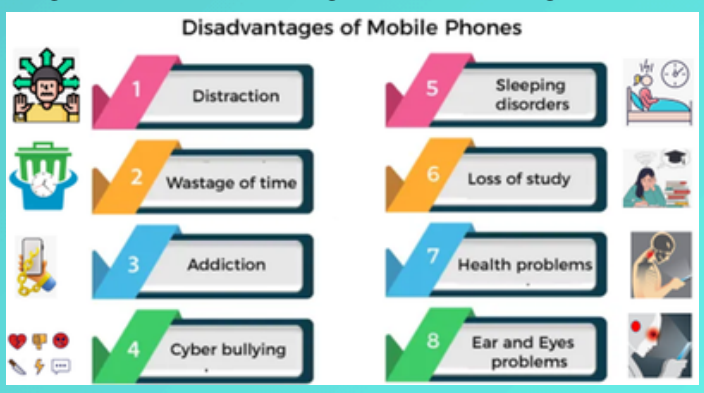
· Environmental Trade-offs: Traditional ethanol production is water-intensive. Sugarcane, a primary feedstock, is often grown in water-stressed regions. To mitigate this, the government is shifting focus toward 2G ethanol made from agricultural residues like rice straw, which also helps reduce seasonal crop burning.

Smt. Pankaja H G
Assistant Professor
Department of EEE

SMARTPHONE OVERUSE AND ITS IMPACT

Children are becoming addicted to cell phones

Martin Cooper invented the mobile phone and made the first-ever mobile phone call in 1973 while working at Motorola. Mobile phones have both advantages and disadvantages in their usage.



1. Mental Health and Emotional Well-being

Higher Anxiety & Depression: Early smartphone use (before age 12–13) is linked to more anxiety, depression, & low self-esteem.

Addiction Risk: Frequent notifications and "likes" give quick pleasure, leading to overuse and habit-forming behaviour.

Cyberbullying & Predators: Children are more exposed to online harassment and predators and may not handle it well.

Suicide Risk: Heavy screen use is linked to a higher risk of suicidal thoughts.

2. Physical Health Risks

Sleep Problems: Blue light from screens reduces melatonin [hormones], causing poor sleep, irregular schedules, and daytime tiredness.

Eye & Ear problems: Long screen use can lead to dry eyes, blurred vision, headaches, and increased risk of myopia (short sightedness). Listening to loud music through earphones for long periods can damage hearing.

Obesity and Sedentary Lifestyle: Increased screen time often replaces physical activity, leading to a higher risk of obesity and related cardiovascular issues.

Radiation Concerns: Children may absorb more radiation due to thinner skulls; although cancer risks are not proven, experts like the American Academy of Pediatrics advise caution.

3. Developmental and Academic Impact

Reduced Attention Span: Frequent multitasking on social media reduces focus.

Poor Social Skills: Excessive phone use can limit empathy and face-to-face communication skills.

Lower Academic Performance: Phones cause distractions, leading to lower grades and reduced interest in studies.

Mitigation to avoid cell phone radiations

Use Speakerphone or Wired Headsets: The highest levels of radiation are emitted during calls. Keep the phone away from your ear and brain by using the speakerphone setting, wired headphones, or an air-tube headset.

Keep the Phone Away from Your Body: Avoid carrying your phone in pockets, bras, or on your belt. Distance is crucial—even a few inches can significantly reduce the amount of radiation your body absorbs. Store it in a bag or purse instead.

Text More, Talk Less: Texting keeps the device away from your head and body. Additionally, texting requires less power, resulting in lower radiation emissions compared to the consistent, high-power transmission of a voice call.

Avoid Using in Poor Signal Areas: When your phone shows only one or two bars of signal, it works harder to connect, increasing radiation emissions. Avoid making calls or streaming content in elevators, cars, or basements.

Switch to Airplane Mode or Turn It Off: Turn off Wi-Fi, Bluetooth, and cellular data when not in use, especially when carrying it in your pocket. Setting your phone to airplane mode eliminates radiofrequency transmission entirely.

Limit Use at Night (No Sleeping with the Phone).

Do not sleep with your phone under your pillow or on your nightstand: Keep it at least 3 feet away from your bed, or turn it off to allow your body to rest without constant exposure.

Additional Tips:
Wait to connect: Do not hold the phone to your ear until the person on the other end picks up, as it emits more power while connecting.
Check SAR levels: When buying a new phone, check the manufacturer's website or databases like the Environmental Working Group (EWG) to choose a model with a low Specific Absorption Rate (SAR).

