URJA 2025

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Year 2024-25

IPS Academy

Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV)

Editorial Board

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3rd year

Faculty Co-Ordinator

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Department of Electrical & Electronics Engineering

Department Vision

The vision of the Electrical and Electronics Engineering is to prepare students to compete globally in their profession, in order to reach the highest level of intellectual attainment and making significant contribution to society.

Department Mission

1. To become an internationally leading Electrical and Electronics Engineering department for higher learning and be self-reliant.

2. To build upon the culture and values of universal science and contemporary education through understanding of Electrical and Electronics Engineering.

3. To be a centre of research and education generating knowledge and technologies, this lay groundwork in shaping the future in the fields of Electrical and Electronics Engineering.

4. To develop partnership with industrial, R&D and government agencies and actively participate in conferences, technical and community activities.

About Department

Electrical Engineers are the backbone of any country. They provide power for industrial & domestic needs. The department of Electrical & Electronics Engineering was established in the year 2003. B.E. (Electrical & Electronics Engineering) is focus on Electrical Machines, Control System, Power System, and Network Analysis. Recently the rapid advance in Semiconductors technology and its application in electrical industry, the branch has introduced adequate number electronics subject like Micro Controller & its Interfacing, Power Semiconductor devices, Power Semiconductor drives, DSP, Advance Communication, Analog and Digital Communication etc. With the emphasis on above areas, the student will acquire analytic and practical skills and hence can serve better in industrial, services and research organizational set ups. The Various laboratories in the department are Basic Electrical Engineering, Electrical Instrumentation, Network Analysis, Electrical Machine, Power System & Protection, Power / Industrial Electronics, Control System, Electronic Devices & Circuits, Microcontroller & Interfacing, Software & Simulation Digital Electronics & Logic Design.

Courses Offered

1. B. Tech. (UG Program) in Electrical & Electronics Engineering

2. M. Tech (PG Program) with specialization in Power Electronics

Department Program Education Objective

PEO 1 *Education in the fundamental sciences and mathematics that underlie Electrical and electronics engineering with a general breadth and depth in Electrical and electronics engineering analysis and design.*

PEO 2 *Awareness of current technology and the fundamental background to be able to stay informed and adept at new technologies in Electrical and electronics engineering and to pursue higher studies*

PEO 3 *The ability to put ideas into practice through effective analysis & problem solving for various Electrical and electronics engineering applications*

PEO 4 *A broad awareness of the world around them through general education so they are prepared to achieve their potential and make contributions in their Electrical and electronics engineering fields.*

PEO 5 *The foundation of communications and teamwork skills and professional attitudes and ethics Scientist of the Quarter*

Bimal N. Bose – Father of Modern Power Electronics

Dr. Bimal N. Bose is known as the Father of Modern Power Electronics. He was a famous electrical engineer and researcher. His work played a very important role in the development of modern power electronic systems. He helped to connect theoretical knowledge with practical industrial applications.

Dr. Bimal N. Bose was born in India. He completed his early education in Electrical Engineering in India. Later, he went to the United States for higher studies. He earned his Master's degree and PhD in Electrical Engineering. His strong academic background helped him become a leading researcher in his field.

He worked as a professor in the United States, especially at the University of Tennessee, Knoxville. He taught power electronics and guided many research students. Many of his students later became successful engineers and scientists. He was also honoured as an IEEE Fellow for his outstanding contributions.

Dr. Bose made major contributions in power electronics using devices like SCR, GTO, MOSFET, and IGBT. He worked on power converters

and inverters to make them more efficient and reliable. His research helped in reducing size, improving performance, and increasing efficiency of power electronic systems.

He also contributed greatly to DC and AC motor drives. His work laid the foundation of modern variable speed motor control. Today, Variable Frequency Drives used in industries are based on his research and ideas.

One of his most important contributions was the use of artificial intelligence in power electronics. He introduced fuzzy logic and neural networks for motor control and system optimization. This made power electronic systems smarter and more efficient.

