

ELECTRICA

**Vol 13 Issue 2
AUGUST-2025**



DEPARTMENT OF ELECTRICAL ENGINEERING

Aryan Institute of Engineering and Technology

Arya Vihar Colony, Bhubaneswar, Barakuda, Odisha 752050

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ABOUT THE INSTITUTE

Established in the year 2009, Aryan Institute of Engineering and Technology (AIET) is one of the premier engineering colleges in the self-financing category of engineering education in eastern India. It is situated at temple city Bhubaneswar, Odisha and is a constituent member of Aryan Educational Trust. The institute is approved by the All India Council for Technical Education (AICTE) under the Ministry of Human Resource Development, Government of India; recognized by the Government of Odisha; and affiliated with Biju Patnaik University of Technology (BPUT), Rourkela, Odisha.

AIET aims to create disciplined and trained young citizens in the field of engineering and technology for holistic and national growth. The college is committed towards enabling secure employment for its students at the end of their four-year engineering degree course. (The NAAC accreditation in the year 2018 vouches for the college's determination and dedication for a sustainable learning environment). The academic fraternity of AIET is a unique blend of faculty with industry and academic experience. This group of facilitators work with a purpose of importing quality education in the field of technical education to the aspiring students. Affordable fee structure along with approachable location in the smart city of Bhubaneswar makes it a preferred destination for aspiring students and parents.

AIET serves as a deep of knowledge for students pursuing program ranging from diploma to B.Tech courses equipped with an excellent infrastructure for academics, co-curricular and extracurricular activities. AIET secured its compliance certificate for ISO 9001:2015 QMS standards from the prestigious INNOVATIVE SYSTEMCERT PVT. LTD Accredited by EGAC, a member of International Accreditation Forum, Ghaziabad, Up, India

VISION AND MISSION OF THE INSTITUTE

Vision

- To become a leading engineering institution of the state by impacting quality technical education at affordable costs to create skilled and motivated engineers to serve the technological requirements of society in different ways.

Mission

AIET will strive continuously to

- To impart contemporary technical education and skills to students of different socio-economic background.
- To equip students with analytical learning and real life problem solving.
- To make learning a continuous endeavour compatible with market needs.
- To promote the spirit of leadership, entrepreneurship, innovation and ethics

ABOUT THE DEPARTMENT

The Department of Electrical Engineering was established in the year 2009. It aims at producing qualified engineers in the areas of electrical machine, power electronics, control system, power system, and instrumentation. The field of Electrical and Electronics is advancing at a very rapid pace. Power electronics has taken the centre stage in every area be it power systems, control systems, power quality, etc. The department is well equipped with a group of highly qualified and dynamic teachers. It boasts of laboratory facility to be one of the best in the state. The students are encouraged and motivated to take up challenging projects. Summer training, industrial visit and projects are carefully planned for the students to remain updated with the technology trend. Seminars and short courses are regularly organized to update the students with the latest in the education and industry trends.

Vision

- To be a leader in the field of electrical engineering education and training by creating graduates who are globally competent, successful in their chosen fields of endeavour, engaged in innovative research and entrepreneurship, and deeply committed to social advancement.

Mission

M1: To impart the fundamentals of electrical engineering so that students may develop new products and solutions to solve issues in the real world.

M2: To enable students to pursue a prosperous career in the cognitive electrical engineering professions and to become ethical technologists.

M3: Through continuous improvement of faculty and lab facilities, to strive for excellence in academics and research works by developing a rich electrical engineering based research centre for industrial growth of the nation.

ELECTRICA

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Chairperson's Message



Dr. Madhumita Parida
Chairperson
AIET, Bhubaneswar

Today's technical world is expanding at the speed of thought and has opened numerous options of excellence. Perfection and quality in educational field enhances one's ability to formulate new ideas & look beyond the obvious which is necessary to succeed in today's technical era. I am gratified to know that the Department of Electrical Engineering is bringing out the first issue of their technical magazine "ELECTRICA" of this academic year (2023-2024). This magazine is providing great space for the faculty and students to pen down their innovative ideas, imagination and perceptions to show case their creativity. So, I take the opportunity to congratulate the Department of EE and its editorial team to successful release of this issue.

Director's Message



Mrs. Sasmita Parida
Director
AIET, Bhubaneswar

It is a noble task on the part of the Department of Electrical Engineering to once again make it with their frequent issue "ELECTRICA". I wish that this technical magazine establishes to be a flint to fire the enthusiasm and excite their minds for many intrusive innovations among the students and inspire passion among the members of the faculty of Electrical Engineering committee. My greeting to the editorial board and department of EE.

