



ELECTRO-TRENDS

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**DEPARTMENT OF ELECTRICAL ENGINEERING
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VIRAR EAST**



OVERVIEW

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THE PRINCIPAL DESK

Dear Readers,

It is a matter of immense pleasure to know that the Department of Electrical Engineering has taken a keen interest to create a common platform for the faculty and students to go beyond classroom activities, to explore new possibilities and collaborate with technology dynamically. I am confident that this magazine will give impetus to research culture amongst students and faculty with emphasis on entrepreneurship.

I congratulate the entire editorial team for their hard work and dedication in giving the requisite shape to this magazine. I hope this magazine will inspire passion among the faculty and students.

I wish them all the very best in their future endeavors as well.



DR. ARUN KUMAR

PRINCIPAL

VIVA INSTITUTE OF TECHNOLOGY

FROM HOD'S DESK

Dear Readers,

Learning is a continuous process. Throughout life, a human being remains a student. Based on the same, the Department of Electrical Engineering of VIVA Institute Of Technology is glad to present in front of you a new technical magazine "ELECTROTREND". In this, we encourage our students and faculty members to present articles on new technologies in engineering going on all across the world. Nowadays technology changes at rapid speed; due to this it's impossible for anyone to survive with his existing knowledge for long term without upgrading to recent trends. It seems to be very important to be in touch with recent trends in engineering. To achieve this effectively faculty members and students need to be motivated to read and write articles based on new technology in engineering. "ELECTRO-TRENDS" is a platform provided by the Department of Electrical Engineering to explore the hidden talents of faculty and students.

The department of electrical engineering also focuses on a high level of teaching quality during lectures and practicals. We also encourage students to participate in workshops, conferences, STTP and technical competitions. "ELECTRO-TRENDS" will help students to grow in all aspects of electrical engineering such as Power system Analysis & Protection, Renewable Energy & its sustainability, Smart grid Technology, Advance trends in Electrical engineering and so on.

At last, I wish to congratulate all members who have participated in making this magazine successful.



PROF. BHUSHAN SAVE

HEAD OF DEPARTMENT

DEPARTMENT OF ELECTRICAL ENGINEERING



DEPARTMENT VISION

To aspire for excellence in imparting quality education in the field of Electrical Engineering with an eagerness of developing a professional mindset along with good human values.

DEPARTMENT MISSION

- To maintain a benchmark in quality of educational standards in the field of Electrical Engineering.
- To provide a platform for exploring a professional mindset.
- To promote ethical practices for developing good human values.

PROGRAMME EDUCATIONAL OBJECTIVES

- To provide students with the knowledge of basic sciences and social sciences in general and Electrical engineering in particular, so as to impart the necessary skills to analyze and synthesize electrical circuits, algorithms and complex apparatus.
- To inculcate in students Professional attitude, effective communication skills and capability to succeed in multi-disciplinary and diverse fields.
- To provide technical knowledge, skills and competence to identify, comprehend and solve problems in industry, research and academics related to power, information and hardware.
- To prepare and inspire the students to become future researchers/scientists with innovative ideas for sustainable development.



CONTENTS

Recent Trends in Electrical Engineering	1
The Importance of Virtual Labs for Students and Faculties of Electrical Engineering	4
Robotic Process Automation	6
Predictive Maintenance: Harnessing Data Science for Enhanced Equipment Health and Performance	8
Enhancing Electrical Equipments Maintenance in Extra High Voltage Power Systems with Augmented Reality	11
CYBER SECURITY THREATS AND REMEDIES FOR INDIAN POWER SECTOR	12
Revolutionizing Electrical Industries: Artificial Intelligence & Machine Learning	16
Power Electronics for Electric Vehicle Battery Management Systems	18
BRUSHLESS DC MOTOR	19
SAND BATTERY	22
ARTIFICIAL INTELLIGENCE AND AUGMENTED REALITY	24
STUDENT ACHIEVEMENTS	32
ALUMNI CORNER	35
Toppers List	37

Recent Trends in Electrical Engineering

Electrical engineering is swiftly undergoing innovations and bold researches altogether departments round the globe towards higher ways in which to get, store, use voltage. Despite vital strides from past years, the EE business isn't showing any signs of reducing or even billowing at sky-speed. Below square measure a number of the noteworthy business trends that you just ought to be careful of in 2023.

