St. XAVIER'S
CATHOLIC COLLEGE OF ENGINEERING
(Autonomous)
Chunkankadai, Nagercoil - 629003
Kanyakumari District, Tamil Nadu

Approved by AICTE & Affiliated to Anna University, Chennai
Accredited with 'A' Grade by NAAC
UG Programs(ECE, EEE, Mech, Civil, CSE & IT) Accredited by NBA
Anna University Recognized Research Institute
Recognized under section 2(f) & 12(B) of UGC Act, 1956
UG Programs(ECE, EEE, Mech, Civil, CSE & IT),
MBA & MCA Programs Permanently Affiliated

2024 - 2025

ELECTRICAL & ELECTRONICS ENGINEERING

e - Newsletter

President

Dr. S. V. Kayalvizhi, M.E,Ph.D
Head of the Department

Editor

Dr. S.V. Kayalvizhi, M.E,Ph.D,

Special Contributors

Website : Er. M. Abragam Siyon Sing, M.E,
Assistant Professor

Faculty Advisor : Dr. A. Darwin Jose Raju, M.E,

Assistant Professor

Technical Support : Mr. G. Sahaya Glitus,
Skilled Assistant

Student representatives

Jenin. J (IV-EEE)
Sowmiya M (III-EEE)
Oswin Franco. I (II-EEE)

College Vision, Mission, Slogan, Quality Policy, Objectives and Values

St. Xavier's Catholic College of Engineering

Vision	Mission
To be an institution of eminence of optimal human development, excellent engineering education and pioneering research towards developing a technically-empowered humane society.	To transform the (rural) youth into top class professionals and technocrats willing to serve local and global society with ethical integrity, by providing vibrant academic experience of learning, research and innovation and stimulating opportunities to develop personal maturity and professional skills, with inspiring and high caliber faculty in a quality and serene infrastructural environment.
Slogan	**Quality policy**
Towards a technically-empowered humane society.	Attaining global eminence, by achieving excellence in all that we do, in life, education and service.

Objectives	Values
To transform our students into fully-functioning human persons and empowering leaders with autonomy and passion for continuous self-learning. To equip them with contemporary scientific and technical knowledge with student centred teaching methods. To animate them into pioneering researchers and investors. To train them to excel with cutting edge technical, entrepreneurial and managerial skills for a successful career. To expose them to challenging opportunities of self-discovery and to commit themselves to lead a value-based life of humane service. To recruit faculty who inspire the students with their passion for knowledge and transmit knowledge to the students	Efficiency that leads to Excellence Excellence that leads to Eminence Genuineness that leads to authenticity Transparency that leads to credibility Person centeredness that leads to family-ness Appreciation that leads to high motivation Altruism that leads to humane service Critical thinking that leads to scientific approach Fidelity that leads to responsibility Knowledge that leads to wisdom Innovative research that leads to

by student-centred creative and innovative teaching and learning methods, lead them by example in high-end researchers, and edify the students with their life of integrity and ethics. To provide standard infrastructure, serene and stimulating environment that is most conducive to learning. To develop avenues of continuous and responsive collaboration with stakeholders for the optimal development of the students and institution.	inventions Hardwork that leads to achievements Eco friendliness that leads to protection of nature Aesthetic campus that leads to serene environment Fiscal discipline that leads to economic sustainability Feedback that leads to responsivity Spirituality that leads to committed service.

Department Vision Mission PEO PO PSO
Program: B.E. Electrical and Electronics Engineering.

Vision	
	Producing globally competent professionals, innovative researchers and successful entrepreneurs in the field of Electrical and Electronics Engineering for developing a technically empowered humane society
Mission	
M 1	To impart high quality technical education in Electrical and Electronics Engineering with high calibre faculty members, excellent infrastructure and stimulating environment
M 2	To lead the students to learn and practice technologies that are prevalent in the related industries
M 3	To introduce the students to the latest concepts and innovations through technical gatherings and research collaborations
M 4	To inculcate ethical values, team spirit and leadership qualities to meet the social challenges and needs
Program Educational Objectives (PEO)	
PEO 1	Build a solid foundation in Mathematics, Science, Engineering and Soft Skills for diverse career and persistent learning
PEO 2	Engage in life long process of learning and research to keep themselves abreast of new developments in the field of Electrical and Electronics Engineering
PEO 3	Have an ability to work in multi- disciplinary environment
PEO 4	Practice their profession conforming to ethical values and environmentally friendly policies
PEO 5	Model, design and develop a system and component or process the same to meet the
Program Outcomes (PO) (with Graduate Attributes)	
PO 1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	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	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	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	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	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	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams, and in

	multidisciplinary settings.
PO 10	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	Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12	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 (PSO)	
PSO 1	Utilize the Technological advancements in the field of modern Power Systems and formulate reliable and feasible solutions towards the eco-friendly and challenging environment.
PSO 2	Design and analyze fundamental Electronics and Embedded systems for real-world problems and develop smart products.
PSO 3	Apply recent Technology to control Electrical Machines with the aid of solid state devices to enhance energy conservation and sustainability.