Principal's Message



Prof. (Dr.) Dillip Kumar Biswal
Principal
AIET, Bhubaneswar

It gives me immense pleasure to note that, department of EE has been publishing their bi-annual magazine "ELECTRICA" and I am sure this will provide an opportunity for the faculty and students to share their knowledge and beacon the information about various issues and activities that are being taking place in the department. I look forward for more activities and achievements for the department to march towards excellence in the future. I would like to thank all teaching, supporting staff and our beloved students for their active participation in publishing this magazine. My special compliments and congratulation to the editorial team of the department for their consistent effort in publishing this magazine

Dean Academic's Message



Prof. (Dr.) P K Swain
Dean Academics
AIET, Bhubaneswar

I am glad to know that the Department of Electrical Engineering is bringing out its technical magazine “ELECTRICA” which will mount creativity in the minds of the students as well as the staff members. The release of this spectacular first issue of ELECTRICA has added value to their constant efforts. Through this message, I wish them “All the very Best” for their future endeavors to and hope the students of EE bring more achievements to the college on the whole.

Vice Principal's Message



Prof. (Dr.) A K Sahoo
Vice Principal
AIET, Bhubaneswar

I am glad to pen for this wonderful magazine “ELECTRICA” as an appreciation of the commendable efforts put forth by the team of Electrical Engineering department for its first issue in the academic year 2023-24. The efforts taken to bring about innovative content is appreciable. I wish all the students who have involved in bringing out the magazine for their greater success and career ahead.

HOD's Message



Prof. (Dr.) P C Nayak
HOD EE
AIET, Bhubaneswar

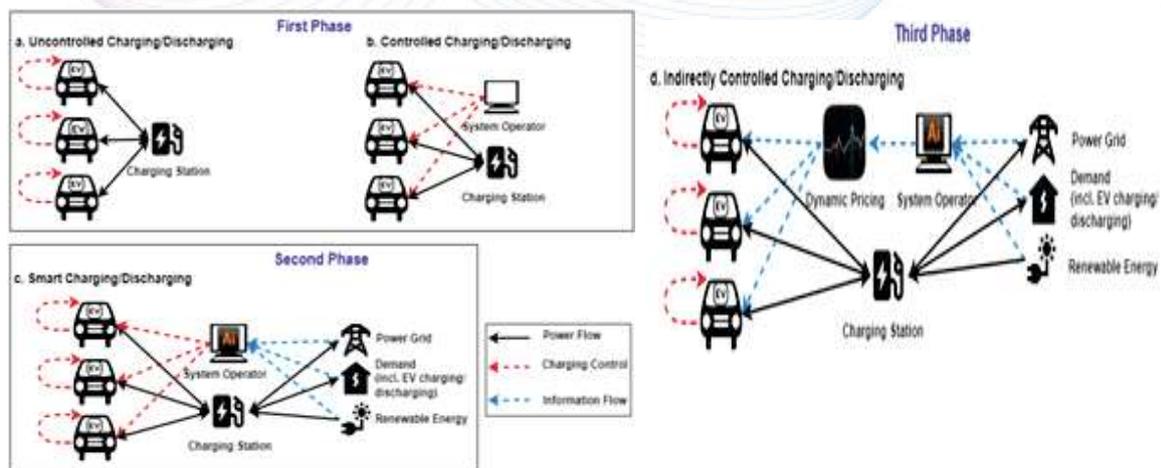
I feel privileged in presenting the first issue of departmental magazine “ELECTRICA” once again successful for this academic year 2023-24. This magazine is intended to bring out the unseen fictitious talents among the students and the faculty and also to inculcate leadership skills among them. I'm confident that it will inspire the students who aspire to be poets and writers and push their imaginations to explore new avenues. I acknowledge my gratitude to our principal for their continuous support to prepare these issues of magazine. I extend my sincere thanks to the editorial team for their constant effort and support in bringing out the magazine in the present form.

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FACULTY CORNER

AI-DRIVEN EV ENERGY MANAGEMENT



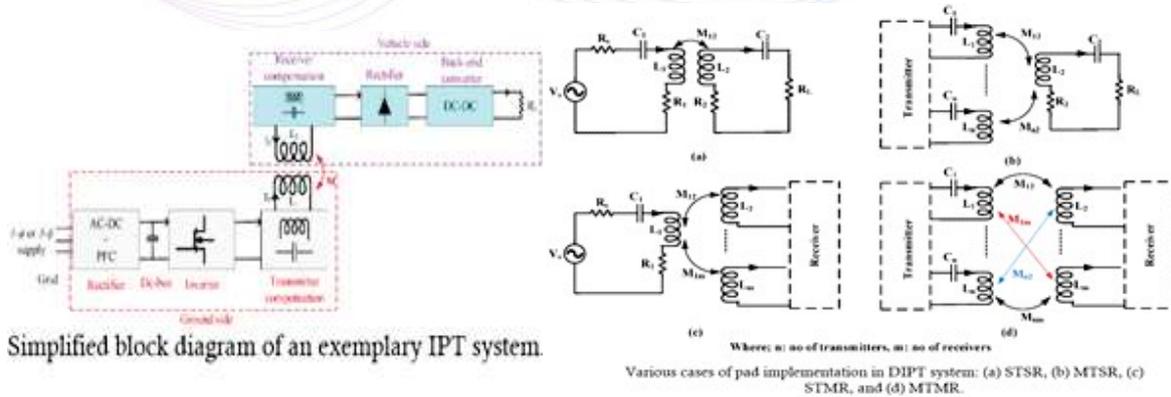
The increasing adoption of electric vehicles has become a major driver in the global transition toward sustainable and low-carbon energy systems. While electric vehicles significantly reduce emissions from the transportation sector, their large-scale integration introduces new challenges for electrical power systems. Uncontrolled charging behavior can lead to peak load stress, voltage instability, and inefficient utilization of renewable energy. To overcome these challenges, electrical engineering has embraced innovative solutions based on artificial intelligence to optimize electric vehicle charging, discharging, and grid interaction.