B.Tech in Electrical Engineering remains one of the most popular branches of engineering studies even today. Scientists and electrical engineers around the globe have created notable strides that may build 2023 quite attention-grabbing. In fact, most developments that are ongoing for years can come back to fruition in 2023.

Electric Vehicles (EV)

Beginning this year, the share worth of Tesla, one amongst the foremost outstanding electric automobile makers within the world, has been soaring.

What this entails is that electrical cars are going to be in demand. In keeping with consultants, one decade from now, over a hundred million EVs can fill the roads. Several investments are being created towards work unit technology, which can see a lot of amendments in 2021 alone.

The growth of the EV business can be propagated by things like improved

battery technology, IoT, and AI, simply to say some.

Battery Technology

It's unarguable that Solar and wind energy squares measure the purest styles of property energy. However, these solely work best if they work with batteries, and in light-weight of this, varied electrical departments and firms round the globe square measure operating unrelentingly towards expert batteries.


With improved battery technology, the business of electrical cars will create important strides this year. A lot of innovations within the field of AI will be witnessed.

Internet of Things (IoT)

The advent of 5G technologies, that has speeds 5x quicker than its precursor (4G), has increased IoT considerably. IoT could be an assortment of "things" connected through the Internet, from electronic devices, people, buildings, roads, processes, and even animals — just about everything we tend to see around.

Typical samples of IoT devices wearable technology, smartphones, and a range of sensors.

With the 5G network's intensive rollout in 2021, a surge in technology IoT devices is anticipated. Within the industry, we'll see good grids, actinic radiation communication, and good



Lighting. Further, increasing the development trade, electrical contractors also will witness an increase in demand for putting in IoT systems in buildings.

Smart Grids

A decade ago, individuals alone relied on electricity from a national power system. A grid may be a network of power lines that transmit electricity from the power supply to the general public. Whereas this standard power system can stay for a moment, it's been considerably improved over the years.

The smart grid conjointly works handily for household's corporations and corporations firms that now do not rely on power companies. That's right, most shoppers currently generate their own power, and this trend is anticipated to extend in 2022. Smart grids have conjointly become valuable as they improve safety. They minimize accidents by providing a better level of management once multiple power sources square measure concern.

Wireless Transfer of Electricity

The wireless transfer of electricity was invented within the USA at the Massachusetts Institute of Technology. Behind this invention were Professor Marin Soljacic and his team. This technology permits electricity to be transmitted over distances through the air, wood, granite, plastic, and grass. Although

still in its primitive stages, lots of its application has been seen in 2021.

The application of wireless power transfer is predicted to progress even more in 2023. Finally, we'd be ready to eliminate all the ability cables that people use daily. Despite the fact that it should not be all of them in 2021, the close to future guarantees fascinating advancements.

Artificial Intelligence (AI)

Artificial intelligence has become a major topic in all sectors of science, engineering. It's believed that in 2022 moving forward, electrical engineers will need to add a little AI information to their experience. Many electrical engineering colleges now offer value addition programs to help students gain additional skills based on industry standards. Learning AI can assist the engineers in:

- Forming algorithms required for the interpretation of data
- Creating/improving old programs
- Developing new strategies in electronics
- Developing machine & AI learning platforms
- Image processing
- Creating algorithms to help with troubleshooting

Project Management Software

The increase in sophistication of electrical engineering demands a simplified means of keeping records for all tasks current. In 2021, a lot of contractors are looking forward to

software packages to reduce time lost on work. Consumer Relationship Project Management software package is changing into the quality de facto for programming and request, following client interactions, and ultimately saving countless time usually spent on work.

Wearable Technologies

Wearable devices became very popular over the past few years. The most talked-about are Apple Watches, that square measure believed to advise users of important health conditions like cardiovascular diseases before they increase.

But did you recognise that there's more? In electrical engineering, wearable devices considerably facilitate safety on the task. Electrical engineers will choose between varieties of devices that minimise electrical shock risk once dealing with charged circuits.