Dr. Bose also worked in the area of renewable energy. He explained the role of power electronics in solar and wind energy systems. His ideas helped in the development of modern renewable energy systems and electric vehicles.

He wrote many famous books on power electronics and motor drives. His books are used by students, teachers, and engineers all over the world. He also published many research papers in IEEE journals.

Dr. Bimal N. Bose received many national and international awards during his career. He is respected worldwide for his research, teaching, and vision. Because of his lifelong contribution, he is truly called the Father of Modern Power Electronics.

Renewable Energy and Electric Vehicles

The rapid growth of energy demand and transportation has created serious environmental concerns, including greenhouse gas emissions, air pollution, and dependence on fossil fuels. As a student of engineering and technology, I believe that renewable energy systems and electric vehicles (EVs) play a key role in addressing these challenges and moving toward sustainable development.

Role of Renewable Energy in Modern Power Systems

Renewable energy sources such as solar, wind, hydroelectric, and biomass are increasingly integrated into modern power grids. These sources are clean, abundant, and environmentally friendly. Among them, solar and wind energy have seen significant cost reductions due to technological advancements and large-scale deployment. However, their intermittent nature requires effective energy storage systems and smart grid management for reliable operation.

Electric Vehicles as the Future of Transportation

Electric vehicles represent a major shift from internal combustion engine vehicles to electrified transportation. EVs use high-energy-density lithium-ion batteries and electric motors, which offer higher efficiency compared to conventional engines. The absence of tailpipe emissions makes EVs suitable for reducing urban air pollution.

Integration of EVs with Renewable Energy

The true environmental benefit of EVs is achieved when they are powered by renewable energy. Renewable-based EV charging infrastructure, such as solar-powered charging stations, can significantly reduce carbon emissions. Advanced concepts like vehicle-to-grid (V2G) technology allow EVs to act as mobile energy storage units, supporting grid stability during peak demand.

Importance for India's Energy Transition

In the Indian context, the adoption of renewable energy and EVs is crucial for reducing dependence on imported fossil fuels and meeting climate targets. Government initiatives such as rooftop solar programs, EV subsidies, and charging infrastructure development are accelerating this transition. From a student's viewpoint, this also opens opportunities for research, innovation, and skill development in emerging energy technologies.Despite rapid progress, challenges remain in battery cost, charging time, energy storage, and grid integration.

Conclusion

Renewable energy and electric vehicles together form the backbone of a sustainable energy and transportation system. As students and future engineers, understanding and contributing to these technologies is not only an academic responsibility but also a step toward building a cleaner and greener future.

Article by
Nalin Dwivedi (0808EX221007)
4th Year, EEE

Nobel Prize 2024

Celebrating Breakthroughs That Shape Our World

Every year, the Nobel Prizes recognize the most influential discoveries and ideas that benefit humanity across science, literature, economics, and peace. The 2024 Nobel Prizes were announced in October and awarded in December, highlighting achievements that range from groundbreaking advances in artificial intelligence and molecular biology to powerful human stories advocating peace.

Physics: From Neural Networks to Everyday AI

The 2024 Nobel Prize in Physics was jointly awarded to John J. Hopfield and Geoffrey Hinton for pioneering concepts that enable machine learning using artificial neural networks. Their foundational work transformed physics and computer science by explaining how networks of simple units—modelled loosely on the human brain—can learn patterns from data. These ideas now power technologies like speech recognition, image classification, and language models. This recognition marks one of the first times foundational AI research has been honoured by a Nobel Prize, reflecting the deep scientific impact of these theoretical breakthroughs.

Chemistry: AI Meets Protein Science

In Chemistry, the Nobel Prize was split between David Baker, Demis Hassabis, and John M. Jumper for their work in computational protein design and structure prediction. These discoveries use advanced algorithms and machine learning to predict and design protein structures with exceptional accuracy—efforts that promise faster drug

discovery, better vaccines, and new materials for healthcare. By bringing artificial intelligence into molecular science, this award underscores a major shift in how complex biological problems are solved.