Artificial intelligence techniques enable intelligent scheduling of electric vehicle charging by analyzing historical data, user behavior, electricity demand, and renewable energy availability. Unlike conventional scheduling methods, AI-based models can adapt dynamically to changing grid conditions. These intelligent systems predict optimal charging times, ensuring that vehicles are charged when electricity demand is low or when renewable energy generation, such as solar or wind power, is abundant. This approach improves grid stability while maximizing the use of clean energy resources. This bidirectional energy flow enhances system reliability and reduces dependence on conventional fossil-fuel-based power plants.

Dynamic electricity pricing further strengthens intelligent charging systems. By varying electricity prices according to demand and supply conditions, users are encouraged to charge vehicles during off-peak hours or periods of high renewable generation. Despite these advancements, challenges remain in ensuring user participation, data security, and large-scale implementation. Ongoing research focuses on improving prediction accuracy, enhancing algorithm efficiency, and integrating artificial intelligence with smart grid infrastructure. These developments aim to create resilient and flexible power systems capable of handling the growing penetration of electric vehicles. AI-based electric vehicle charging and grid optimization represent a major innovation in electrical engineering.

Mr. Ajit Kumar Panda
Asst. Professor, EE
AIET, Bhubaneswar

AN OVERVIEW OF DYNAMIC INDUCTIVE CHARGING FOR ELECTRIC VEHICLES



Green energy innovation has become one of the most important frontiers in modern electrical engineering, shaping a future where energy needs are met sustainably and efficiently. One of the most promising advancements within this field is in the electrification of transportation particularly through wireless (inductive) charging technologies for electric vehicles (EVs). Traditional EV charging systems require physical plug-in connections, which can be inconvenient for users and limit the potential for seamless energy transfer. Wireless charging addresses these limitations by transferring power without direct contact, using magnetic fields generated between two coils — one embedded in the roadway and the other on the vehicle's underside. This innovation not only enhances user convenience but also aligns with the broader goal of reducing greenhouse gas emissions by enabling more widespread adoption of EV technologies. Dynamic inductive charging systems represent a major breakthrough, allowing EVs to charge while in motion. In this approach, transmitting coils are installed beneath the driving surface, creating an electromagnetic field that powers moving vehicles through inductive coupling. This enables “on-the-move” charging, significantly extending driving range without the need for long stops at charging stations. For electrical engineers, designing such systems involves optimizing coil arrangements, developing efficient compensation networks, and integrating advanced power electronic converters that manage frequency and energy transfer with minimal losses. Effective dynamic charging systems also require intelligent control techniques to ensure reliable power flow despite vehicle speed and alignment variations.

Another key innovation involves the segmentation of charging tracks to improve efficiency and flexibility. Instead of using a single long coil, segmented coil arrays can be activated as the vehicle passes over each section. This architecture helps minimize energy loss and electromagnetic interference while enhancing safety and adaptability in real-world traffic conditions. Engineers must also address challenges such as ensuring electromagnetic field safety, managing system costs, and mitigating installation complexities in urban environments. By reducing dependency on fossil fuels and enhancing energy system resilience, these technologies contribute significantly to sustainable development goals. As research and practical deployment continue, innovations in dynamic charging and power electronics will play an increasingly central role in engineering a greener, cleaner, and more efficient energy future.

Mr. Satya Sobhan Panigrahi
Asst. Professor, EE
AIET, Bhubaneswar

SMART-AUTH BILLING FOR IOEV



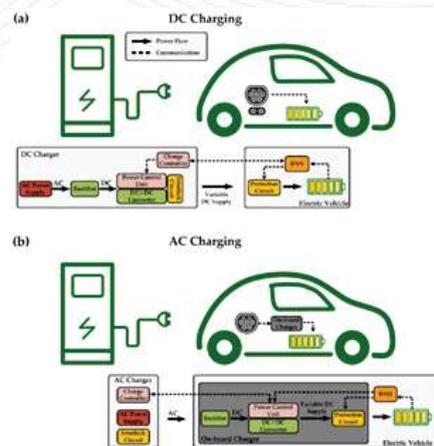
In the rapidly evolving landscape of sustainable transportation, dynamic wireless charging (DWC) represents one of the most promising innovations within electrical engineering. This technology aims to charge electric vehicles (EVs) while they are in motion by embedding charging infrastructure into roadways. By eliminating the need for EVs to stop at stationary charging stations, DWC systems reduce range anxiety, increase convenience, and enable longer trips with minimal interruptions. This transformative concept is closely linked with the broader Internet of Electric Vehicles (IoEV), where vehicles, charging pads, and grid infrastructure work together through intelligent communication networks to optimize energy delivery and system performance.