Acknowledgement

We express our heartfelt thanks and gratitude to our staff, students and well wishers, without whose cooperation e-connect wouldn't have been a reality.

Dr. S. V. Kayalvizhi

From HOD / editors desk

Dear Readers,

I am thrilled to bring you this new edition of our department newsletter. As editor, it has been a pleasure working alongside faculty, students, and staff to compile the stories and updates that you'll find in these pages.

This issue is filled with inspiring stories of achievement, growth, and innovation. From student projects to faculty research, we've worked to capture the spirit of our department and the remarkable individuals who make it a vibrant and dynamic place.

I am excited to share these highlights with you and hope that this newsletter serves not only as a record of our accomplishments but also as a source of inspiration for future endeavour's. I encourage you to continue contributing, whether through stories, ideas, or feedback, so Ie can make each edition even better.

Thank you to everyone who contributed to this issue. Your involvement makes this publication possible, and I look forward to bringing you more stories in the future.

Warm regards,
Dr. S. V. Kayalvizhi
Head of Department/Editor
Electrical and Electronics Engineering

Programs offered

DEGREE	PROGRAMME	INTAKE
B.E	Electrical & Electronics Engineering	60
M.E	Power Electronics & Drives	12
Ph.D. (Research)	Electrical & Electronics Engineering	

RESEARCH ACTIVITIES

Dr. M. Marsaline Beno

- Along with **Er. M. Abragam Siyon Sing** published an article titled *"Energy Consumption Analysis and Management Strategies for the Dairy Farm in India Towards Sustainable Development"* in the *IETE Journal of Research*, published by *Taylor & Francis* in **2024**.
- Authored *"Interference Suppression in 2x2 MIMO Antenna Using Bowtie Decoupler"*, which was published in the *International Research Journal of Modernization in Engineering Technology and Science* in **2024**.
- **Er. S. Shiny r**esearch on *"Dynamic Load Scheduling and Power Allocation for Energy Efficiency and Cost Reduction in Smart Grids: An RLSALBWO Approach"*, published in *Peer-to-Peer Networking and Applications* in **2024**.

Dr. J. Merry Geisa

- **C. Jasphin** published an article titled *"Automated Identification of Gastric Cancer in Endoscopic Images by a Deep Learning Model"* in the *Automatika Journal for Control, Measurement, Electronics, Computing, and Communications* in **2024**.
- **D. Navin Sam, S. Joseph Jawhar** authored *"Selective Harmonic Elimination of a High Gain Multi-Source Multilevel Inverter Topology Using Relative Bat Quantum Opposition Algorithm Optimization Technique"*, published in the *Journal of Environmental Protection and Ecology* in **2024**.

Dr. M. John Bosco

- Contributed a study on *"Maximum Power Extraction of Photovoltaic System Using a Novel Cross Diagonal View Method"*, published in *The Patent Office Journal No. 17/2024*.
- Published *"An Extended Cross Diagonal View Network Topology for a PV System of Non-Square Dimension Under Shading Conditions to Yield Maximal Power"* in the *Journal of New Materials for Electrochemical Systems* in **2024**.
- **T. Tijo, P. Pravin, and G. Babin Dhas** developed a *"High-Pressure Automatic Vacuum Cleaner Using Arduino"*, published in the *BOHR Journal of Electrical and Electronic Communication Engineering* in **2024**.

Dr. M. John Bosco

- **M. Mary Synthuja, Jain Preetha** presented *"Solar PV Power Generation and Distribution Through Wireless Power Transmission"*, published by *HBRP Publication* in **2024**.
- **M. Mary Synthuja Jain Preetha** authored *"Power Distribution Through Wireless Power Transmission Technique"*, published in the *International Research Journal of Education and Technology* in **2024**.

Dr. Jain B. Marshel

- **L.R. Monisha Miriam, Ajith J. Kings, R. Edwin Raj, R.S. Rimal Isaac, A. Saravanan, L.J. Ashwand Jesvil, and Anujith N. Rajan** conducted a study on

"Synthesis of Biodiesel from a Unique Potential Oil Reserve Delonix Regia Using a Novel Biocatalyst Bamboo Stem – A Comparative Study by RSM and ANN", published in *Industrial Crops and Products* in **2024**.

- **P. Sujin, Ajith J. Kings, and L.R. Monisha Miriam** published *"Optimized Biodiesel Production from Mixed Non-Edible Oils Using Advanced Computational Techniques and a Novel Bifunctional Liquified Catalyst: Compatibility Assessment in IC Engines"* in *Biomass and Bioenergy* in **2024**.

Dr. M. Germin Nisha,

- **J. Jasmine, and Rajesh Prasad** explored *"Enhancing Smart Grid Reliability with Advanced Load Forecasting Using Deep Learning"*, published in *Electrical Engineering (Springer)* in **2025**.
- **V.G. Anisha Gnana Vincy** developed *"Optimized Parallel Depthwise Separable Convolutional Neural Network-Enabled Smart Waste Management IoT in Smart Cities"*, published in the *Environmental Engineering and Management Journal* in **2024**.