Dr. Venkatesha K ,
Professor and Head,
Department of Electrical & Electronics Engineering,
BNMIT, Bengaluru-560070

Faculty achievements

1. Dr. Shubha Rao K has received Best Track paper award for the paper titled “Performance Evaluation of Kalman-Based Filters on 1RC and 2RC Models for Lithium-Ion Battery SoC Estimation” in second International Conference on Advances in Energy and Environmental Engineering 2026 held 0n 30-31 January 2026 hosted by Dr. Vithalrao Vikhe Patil College of Engineering, Ahilyanagar, Maharashtra.
2. Pranav N, Thanmayee M K, Champa P.N, Varshini K, “A Review on Integrating Hybrid(Wind & Solar) Energy Systems in India”, International Journal of Engineering Research & Technology (IJERT), Volume 14, Issue 12, ISSN: 2278-0181, December 2025, Impact factor-8.7 an international Peer-Reviewed UGC approved Journal. DOI:10.17577/IJERTV14IS120505
3. Pratik Chakraborty, Jeevika B, Hamsa B, Shreyas S, Shubha Rao K,”HydroSolar Energy System: Hydrogen Production and Fuel Cell Integration with IoT Monitoring,” IEEE international conference on Circuits, Controls, and Communications (CCUBE-2025), 24-25 october,2025, held at RNS institute of Technology, Bengaluru.DOI: 10.1109/CCUBE66458.2025
4. Shruti V Joshi, Prakash D B, Chethan Raj, “Parallel Inverter Coordination in Islanded Microrid Using Fuzzy Logic Based Multiloop Droop Control” 2025 IEEE International Conference on Compute, Control, Network and Photonics(ICCCNP). DOI: 10.1109/ICCCNP63914.2025.11233553
5. Dr. Shubha Rao K has served as session chair in IEEE International Conference on Circuits, Controls and Communications (CCUBE), RNS Institute of Technology, Bengaluru from 24-25 Oct. 2025
6. Smt. Shruti V Joshi has received Best Paper Award for the paper, “Parallel Inverter Coordination in Islanded Microrid Using Fuzzy Logic Based Multiloop Droop Control” 2025 IEEE International Conference on Compute, Control, Network and Photonics (ICCCNP). DOI: 10.1109/ICCCNP63914.2025.11233553.
7. Organized Five days Online National Workshop on “Applied AI & ML in Electrical Systems: Learn, Analyze & Innovate”, 15th to 19th December 2025, Dept of EEE, BNMIT.

8. Smt. Kruthi Jayaram “A model reference based adaptive controller for power flow management in microgrid systems”, Q1 Journal, published in Scientific reports, Springer nature, Published: 02 July 2025.
9. Madhu S has served as reviewer in ICVTTS 2025, 19th -20th September 2025, IEEE VTS Bangalore Chapter.
10. Madhu S has served as reviewer in ICISPES-2025, DSCE, 18th -19th December 2025.
11. Madhu S has served as reviewer in IEEE PICC 2025, GEC- Thrissur, 9th -11th October 2025.
12. Champa P N has served as reviewer in activity for SN computer science, ISSN: 2250-2114, Springer Nature (New York, US), SOURCE-WORK-ID: 4ed8818d-2217-4891-a10a-b0b0892aa778 during 2025.
13. Champa P N received Appreciation as a reviewer from 2nd IEEE International Conference on Vehicular Technology and Transportation Systems (ICVTTS 2025), organized at school of Engineering and Technology, CHRIST (Deemed to be University), Bengaluru on 19th-20th September 2025.
14. Shubha Rao K Served as Reviewer in IEEE international conference on Vehicular Technology and Transportation Systems (ICVTTS-2025) held in Bengaluru from 19-20 September 2025Shubha Rao K has been recognized as a Reviewer of the American Journal of Electrical Power and Energy Systems (EPES) for reviewing a paper in the month of August 2025.
15. Champa P N has served as the Editor for book chapter/Research papers for edited book “Frontiers in Power Electronics for Electric Mobility: Innovation and Emerging Trends“, Edited Book Series ID: 11IIP2026S1_G3 Publisher: Iterative International Publishers (IIP), Selfypage Developers Pvt Ltd. 2025-26.
16. Dr. Saravana (BMSCE), Dr. Gomathi (BMSCE), Dr. Madhu S (BNMIT), A Text Book of mathematical Foundations of Machine Learning', RK Publications, ISBN- 978-93-47046-59-9, 1st Edition, 2025.
17. Smt. Kruthi Jayaram Served as internal evaluator for Smart India Hackathon SIH 2025.

EDITORIAL TEAM

Faculty

Smt. Pankaja H G
Assistant Professor

Students

Shriram V Shandilya - 2nd SEM
Vedavyas - 2nd SEM
Shaurya P Bagi - 2nd SEM