Physiology or Medicine: The microRNA Revolution

The 2024 Nobel Prize in Physiology or Medicine was awarded to Victor Ambros and Gary Ruvkun for discovering microRNA and revealing its key role in regulating gene expression. MicroRNAs are short RNA molecules that control when and how genes are activated, influencing development, disease progression, and cellular functions. This fundamentally changed our understanding of genetics and opened new avenues in medical research.

Literature: Exploring Human Fragility

The Nobel Prize in Literature went to Han Kang, a South Korean author known for intense, poetic prose that confronts historical trauma and the fragility of human life. Her work bridges personal narrative and collective memory, offering readers deep empathy and reflection on what it means to live through suffering and change. Han Kang's award is also historic, as she became the first South Korean and the first Asian woman to win this prize in Literature.

Peace: Remembering the Cost of War

In an emotionally powerful decision, the 2024 Nobel Peace Prize was awarded to Nihon Hidankyo, the Japanese Confederation of Atomic and Hydrogen Bomb Sufferers Organizations. Representing survivors (Hibakusha) of the Hiroshima and Nagasaki bombings, this organization was honoured for advocating nuclear disarmament and

educating the world about the human cost of nuclear weapons. Their testimony and persistent activism aim to maintain a global norm against the use of nuclear arms.

Economic Sciences: How Institutions Shape Prosperity

The 2024 Nobel Prize in Economic Sciences was shared by Daron Acemoglu, Simon Johnson, and James A. Robinson for research on how political and economic institutions influence prosperity. Their work shows that inclusive institutions—those that support the rule of law, broad participation, and equal opportunities—are essential for long-term economic growth. This insight illuminates why some nations flourish while others struggle, with implications for policy and development worldwide.

Article by
Atishay Jain (0808EX233D02)
4th Year, EEE

Smart Grids: The Future of Modern Power Systems

The traditional power grid was designed for one-way electricity flow—from power plants to consumers. However, with the increasing use of renewable energy, electric vehicles, and distributed generation, this conventional system is no longer sufficient. This has led to the development of **Smart Grids**, which represent the next generation of electrical power systems.

What is a Smart Grid?

A smart grid is an **advanced electricity network** that uses digital communication, sensors, and automation to monitor and control power flow in real time. Unlike conventional grids, smart grids allow **two-way communication** between utilities and consumers. This improves efficiency, reliability, and power quality.

Key Technologies Used in Smart Grids

Smart grids integrate several modern technologies such as:**Advanced metering infrastructure (AMI)** for real-time energy monitoring**Power electronics devices** like FACTS and smart inverters

Communication networks for fast data exchange**Artificial intelligence and data analytics** for demand forecasting and fault detectionthese technologies help in detecting faults quickly and restoring power with minimal interruption.

Role of Renewable Energy Integration

One of the major advantages of smart grids is their ability to handle **intermittent renewable energy sources** such as solar and wind. Smart

grids balance supply and demand using energy storage systems and intelligent control strategies. This makes large-scale renewable integration technically feasible.

Importance for Electric Vehicles

Smart grids play a critical role in **EV charging management**. Techniques like controlled charging and vehicle-to-grid (V2G) allow EVs to act as temporary energy storage units. This reduces peak load stress on the grid and improves overall system stability.

Benefits of Smart Grids

Improved **power reliability and quality**

Reduced **energy losses**

Better **fault detection and self-healing** capability

Active **consumer participation** in energy management

Challenges and Future Scope

Despite their advantages, smart grids face challenges such as high initial cost, cyber security risks, and lack of standardization. Future research is focused on **AI-based grid control, cyber-secure communication, and large-scale energy storage integration**.

Article by
Himanshu Gehlot (0808EX233D05)
4th Year, EEE

E-Awartan Tech Fest – 2025

Department of Electrical & Electronics Engineering, IPS Academy, IES, Indore have organized two days Tech-Fest event “e-Awartan 2024”.