CONFERENCE

Dr. A. Darwin Jose Raju

- **M. Senthil Kumaran, K. Murugesan, and S. Solai Manohar** presented a paper titled *"Predictive Error Switching Strategy for Multilevel Matrix Converter"* at **INDISCON 2024 IEEE 5th India Council International Conference** in **Chandigarh, India**.

Dr. J. Merry Geisa

- Presented *"Optimum Power Management Using FACTS Devices"* at the **National Conference on Sustainable Engineering** held at **Sivaji College of Engineering and Technology**.

Dr. S. V. Kayalvizhi,

- **S. Prithivi, and Dr. V. Suresh** presented *"An Efficient Approach for Brain Age Prediction Using ResNet Deep Learning Model"* at **ICCIDA-2024**, hosted by **SXCCE**.

Er. Almond D. Souza

- **Dr. Latha** presented *"Geophysical Investigation of Groundwater Using Resistivity Survey in Kanyakumari District"* at the **International Conference on Recent Advances in Energy**, hosted by **St. Xavier's Catholic College of Engineering**.

FUNDED PROJECTS

Dr. M. John Bosco

- Applied for a **research project** titled *"Solar Sweeper Robot"* under the **TNSDC - Naan Mudhalvan** scheme in the field of **Science and Technology** on **January 30, 2024**. The project is currently in the **applied** status.

AWARDS / RECOGNITION

S. No	Staff Name	Details	Sponsor	Award Date
01.	Dr. M. MARSALINE BENO	DISTINGUISHED PROFESSOR AWARD	IET KKLN	2024-12-13
		IGEN LIMCO BOOK OF RECORDS ACHIEVER	IGEN	2024-10-31
		STAR GREEN ORGANIZER	IGEN	2024-10-21
02.	Dr. J. MERRY GEISA	Topper	NPTEL-AICTE	2024-11-21
		Reviewer	IJIRE	2024-08-13
03.	Dr. S.V. KAYALVIZHI	IGEN SDG WARRIOR(SDG&)	The Institution of Green Engineers	2024-11-22
		Judge for poster presentation	EnSav club	2024-10-04
04	Dr. M. JOHN BOSCO	BEST INNOVATOR AWARD - DESIGN PATENT	IPR	2024-12-19
		BEST INNOVATOR AWARD - UTILITY PATENT	IPR	2024-12-19
05.	Dr. S.S. SELVA PRADEEP	Best Faculty Advisor Award	IET KKLN	2024-12-18
		IGEN SDG Warrior-SDG1	IGEN	2024-11-22
		Green Action Pledge	IGEN	2024-10-26
		Resource Person	Green Agri Club of India	2024-08-21
06.	Er. P. SUJI GARLAND	IEIKKLC-Eighth Annual Meeting-2024	IEI KKLC	2024-10-26

S. No	Staff Name	Details	Sponsor	Award Date
07.	Er. ABRAGAM SIYON SING.M	IGEN Sustainability Champion Award 2024	IGEN	2024-12-14
		IGEN EnSAv Club Best Ambassador of the year 2024	IGEN	2024-11-22
		IGEN SDG7 Icon of the year 2024	IGEN	2024-11-22
		Green Commander Award	IGEN	2024-10-30
		IGEN Green Engineer Award 2024	IGEN	2024-09-15
08.	Dr. JESUS BOBIN.V	IGEN EnSaver Award 2024	IGEN	2024-11-22
		IGEN ENSAV CLUB ORGANIZER AWARD 2024	IGEN	2024-11-22

CONF/FDP ORGANISED

Dr. A. Darwin Jose Raju

- Served as a Session Speaker at the IEEE SPAX Seminar, organized by the IEEE Student Branch, KIT, Coimbatore, on January 6, 2025.
- Participated as a Session Speaker in the IEEE Reliability Society Madras Summit, organized by the IEEE Madras Reliability Society, on November 9, 2024.
- Served as a Proctor for the IEEE Xtreme 18.0 Programming Competition, organized by the IEEE Computer Society, from October 26 to October 27, 2024.
- Chief Guest at the IEEE Student Branch Inauguration, hosted by Rohini College of Engineering and Technology, on January 23, 2024.
- Chief Guest for National Science Day 2023, held at Study World College of Engineering, on February 28, 2023.

Dr. M. John Bosco

- Coordinated a National Seminar on *"Role of Entrepreneurship Development and Startups"*, organized by IIC-SXCCE, on August 27, 2024.
- Coordinated a National Seminar on *"Role of Entrepreneurship in Economic Development"*, organized by IIC-SXCCE, on August 1, 2024.
- Resource Person for the National Workshop on *"Intellectual Property Rights and Innovation"*, organized by IIC-SXCCE, on August 29, 2024.

