ELECTRICAL AND ELECTRONICS ENGINEERING

VOLTRIX

ANNUAL MAGAZINE

2024 - 25

CONNECTING KNOWLEDGE,

CONDUCTING INNOVATION

Chettinad
College of Engineering & Technology
Approved by AICTE-New Delhi and Affiliated to Anna University-Chennai.

NH-67, KARUR-TRICHY HIGHWAY
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9345002630

VOLTRIX

ANNUAL MAGAZINE 2024-25

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Department of Electrical and Electronics Engineering
Chettinad College of Engineering and Technology, Karur

It gives us immense pleasure to present VOLTRIX, the Annual Magazine of the Department of Electrical and Electronics Engineering, Chettinad College of Engineering and Technology, Karur, for the Academic Year 2024–25.

VOLTRIX serves as a vibrant platform to showcase the academic excellence, technical innovations, creative expressions, and achievements of our students and faculty members. It reflects the department's continuous journey towards knowledge, research, and skill development in the ever-evolving field of Electrical and Electronics Engineering.

The magazine captures a wide spectrum of content ranging from technical articles, research insights, project innovations, industrial trends, and green energy initiatives to student activities, achievements, and creative contributions. It also highlights the department's active involvement in seminars, workshops, industrial collaborations, and value-added programs that nurture the professional growth of young engineers.

With a commitment to excellence, teamwork, and innovation, VOLTRIX 2024–25 stands as a testimony to the enthusiasm and dedication of our budding engineers and the unceasing guidance of our faculty.

PRINCIPAL MESSAGE

I am immensely delighted to extend my warm greetings to all readers of *VOLTRIX 2024-25*, the annual magazine of the Department of Electrical and Electronics Engineering, Chettinad College of Engineering and Technology, Karur.

This magazine stands as a vibrant platform to showcase the intellectual capabilities, technical achievements, and creative expressions of our budding engineers. It is heartening to witness how the department consistently fosters innovation, academic excellence, and holistic development through such initiatives.

At Chettinad College of Engineering and Technology, we strive to cultivate a spirit of curiosity, integrity, and leadership among our students. The contributions featured in this edition reflect not only the depth of technical understanding but also the passion and commitment of our students and faculty towards their field.

I appreciate the editorial team, faculty members, and student contributors who have worked with dedication to bring out this edition of *VOLTRIX*. May this magazine continue to inspire and ignite minds in the years to come.

Wishing the Department of Electrical and Electronics Engineering continued success in all its future endeavors.

Dr. (Mrs.) A. Punitha
Principal
Chettinad College of Engineering and Technology, Karur

HOD MESSAGE

It gives me great pleasure to present VOLTRIX 2024-25, the annual magazine of the Department of Electrical and Electronics Engineering, Chettinad College of Engineering and Technology, Karur.

This magazine is a testament to the creativity, talent, and technical enthusiasm of our students and faculty. It brings together a collection of technical articles, project highlights, achievements, and student expressions that reflect the vibrant academic culture within our department.

As technology continues to evolve, our department remains committed to equipping students with the knowledge, skills, and values required to excel in the ever-changing field of Electrical and Electronics Engineering. We continuously strive to provide a platform where innovation, research, and holistic development are encouraged and celebrated.

I sincerely appreciate the efforts of the editorial board, contributors, and coordinators who have made this publication a reality. I hope VOLTRIX 2024-25 inspires its readers and continues to be a source of pride for the department.

Mr. N. Vijayasarathi
Head of the Department
Electrical and Electronics Engineering
Chettinad College of Engineering and Technology, Karur

BOARD OF EDITORS MESSAGE

With immense pride and enthusiasm, we present to you VOLTRIX 2024-25, the annual magazine of the Department of Electrical and Electronics Engineering, Chettinad College of Engineering and Technology, Karur.

This magazine is more than just a collection of pages — it is a reflection of the vibrant energy, technical brilliance, and creative spirit that define our department. From insightful technical articles and innovative project highlights to poems, fun sections, and achievements, VOLTRIX captures the essence of our students' and faculty's journey throughout the academic year.

As editors, it has been a fulfilling experience curating content that showcases the diverse talents of our department. We have strived to strike a balance between technical depth and creative expression, offering something valuable and engaging for every reader.

We extend our heartfelt gratitude to our Principal, HOD, faculty members, and all contributors for their constant support and encouragement. A special thanks to the students whose enthusiasm and efforts gave life to this edition.

We hope VOLTRIX 2024-25 informs, inspires, and ignites new ideas among its readers.

Happy Reading!

Mr. M. Vasanthprakash
AP/EEE

Ms. P. Thenmozhi
AP/EEE

ABOUT CHETTINADTECH

The Chettinad College of Engineering and Technology is promoted by the Rani Meyyammai Achi of Chettinad Charitable Trust. The promoters of the college have over 90 years of experience in education. The sponsoring trust comprises of eminent personalities who have excelled as leaders in the field of education. With over 90 years of experience in education, especially technical education, the Rani Meyyammai Achi of Chettinad Charitable Trust has been imparting quality technical education at an affordable price to the students in the rural areas.

The college, located in the district of Karur in Tamil Nadu was started in the year 2007. It is approved by the All India Council for Technical Education, New Delhi and is affiliated to the Anna University, Chennai. For over a decade, the college has been committed to delivering quality technical education to the student community. Considered to be one of the top engineering colleges in Tamil Nadu, it has excellent infrastructure which provides growth opportunities for students to excel in their respective disciplines in the fields of engineering, technology and management. The college works towards moulding students into all-rounders with good interpersonal skills and effective soft skills to make them confident to embrace challenges of the future.

VISION OF THE INSTITUTE

To holistically develop competent and responsible Engineers and Managers as future leaders by providing an enriching, safe and joyful learning environment where students feel empowered.

MISSION OF THE INSTITUTE

1. To impart knowledge and the skills through active learning, industrial exposure and innovative project development.

2. To develop leaders through effective mentoring, SMART goal setting and providing a joyful and safe learning environment.

3. To facilitate research in Engineering and Technology and encourage independent learning

COURSES

S.NO	COURSE	SEATS
1.	Artificial Intelligence & Data Science	60
2.	Information Technology	60
3.	Computer Science and Engineering	60
4.	Electronics and Communication Engineering	60
5.	Electrical and Electronics Engineering	60
6.	Mechanical Engineering	60
7.	Master of Business Administration	90

ABOUT E E E

The Department of Electrical and Electronics was established in the year 2008 with the aim of combining modern teaching methods with inter-disciplinary knowledge, human values and professional ethics. The department offers a unique blend of theory and practice. It provides a quality learning environment, in terms of state-of-the-art facilities, sharing and widening of knowledge through MoU with relevant industries and interacting with experts from academia and industry.

The department is well equipped with state-of-the-art laboratories such as the Electrical Machines Lab, Electric Circuits Lab, Control Systems Lab, Measurement and Instrumentation Lab, Engineering Practices Lab, Power Electronics Lab, Power System Simulation Lab and Electric Drives and Controls Lab. To improve practical and simulation skills, MAT LAB Software with all tool boxes has been provided. Power World Simulator, MI Power, PSpice and MultiSim software programmes have been provided to improve the designing ability of the students.

VISION OF THE DEPARTMENT

To create a thriving community where enduring student relationships flourish, fostering a culture of innovative idea development, socially responsible, and ethically driven engineers in the electrical industry.

MISSION OF THE DEPARTMENT

1. To nurture students, enabling them to effectively confront professional challenges and emerge as outstanding engineers and technocrats.
2. To provide a holistic and comprehensive education that ensures total quality, encompassing broad exposure and value additions.
3. To engage in research within the realm of Electrical and Electronics Engineering, addressing the needs of the industry, scientific community, and society at large.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 Find employment in Core Electrical and Electronics Engineering and service sectors.

PEO 2 Get elevated to technical lead position and lead the organization competitively.

PEO 3 Enter into higher studies leading to post-graduate and research degrees. Become consultant and provide solutions to the practical problems of core organization.

PEO 4 Become an entrepreneur and be part of Electrical and Electronics product and service industries.

PROGRAM OUTCOMES (POs)

PO 1 **ENGINEERING KNOWLEDGE:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2 **PROBLEM ANALYSIS:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3 **DESIGN/DEVELOPMENT OF SOLUTIONS:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4 **CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5 **MODERN TOOL USAGE:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6 **THE ENGINEER AND SOCIETY:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7 **ENVIRONMENT AND SUSTAINABILITY:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO 8 **ETHICS:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9 **INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10 **COMMUNICATION:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11 **PROJECT MANAGEMENT AND FINANCE:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12 **LIFE-LONG LEARNING:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1 Ability to understand the principles and working of electrical components, circuits, systems and control that are forming a part of power generation, transmission, distribution, utilization, conservation and energy saving. Students can assess the power management, auditing, crisis and energy saving aspects.

PSO 2 Ability to apply mathematical methodologies to solve problems related with electrical engineering using appropriate engineering tools and algorithms.

PSO 3 Ability to use knowledge in various domains to identify research gaps and hence to provide solution which leads to new ideas and innovations.

DEPARTMENT FACULTY

Mr. N. Vijayasarathi
Head & Assistant Professor/EEE

Mrs. P. Thenmozhi
Assistant Professor/EEE

Dr. M. Senthilkumar
Professor/EEE

Mr. S. Ragul
Assistant Professor/EEE

Dr. P. Pounraj
Associate Professor/EEE

Mr. M. Vasanthprakash
Assistant Professor/EEE

Mrs. A. Bhuvaneswari
Assistant Professor/EEE

Mr. M. Dineshkumar
Assistant Professor/EEE

Mr. P. Pandi
Assistant Professor/EEE

Mr. K. Boopathi
Lab Instructor/EEE

Mrs. S. Malarkodi
Assistant Professor/EEE

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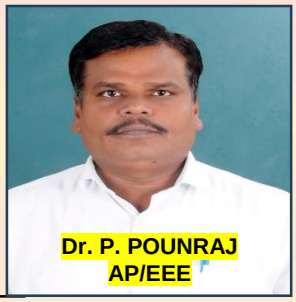
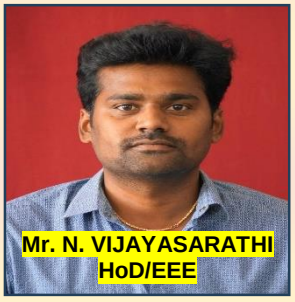
PRINCIPAL


Dr. M. SENTHILKUMAR
PROF./EEE


Dr. P. POUNRAJ
AP/EEE

Editor-in-Chief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HoD/EEE

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AP/EEE


Ms. P. THENMOZHI
AP/EEE

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II-EEE


Mr. K. SUREN
III-EEE


Ms. M. BHUVANA
IV-EEE

Programme Name: Live Demonstration Class for CVM school students

Date: 11-07-2024

Class & No. of Participants: CVM XII Students & 39

Venue: Electrical Machines Lab.