The tech fest was held for one days from 30th April 2024 .

On 30th April 2024, the event starts with online technical quiz competition in Electrical Engineering, in which technical questions were asked to students. Students tried their best to score maximum marks in this event. This competition was held online on Google form.

After this event, there was a short break of 15 minutes to prepare for the next event. On the same day, The Poster competition and science exhibition event was commenced at 1:30 PM. There were number of teams who participated in the events with their innovative ideas. The Poster competition and science exhibition competition coordinated by Student coordinators under supervision of faculty coordinator.

At the end of the event, results were declared by judges for all events.

Technical Quiz Competition

To develop and enhance technical knowledge of students, IPSA-IES, Electrical and Electronics Engineering Department, every year organizes Project Competition in techfest “e-Awartan”. This event provides the student a best platform to showcase their technical knowledge. We always motivate students to participate in these technical activities and provide them platform to express their knowledge related to engineering field.

In the academic Year 2024, event Technical Quiz Competition was held on 30th April 2024

Timing 1:00 – 1:30pm.

Faculty Coordinators: Ms. Namrata Nebhnani / Ms. Priya Pal

The event was conducted in online mode via Google forms.

Event Duration: 30 minutes.

Poster Competition

To develop and enhance technical knowledge of students, IPSA-IES, Electrical and Electronics Engineering Department, organizes Poster Competition in techfest “e-Awartan”. This event provides the student a best platform to showcase their technical knowledge. We always motivate students to participate in these technical activities and provide them platform to express their knowledge related to engineering field.

In the academic Year 2024, event Poster Competition was held on 30th April 2024

Timing 1:30 – 2:00pm.

Faculty Coordinators: Mohd. Firoz / Mr. Deepesh Bhati

The event was conducted in room No.409, EEE Department IPSA, IES

Event Duration: 30 minutes.

Science Exhibition

The main motive of Science Exhibition is to provide a competitive atmosphere and encourage students to prepare some good projects that will be helpful for the society as well as give an additional support to their education.

Science Exhibition was held on 30th April 2024. Event was started at 02:30 PM.

There were total 21 Models exhibited in this event.

All projects are good and enough technical sound, number of audience are 91.

The coordinator of Science Exhibition is Dr. Sanjay Jain & Dr. Kavita Soni

Abstract of Student Paper presented at E- Awartan

SOLAR POWERED EV CHARGING STATION WITH IOT

Ms. Namrata Nebhnani[1] ,Akash Kumar Mishra[2] ,Swastik Agrawal[3],Devansh Dongre[4]
1. Assistant Professor
2,3,4 Students EEE, IPS Academy, Institute of Engineering and Science, Indore (M.P.)

Abstract

As a solar-powered EV charging station integrated with IoT for real-time monitoring, solar panels convert sunlight into 12V DC, which is boosted to charge a lithium-ion battery. A lithium-ion charging module ensures safe operation, preventing overcharging and deep discharge. The system uses an ESP32 microcontroller for IoT functionality, allowing remote monitoring through the Blynk app. Local monitoring is displayed on an I2C 16x2 LCD. The prototype includes relays for automatic cut-off, LEDs for status, and a buzzer for alerts. The system offers a scalable, sustainable solution for efficient EV charging, minimizing reliance on traditional power sources and reducing operational costs.

FIRE FIGHTING DRONE: A VERSATILE RESCUE

Md. Firoz[1], Ajit Kumar Vishwakrma[2], Ravi Bamniya[3], Vibhor Guha[4]
1. Assistant Professor
2, 3,4 Students EEE, IPS Academy, Institute of Engineering and Science, Indore (M.P.)