Er. Almond D'Souza

- Coordinated a Faculty Development Program (FDP) on Hyper Mesh, organized by TANCAM, from February 10 to February 16, 2025.

Dr. S. S. Selva Pradeep

- Coordinated a State-level Seminar cum Exhibition on *"Integrating Agri-Tech Innovation for Circular Economy and Resilience"*, organized by IET SXCCE and Green Agri Club of India, on August 20, 2024.

Dr. Jesus Bobin V

- Served as a Convener for the IGEN EnSave Award Ceremony, organized by IGEN-EnSav Club, on November 22, 2024.
- Organizer for the University Seminar on *"Basics of IPR and Its Importance for Innovators and Entrepreneurs"*, organized by SEE and IIC, on November 18, 2024.
- Coordinated a University Campus Visit to SXCCE for Amala Convent School students, on October 4, 2023.

CONF/FDP ATTENDED

Dr. A. Darwin Jose Raju

- Attended an FDP on Soft Skill Development, conducted by NPTEL in online mode, from July 1, 2024, to September 30, 2024.
- Participated in the IEEE HIVE @TENCON 2024 Workshop, organized by IEEE R10 Young Professionals, at Marina Bay Sands Convention Centre, Singapore, from December 1 to December 2, 2024.
- Attended the IEEE WIE International Leadership Summit Conference, hosted by IEEE Madras WIE Affinity Group, at Anna University, Chennai, from October 3 to October 5, 2024.

Dr. J. Merry Geisa

- Attended an International FDP on Soft Skills, conducted by NPTEL-AICTE, in online mode, from July 1, 2024, to October 31, 2024.

Dr. S. V. Kayalvizhi

- Participated in an FDP on Developing Soft Skills and Personality, organized by NPTEL, in online mode, from August 1, 2024, to October 30, 2024.
- Attended a Seminar on Future Prospects and Challenges of Renewable Energy for Sustainability, organized by Vellore Institute of Technology, Vellore, in online mode, from July 26 to July 28, 2024.

Dr. M. John Bosco

- Participated in an FDP on Advanced Technologies for Smart Power Systems, conducted by AICTE Training and Learning (ATAL) Academy, at Noorul Islam Centre for Higher Education, from February 10 to February 15, 2025.
- Attended an FDP on Design for Manufacturing & Advanced Automation for Industry 4.0, conducted by AICTE Training and Learning (ATAL) Academy, at Sri Manakula Vinayagar Engineering College, from January 20 to January 25, 2025.
- Participated in an FDP on AI in Education: Integrating AI into the Computer Science Curriculum, organized by St. Xavier's Catholic College of Engineering, Department of Computer Science Engineering, from June 24 to June 29, 2024.
- Attended an Innovation Ambassador (IA) - Foundation Level Workshop, conducted by MoE's Innovation Cell & AICTE, in online mode, from July 29 to August 3, 2024.
- Participated in the Innovation Ambassador (IA) - Advanced Level Workshop, conducted by MoE's Innovation Cell & AICTE, in online mode, from August 5 to August 10, 2024.
- Attended an Innovation Ambassador (IA) - Reskilling Workshop, conducted by MoE's Innovation Cell & AICTE, in online mode, from August 12 to August 20, 2024.

- Participated in an International FDP on Soft Skill Development, conducted by IIT Kharagpur, in online mode, from July 1 to September 30, 2024.
- Attended an International FDP on Exploratory Data Analysis and Visualization, organized by Electronics and ICT Academy, IIT Roorkee, at St. Xavier's Catholic College of Engineering, from September 9 to September 14, 2024.

Er. Almond D'Souza

- Attended an FDP on Exploratory Data Analysis, organized by IIT Roorkee, at St. Xavier's Catholic College of Engineering, from September 9 to September 14, 2024.

Dr. S. S. Selva Pradeep

- Participated in the Industry Institute Summit 6.0 Conference, organized by IET-Chennai LN, in Sholinganallur, Chennai, on September 26, 2024.

Dr. Jesus Bobin V

- Attended an FDP on Deep Dive into AI: Latest Trends Using Machine Learning and Deep Learning, conducted by REVA University (AICTE-ATAL), in online mode, from January 13 to January 18, 2025.
- Participated in an FDP on Augmented Reality and Virtual Reality in Engineering Education, conducted by Rohini College of Engineering and Technology (AICTE-ATAL), in online mode, from January 6 to January 11, 2025.
- Attended a Workshop on Awareness Program on How to Connect, Simulate, and Innovate Using Arduino on Cloud, conducted by FOSSEE-IIT Bombay, in online mode, on November 28, 2024.

ONLINE COURSE COMPLETION

Dr. A. Darwin Jose Raju

- Completed an NPTEL course on Soft Skill Development, created by IIT Kharagpur, from July 1, 2024, to September 30, 2024, and received an Elite certificate after the exam on November 23, 2024.