Dynamic wireless charging requires seamless interaction among multiple components, the EV, charging segments embedded in the road, charging pad owners, and a central management system. Each of these elements must coordinate through high-speed communication technologies such as 5G and dedicated short-range communication (DSRC). These networks facilitate real-time data exchange, enabling vehicles to register with the charging network, authenticate securely, and receive energy without physical connectors. A key challenge inherent in DWC and IoEV systems is the need for robust authentication and billing mechanisms. Since vehicles move rapidly through charging segments, communication latency must be extremely low to maintain reliable service. Engineering solutions focus on lightweight authentication schemes that verify vehicle credentials quickly and securely, while billing mechanisms must accurately record energy use as vehicles traverse multiple charging zones. Innovations in cryptographic techniques, including symmetric and asymmetric encryption and lightweight hashing, help ensure secure exchanges while minimizing computational overhead critical aspect for resource-limited on-board vehicle systems.

In dynamic wireless charging within the Internet of Electric Vehicles exemplifies a groundbreaking green energy innovation in electrical engineering. By combining advanced communication networks, secure authentication, efficient billing, and smart grid coordination, this technology not only supports the electrification of transportation but also enhances the resilience and sustainability of future energy systems.

Dr. Debasish Mishra
Asst. Professor, EE
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TRENDS IN EV CHARGING INFRASTRUCTURE



The rapid growth of electric vehicles has created new challenges and opportunities for electrical power systems. This article discusses recent advancements in electric vehicle charging infrastructure, including conductive and wireless charging technologies, and their role in supporting sustainable and green energy systems. The transition from conventional fuel-based transportation to electric mobility is a significant step toward reducing greenhouse gas emissions and achieving sustainable development goals. Electric vehicles have emerged as a clean alternative to internal combustion engine vehicles, but their large-scale adoption depends heavily on the availability of reliable and efficient charging infrastructure. As a result, electric vehicle charging systems have become a major focus area in electrical engineering research and innovation.

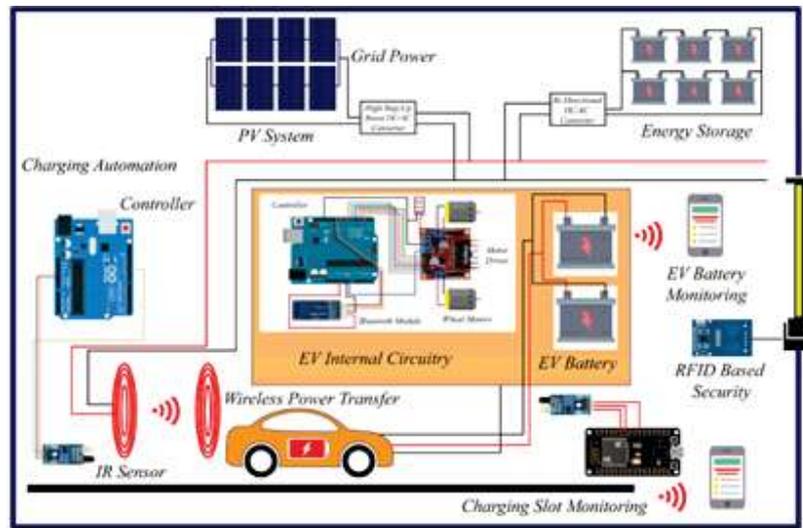
Conductive charging systems remain the most widely used method for electric vehicle charging. These systems rely on physical connectors to transfer electrical energy from the grid to the vehicle battery. Continuous improvements in power electronic converters, control strategies, and safety mechanisms have led to faster charging times and higher efficiency. High-power fast charging stations are particularly important for public and highway charging applications, as they reduce waiting times and enhance user convenience. Wireless charging has emerged as a promising alternative that eliminates the need for physical connectors. This technology uses electromagnetic coupling to transfer energy between a transmitter embedded in the ground and a receiver mounted on the vehicle. Wireless charging offers improved convenience and reduced mechanical wear, making it attractive for urban and autonomous vehicle applications. However, challenges such as alignment sensitivity, energy transfer efficiency, and infrastructure cost must be addressed to enable widespread adoption.

The integration of electric vehicle charging infrastructure into existing power networks presents several technical challenges. Large-scale charging demand can lead to increased peak loads, voltage fluctuations, and stress on distribution systems. Smart charging strategies, supported by advanced communication and control technologies, allow charging to be scheduled based on grid conditions and renewable energy availability. Such approaches help reduce grid congestion and support the efficient utilization of green energy sources.