Description:

On July 11, 2024, we had the pleasure of hosting 39 Chettinad Vidya Mandir XII students and two faculty members on our campus for an insightful live demonstration class. The session, led by our Electrical and Electronics Engineering department faculty, Mr. N. Vijayasarathi, AP/EEE and Mr. P. Pandi, AP/EEE aimed to deepen students understanding of the fundamental concepts of electrical machines and transformers, their working principles, and their applications in real-world scenarios. Through hands-on demonstrations and design calculations, students learned about the construction and operation of transformers, DC motors, and alternators.

During the interactive Q&A session, students enthusiastically engaged with our faculty, clarifying doubts and exploring real-world applications and career opportunities in Electrical Engineering. The Chettinad Vidya Mandir students found the session informative and engaging, with many indicating a heightened interest in pursuing studies in electrical engineering. They expressed gratitude to the administration of Chettinad College of Engineering and Technology and extended special thanks to the demonstrators for their excellent presentations, which provided a valuable learning experience by combining theoretical knowledge with practical demonstrations.

Event Photos:


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Programme Name: Value Added Course - "Fundamentals of MATLAB"

Date: 12-08-2024 to 14-08-2023 (3 Days)

Class & No. of Participants: II Year & 35 Students

Venue: G-Block EEE Computer Lab

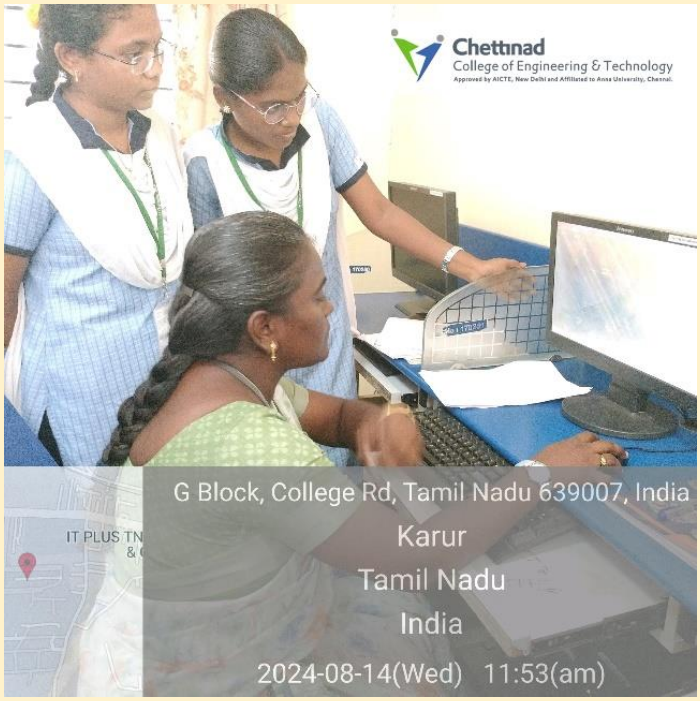
Faculty incharge:

1. Mrs. P. Thenmozhi,AP/EEE
2. Mr. S. Ragul, AP/EEE

Description:

The Department of Electrical and Electronics Engineering organised a three-day value-added course on "Fundamentals of MATLAB" for 2nd-year EEE students from August 12th to 14th, 2024. The sessions, titled 'Getting into MATLAB,' were led by EEE faculty members Mrs. P. Thenmozhi, AP/EEE, and Mr. S. Ragul, AP/EEE. During the course, students learnt to simulate and analyse the output of various functional tools such as numerical analysis, digital image processing, power electronics, electric machinery, and electrical engineering, which falls into 7 module bases: application base, measurement module base, discrete measurement module base, and power module base, which includes DC voltage sources, current sources, and AC power systems using MATLAB software.

Event Photos:


Chettinad
College of Engineering & Technology
G Block, College Rd, Tamil Nadu 639007, India
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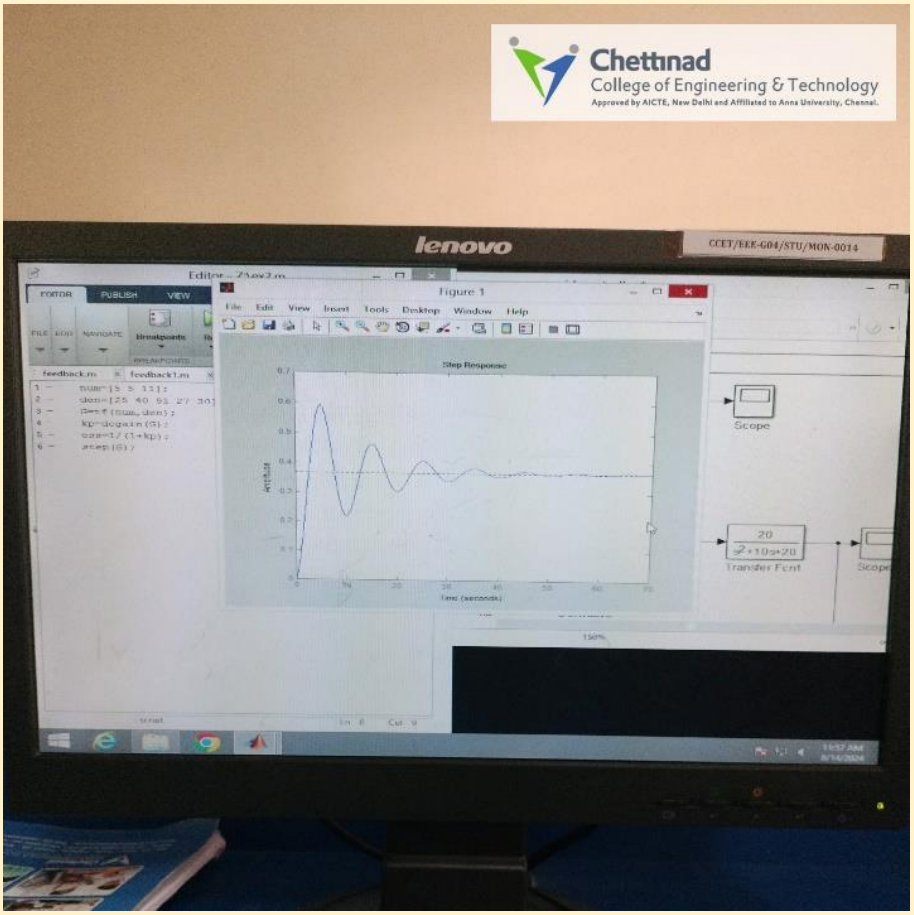
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Programme Name: Value Added Course - " Design of Regulated Power Supply"

Date: 12-08-2024 to 13-08-2023 (2 Days)

Class & No. of Participants: III Year & 40 Students

Venue: G-Block EEE Computer Lab

Faculty incharge:

1. Dr. P. Pounraj, AP/EEE
2. Dr. M. Senthil Kumar, ASP/EEE

Description:

The 'Design of Regulated Power Supply' value-added course, conducted from 12-08-2024 to 13-08-2024 at Chettinad College of Engineering and Technology, provided third-year Electrical and Electronics Engineering students with crucial knowledge and practical skills in designing and implementing regulated power supplies. The session was conducted by our EEE department faculty, Dr. P. Pounraj, AP/EEE, and Dr. M. Senthil Kumar, ASP/EEE. The course covered essential concepts like voltage regulation, stability, and filtering, enhancing students' practical abilities through hands-on exercises. This course is highly relevant as it equips students with critical skills needed for various electronics applications, preparing them for real-world engineering challenges and future career opportunities in the industry.

Event Photos:

Programme Name: 5 days - Energy Audit

Date: 19-08-2024 to 23-08-2024 (5 Days)

Class & No. of Participants: III Year & 6 Students

Venue: Government Hospital, Kulithalai

Faculty incharge:

3. Mr. N. Vijayasarathi, AP/EEE
4. Mr. M. Vasanthprakash, AP/EEE

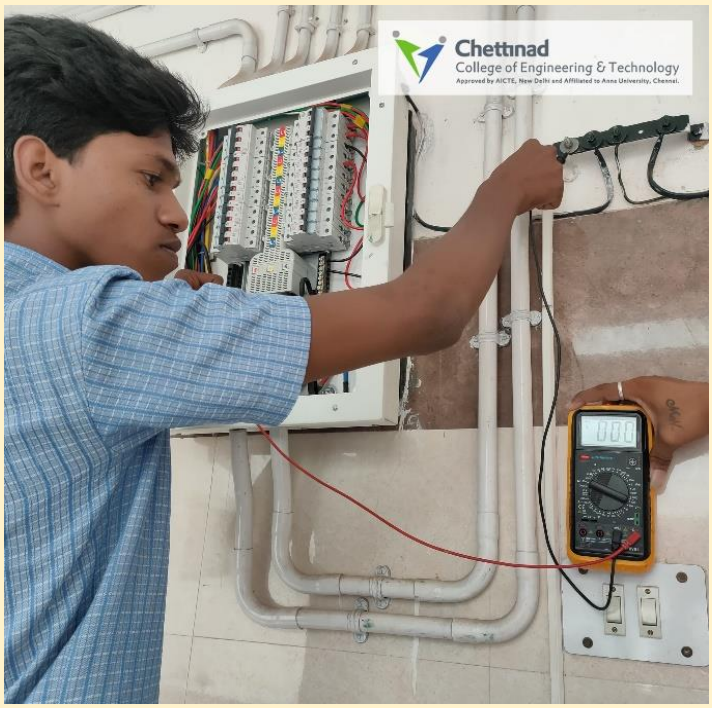
Description:

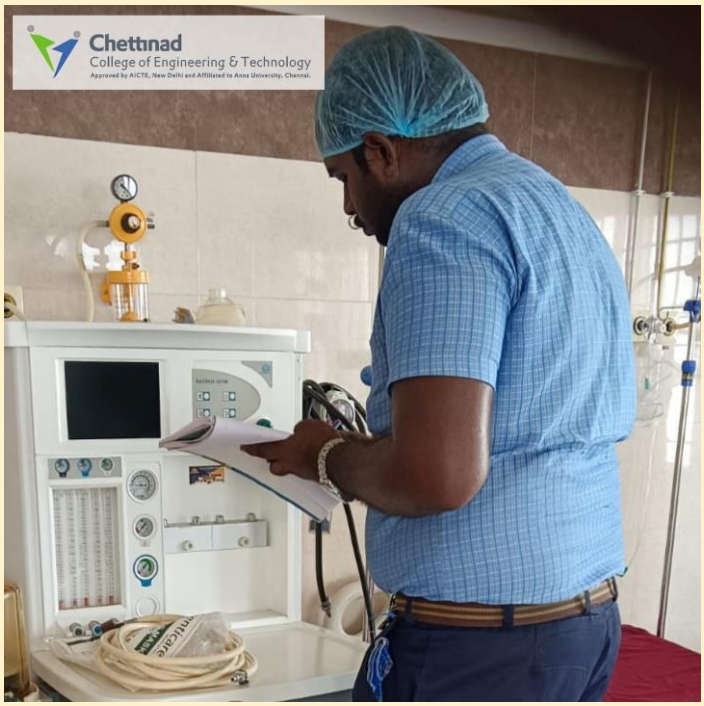
From August 19th to 23rd, our dedicated team—led by Mr. N. Vijayasarathi, Project Convener, Mr. M. Vasanthprakash, Project Coordinator, and third-year EEE students Mahalakshmi P, Manoj M, Santhoshkumar S, Suren K, Hariharasudhan S, and Vignesh C—conducted a comprehensive energy audit at the Government Hospital in Kulithalai. The primary objective of the audit was to evaluate energy consumption patterns and identify opportunities for energy efficiency improvements. This audit covered all major energy-consuming systems within the hospital, like lighting, HVAC, medical equipment, and electrical appliances.Students measured all the medical facility's electrical equipment power rating and estimated how much energy was utilised by each piece of equipment, which will show the energy consumption that could benefit from conservation or improved efficiency. The audit was conducted over five days. Energy consumption data was collected through direct measurement using energy meters and analysis of utility bills. Observations were also made on the operational efficiency of different systems.