Dr. J. Merry Geisa

- Completed an NPTEL course on Soft Skills, created by IIT Roorkee, from July 22, 2024, to October 11, 2024, and was awarded a Silver Medal after the exam on October 27, 2024.
- Completed an Arduino course, created by IIT Bombay, from April 1, 2024, to June 28, 2024, and passed the exam on July 1, 2024.

Dr. S. V. Kayalvizhi

- Completed an NPTEL course on Developing Soft Skills and Personality, from August 1, 2024, to October 31, 2024, and received an Elite certificate after the exam on October 27, 2024.

Dr. M. John Bosco

- Completed an NPTEL course on Soft Skill Development, created by IIT Kharagpur, from July 1, 2024, to September 30, 2024, and passed the exam on September 28, 2024.

Dr. M. John Bosco

- Completed an Arduino course, created by St. Xavier’s Catholic College of Engineering, from January 12, 2024, to June 30, 2024, and was awarded a Gold Medal after the exam on July 5, 2024.

Er. Almond D'Souza

- Completed a Soft Skills for IT course, created by Great Learning Academy, from August 12, 2024, to September 10, 2024, and received a Participation certificate on September 10, 2024.

Dr. S. S. Selva Pradeep

- Completed an NPTEL course on Developing Soft Skills and Personality, created by

Swayam, from August 1, 2024, to October 31, 2024, and passed the exam on November 21, 2024.

Er. P. Suji Garland

- Completed an NPTEL course on Developing Soft Skills and Personality, created by IIT Bombay, from August 1, 2024, to September 30, 2024, and passed the exam on October 27, 2024.

Dr. Jain B. Marshel

- Completed an Arduino course, from June 3, 2024, to June 26, 2024, and passed the exam on June 28, 2024.

Er. Abragam Siyon Sing M

- Completed an NPTEL course on DC Microgrid and Control System, created by IIT Roorkee, from July 8, 2024, to September 21, 2024, and received an Elite certificate after the exam on September 21, 2024.

Dr. J. Leon Bosco Raj

- Completed a Soft Skills for IT course, created by Great Learning Academy, from September 10, 2024, to September 12, 2024, and passed the exam on September 12, 2024.
- Completed a Moodle Test for Teachers, created by Spoken Tutorial Project, IIT Bombay, on December 18, 2023, and passed the exam on June 4, 2024.

Er. S. Shiny

- Completed an NPTEL course on Developing Soft Skills and Personality, created by IIT Bombay, on January 29, 2025, and received an Elite certificate after the exam on October 27, 2024.

Dr. M. Germin Nisha

- Completed an Innovation Ambassador - Advanced Level course, on August 14, 2024, and passed the exam on the same day.
- Completed an Innovation Ambassador - Foundation Level course, on July 30, 2024, and passed the exam on the same day.
- Completed an Arduino Training course, created by IIT Bombay, from June 3, 2024, to June 26, 2024, and passed the exam on June 28, 2024.
- Completed a Big Data Analytics in Smart Grid course, created by NITTTR Chandigarh, from February 12, 2024, to February 16, 2024, and passed the exam on June 20, 2024.

GALLERY

2025 Passed out Students

RESUME COMPETITION

SEE INAUGURATION

PROJECT IDEA PRESENTATION

TEACHER'S DAY CELEBRATION

VLSI TRAINING

ELECTRICAL VEHICLE TRAINING

ELECTRICAL WORK SHOP

FACTS OF SOLAR ENERGY

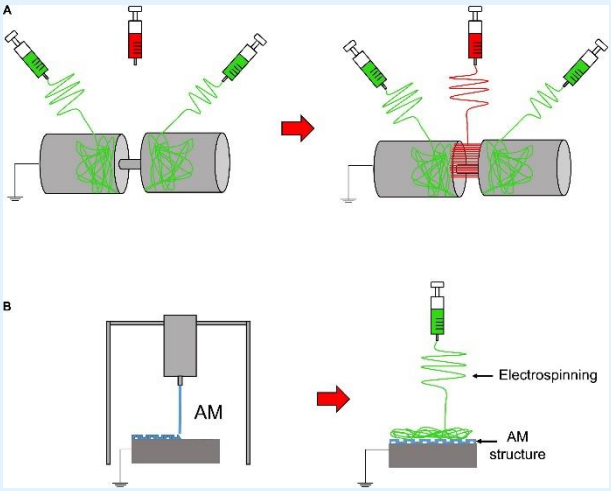
- Every hour, the sun beams more energy onto Earth than the entire human population uses in a year. That's an astronomical amount of power waiting to be harnessed!
- The photovoltaic effect—the principle behind solar panels—was first discovered by French physicist Edmond Becquerel in 1839. It took over a century for technology to catch up and make practical use of this discovery.

- The first satellite powered by solar energy was launched in 1958. Today, nearly all spacecraft, including the International Space Station, rely on solar panels for power.
- Over the past few decades, the price of solar panels has dropped dramatically (by more than 80% in some regions), making solar energy one of the most cost-effective forms of renewable energy available.