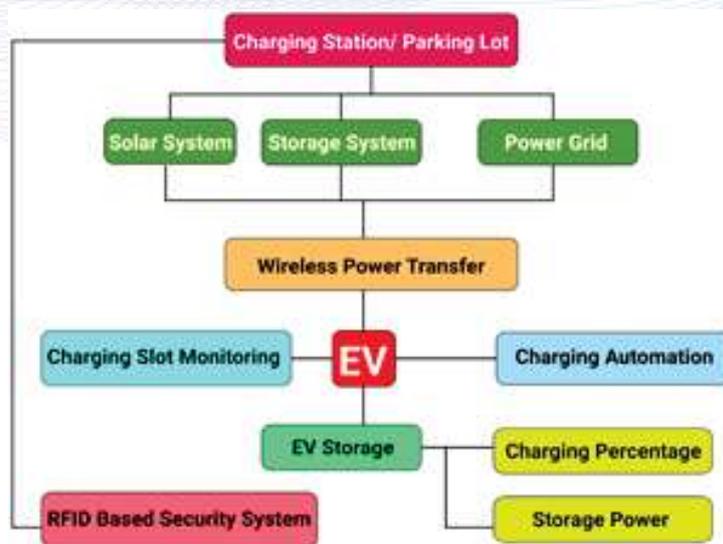
Advancements in electric vehicle charging infrastructure are essential for enabling sustainable transportation and green energy integration. Through innovations in conductive and wireless charging, along with intelligent grid integration, electrical engineers are developing solutions that enhance system reliability and environmental performance. These efforts will play a crucial role in shaping a cleaner and more energy-efficient future.

Dr. Pratap Chandra Nayak
Associate Professor, EE
AIET, Bhubaneswar

SMART AND SUSTAINABLE WIRELESS ELECTRIC VEHICLE CHARGING STRATEGY WITH RENEWABLE ENERGY AND INTERNET OF THINGS INTEGRATION



Electric vehicles are a key pillar of sustainable transportation and play a central role in reducing carbon emissions and fossil fuel dependence. However, the rapid adoption of electric vehicles depends not only on vehicle efficiency and battery technology but also on the availability of reliable and green charging infrastructure. Traditional charging stations are often dependent on grid electricity and require physical cable connections that can pose safety challenges, inconvenience, and maintenance issues. Innovations in wireless charging systems, integrated with renewable energy resources and modern connectivity solutions, offer a promising pathway toward more sustainable and user-friendly EV charging. Recent advancements focus on wireless power transfer (WPT) as an alternative charging method that eliminates the need for physical plugs and cables. WPT uses electromagnetic induction to transfer energy between a charging pad on the ground and a receiver mounted on the vehicle. This technology provides a safer and more convenient user experience, requiring drivers simply to park over a charging pad to initiate charging. By eliminating cable wear and positioning issues, WPT enhances reliability and reduces maintenance needs. When combined with renewable energy sources such as solar photovoltaic systems and battery storage, wireless charging stations can operate with low environmental impact and higher energy independence.



The integration of renewable energy resources with EV charging also addresses one of the main challenges of sustainable transportation: ensuring that the energy used for charging is itself clean and low carbon. Solar arrays installed near charging stations or integrated with rooftop systems can supply direct renewable power. Excess energy can be stored in batteries and used during periods of high demand or low solar production, increasing the overall efficiency and sustainability of the charging infrastructure. Moreover, the use of renewable energy in EV charging contributes to reducing annual carbon emissions by minimizing reliance on fossil fuel-based grid power. In addition to energy supply solutions, modern charging systems incorporate Internet of Things (IoT) technologies to improve user interaction and system performance. IoT connectivity allows real-time monitoring of battery status, photovoltaic output, and station availability. Users can access this information through smartphone applications, enabling better planning of charging sessions and real-time feedback on system health. Security protocols integrated via IoT also help protect users and infrastructure by ensuring authenticated access and data privacy. Finally, economic evaluations of these systems in real-life implementation scenarios reveal significant benefits, including lower overall operational costs and strong participation of renewable energy in the power mix. By combining wireless charging, renewable sources, and smart connectivity, electrical engineering innovations are enabling a more sustainable, efficient, and user-centric future for electric vehicle charging.

Dr. Sunita Pahadasingh
Associate Professor, EE
AIET, Bhubaneswar

DIGITAL SUBSTATIONS AND IEC 61850: TRANSFORMING POWER SYSTEM AUTOMATION



Power system substations are undergoing a digital transformation driven by the need for improved reliability, interoperability, and real-time monitoring. Traditional substations rely on extensive copper wiring and analog signals, making them complex, inflexible, and maintenance-intensive. Digital substations based on IEC 61850 standards offer a modern alternative.

IEC 61850 defines communication protocols and data models for substation automation systems. It enables seamless interoperability between devices from different manufacturers, eliminating vendor lock-in. By replacing hardwired connections with Ethernet-based communication, digital substations significantly reduce cabling and installation complexity.

One of the key features of IEC 61850 is the use of Generic Object-Oriented Substation Events (GOOSE) and Sampled Values (SV). These allow high-speed communication for protection and control functions, ensuring fast fault detection and isolation. Time synchronization using Precision Time Protocol (PTP) ensures accurate data alignment across devices.

Digital substations enhance asset monitoring and predictive maintenance. Intelligent Electronic Devices (IEDs) continuously collect operational data, enabling condition-based maintenance strategies that reduce downtime and operational costs. Cybersecurity, however, becomes a critical concern, requiring robust encryption, authentication, and network segmentation. The transition to digital substations represents a significant step toward smart grids. With enhanced flexibility, scalability, and intelligence, IEC 61850-based substations are shaping the future of power system automation.