As per the Specific Energy Consumption (SEC) consideration, students calculated the hospital SEC, which was taken as a reference for comparison and was calculated to be 582 kWh/day. Energy Conservation Measures (ECM) with and without investment were recommended for potential energy savings for the hospital. Implementing the recommended measures could result in significant energy savings and reduce the optimised energy usage across the hospital.

Energy-saving potential could be achieved by implementing the given proposals with around Rs. 4,79,014 per annum. Finally, the energy audit report was submitted to the Chief Medical Officer, and students received certificates and appreciation. Mr. N. Vijayasarathi, HoD/EEE, thanked all of the students who took part in the energy audit.

Event Photos:

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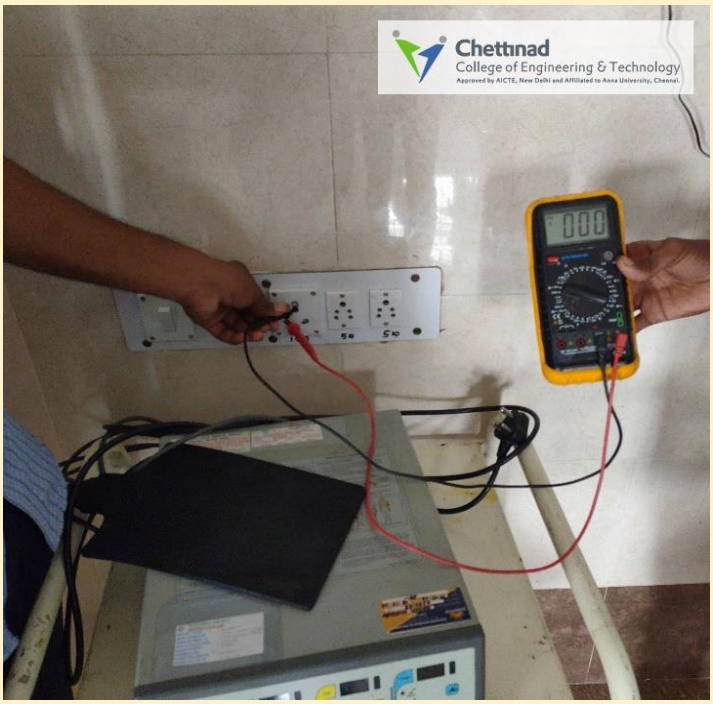
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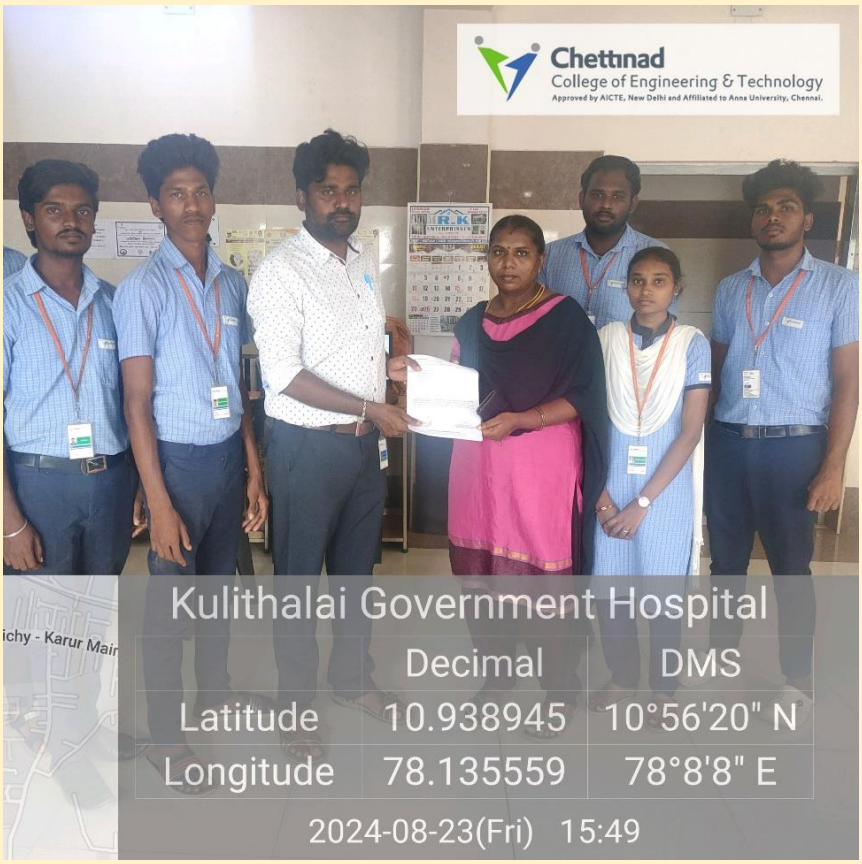
College of Engineering & Technology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College of Engineering & Technology
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Programme Name: Department of EEE - Orientation Programme for the next level semester of Second, Third & Final Year

Date: 22-08-2024

Venue: G Block Seminar Hall

Resource Person: Mr. N. Vijayasarathi, HoD/EEE

Description:

As part of the orientation, the Department of Electrical and Electronics Engineering organized a **'Student Orientation Programme'** for the next level semester of Second, Third & Final Year EEE Students on 22.08.2024. Mr. N. Vijayasarathi, HoD/EEE welcomed all the students and faculty members of EEE department. The speaker delivered information to the students regarding the college's vision & mission, disciplinary rules and regulations to be followed inside the college, the subjects and faculty for the academic year 2024–2025(odd semester), Department plans, Academic instructions, Internship, NPTEL course, Soft skill and Placement training programmes for our students. Apart from this, he also shared his domain knowledge on goal setting and how to set short-term and long-term goals and achieve them, career opportunities for electrical engineers, guidelines for higher studies. The event set a positive tone for the academic year 2024-25(odd), ensuring that students feel supported and motivated to succeed.

Event Photos:

Programme Name: Batch 17 - Orientation Programme

Date: 18-09-2024

Class & No. of Participants: I Year & 28 Students

Venue: G Block Seminar Hall

Description:

The Department of Electrical and Electronics Engineering orientation programme was organized to welcome and familiarize the incoming students with the department, its curriculum, faculty, and facilities. The aim of the event was to give a comprehensive overview of the academic journey ahead and inspire students to pursue excellence in the field. The primary objectives of the orientation programme were to introduce students to the structure and scope of the EEE course. To provide an overview of departmental resources, laboratories, and infrastructure. To give insights into career prospects, goal setting, and the importance of internships. The programme began with an opening speech by the Head of the Department, Mr. N. Vijayasarathi, HOD/EEE who welcomed the new batch. He outlined the department's mission, vision, an overview of the curriculum, and achievements over the years, emphasizing the importance of innovative thinking in Electrical and Electronics Engineering. He also delivered a session on career opportunities in Electrical and Electronics Engineering. He discussed the current trends, emerging technologies, and the importance of internships. The role of research and development in EEE was also emphasized, encouraging students to explore higher education and innovation. The orientation program successfully sets the incoming students up by the department to give them clarity on the course structure, departmental activities, and future career paths. Students left the event feeling motivated and better prepared for their Electrical and Electronics Engineering academic journey.

Event Photos:

Programme Name: New Beginnings: The Freshers Party

Date: 18-09-2024

Class & No. of Participants: I Year & 28 Students

Venue: C Block Seminar Hall

Faculty incharge: Mr. P. Pandi, AP/EEE

Description:

The Freshers' Party celebration for the Electrical and Electronics Engineering Batch 17 was held on September 18, 2024, with great enthusiasm and joy. The event, organised by the senior students (II year) and faculty members to welcome the new batch into the EEE family, aimed to help the freshers feel comfortable, foster camaraderie, and create lasting memories. The venue was beautifully decorated, and the atmosphere was filled with excitement as the freshers, along with faculty and senior students, gathered to mark the occasion. The entertainment session featured a variety of dance performances, musical acts, drama & skits, and fun games by both the freshers and seniors.

The celebration ended with an exciting DJ session, where students hit the dance floor and let loose. The energetic music created an electrifying atmosphere, allowing everyone to dance together and break down formal barriers. It marked the beginning of new friendships and an exciting academic journey for the freshers. The event concluded with a vote of thanks from Mr. P. Karthikeyan, II-EEE, the Event Coordinator. Faculty members appreciated the hard work and creativity of the organising team and extended their best wishes to the freshers for a successful academic year ahead.

Event Photos:


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Programme Name: Field Trip

Date: 22-10-2024

Class & No. of Participants: III Year & 40 Students

Location: Puliyur Substation

Faculty incharge: Mr. M. Vasanthprakash, AP/EEE & Mr. P. Pandi, Sr. AP/EEE

Description:

On October 22, 2024, the department of Electrical and Electronics Engineering organised a field trip to Puliyur Substation for III-year EEE 40 students, accompanied by 2 faculty members, Mr. M. Vasanthprakash, AP/EEE, and Mr. P. Pandi, Sr. AP/EEE. The purpose of the visit was to provide students with practical exposure to the functioning of an electrical substation and to understand the real-time applications of the theoretical concepts studied. Puliyur Substation is a critical node in the region's power distribution network that handles the transformation of high-voltage electricity from power plants to lower voltage levels suitable for distribution to residential, commercial, and industrial areas. The substation is to equip the students with modern equipment, including transformers, circuit breakers, relays, and control systems.