- Solar panels aren't just for rooftops! They're now being integrated into windows, building facades, and even paving materials. Some experimental projects even include solar roads that aim to generate power from our everyday commutes.

- Vast solar farms, like India's Bhadla Solar Park (spanning over 14,000 acres), can produce hundreds of megawatts of power—enough to supply thousands of homes with clean energy.

- Even on cloudy or overcast days, solar panels can generate electricity. Although they perform best in direct sunlight, they're still effective at capturing ambient light.
- Most solar panels come with warranties of 25 years or more, and with proper care, they can continue to produce clean energy for decades, making them a reliable long-term investment.



- Researchers are developing transparent solar panels that could one day turn windows into energy generators. Imagine skyscrapers that power themselves!
- Unlike fossil fuels, solar energy produces no emissions during operation. This makes it a vital player in the fight against climate change, helping to reduce our carbon footprint.

Night Road Accident

Control Device

Introduction

Driving at night presents a unique set of challenges that significantly increase the risk of road accidents. The lack of natural light, diminished depth perception, and decreased peripheral vision all contribute to reduced driver performance. Among the most pressing issues during night driving is the use of high-beam headlights, which, while essential for seeing the road ahead, can cause intense glare when directed at oncoming traffic. This glare can lead to temporary blindness, confusion, and even loss of control, resulting in collisions and fatalities. The problem is exacerbated in regions with inadequate street lighting and poor road infrastructure. Despite existing regulations and etiquette surrounding headlight usage, non-compliance remains widespread, largely due to driver negligence or lack of awareness. To counter this pervasive problem, the need for an automated solution becomes evident. Automatic headlight dimming systems are available in some high-end vehicles, utilizing cameras and microcontrollers to detect oncoming traffic and adjust beam intensity. However, these systems are often expensive and complex, limiting their adoption in budget-conscious markets. This project proposes an alternative approach that relies on basic electronic components to achieve a similar result. The goal is to provide a simple, reliable, and affordable system that can be retrofitted into existing vehicles or integrated into new designs without significantly increasing manufacturing costs. The proposed solution leverages a Light Dependent Resistor (LDR) to sense the intensity of incoming light. When the LDR detects bright light from an approaching vehicle, it triggers a transistor-based circuit that activates a relay to switch the headlights from bright to dim mode. This entire process occurs automatically, requiring no manual input from the driver. In doing so, the system ensures that proper headlight etiquette is maintained, even if the driver forgets or chooses not to adjust the lights manually. This paper delves into the detailed functioning of this system, evaluates its effectiveness through theoretical and practical analysis, and explores its potential for widespread implementation. The ultimate aim is to contribute to the reduction of nighttime road accidents through technology-driven intervention.
II.PROBLEMSTATEMENT

Nighttime driving poses significant dangers, particularly in environments where road infrastructure is lacking or poorly maintained. One of the most hazardous factors is the improper use of vehicle headlights, specifically the overuse or misuse of high-beam lights. High-beam headlights are designed to illuminate the road ahead over long distances, making them ideal for unlit roads. However, when drivers fail to switch to low beams in the presence of oncoming traffic, the intense glare can obscure vision, disorient drivers, and lead to collisions. This is a common issue in many parts of the world, where traffic regulations regarding headlight usage are not strictly enforced or followed.
Fig 1 The human eye takes several seconds to adjust from bright light to darkness. During this period of adaptation, a driver exposed to high-beam glare from an oncoming vehicle may become momentarily blinded, increasing the likelihood of veering off the road, missing obstacles, or being unable to react in time to avoid a crash.

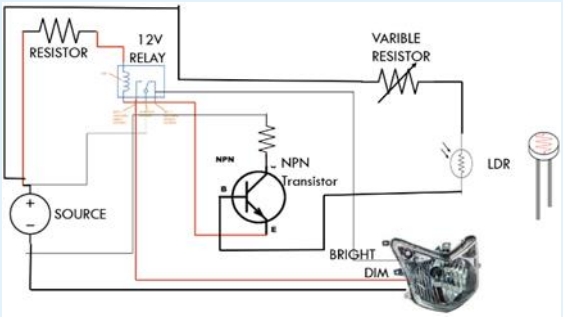
Proposed Solution

The core of this project is a sensor-based system that adjusts headlight brightness based on the intensity of incoming light. The device consists of an LDR module, a relay, a variable resistor, a transistor, and a resistor. When the LDR detects bright light from an oncoming vehicle, it triggers a response in the transistor, which in turn activates the relay to switch the headlights to dim mode. This process is entirely automatic and does not require driver intervention. The system is designed to be compact, energy-efficient, and compatible with existing headlight configurations.

Working Principle

The device operates on the principle of light sensing and electrical switching. In normal conditions, the headlights remain in bright mode. When light from an oncoming vehicle falls on the LDR, the resistance of the LDR drops, allowing current to flow through the circuit. This change is detected by the NPN transistor, which then becomes forward-biased. The transistor conducts and sends a signal to the relay. The relay, in turn, switches the headlight from bright to dim mode. Once the incoming light disappears, the LDR's resistance increases again, and the circuit returns to its original state. This process ensures that headlights are automatically dimmed without any manual input.