Dr. Krushna Keshab Baral
Assistant Professor
AIET, Bhubaneswa

STUDENTS CORNER

INTELLIGENT MONITORING SYSTEMS FOR ELECTRIC VEHICLE CHARGING

The rapid growth of electric vehicles has created new opportunities for sustainable transportation while also presenting challenges for electrical infrastructure management. As charging stations become more widespread, efficient operation and monitoring of these facilities is essential to ensure reliability, safety, and optimal resource utilization. Intelligent monitoring systems play a crucial role in addressing these challenges by enabling real time supervision and data driven decision making for electric vehicle charging infrastructure.

Intelligent monitoring systems rely on advanced sensing and communication technologies to collect operational data from charging stations. Parameters such as voltage, current, power consumption, temperature, and connection status are continuously observed. This information provides valuable insight into the performance of charging equipment and user interaction patterns. By analyzing this data, system operators can detect abnormal conditions, identify inefficient usage, and ensure the safe operation of charging facilities. Another important feature is predictive maintenance. Furthermore, the data collected through monitoring platforms provides a foundation for future innovation. Advanced analytics and intelligent control strategies can be developed to optimize energy usage, support renewable integration, and improve overall system efficiency. Electrical engineers play a key role in designing and implementing these systems, ensuring that charging infrastructure remains reliable, scalable, and environmentally sustainable.

In conclusion, intelligent monitoring systems are essential for the effective management of electric vehicle charging infrastructure. By enhancing efficiency, reliability, and grid compatibility, these systems contribute significantly to the advancement of sustainable transportation and modern electrical engineering practices.

ABINASH SETHY
Regn. No. : 2301320245
2nd Year, EE
AIET,BBSR

GRID-FORMING INVERTERS: A FOUNDATION FOR FUTURE LOW-INERTIA POWER SYSTEMS

The global transition toward renewable energy has significantly altered the dynamic behavior of power systems. Conventional power grids relied heavily on synchronous generators, which inherently provided rotational inertia essential for frequency stability. However, the increasing penetration of inverter-based renewable sources has resulted in low-inertia power systems, posing serious challenges to grid stability. Grid-forming inverters have emerged as a critical solution to address this issue.

One of the key control strategies employed in grid-forming inverters is droop control. By adjusting frequency and voltage based on active and reactive power output, droop control enables power sharing among multiple inverters. Grid-forming inverters play a vital role in microgrids, offshore wind farms, and battery energy storage systems.

Ongoing research focuses on harmonizing grid codes, improving control robustness, and integrating grid-forming capabilities into large-scale renewable plants. As synchronous generators gradually retire, grid-forming inverters are expected to become the backbone of future power systems.

MANASA KUMAR GOCHHAYAT

Regn. No. : 2201320162

3rd Year, Ee

Aiet, Bbsr

ADVANCED ENERGY STORAGE TECHNOLOGIES FOR GRID-LEVEL APPLICATIONS

Energy storage is a cornerstone of modern power systems, enabling flexibility, reliability, and efficient renewable integration. While lithium-ion batteries dominate current deployments, grid-level applications demand diverse storage technologies capable of addressing long-duration and high-power requirements.

Pumped hydro storage remains the most mature and widely used large-scale storage technology. It offers high efficiency and long operational life but is geographically constrained. Compressed air energy storage (CAES) provides an alternative by storing energy in underground caverns, though efficiency improvements are still under development.

Electrochemical storage technologies are rapidly evolving. Flow batteries, such as vanadium redox batteries, are particularly suited for grid applications due to their independent scaling of power and energy. They offer long cycle life and enhanced safety, making them attractive for renewable integration.

Thermal energy storage and hydrogen-based storage systems are gaining attention for long-duration applications. Power-to-hydrogen systems convert excess renewable electricity into hydrogen, which can be stored and reconverted into electricity or used directly in industrial processes.

Challenges in energy storage deployment include high capital costs, lifecycle degradation, and integration complexity. Nevertheless, continuous advancements in materials science and power electronics are driving cost reductions and performance improvements. Grid-level energy storage is set to play a transformative role in enabling a resilient and decarbonized power system.

ARMAN KHAN

Regn. No. : 2301320247

2nd Year, Ee

Aiet, Bbsr

POWER SYSTEM PROTECTION IN RENEWABLE-DOMINATED NETWORKS

Traditional power system protection schemes were designed for unidirectional power flow and predictable fault currents from synchronous generators. The increasing integration of renewable energy sources has fundamentally altered fault characteristics, necessitating a re-evaluation of protection strategies. Inverter-based resources limit fault current contribution, often to values close to rated current. This behavior challenges conventional overcurrent protection schemes, leading to delayed or failed fault detection. Directional protection and differential protection schemes are increasingly adopted to address these issues.