Upon arrival, the students were welcomed by the substation's engineering team, Mr. R. Kirubhakaran, Assistant Executive Engineer (AEE), and Mr. R. Perumal, Junior Engineer (JE), who gave a brief overview of the substation's operations and its significance in the power grid. The students were then taken on a guided tour to the substation. They observed the main components, such as transformers, circuit breakers, and protective devices. The engineers explained how power is stepped down from higher to lower voltages and the role of each component in ensuring stable power supply. A visit to the control room allowed the students to see how the substation is monitored and controlled. They were introduced to the SCADA (Supervisory Control and Data Acquisition) system, which enables remote monitoring and control of various substation operations.

During the interactive Q&A session with the engineers, questions about the challenges of managing a substation, the future of renewable energy integration, and the evolution of power systems were discussed. The field trip to Puliyur Substation was highly educational and informative and provided the students with valuable insights into the real-world functioning of electrical substations, which enhanced their understanding of electrical engineering concepts.

Event Photos:


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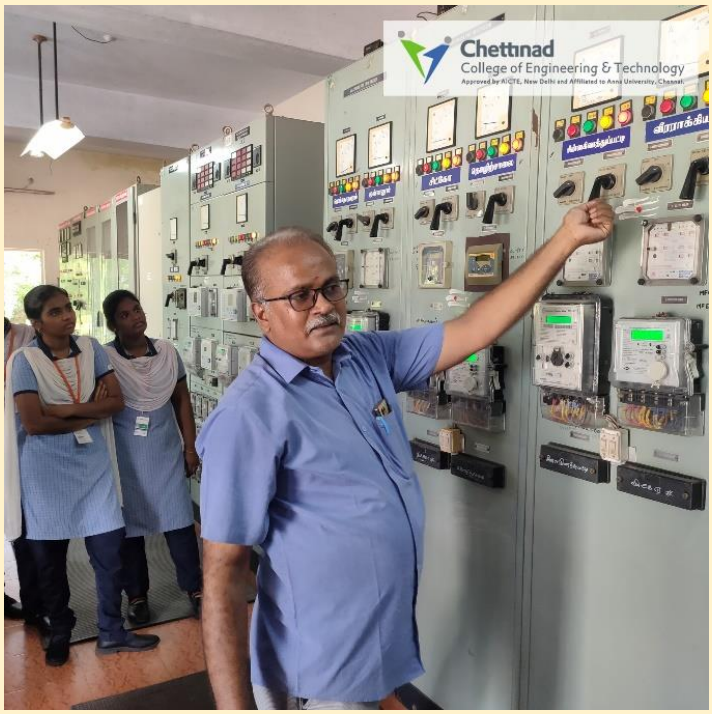
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Programme Name: Association Inaugural for the academic year 2024-25

Date: 23-10-2024

Class & No. of Participants: I Year to IV Year

Venue: C Block Seminar Hall

Chief Guest & Speaker: Mr. P. Ganesan, DGM, Chettinad Cement Corporation Pvt. Ltd., Puliyur

Description:

On 23rd October 2024, the Department of Electrical and Electronics Engineering at Chettinad College of Engineering & Technology, held a guest lecture on "Unlocking the Power of Energy Conservation" as part of their association inaugural. The event was graced by Mr. P. Ganesan, Deputy General Manager (DGM), Chettinad Cement Corporation Ltd., Puliyur, as the Chief Guest and Speaker. The event began with a prayer song by third-year EEE girls, followed by the traditional lighting of the Kuthuvilaku by the dignitaries and formal introductions and welcoming speeches by students and faculty members.

The focus of the event centered on Mr. Ganesan's technical presentation, where he underscored the urgent need for energy conservation in the modern industrial landscape. He emphasised the significant role industries, particularly cement manufacturing contribute in energy consumption and how this consumption can be optimized. Drawing from his vast experience at Chettinad Cement Corporation, Mr. Ganesan illustrated how his organization has successfully implemented energy-saving initiatives. He explained how using innovative technologies and management practices has reduced their energy footprint and led to significant cost reductions.

Mr. Ganesan encouraged students to focus on sustainability in their future roles as engineers. He highlighted the vital role that young engineers play in promoting energy conservation through innovations and engineering solutions. The session ended with an engaging Q&A session, where students had the opportunity to ask Mr. Ganesan about the future of energy conservation technologies and the role of renewable energy in industrial applications. The event wrapped up with a vote of thanks by Ms. P. Nageshwari, III year EEE, followed by the National Anthem.

Event Photos:


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ENERGY CONSERVATION

Programme Name: Heritage Visit

Organized by: Department of Electrical and Electronics Engineering

Date: 09-11-2024(Saturday)

Total no. of students: 29

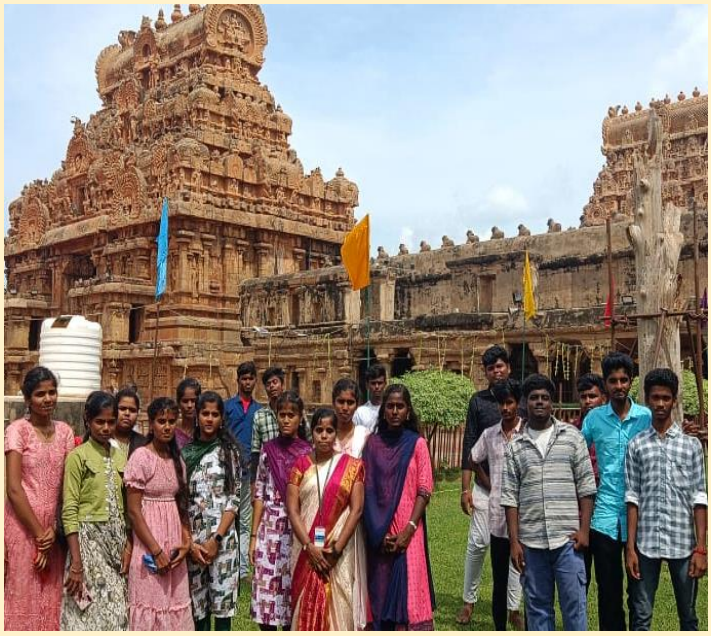
Venue: Thanjai Pragatheeswarar Temple

Description:

The Chettinad College of Engineering and Technology organised a one-day heritage visit on November 9, 2024. A group of 29 students from the Electrical and Electronics Engineering (EEE), along with 5 faculty members, visited the Brihadeeswarar Temple in Thanjavur, a UNESCO World Heritage site, renowned for its architectural magnificence and historical importance. The magnificent temple instantly captivated the students with its towering gopurams and intricate sculptures. Dr. A. Kanchana, AP/Tamil, provided an orientation session on the temple's history, architectural significance, and engineering marvels, and shared insights about its construction under the Chola Dynasty and its resilience over centuries.

Our students explored the temple Vimana (tower), admired for its impressive height of over 60 meters, and observed its unique engineering and materials that have preserved it through the ages. The intricate sculptures and artwork left the students in awe, offering insights into the advanced techniques and rich culture of the Chola period while deepening their understanding of ancient cultural significance. After the heritage visit, students participated in discussions with the faculty, sharing observations on the temple's construction techniques and cultural symbolism.The group gathered for a final photo at 3:30 PM before heading back to college, with the journey filled with lively discussions about the temple's fascinating architecture.

Event Photos:



Value-Added Course: Power Supply Design: From Concept to Fabrication

Date: 24-01-2025; 27-01-2025 & 28-01-2025 (3 Days)

Class & No. of Participants: II Year & 35 Students

Venue: G Block Computer Lab & EEE Workshop Lab

Course Coordinators: 1. Dr. P. Pounraj, ASP/EEE, 2. Mr. S. Ragul, AP/EEE,
3. Mr. M. Vasanthprakash, AP/EEE,

Description:

The Value-Added Course on 'Power Supply Design: From Concept to Fabrication' was successfully conducted on January 24, 27, and 28, 2025, for second-year EEE students at Chettinad College of Engineering and Technology. The course provided an in-depth understanding of designing and fabricating regulated power supplies, equipping students with essential theoretical knowledge and practical skills. The sessions focused on fundamental electronics concepts, power supply analysis using MATLAB, hands-on training with circuit components, and step-by-step fabrication techniques. Students actively participated in designing and testing circuits, gaining real-time experience with diodes, capacitors, inductors, and voltage regulators.

The practical sessions were conducted in the EEE workshop lab and computer lab, ensuring an effective learning environment with adequate resources. Throughout the course, students engaged in various exercises that enhanced their problem-solving abilities, critical thinking, and creativity. They successfully completed hands-on projects, demonstrating their ability to design, analyze, and fabricate power supply circuits (5 volts & 12 volts). The course met its objectives effectively, with students appreciating the practical exposure and learning outcomes.

Event Photos: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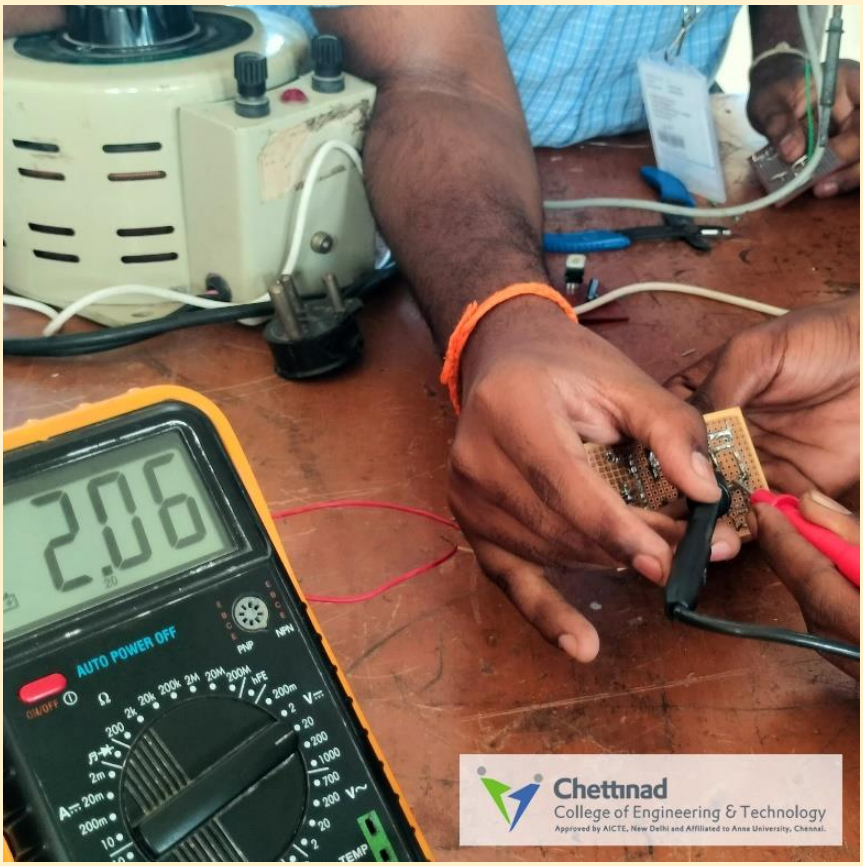
2.06
AUTO POWER OFF
Chettinad
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Value-Added Course: Design and Implementation of 1.5KV ON/OFF grid for Solar Energy System

