

# URJA 2023

e - Magazine

Year 2022-23

IPS Academy

Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV)

## Editorial Board

Student Co-Ordinator

Sajal Shukla

Anish Moolchandani

4th year

Faculty Co-Ordinator

Hemant Mehar, Asst Prof, EEE

**Department of Electrical & Electronics Engineering**

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## **Department Vision**

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*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.*

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## **Department Mission**

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- 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.*

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## About Department

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*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, 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*

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## Department Program Education Objective

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**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

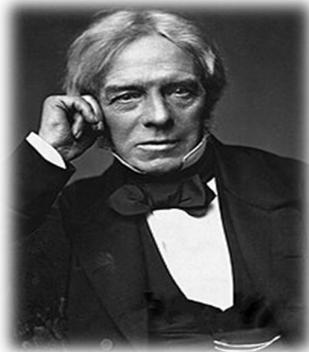
**PEO 4** A broad awareness of the world around them through general education so they are prepared to achieve their potential and make contributions in their Electrical and electronics engineering fields.

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

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## Michael Faraday: A Pioneer of Electricity and Magnetism

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*Michael Faraday, born in 1791 in London, England, didn't have a fancy education, but he had a burning curiosity about the world around him. This curiosity led him to become one of the greatest scientists in history, especially known for his experiments with electricity and magnetism. Faraday grew up in a poor family and didn't go to school for long. At 14, he started working as an apprentice to a bookbinder. While binding books, he read many scientific books and became fascinated by science.*

### *Key Experiments and Discoveries*

*Faraday's experiments were simple but revolutionary. Here are some of his most important discoveries:*

*Electromagnetic Induction: In 1831, Faraday discovered that if you move a magnet near a wire, it creates electricity in the wire. This discovery of electromagnetic induction paved the way for electric generators and transformers, which are essential for producing electricity.*

*Electrolysis Laws: In 1833, Faraday figured out how electricity affects chemicals in water. This led to the laws of electrolysis, explaining how electric currents break down water and other substances into their basic parts.*

*Faraday Cage: In 1836, he invented something called the Faraday cage. It's a simple metal cage that can block electric fields from getting inside. This is really useful in protecting sensitive electronics from interference.*

*Diamagnetism and Faraday Effect: Faraday also studied how magnets affect different materials. He discovered diamagnetism, where certain materials are slightly repelled by magnets. He also found the Faraday effect, which shows how light changes when it passes through a magnetic field.*

#### *Legacy and Impact*

*Faraday didn't just do experiments; he also loved sharing his discoveries with others. He gave lectures that made science fun and interesting for everyone, not just scientists. His lectures at the Royal Institution in London, called the Christmas Lectures, are still popular today.*

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*Michael Faraday's life teaches us that you don't need a fancy education to make big discoveries. With curiosity, persistence, and a love for learning, anyone can change the world. Faraday's experiments laid the foundation for many modern technologies and continue to inspire scientists and inventors around the world. His story reminds us that science is for everyone and that the simplest experiments can sometimes lead to the most groundbreaking discoveries.*

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**Students placed On Campus in Session 2022-23**

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**Dipti Rawal**  
*Tata Consultancy Engg (TCE)*  
**4.5 Lac**



**Gaurav Vishwakarma**  
*Winspark Innovations Learning*  
**6 Lac**



**Ritesh Nandeda**  
*Reliance Industries Limited*  
**8 Lac**



**Pranay Bohre**  
*Reliance Industries Limited*  
**8 Lac**



**Kushagra Soni**  
*Consultadd*  
**5 Lac**



**Omica Sharma**  
*Capgemini*  
**4.25 Lac**



**Pawan Patidar**  
*URON Energy LLP*  
**3.5 Lac**



**Rajeev Tomar**  
*DTDC*  
**4.2 Lac**

**Sumit Kumar**  
*Newgen Software Technologies Limited*  
**4.0 Lac**

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## *Result of the Department*

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<i>2019-23 Batch</i>				
<i>Top 5 Students</i>				
<i>S. No</i>	<i>Roll No.</i>	<i>Name of student</i>	<i>SGPA</i>	<i>CGPA</i>
<i>1</i>	<i>0808EX191014</i>	<i>Omica Sharma</i>	<i>9.56</i>	<i>9.46</i>
<i>2</i>	<i>0808EX191016</i>	<i>Pranay Bohre</i>	<i>9.19</i>	<i>9.24</i>
<i>3</i>	<i>0808EX191009</i>	<i>Dipti Rawal</i>	<i>9.06</i>	<i>9.04</i>
<i>4</i>	<i>0808EX191012</i>	<i>Kushagra Soni</i>	<i>9.19</i>	<i>8.95</i>
<i>5</i>	<i>0808EX191002</i>	<i>Aditya Shivhare</i>	<i>8.63</i>	<i>8.67</i>