Adaptive protection systems leverage real-time measurements and communication networks to dynamically adjust protection settings. These systems enhance selectivity and reliability under varying operating conditions. The use of IEC 61850 communication standards enables fast data exchange and coordinated protection actions. Artificial intelligence and machine learning techniques are being explored to improve fault classification and location accuracy. However, cybersecurity and data integrity concerns must be carefully addressed. Modern protection systems must balance speed, reliability, and adaptability. As renewable penetration continues to rise, innovative protection philosophies will be essential for maintaining grid security.

AKASH DAS

Regn. No. : 2201320150

3rd Year, Ee

Aiet, Bbsr

ELECTROMAGNETIC COMPATIBILITY CHALLENGES IN HIGH-POWER ELECTRONIC SYSTEMS

The widespread adoption of power electronic converters has intensified electromagnetic compatibility (EMC) concerns in modern electrical systems. High switching frequencies and fast voltage transitions generate electromagnetic interference (EMI) that can affect nearby equipment and communication systems. Conducted and radiated emissions are major EMI sources in high-power converters. Improper grounding, cable layout, and shielding exacerbate these issues. Compliance with international EMC standards requires careful design and testing. Mitigation techniques include the use of passive filters, shielding enclosures, and optimized PCB layouts. Soft-switching techniques and spread-spectrum modulation are also employed to reduce EMI at the source. As power electronic systems become more compact and powerful, achieving EMC compliance without compromising efficiency remains a critical engineering challenge.

PARHITA DHARUA

Regn. No. : 2101320128

4th Year, Ee

Aiet, Bbsr

ELECTRIC VEHICLE CHARGING INFRASTRUCTURE: GRID IMPACT AND MITIGATION STRATEGIES

The rapid growth of electric vehicles (EVs) presents both opportunities and challenges for power distribution networks. Uncoordinated EV charging can lead to voltage fluctuations, transformer overloading, and increased peak demand. Smart charging strategies leverage communication and control to optimize charging schedules based on grid conditions and energy prices. Vehicle-to-grid (V2G) technology enables EVs to act as distributed energy storage units, providing ancillary services such as frequency regulation. The architecture of battery chargers plays a significant role in determining charging speed, efficiency, and overall performance. Chargers can vary in power levels and topologies, and engineers continuously work to refine these architectures to maximize energy transfer, minimize losses, and enhance safety. Advanced charging designs also incorporate power conversion mechanisms that adapt voltage and current characteristics to match the specific requirements of different battery chemistries and capacities. Power management within EV systems extends beyond the charger itself and encompasses strategies for optimizing energy flow between the vehicle, its internal systems, and external power networks. Effective management techniques ensure that energy is used judiciously, enhance battery longevity, and contribute to overall system reliability. These interactions support features such as demand-based charging, which adjusts energy delivery based on real-time load conditions, and vehicle-to-grid exchanges, where stored energy in electric vehicle batteries can be fed back into the grid to aid in peak load management. Fast-charging stations demand high power levels, necessitating grid reinforcement and local energy storage solutions. Power quality issues, including harmonics and voltage sag, must be carefully managed. A coordinated approach involving utilities, policymakers, and consumers is essential to ensure sustainable EV integration without compromising grid reliability.

PRIYANSHU BEHERA

Regn. No. : 2101320131

4th Year, Ee

Aiet, Bbsr

STORY

THE FIRST FAILURE

The word FAIL was printed in red, unapologetic and final. Aman stared at the notice board longer than necessary, as if the letters might rearrange themselves out of pity. Around him, celebration and disappointment moved side by side, but his world narrowed to a single result. He had always been the dependable one—the student teachers nodded at, the name relatives quoted with pride. Failure felt like a foreign language spoken fluently by everyone except him. He walked back to the hostel slowly, avoiding phone calls, avoiding mirrors. That night, his roommate Rahul placed two cups of tea on the table. No advice, no lecture. Just silence. Eventually, Aman spoke. Words came out broken, ashamed, relieved. Rahul listened. Over the next weeks, Aman attended classes differently. Not to impress, but to understand. He asked questions he once feared sounded foolish. He discovered gaps he never knew existed. Learning felt raw, honest. When the next results came, he passed. Modestly. But this time, the paper didn't define him. Failure had taught him something success never did—how to begin again.

RAJESH MALIK

Regn. No. : 2201320167

3rd Year, EE, Aiet, Bbsr

HOSTEL BALCONY NO. 3

Hostel Balcony No. 3 faced the railway tracks. Trains passed every night at 2:17 a.m., punctual and loud. For Neel, that sound marked survival. It meant another day endured. Balcony No. 3 became a gathering place for insomniacs—an economics topper battling anxiety, a sports quota student hiding an injury, a literature major unsure of her future. They didn't introduce themselves formally. They shared snacks, stories, and silences. One night, power went out across campus. Darkness erased labels. Conversations deepened. They spoke about pressure, expectations, and the fear of disappointing people back home. By semester's end, the group drifted apart naturally, as schedules changed. But whenever Neel heard a distant train, he remembered that balcony—a place where strangers helped each other breathe.

KIRTI KAUSHIK NAYAK

Regn. No. : 2301320254

2nd Year, Ee

Aiet, Bbsr

THE SUBSTITUTE PROFESSOR

The regular professor was on leave, replaced by someone no one recognized. Students expected an easy week. They were wrong. The substitute professor didn't use slides. He asked questions. Hard ones. He made students uncomfortable, forcing them to explain ideas instead of memorizing them. At first, the class resisted. Attendance dipped. Complaints circulated. Still, he continued.