Date: 30-01-2025 to 01-02-2025

Class & No. of Participants: III Year & 40 Students

Venue: G Block Computer Lab & EEE Workshop Lab

Course Coordinators: 1. Dr. M. Senthilkumar, Prof./EEE, 2. Dr. P. Pounraj, ASP/EEE,
3. Ms. A. Bhuvaneswari, AP/EEE, 4. Ms. P. Thenmozhi, AP/EEE

Description:

Our EEE Department successfully conducted a Value-Added Course for III Year EEE students titled "Design and Implementation of a 1.5 Kw On/Off-Grid Solar Energy System" from January 30 to February 1, 2025. This course enabled our students to develop knowledge in efficient energy conversion, power storage, and seamless integration with the grid or autonomous operation for a reliable power supply. They learned to design and implement a 1.5kW on-grid/off-grid solar energy system, optimizing power generation, storage, and integration with the grid or standalone operation using MATLAB. All students designed and simulated an on-grid solar-wind power system for a commercial building using MATLAB and implemented a 1.5kW Solar Energy System. A total of seven prototype models were developed by the students.

Course Coordinators:

1. Dr. M. Senthilkumar, Prof./EEE,
2. Dr. P. Pounraj, ASP/EEE,
3. Ms. A. Bhuvaneswari, AP/EEE,
4. Ms. P. Thenmozhi, AP/EEE

Event Photos:


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Programme Name: 5 Days - Industrial Training

Date: 17-03-2025 to 21-03-2025

Class & No. of Participants: III Year EEE & 5 students

Venue: Chettinad Cement Corporation Pvt. Ltd, Karikali, Dindigul.

Description:

The Department of Electrical and Electronics Engineering organized a five-day industrial training session from March 17 to 21, 2025, for third-year students at Chettinad Cement Corporation Pvt. Ltd., focusing on electrical systems, power distribution, motor control, maintenance procedures, troubleshooting techniques, automation, and safety protocols. The training included plant visits, hands-on experiences, and interactive sessions with industry professionals.

On Day 1, students learned about the plant's electrical infrastructure and safety measures, and the comprehensive electrical system designed for large-scale operations followed by an orientation session by the electrical engineering team highlighting the importance of safety in preventing electrical hazards.

On Day 2, students visited the power distribution center, learned about distribution networks, switchgear, motor control systems, variable-frequency drives (VFDs), and strategies for efficient power supply and energy optimization.

On Day 3, students learned about motor control, maintenance, and troubleshooting activities and discussed preventive measure strategies. They also studied MCCs and components like starters and relays, contactors, and overload relays, as well as the importance of a systematic approach.

On Day 4, the Technical Engineers explained the selection and application of various motors used in cement production and covered transformer fundamentals, including construction, working principles, cooling methods, and maintenance procedures.

On the final day, students explored automation technologies and safety protocols, with a focus on PLC systems, learning how automation enhances efficiency and accuracy while safety measures prevent accidents.

We extend our sincere gratitude to Chettinad Cement Corporation Pvt. Ltd. for this exceptional training opportunity for our students. Special thanks to the HR team, electrical engineers, and all staff members who contributed to this enriching experience.

Event Photos:


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Programme Name: Power Audit

Date: 24-03-2025 to 28-03-2025

Class & No. of Participants: III Year EEE & 5 students

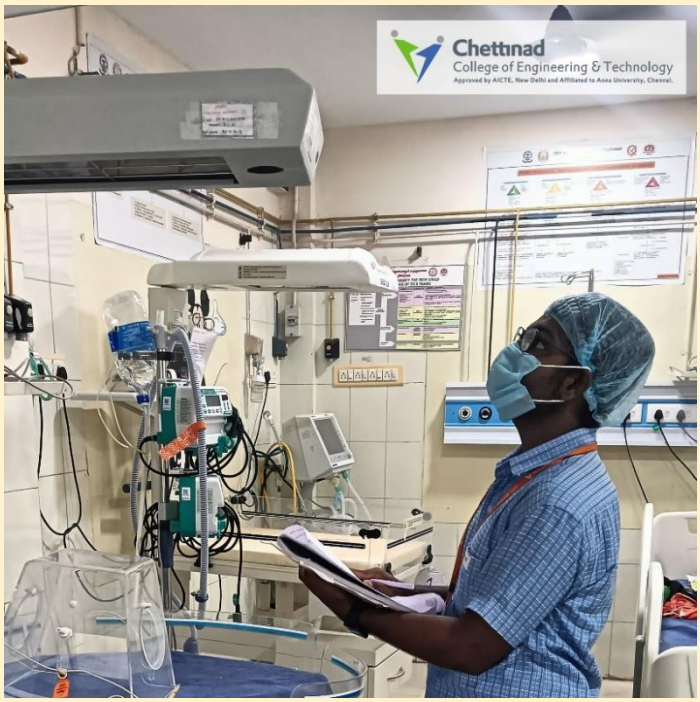
Venue: Government Medical College and Hospital, Dindigul.

Description:

A comprehensive Power Audit was conducted at the Government Medical College and Hospital, Dindigul from March 24, 2025, to March 28, 2025. The audit aimed to evaluate the energy consumption patterns, identify potential areas for energy conservation, and recommend strategies for improving overall energy efficiency. The audit was executed by a dedicated team comprising third-year EEE students from Chettinad College of Engineering and Technology, Karur. The initiative was undertaken as part of their academic training and practical exposure in the domain of energy auditing.

The audit activities were carried out under the supervision of Mr. N. Vijayasarathi, Head of the Department / EEE, and Mr. S. Ragul, Assistant Professor / EEE. The faculty provided valuable guidance throughout the audit process, which included load analysis, identification of high-energy-consuming equipment, assessment of power factor, examination of lighting and HVAC systems, and evaluation of the overall electrical infrastructure. This collaborative effort not only contributed to the professional development of the students but also provided insightful recommendations to the hospital administration for optimizing energy usage, reducing power costs, and promoting sustainable practices within the institution.

Event Photos: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Programme Name: Industrial Visit

Date: 18-04-2025 to 19-04-2025

Participants: 62 Students and 5 Faculty Members

Venue: Marayoor, Kerala and Munnar

Description:

The Department of Electrical and Electronics Engineering at Chettinad College of Engineering and Technology, Karur successfully organized an Industrial Visit on 18th and 19th April 2025, offering our students valuable exposure to real-time industrial processes and practices. On 18th April, our team visited Messa Jaggery Industry, Marayoor, where students gained insights into traditional and modern jaggery production techniques. On 19th April, we explored the operations at Kannan Devan Hills Plantation Company, Munnar, learning about the electrical systems involved in tea processing and plantation management. A total of 62 students and 5 faculty members enthusiastically participated in this enriching experience. This industrial visit bridged the gap between classroom learning and industry practices, igniting curiosity and encouraging innovation among our budding engineers. The industrial visit provided students with a practical understanding of electrical systems in agro-based and plantation industries. They observed real-time applications of power distribution, motor control systems, and energy management practices.

Industrial Visit Photos:

Revolution of Renewable Energy Systems: Solar to Hydrogen

BHUVANA M – IV EEE

The 21st century has witnessed an unprecedented demand for clean and sustainable energy. With fossil fuel reserves depleting and environmental concerns rising, renewable energy sources are gaining global attention. Among them, **solar energy** and **hydrogen energy** stand out as game changers in the journey towards a sustainable future.

Solar Energy: The Frontline of Renewables

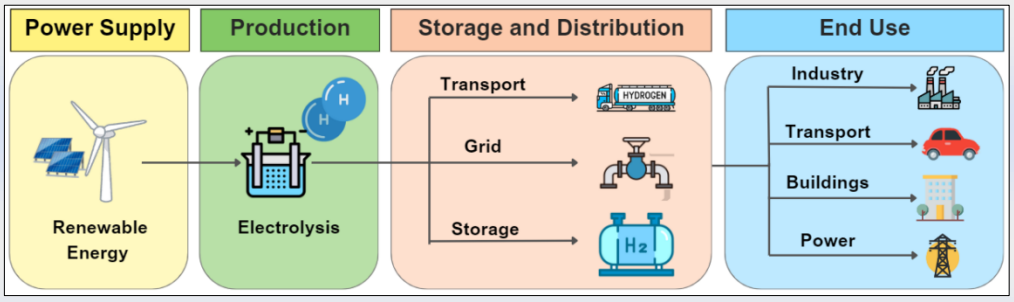
Solar power has become the backbone of renewable energy systems due to its availability and scalability.

- **Photovoltaic (PV) systems** directly convert sunlight into electricity using semiconductor materials.
- **Concentrated Solar Power (CSP)** systems use mirrors or lenses to focus sunlight and generate heat, which is then used for power production.
- **Advantages:** Clean, abundant, scalable, and cost-effective due to decreasing PV panel costs.
- **Challenges:** Intermittency during night/cloudy days, need for large areas, and efficiency limitations.

Hydrogen: The Energy Carrier of the Future

While solar energy directly provides electricity, hydrogen acts as a versatile **energy carrier** that can store, transport, and supply energy on demand.

- **Production Methods:**
  - *Electrolysis* – splitting water into hydrogen and oxygen using renewable electricity.
  - *Steam Methane Reforming (SMR)* – widely used but not fully green.
  - *Biomass Gasification* – converting organic matter into hydrogen-rich gas.
- **Applications:** Hydrogen fuel cells for vehicles, grid energy storage, industrial heating, and aerospace applications.
- **Advantages:** Zero-emission when used in fuel cells, high energy density, and potential for long-term storage.