Circuit Diagram



The circuit consists of an LDR connected in series with a variable resistor to form a voltage divider. The output of the divider is fed to the base of an NPN transistor. The collector of the transistor is connected to the relay, while the emitter is grounded. When light intensity increases, the transistor is activated, which energizes the relay coil and toggles the headlight to dim mode. A simplified schematic can be created using common software or drawn manually for demonstration purposes.

Advantages

Significantly reduces the risk of night-time road accidents. Eliminates the need for manual switching of headlight modes. Enhances driver comfort and safety. Low cost and easy to implement. Requires minimal maintenance and energy consumption. Can be adapted to various types of vehicles. Promotes responsible driving practices. This system is especially useful in regions where drivers often ignore headlight etiquette.

Limitations

The device may not function accurately during rainy or foggy conditions due to reduced light detection. Sensitivity may vary based on component quality and calibration. Not suitable for vehicles with integrated LED or smart lighting systems without modification. External factors such as streetlights might trigger false switching. Despite these limitations, the device performs reliably under normal night driving conditions and provides substantial safety benefits.

Conclusion

The automatic headlight dimming device is a practical and economical solution to a critical safety issue on the roads. By leveraging simple electronics, it enhances driving safety by reducing glare from oncoming vehicles. The system is easy to build, install, and maintain, making it suitable for widespread adoption. With further refinement, such as integrating weather sensors or smart control units, this project can be expanded for more comprehensive vehicle automation.

S.R. Sam Raj Kumar

III EEE

Cloud Computing in the Field of Electrical Engineering

Antony Aakash S, Third Year EEE, St. Xavier's Catholic College of Engineering, Nagercoil

Introduction

In the era of digital transformation, cloud computing has emerged as a game-changer across various industries. Electrical engineering, traditionally rooted in physical systems and hardware, is now rapidly embracing cloud technologies to enhance design, simulation, monitoring, and maintenance processes. Cloud computing enables on-demand access to powerful computing resources, vast storage, and collaborative platforms that can significantly improve efficiency and innovation in electrical engineering applications.

What is Cloud Computing?

Cloud computing refers to the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. Instead of owning their own computing infrastructure or data centers, organizations can rent access to anything from applications to storage from a cloud service provider.

Cloud models include:

- **Infrastructure as a Service (IaaS)** – Renting infrastructure such as virtual machines or storage.
- **Platform as a Service (PaaS)** – Providing platforms to develop, run, and manage applications.
- **Software as a Service (SaaS)** – Delivering software applications over the internet.

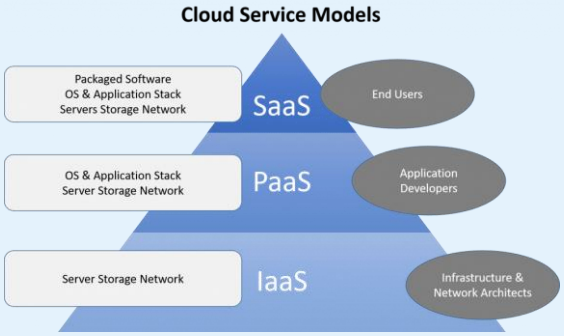


Fig 1 : Cloud Model

Applications of Cloud Computing in Electrical Engineering

1. Power Systems Monitoring and Smart Grid Integration

Electrical engineers are using cloud computing for real-time monitoring and control of power systems. Smart meters and IoT sensors send data to cloud-based platforms where it is processed and analyzed to balance supply and demand, detect faults, and optimize grid performance. Cloud computing allows for:

- **SCADA Systems on Cloud** – Cloud-based SCADA systems offer remote access, easier upgrades, and lower infrastructure costs.
- **Demand Response Management** – Cloud computing supports demand-side management by analyzing usage patterns and recommending power-saving actions.

2. Electrical Simulation and Design

Designing electrical circuits and power systems requires intensive computational power. Cloud computing enables engineers to use simulation software without needing powerful local machines. Tools like MATLAB, ETAP, and PSpice can now be accessed via the cloud, allowing for:

- **Faster Simulation Processing**
- **Collaboration on Complex Projects**
- **Remote Access to Design Environments**

For example, load flow studies, fault analysis, and harmonic analysis can be performed more efficiently through cloud platforms, particularly beneficial for large-scale industrial projects.

3. Renewable Energy Forecasting and Management

Cloud-based systems are used to collect and analyze data from renewable energy sources like solar panels

and wind turbines. By combining weather data with performance data stored in the cloud, engineers can:

- Predict power generation more accurately
- Schedule maintenance efficiently
- Manage energy storage and grid integration

This approach is vital for integrating renewable energy into national grids without compromising stability.

Benefits of Cloud Computing in Electrical Engineering

1. Scalability and Flexibility

Cloud systems can scale resources up or down based on the complexity of the task. Engineers can run high-performance simulations without needing to invest in physical hardware.