Abstract

A Firefighting Hexa-Copter, an advanced UAV designed for efficient fire suppression in hazardous areas. Unlike traditional drones, it uses an external water pump system, reducing onboard weight and enhancing flight endurance. The hexacopter configuration ensures stability and redundancy, powered by high-thrust BLDC motors, ESCs, and a LiPo battery. Machine learning-based fire detection enables precise targeting, while a Pixhawk flight controller manages dynamic positioning. Mathematical modelling and Excel-based analysis optimize thrust, stability, and discharge precision. The system offers a scalable, efficient fire suppression solution for urban, industrial, and forest fires.

FOOTSTEP POWER GENERATION

Mr. Kamlesh Gupta[1],Rohan Kant[2],Mohit Sharma[3]
1. Assistant Professor
2, 3 Students EEE, IPS Academy, Institute of Engineering and Science, Indore (M.P.)

Abstract

The Footstep Power Generation system is designed to harvest kinetic energy from human footsteps and convert it into usable electrical power. Using a rack and pinion mechanism, foot pressure is transformed in to rotational motion, driving a motor as a generator to produce DC electricity. This energy powers an LED bulb and charges a battery. Stored DC is later converted to AC via rectifier and transformer for broader application. The prototype includes a spring-loaded platform, battery, LEDs, and an inverter. This sustainable solution is ideal for high-traffic areas, offering an eco-friendly, scalable approach to energy generation while reducing dependency on non-renewable sources and promoting awareness of clean energy alternatives.

OBJECT DETECTION ULTRA SOUND RADAR

Prof. Manoj Gupta[1], Vasudev Rathod[2], Shruti Tiwari[3]
1. Assistant Professor
2, 3 Students EEE, IPS Academy, Institute of Engineering and Science, Indore (M.P.)

Abstract

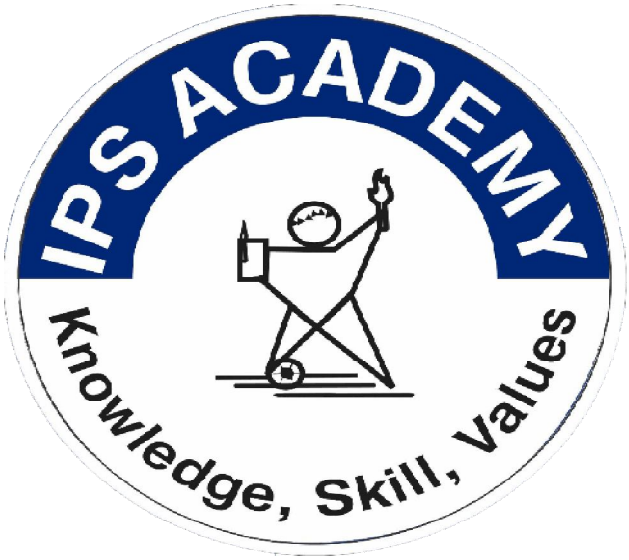
Ultra sound radar technology is a crucial tool for object detection and distance measurement, widely used in application such as robotics, automotive systems, and industrial automation. This project explores the development of an ultrasound radar system that utilizes ultrasonic waves to detect obstacles and determine their distance with high accuracy. The system consists of an ultrasonic sensor, a microcontroller for signal processing, and a visual display for real-time monitoring. The radar operates by emitting high-frequency sound waves, which reflect off objects and return to the sensor. By measuring the time taken for the waves to travel back, the system calculates the object's distance. The integration of advanced filtering techniques enhances measurement precision, reducing noise and improving detection reliability. The project also incorporates an efficient graphical representation of the detected objects, making it user-friendly and suitable for real-world applications. This study aims to optimize the system's accuracy, response time, and range while ensuring cost-effectiveness and ease of deployment.

Department Events during 2024-25

- Workshop on PLC and SCADA
  21st October 2024 to 26th October 2024

- Refresher course on PLC Application to Electrical Engineering
  06th January 2025 to 10th January 2025 / 05 days

- Refresher Course on MATLAB Programming
  05th August 2024 to 09th August 2024 / 05 days



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