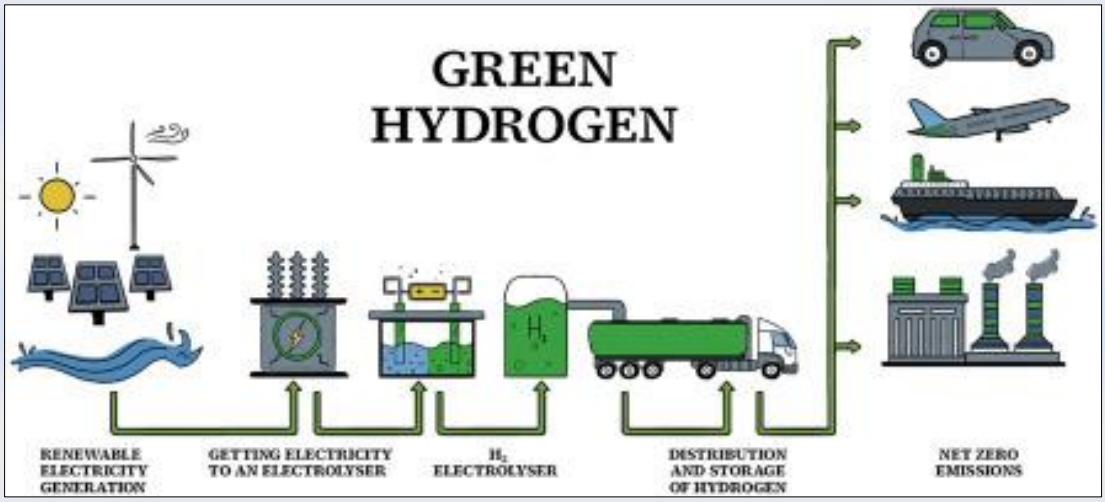
Solar to Hydrogen: Bridging the Gap

The integration of solar energy with hydrogen production provides a sustainable solution to intermittency issues.

- **Solar-powered Electrolysis:** Solar panels generate electricity, which is then used to split water into hydrogen and oxygen.
- **Photoelectrochemical (PEC) Cells:** Advanced devices that directly convert sunlight into hydrogen without intermediate electricity conversion.
- **Hybrid Systems:** Combining solar, wind, and hydrogen storage for reliable energy supply in smart grids.

Recent Innovations

- **Perovskite Solar Cells** with higher efficiency for hydrogen production.
- **Green Hydrogen Projects** in India, Europe, and the Middle East aiming to decarbonize industries.
- **Portable Hydrogen Fuel Cells** for EVs and drones.



Nanotechnology in Energy Storage Devices

LAKSHAN S– IV EEE

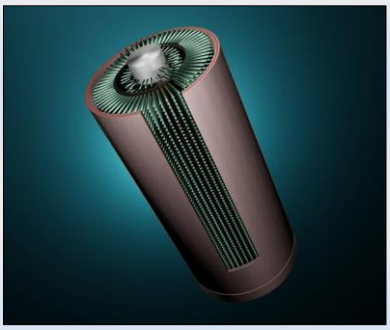
Introduction

Energy storage plays a crucial role in modern electrical and electronic systems, particularly with the increasing demand for renewable integration, electric vehicles, and portable electronics. Conventional batteries and capacitors, though reliable, often face challenges such as limited energy density, long charging time, and shorter life span. **Nanotechnology**—the manipulation of materials at the nanometer scale (1–100 nm)—has opened new frontiers in enhancing the performance of energy storage devices.

Role of Nanomaterials in Energy Storage

At the nanoscale, materials exhibit unique electrical, thermal, and chemical properties due to their large surface area-to-volume ratio and quantum effects. This makes them ideal for improving:

- **Energy Density** – storing more energy per unit volume.
- **Power Density** – delivering energy quickly.
- **Cycle Life** – increasing the number of charge-discharge cycles.
- **Efficiency** – reducing energy loss during operation.



Applications in Different Devices

1. Lithium-ion Batteries (Li-ion)

- **Nanostructured Electrodes:** Nanoparticles of silicon, tin, or carbon nanotubes improve capacity and conductivity.
- **Benefits:** Faster charging, higher storage capacity, and longer lifespan.
- **Example:** Tesla and other EV manufacturers are exploring nanotechnology-enhanced Li-ion batteries for extended driving ranges.

2. Supercapacitors

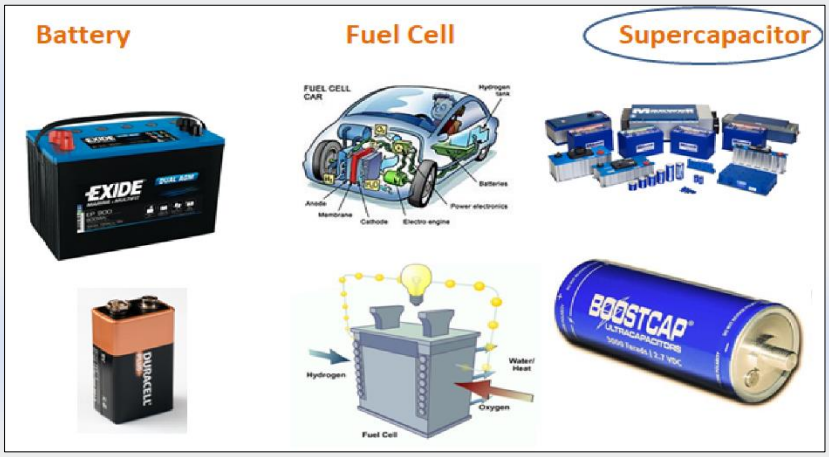
- Use **nanoporous carbon, graphene, and carbon nanotubes** to increase surface area for charge storage.
- Provide **ultra-fast charging/discharging** with high power density.
- Applications include regenerative braking systems in electric vehicles.

3. Hydrogen Storage

- Nanostructured metal hydrides and carbon nanotubes enable efficient storage of hydrogen at lower pressures.
- Plays a vital role in **fuel cell technology** for clean transportation.

4. Solid-State Batteries

- Nanocoatings and nanocomposites improve ionic conductivity and safety by replacing flammable liquid electrolytes with solid ones.
- Potentially revolutionize portable electronics and EVs.



Recent Innovations

- **Graphene-based supercapacitors** with ultra-high charge rates.
- **Nanostructured silicon anodes** achieving 10x higher capacity than traditional graphite.
- **Nano-enhanced flow batteries** for large-scale renewable energy storage.
- **Flexible nano-batteries** for wearable electronics.

Nanotechnology in Energy Storage Devices

GOWTHAMAN P – IV EEE

Introduction

High Voltage Engineering (HVE) is a specialized field in Electrical and Electronics Engineering that deals with the generation, measurement, and application of voltages typically above **1 kV AC or 1.5 kV DC**. With the growing demand for efficient power transmission, renewable energy integration, and advanced testing systems, HVE has become vital in modern electrical infrastructure. Recent innovations are making high-voltage systems safer, more efficient, and more reliable.

Key Innovations in High Voltage Engineering

1. Ultra High Voltage (UHV) Transmission
   - UHV AC (1200 kV) and UHV DC (±1100 kV) systems are being deployed worldwide.
   - Reduce transmission losses over thousands of kilometers.
   - Example: **China's UHVDC lines** transmitting renewable power from remote regions to cities.

2. Gas-Insulated Switchgear (GIS)
   - Compact, reliable switchgear using **SF_6 alternatives** such as vacuum and eco-friendly gases.
   - Reduces space requirements in urban substations.
   - Enhances safety and insulation performance.

3. High Voltage Testing and Diagnostics
   - Advanced methods such as **Partial Discharge (PD) measurement, UHF sensors, and digital monitoring** ensure equipment health.
   - Online condition monitoring of transformers, cables, and circuit breakers.

4. High Voltage in Renewable Energy Systems
   - Offshore wind farms use high-voltage AC/DC for bulk transmission.
   - Solar power plants integrate high-voltage inverters for grid connectivity.
   - Hydrogen and EV charging infrastructures rely on HV converters.

5. Plasma and Medical Applications
   - High voltage plasma discharges are used in **air purification, water treatment, and sterilization**.
   - **Pulsed electric fields** applied in medicine for cancer therapy and tissue engineering.

Automation and Robotics in Electrical Engineering

THIRIVENI S – IV EEE

Introduction

In the era of Industry 4.0, **automation and robotics** have become integral to Electrical and Electronics Engineering (EEE). With advancements in sensors, controllers, and artificial intelligence, electrical engineers are now at the forefront of designing systems that are smarter, safer, and more efficient. From **power plants to manufacturing units**, automation and robotics are reshaping industries, reducing human effort, and enhancing productivity.

Automation in Electrical Engineering

Automation refers to the use of **control systems such as PLCs (Programmable Logic Controllers), SCADA (Supervisory Control and Data Acquisition), and DCS (Distributed Control Systems)** to operate equipment with minimal human intervention.

Key Areas of Application

- **Power Systems:** Automatic load forecasting, fault detection, and self-healing smart grids.
- **Industrial Processes:** Continuous monitoring and control of motors, drives, and machines.
- **Home Automation:** Smart lighting, HVAC systems, and IoT-enabled devices for energy management.
- **Renewable Energy:** Automated tracking systems in solar panels and wind turbine monitoring.

Benefits

- Increased efficiency and precision.
- Reduced human errors and downtime.
- Enhanced safety in hazardous environments.

Robotics in Electrical Engineering

Robotics integrates **electrical, electronics, mechanical, and computer engineering** to design machines capable of performing complex tasks. In the EEE field, robotics is widely applied in:

Key Applications

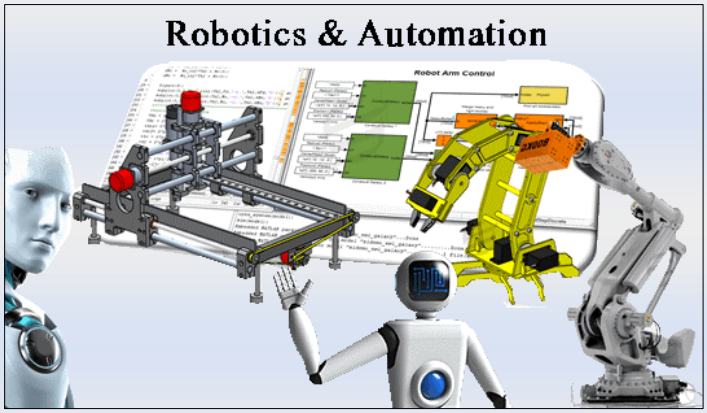
1. **Manufacturing:** Robotic arms for welding, assembly, and material handling.
2. **Power Systems:** Robots for inspection of transmission lines and substations, reducing human risk.
3. **Medical Robotics:** Electrically powered surgical robots ensuring precision and minimally invasive procedures.
4. **Service Sector:** Autonomous delivery robots and drones for logistics, agriculture, and surveillance.
5. **Maintenance:** Robots used for transformer oil testing, pipeline inspection, and nuclear plant maintenance.

Challenges

- High installation and maintenance cost.
- Cybersecurity concerns in network-connected automation systems.
- Need for skilled workforce to design, operate, and maintain advanced systems.

Future Scope

- **Fully autonomous smart grids** for energy efficiency.
- **Robotic maintenance teams** for hazardous sites.
- **5G-enabled robotics** for real-time communication in industries.
- **Sustainable robotics** powered by renewable energy and efficient storage.