On the final day, he revealed he was an alumnus who once failed the same course. “This place taught me resilience,” he said. “I returned to pass it on.” Years later, students remembered him—not for grades, but for awakening curiosity.

NARESH SAMAL

Regn. No. : 2101320126

4th Year, Ee

Aiet, Bbsr

POEM

THE LIBRARY THAT WATCHED US GROW

The library opens before we do.
It waits with patient lights
and chairs that remember our weight.
Here, silence is not empty—
it is crowded with ambition.
Some students enter like warriors,
armed with notes and confidence.
Others slip in quietly,
carrying doubt like a second bag.
Books do not judge.
A girl studies literature
to outrun loneliness.
Pages turn like quiet applause.
Time slows down,
as if respecting effort.
Outside, the world demands success.
Inside, we learn survival.
When we leave,
holding our unfinished dreams
between chapters
we swear we'll return to.

CHANDAN PATRA
Regn. No. : 2201320155
3rd Year, Ee
Aiet, Bbsr

ROLL NUMBERS DON'T DREAM

They call me by a number.
It is efficient.
It is clean.
It is forgettable.
The number submits assignments on time.
The number scores reasonably.
The number never asks why.
But behind it,
a human trembles.
I dream beyond syllabi,
I imagine futures
not approved by relatives.
Exams reward memory,
not curiosity.
Attendance records bodies,
not courage.
One day,
this number will disappear from databases.
What remains
will be the risk I took
when no one was counting.

LABANYA MALLIK
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**HOSTEL NIGHTS ARE
A DIFFERENT COUNTRY**

At night, the hostel changes citizenship.
Rules soften.
Walls listen.
Someone laughs too loudly
to hide heartbreak.
Music leaks through doors,
carrying memories of home.
We solve life at 2 AM
and forget by breakfast.
In these corridors,
friendships are born without resumes.
Loneliness sits beside us,
uninvited but familiar.
Years later,
success will feel quiet.
But these nights—
these nights will echo forever.

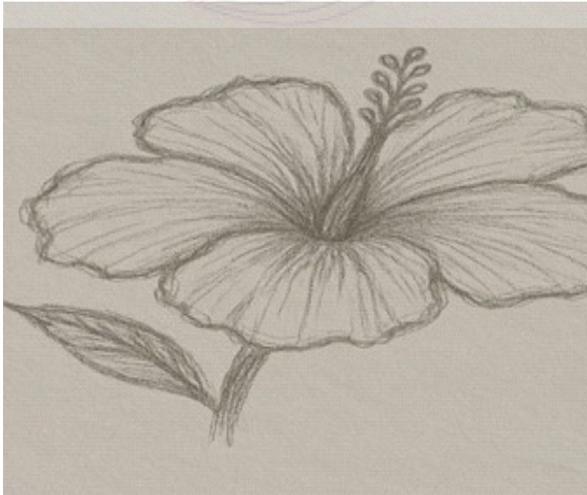
BHARAT KUMAR BEJ
Regn. No. : 2301320249
3rd Year, Ee
Aiet, Bbsr

THE LAST BENCH PHILOSOPHY

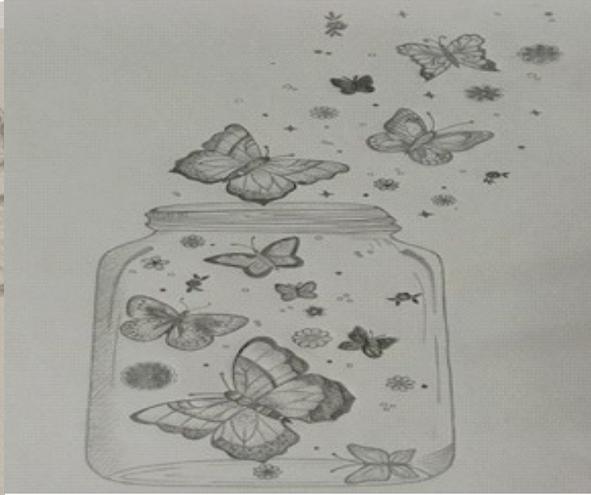
From the last bench,
the world looks negotiable.
Teachers speak of certainty.
We question quietly.
Here, boredom breeds creativity.
Doodles become declarations.
Whispers turn into revolutions.
We are labeled careless,
but we observe deeply.
We know who pretends,
who fears,
who dreams silently.
The last bench does not reject learning.
It rejects fear.
Many will stand ahead of us today.
But some of us
will walk further tomorrow.

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PHOTO GALARY



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Techfest 2024-25



Techfest 2024-25



Techfest 2024-25



World Cancer Day 2024-25



International Women's Day celebration 2024-25





NCC PARADE ON REPUBLIC DAY 2024-25



STUDY TOUR EE/EEE DEPARTMENT 2024-25



WORLD BLOOD DONOR DAY 2024-25