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## **Students Articles**

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### ***Super-capacitors: A Promising Frontier in Renewable Energy Storage***

#### ***Introduction***

*In the realm of renewable energy storage, super-capacitors, also known as ultra-capacitors or electrochemical capacitors, are emerging as a revolutionary technology with the potential to complement and enhance existing energy storage solutions. Unlike traditional batteries, super-capacitors store energy electrostatically rather than chemically, offering unique advantages for applications ranging from grid-scale energy storage to electric vehicles and beyond. Super-capacitors consist of two electrodes separated by an electrolyte and a porous separator. The electrodes are typically coated with a high-surface-area material like activated carbon or carbon nanotubes, which allows for the accumulation of electrical charge. Unlike batteries, which store energy through chemical reactions, super-capacitors store energy in an electrostatic double-layer capacitance or through a process called pseudo capacitance, offering rapid charge and discharge cycles and virtually unlimited lifespan.*

#### ***Applications in Renewable Energy Storage***

*Grid-Scale Energy Storage: Super-capacitors can be employed alongside batteries and other energy storage systems to provide fast-response energy storage solutions for stabilizing fluctuations in renewable energy sources such as solar and wind power. Their ability to charge and discharge rapidly makes them ideal for managing short-term energy surges and grid balancing.*

*Energy Harvesting and Peak Shaving: Super-capacitors are effective in capturing and storing energy from intermittent renewable sources during peak production periods. This stored energy can then be released during peak demand periods, reducing reliance on fossil fuels and enhancing grid reliability.*

*Regenerative Braking in Electric Vehicles: In transportation, super-capacitors are used in regenerative braking systems in electric and hybrid vehicles. They quickly store energy generated during braking and release it to assist with acceleration, thereby improving overall energy efficiency and extending battery life.*

*Power Quality and Uninterrupted Power Supply (UPS): Super-capacitors provide instantaneous power delivery and help maintain stable voltage levels, making them suitable for applications requiring high power density and reliability, such as UPS systems for critical infrastructure and industrial equipment.*

### **Advantages Over Traditional Batteries**

*High Power Density: Super-capacitors have higher power density than batteries, allowing for rapid charge and discharge rates without degradation over time.*

*Long Cycle Life: They offer virtually unlimited cycle life compared to batteries, making them a durable and cost-effective energy storage solution in the long term.*

*Temperature Resilience: Super-capacitors operate effectively across a wide range of temperatures, from extreme cold to heat, without significant performance degradation.*

### **Challenges and Future Directions**

*While super-capacitors offer compelling advantages, there are challenges to be addressed for broader commercial deployment. Current super-capacitors have lower energy density compared to batteries, limiting their capacity for long-term energy storage. Manufacturing costs need to be reduced to achieve cost competitiveness with traditional energy storage technologies. Innovations in electrode materials and electrolytes are crucial for improving performance and addressing environmental impacts related to resource extraction and recycling.*

### **Conclusion**

*Super-capacitors represent a promising frontier in renewable energy storage, offering high efficiency, rapid response times, and exceptional durability. As advancements in materials science and manufacturing continue to drive innovation, the potential for integrating super-capacitors into diverse renewable energy applications continues to expand.*

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**Article by**  
**Pranav Bohre (0808EX191016)**  
**4th Year, EEE**

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## **Students Articles**

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### ***Robotics in Surgical Procedures and Rehabilitation: Advances in Healthcare***

#### ***Introduction***

*In recent decades, robotics has revolutionized the field of healthcare, particularly in surgical procedures and rehabilitation. From enhancing precision and reducing invasiveness in surgeries to aiding recovery and rehabilitation processes, robotic technologies are pushing the boundaries of what's possible in medical treatment and care. Surgical robotics combines advanced robotics, artificial intelligence (AI), and imaging technologies to assist surgeons in performing complex procedures with greater precision and control. Here are some key aspects:*

*Minimally Invasive Surgery (MIS): Robotic-assisted surgery allows for smaller incisions compared to traditional open surgeries. This results in reduced trauma, faster recovery times, and decreased risk of complications for patients. Robots like the da Vinci Surgical System enable surgeons to perform intricate procedures with enhanced dexterity and visualization capabilities.*

*Enhanced Visualization: High-definition cameras and magnification capabilities integrated into robotic systems provide surgeons with detailed, real-time views of the surgical site. This enhances accuracy and enables precise tissue manipulation and suturing.*

*Teleoperation and Remote Surgery: Advances in communication technologies enable teleoperation, where surgeons can perform surgeries from remote locations using robotic systems. This has potential applications in providing healthcare to underserved or remote areas.*