Green Energy Trends: Towards Carbon Neutrality

NATHIYA S– III EEE

Introduction

The global climate crisis has accelerated the need for **green energy solutions** that minimize carbon emissions while meeting the growing demand for electricity. With governments, industries, and research institutions aiming for **carbon neutrality by 2050**, renewable technologies and innovative energy practices are driving the energy transition. For Electrical and Electronics Engineers, this movement opens vast opportunities in design, control, and deployment of clean energy systems.

1. Next-Generation Solar Power

- **Perovskite Solar Cells (PSCs):** These lightweight, flexible materials are achieving efficiencies above 25%, are cost-effective, and easier to manufacture compared to traditional silicon panels.
- **Building-integrated Photovoltaics (BIPV):** Solar materials embedded into building facades and windows convert structures into energy-generating elements—turning homes and offices into power sources.

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2. Advancements in Wind Energy

- **Offshore Floating Turbines:** These turbines, mounted on floating platforms, harness stronger and more consistent winds in deep sea locations.
- **Hybrid Wind-Solar Farms:** Co-location of wind and solar systems ensures more stable energy output as sun and wind often complement each other operationally through the day.

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3. Energy Storage: Powering the Renewables

- **Grid-Scale Battery Storage:** Lithium-ion and emerging alternatives like **solid-state batteries** store energy during peak generation times for use during demand surges or low generation.
- **Green Hydrogen:** Solar and wind-derived electricity power electrolysis to produce hydrogen, a clean fuel that can be stored and used in transport or industry, offering a zero-emissions solution.

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4. Smart Grids & Digital Integration

- **IoT and AI-Enhanced Grids:** Real-time monitoring and predictive algorithms enable dynamic load balancing and efficient grid control.
- **Peer-to-Peer (P2P) Energy Trading:** Consumers become "prosumers"—producing and selling excess energy via decentralized platforms using blockchain for transparent, efficient transactions.

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5. Electrification of Transport

- **Electric Vehicles (EVs):** With growing charging infrastructure and battery improvements, EVs are becoming key to reducing transportation emissions.
- **Vehicle-to-Grid (V2G) Technology:** EVs can feed unused energy back into the grid—turning cars into mobile storage devices that stabilize the grid.

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6. Emerging Clean Energy Solutions

- **Marine Energy:** This includes tidal, wave, and ocean thermal sources—offering underexploited potential for base-load power.
- **Bioenergy with Carbon Capture and Storage (BECCS):** Biomass energy systems integrated with carbon capture techniques deliver energy while reducing overall atmospheric CO_2.

Advantages & Challenges

Advantages	Challenges
Substantial reduction in greenhouse gas emissions	Intermittent power supply from solar and wind
Enhanced energy security and independence	High capital costs for infrastructure
Expanding job markets in green technology sectors	Need for updated grid infrastructure and policies
Decentralized energy access in remote areas	Technical maturity and scalability concerns

Conclusion

The journey to carbon neutrality is fostered by a suite of green energy innovations—ranging from smart renewable systems and energy storage to electrified mobility and smart grids. Combining cost-effective technology with sustainable policy and infrastructure upgrades holds the key to a cleaner, greener energy future.

Plasma Technology in Electrical Engineering

PRATHEESHA VARDHINI K – III EEE

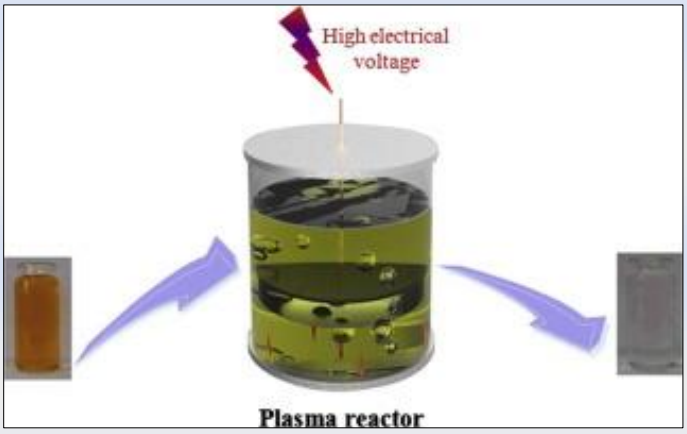
Electrical and Electronics Engineering is constantly evolving with new technologies that push the boundaries of innovation. One such futuristic field gaining momentum is **plasma technology**. Often called the "fourth state of matter," plasma consists of ionized gases with free electrons and ions, possessing unique properties that make it highly versatile for engineering applications.

What is Plasma?

Plasma is formed when a gas is energized to a point where electrons break free from atoms, creating a highly conductive medium. Unlike solids, liquids, and gases, plasma can conduct electricity, respond to magnetic fields, and generate high-energy reactions, making it useful in many modern applications.

Applications in Electrical Engineering

1. **Pollution Control and Air Purification**
   - Plasma-based systems are used in electrostatic precipitators and non-thermal plasma reactors to remove pollutants, toxic gases, and particulate matter from industries.
2. **Material Processing**
   - Plasma arc cutting and plasma spraying are widely used for high-precision cutting, coating, and surface modification of metals in the electrical industry.
3. **Plasma Displays**
   - Plasma Display Panels (PDPs), though now overtaken by LCD and OLEDs, were an early example of plasma technology in consumer electronics.
4. **Plasma-Based Sterilization**
   - Sterilization of medical equipment and food packaging uses cold plasma, offering chemical-free and energy-efficient solutions.
5. **Energy and Power Systems**
   - Plasma is studied for its role in **fusion energy**, where plasma confinement systems like Tokamaks aim to generate clean, limitless electricity for the future.
6. **High-Voltage Engineering**
   - Plasma arcs are harnessed in circuit breakers and switchgear, where arc quenching is vital to ensure safe power system operation.

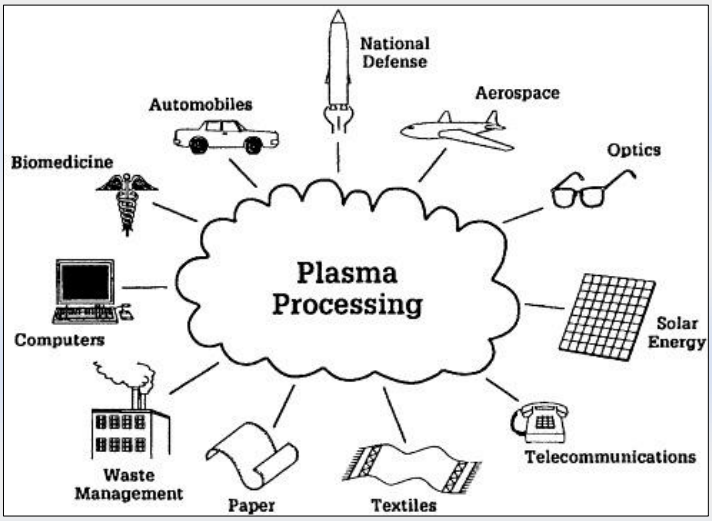


⬘ Advantages of Plasma Technology

- **Eco-friendly**: Reduces chemical use in pollution control and sterilization.
- **High Efficiency**: Provides faster processing in cutting and coating applications.
- **Future-Ready**: Opens possibilities in clean fusion energy.

⬘ Future Scope

In the coming years, plasma technology will become more prominent in **sustainable energy, advanced electronics, space propulsion, and medical engineering**. For EEE students, this field offers exciting research opportunities, combining principles of **high voltage, materials science, and power systems**.



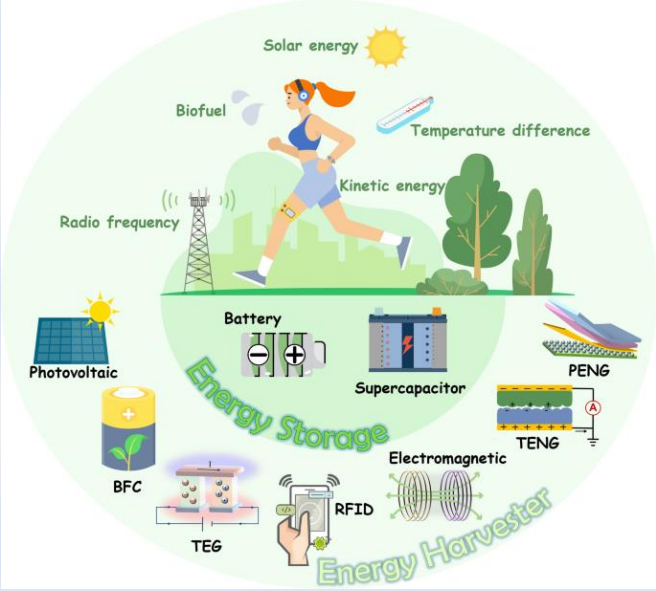
Energy Harvesting from Ambient Sources

VIGNESH C – III EEE

In the age of smart technology and the Internet of Things (IoT), the demand for **self-powered devices** is rapidly increasing. Imagine sensors that never need battery replacements, or medical implants that run indefinitely without external charging. The solution lies in **energy harvesting from ambient sources** — a sustainable way to capture and convert small amounts of energy already present in the environment into usable electrical power.

🔻 What is Energy Harvesting?

Energy harvesting, also called **energy scavenging**, is the process of capturing residual energy from natural or man-made surroundings and converting it into electrical energy. Instead of relying solely on batteries, devices can draw power from **ambient energy sources** like light, heat, vibrations, or radio waves.



🔻 Types of Ambient Energy Sources

1. **Solar Energy** ☼
   - Miniaturized photovoltaic (PV) cells power portable electronics and IoT sensors indoors and outdoors.
   - Example: Solar-powered calculators and remote sensors.
2. **Vibration and Motion** ⚡
   - Piezoelectric and electromagnetic harvesters convert mechanical vibrations into electricity.
   - Example: Sensors powered by vibrations from machines, vehicles, or even footsteps.
3. **Thermal Energy** 🌡

- Thermoelectric generators (TEGs) capture waste heat from engines, industrial processes, or even the human body.
- Example: Wearable medical devices using body heat for power.

4. **Radio Frequency (RF) Energy** 📡
   - RF waves from Wi-Fi, mobile towers, and TV broadcasts can be harvested using rectennas (rectifying antennas).
   - Example: Wireless charging for low-power devices.
5. **Wind and Acoustic Energy** 🌬️ 🎵
   - Micro-turbines and acoustic harvesters utilize airflow and sound vibrations for generating small amounts of power.