2. Cost Efficiency

Using cloud services reduces the need for costly local infrastructure, such as high-performance computers and large storage drives. Pay-as-you-go models make it budget-friendly, especially for startups and academic research.

3. Enhanced Collaboration

Engineers from different locations can collaborate on a single project in real-time. Cloud platforms facilitate version control, access to shared models, and team feedback loops.

4. Data Analytics and AI Integration

Cloud computing provides a platform to deploy artificial intelligence and machine learning models that analyze big data collected from sensors and electrical systems. This leads to predictive maintenance, anomaly detection, and automated decision-making.

Challenges and Considerations

While cloud computing offers numerous advantages, some challenges remain:

- **Data Security and Privacy**: Sensitive infrastructure data stored on the cloud may be vulnerable to breaches. Encryption, multi-factor authentication, and access control are essential.
- **Latency Issues**: Real-time control applications might suffer from latency if internet connectivity is poor.
- **Dependence on Service Providers**: Reliability of service depends heavily on the cloud provider's uptime and policies.

Future Outlook

The future of electrical engineering lies in intelligent, connected systems, and cloud computing is a crucial enabler of that vision. As 5G, AI, and IoT technologies mature, the integration of cloud services will become more seamless. Cloud-native platforms tailored for electrical and electronics engineering will offer more robust, secure, and powerful tools for automation, digital twins, and virtual testing environments.

Universities and industries are already including cloud-based lab platforms to train the next generation of engineers, preparing them to work in increasingly software-defined, data-driven environments.

Conclusion

Cloud computing is revolutionizing the field of electrical engineering by offering scalable computing resources, advanced analytics, and collaborative tools. From power system management to renewable energy optimization and simulation, cloud technologies are enhancing the capabilities and scope of engineers. As the world moves toward smarter infrastructure, the role of cloud computing in electrical engineering will only continue to expand, opening up new opportunities for innovation and efficiency.

Top 3 Electrical Innovations in 2025

The domain of electrical technology is advancing at unprecedented pace, unlocking remarkable possibilities that are reshaping both convenience and efficiency. From autonomous vehicles to intelligent sustainable solutions, we are experiencing profound shifts poised to improve everyday life. As we move through 2025, the fusion of these electrical innovations is set not only to disrupt traditional industries but also to address some of humanity's most urgent issues. In this article, we explore three cutting-edge technologies that are poised to redefine how we work, live, and interact in the coming years.

Autonomous Vehicles

One of the most significant breakthroughs anticipated in late 2025 and into 2026 is the rise of autonomous vehicles. These self-driving cars operate without human intervention, relying instead on data collected from advanced cameras, radar systems, and laser-based sensors to recognize traffic signals and navigate their surroundings. The onboard software, which leverages Artificial Intelligence and Machine Learning, directs the vehicle's control mechanisms to execute driving decisions. Although some recently introduced autonomous models in various regions have encountered technical failures and accidents, substantial advancements are underway to embed reliable autonomy solutions within public transit and freight services. The integration of intelligent cabling, modern electrical components, and sophisticated communication networks is expected to substantially lower accident rates, enhance traffic coordination, and cut down on harmful emissions.

Green Energy Technologies

As the world increasingly prioritizes sustainability, clean energy technologies are progressing at a remarkable rate. The emphasis is on boosting performance and efficiency while transitioning to renewable power sources such as wind, solar, and bioenergy. Notable developments include next-generation photovoltaic cells, wind turbines capable of functioning at reduced wind speeds, and biofuels produced from non-edible biomass. Cutting-edge solutions like perovskite-based solar cells, ultra-thin flexible panels, heterojunction (HJT) technology, floating solar installations, and quantum dot applications are paving the way for a cleaner energy landscape. These advancements play a vital role in cutting global carbon emissions and supporting long-term environmental objectives.

6G: Next-Gen Connectivity

Although 5G networks are currently being implemented, the emergence of 6G technology is set to deliver download and upload speeds up to 100 times faster, along with broader coverage and more reliable connections. This next generation of wireless communication will support instant data transfer and seamless handling of vast datasets with virtually no lag, fueling an era of unprecedented technological progress. One of the goals of the 6G internet is to support one microsecond latency communications. This is 1,000 times faster - or 1/1000th the latency -- than one millisecond throughput. The superior performance of 6G is expected to transform sectors reliant on real-time information, such as Augmented Reality and self-driving vehicles, by providing the ultra-fast, low-latency connectivity these applications demand.

S. Shiny, AP/EEE

St. Xavier's Catholic College of Engineering

(AUTONOMOUS)
Chunkankadai, Nagercoil - 629 003
Kanyakumari District, Tamilnadu, INDIA
E-mail :info@sxcce.edu.in, xaviersengg@yahoo.com
web: www.sxcce.edu.in
Telephone : 91-4652-232560,259662, 227803, 224033, 237361
Fax :91-4652-233982, 259664