*Training and Simulation: Robotic platforms offer simulation environments for training surgeons in virtual settings before performing procedures on patients. This enhances skill development and proficiency while ensuring patient safety.*

*Rehabilitation Robotics: Assisting Recovery and Improving Quality of Life*

*In rehabilitation, robotics plays a crucial role in aiding recovery from injuries, strokes, and neurological conditions. These technologies are designed to assist patients in regaining mobility, strength, and independence:*

*Exoskeletons: Powered exoskeletons are wearable robotic devices that support and augment the body's movement. They assist patients with walking, standing, and performing daily activities, particularly beneficial for individuals with spinal cord injuries or mobility impairments.*

*Robot-Assisted Therapy: Robotics enable therapists to deliver repetitive and intensive rehabilitation exercises with consistent precision. This promotes neuroplasticity and motor recovery in patients recovering from stroke or neurological disorders.*

*Sensor Technologies: Robotics integrated with sensors monitor patient progress and provide real-time feedback to therapists, allowing for personalized rehabilitation plans and adaptive interventions.*

### **Conclusion**

*Robotics has significantly transformed surgical procedures and rehabilitation practices, offering precision, efficiency, and improved patient outcomes. As technology continues to advance, the future of robotics in healthcare holds promise for further innovation and applications. Embracing these technologies not only enhances medical treatment and rehabilitation but also underscores the potential for robotics to improve quality of life and redefine standards of care in the healthcare industry. With ongoing research, development, and collaboration, robotics in healthcare is poised to continue shaping the future of medicine, ultimately benefitting patients and healthcare providers worldwide.*

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**Article by**  
**Omica Sharma (0808EX191014)**  
**4th Year, EEE**

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## Memorable Moments

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### Industrial Visit

*Shakti Pump Industrial Area, Sector 3, Pithampur, Dist. Dhar, Madhya Pradesh*

*Friday, 16th September 2022*



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## ***e-Awartan Tech Fest – 2023***

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*e-Awartan is an annual tech- fest organized by department of Electrical & Electronics Engineering, IPS Academy, IES, Indore every year. This event is for two days, in which different competitions like paper presentation, project competition, technical quiz and expert lecture organized for the students. The main aim behind to conduct this event is to provide a platform to students, to enhance their skills and knowledge. Such type of events is very helpful for students to show their learning in an academic year. Every year, in month of march-April department conduct this event at IES Auditorium Hall.*

### *About e–Awartan 2023*

*Department of Electrical & Electronics Engineering, IPS Academy, IES, Indore has organized two days Tech-Fest event “e-Awartan 2023”. The tech fest was held for two days from 24th - 25th March 2023.*

- *Poster Making Competition*
- *Poster making competition was held on 24th March 2023*
  
- *Technical Quiz Competition*
- *Technical Quiz Competition was held on 24th March 2023*
  
- *Circuit making Competition*
- *Circuit making competition was held on 24th March 2023*
  
- *Project and Model Competition*
- *Project Competition was held on 25th March 2023*
  
- *paper presentation competition*
- *paper presentation competition was held on 25th March 2023*

## Department Events During 2022-23

<b>S No.</b>	<b>Date</b>		<b>Type</b>	<b>Topic</b>
<b>1</b>	25/07/2022	30/07/2022	Refresher Course	Refresher course on Electrical Vehicle (EVs) Technology
<b>2</b>	23/08/2022	23/08/2022	BoS	BoS Meeting
<b>3</b>	23/08/2022	23/08/2022	Expert Lecture	Instrument Transformer Calibration using PMU Data Dr. S.A. Soman, Professor, IIT, Mumbai
<b>4</b>	15/09/2022	15/09/2022	Expert Lecture	Bridging Theoretical Concept to Industry Oriented Application in Power Electronics, Dr. Chinmay Jain, D.G.M- electronics and Controls, Shakti Pump (India) Limited, Pithampur (M.P)
<b>5</b>	16/09/2022	16/09/2022	Industrial Visit	Shakti Pump (India) Limited, Pithampur (M.P)
<b>6</b>	07-01-2023	07-01-2023	Industrial Visit	Shree Pacetronix Ltd.
<b>7</b>	23-01-2023	28-01-2023	Refresher Course	Refresher Course on MATLAB Programming
<b>8</b>	28-02-2023	28-02-2023	Quiz Competition	Quiz Competition (Science Day)
<b>9</b>	24-03-2023	25-03-2023	e-Awartan	Technical Quiz/ Poster Competition/ Circuit Making/Project/ Model Competitions/ Paper Presentation
<b>10</b>	24-04-2023	24-04-2023	Science Exhibition	Science Exhibition



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**Department of Electrical & Electronics Engineering**