🔹 Applications in Electrical and Electronics Engineering

- **IoT Devices & Wireless Sensors**: Self-powered smart sensors in homes, industries, and cities.
- **Medical Implants**: Pacemakers and health monitors powered by body heat or movement.
- **Wearable Electronics**: Fitness trackers powered by motion or sweat-based bioenergy.
- **Smart Grids**: Energy harvesting sensors for fault monitoring and predictive maintenance.
- **Military & Space**: Long-lasting sensors in remote or harsh environments.

🔹 Advantages

- **Battery-Free Operation** – Eliminates frequent battery replacements.
- **Eco-Friendly** – Utilizes renewable and waste energy sources.
- **Cost-Effective in Long Term** – Reduces maintenance and replacement costs.
- **Enables Miniaturization** – Supports compact, wireless, and autonomous devices.

🔹 Future Outlook

With rapid advances in **nanogenerators, flexible electronics, and ultra-low power circuits**, energy harvesting is set to revolutionize how devices operate. In the near future, our surroundings may act as an **invisible power grid**, where everything from wearables to entire smart cities is powered by ambient energy.

✨Conclusion

Energy harvesting is a **game-changer** in electrical engineering, offering a sustainable path towards self-powered systems. For EEE students, this field opens exciting research opportunities in **IoT, biomedical devices, and renewable energy integration**. Truly, the future is one where **energy is everywhere and wasted energy becomes useful power**.

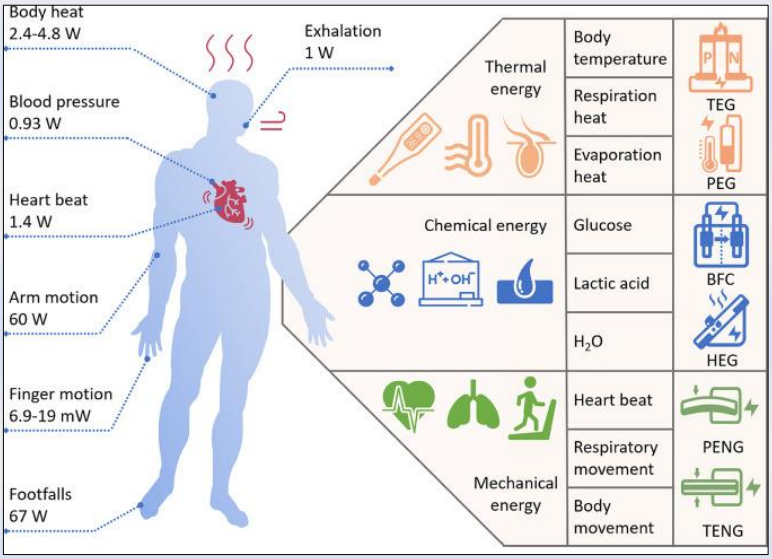
Bioelectronics: Powering the Human Body

JAYAPAL R – II EEE

Electrical and Electronics Engineering is no longer confined to machines and circuits—it is now finding its way inside the **human body**. The field of **bioelectronics** merges biology with electronics to develop medical devices, implants, and wearable systems that can monitor, heal, and even enhance human functions. What makes this more exciting is the possibility of **powering these devices using the human body itself**.

What is Bioelectronics?

Bioelectronics is an interdisciplinary field that combines principles of **electronics, biology, and medicine** to design systems that interact directly with living cells and tissues. These devices require **power sources** that are safe, reliable, and long-lasting—especially when implanted inside the body.



How Can the Human Body Power Electronics?

The human body naturally generates various forms of energy, which can be harvested to power small devices:

1. **Body Heat (Thermoelectric Generators)**
   - The body maintains an average temperature of ~37°C. Thermoelectric materials can convert the temperature difference between skin and air into electricity.
2. **Motion and Muscle Activity (Piezoelectric Materials)**
   - Walking, heartbeat, and breathing create mechanical energy that can be converted into power.
   - Example: Piezoelectric patches on the chest converting heartbeats into energy for pacemakers.
3. **Biochemical Reactions (Biofuel Cells)**
   - Glucose and oxygen in the blood can be used in biofuel cells to generate electricity.
   - Example: Glucose-powered implants running indefinitely inside the body.

4. **Sweat and Fluids (Electrolyte Harvesting)**
    - Wearable patches can extract ions from sweat or saliva to power biosensors.

🔹 Applications of Bioelectronics

- **Pacemakers & Defibrillators** – Powered by body motion or glucose-based biofuel cells.
- **Neural Implants** – Devices that restore vision or hearing by directly interfacing with nerves.
- **Wearable Health Monitors** – Smartwatches and fitness trackers powered by body heat or sweat.
- **Artificial Organs** – Bioelectronic systems supporting kidneys, pancreas, or even heart functions.
- **Drug Delivery Systems** – Implantable pumps releasing medicine on-demand, powered by internal energy harvesting.

🔹 Advantages

- **Battery-Free Operation** – Eliminates surgeries required for battery replacement in implants.
- **Biocompatibility** – Safer power sources that integrate with human physiology.
- **Sustainability** – Harnesses renewable energy generated by the body itself.

🔹 Future Scope

In the future, bioelectronics could lead to **cyborg-like systems**, where humans seamlessly integrate with machines. Research is moving towards **flexible electronics, nanogenerators, and wireless power transfer** that make implants smaller, smarter, and fully autonomous.

✨Conclusion

Bioelectronics represents the future of healthcare and human enhancement. By harnessing the body's own energy, we are not just building medical devices—we are moving towards a world where humans and electronics coexist in harmony. For EEE students, this is a thrilling frontier where **engineering meets life itself**.

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Congratulations Winners!

1ST PRIZE
CIRCUIT CRAZE

2ND PRIZE
CONNEXIONS

III – EEE

MANOJ M KABILAN K SANTHOSHKUMAR S PARAMA SIVAM P
HARIHARASUDHAN S JANARTHANAN M SURYA C RATHEESH KUMAR P

Our EEE department students secured prizes in the National Level Technical Symposium - **PRAVARTAN'25**, held on 26-03-2025 at Adithya Institute of Technology, Coimbatore.

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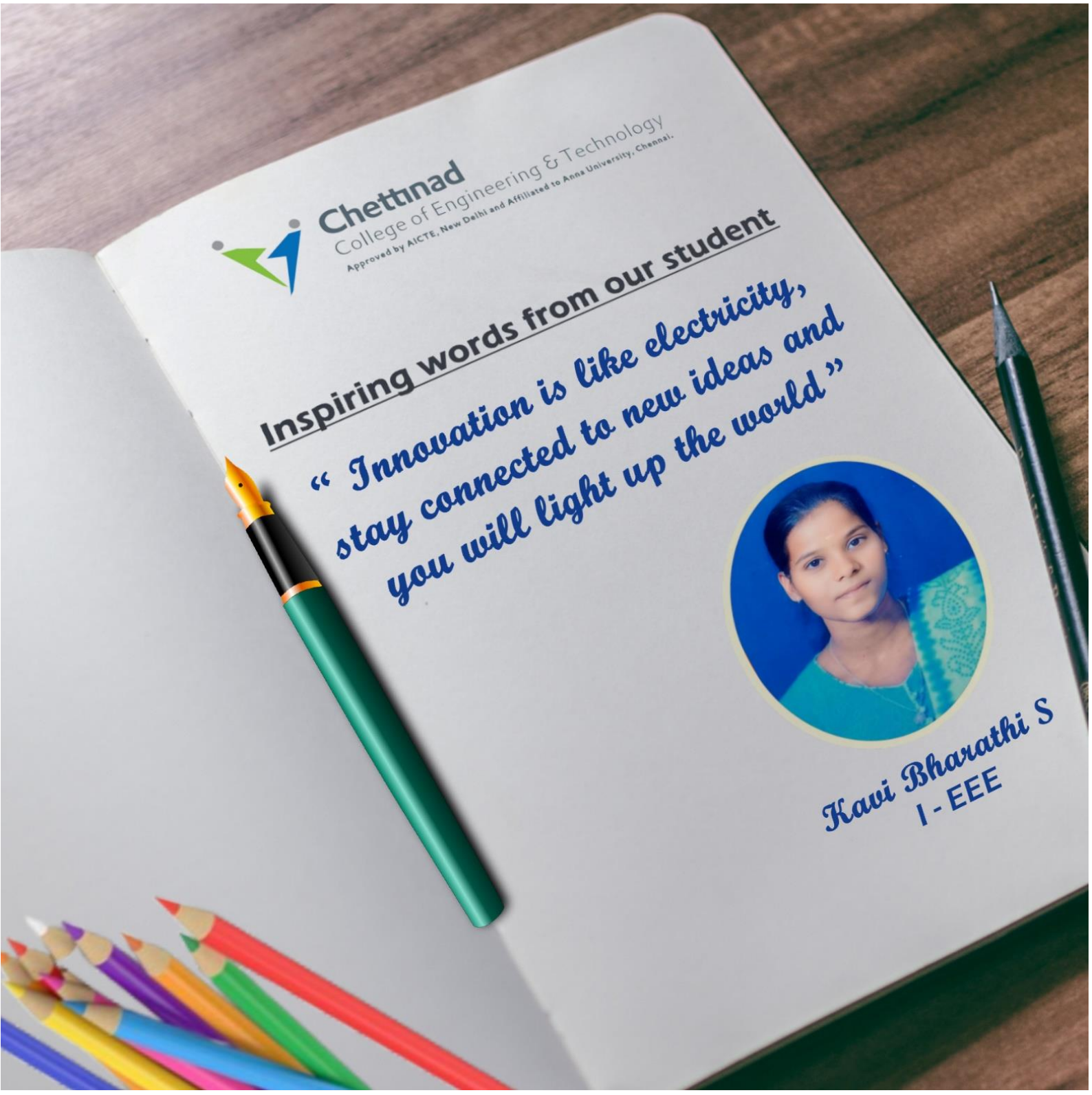
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Inspiring words from our student
" Innovation is like electricity,
stay connected to new ideas and
you will light up the world "
Kavi Bharathi S
I - EEE

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Student's Inspirational Quotes

"Life's journey is like a wire
twist & turn
but stay connected to your core"

PRATHEESHA VARDHINI K L
III YEAR - EEE

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⚡ Thank You for Flipping the Switch with Us! ⚡

As we bring this edition of VOLTRIX 2024-25 to a close, we extend our heartfelt gratitude to all the contributors, staff, students, and well-wishers who helped turn this idea into a vibrant reality.

This magazine is a testament to the passion, creativity, and determination of the Electrical and Electronics Engineering Department. Every article, poem, artwork, and innovation featured here reflects the energy that powers our department — not just in circuits, but in spirit.

May this issue ignite curiosity, spark new ideas, and continue to connect minds through the shared joy of learning and discovery.

Stay inspired. Stay charged. See you in the next edition!

With warm regards,

Team VOLTRIX

Department of Electrical and Electronics Engineering

Chettinad College of Engineering and Technology

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