Conclusion

Career opportunities in electrical engineering remain extremely lucrative even today. Professionals who pursue a career in electrical engineering often study at a top electrical engineering college in Maharashtra. These colleges offer 100% placement assistance through placement drives to help students connect with global companies. So, make sure to analyse your career goals before choosing the right

branch of engineering for higher education.



Dr. Deepak Sajnekar



The Importance of Virtual Labs for Students and Faculties of Electrical Engineering

Introduction

In the field of electrical engineering, practical hands-on experience is crucial for students to grasp complex concepts and develop essential skills. Traditionally, physical laboratories have been the cornerstone of engineering education, providing students with the opportunity to experiment and apply theoretical knowledge. However, with the advent of technology, virtual labs have emerged as powerful tools that complement traditional labs and offer unique benefits. In this article, we will explore the importance of virtual labs for students and faculties of electrical engineering, highlighting their potential to enhance learning outcomes and bridge the gap between theory and practice.

Accessibility and Flexibility

One of the key advantages of virtual labs is their accessibility and flexibility. Unlike physical labs, which often have limited availability and strict time constraints, virtual labs can be accessed anytime, anywhere, as long as students have an internet connection. This enables students to conduct experiments and engage in practical learning at their own convenience, breaking free from the limitations imposed by physical lab schedules. Virtual labs also eliminate geographical barriers, allowing students from different institutions or even different parts of the world to

collaborate and share knowledge, fostering a global learning community.

Cost-Effectiveness and Scalability

Setting up and maintaining physical labs can be an expensive endeavor, requiring significant investments in equipment, space, and maintenance. Virtual labs, on the other hand, offer a cost-effective alternative. By simulating real-world scenarios, virtual labs reduce the need for expensive hardware and consumables, minimizing operational costs. Furthermore, virtual labs have the potential for scalability, enabling institutions to accommodate a larger number of students without the limitations posed by physical infrastructure. This scalability allows for increased enrollment in electrical engineering programs, facilitating access to quality education for a larger pool of aspiring engineers.

Safety and Risk Mitigation

Electrical engineering involves working with high-voltage circuits and potentially dangerous equipment. Physical labs carry inherent risks, and ensuring student safety can be challenging. Virtual labs provide a safe environment for students to experiment with electrical circuits and systems without the associated hazards. Through simulations and virtual models, students can learn about electrical phenomena, observe

real-time effects, and troubleshoot potential issues without any risk to themselves or the equipment. This enhances safety and allows students to gain confidence in their abilities before transitioning to physical labs, where they can apply their knowledge acquired in the virtual realm.

Enhanced Learning Experience

Virtual labs offer a rich and interactive learning experience that complements traditional classroom lectures. Through realistic simulations, students can visualize abstract concepts, observe the behavior of electrical systems, and analyze data in real-time. Virtual labs often provide interactive tutorials, quizzes, and assessments, enabling students to reinforce their understanding and gauge their progress. Moreover, virtual labs can simulate various scenarios and allow students to manipulate parameters, facilitating exploration and experimentation that might be challenging or impractical in a physical lab setting. This hands-on experience in a virtual environment strengthens conceptual understanding, problem-solving skills, and critical thinking abilities.

Continual Learning & Adaptability

Virtual labs have the advantage of being easily updated and adapted to incorporate the latest advancements in electrical engineering. As technology evolves, new components, systems, and techniques emerge, and virtual labs can quickly integrate these updates into their simulations.

This ensures that students are exposed to cutting-edge knowledge and developments, preparing them for the ever-changing landscape of the electrical engineering industry. Additionally, virtual labs facilitate continual learning, allowing students to revisit experiments, modify parameters, and explore different approaches. This iterative process promotes deeper understanding and encourages students to refine their techniques, ultimately fostering a culture of lifelong learning.

Conclusion

Virtual labs have revolutionized the way students and faculties approach electrical engineering education. By providing accessibility, cost-effectiveness, safety, and enhanced learning experiences, virtual labs empower students to explore, experiment, and apply theoretical knowledge in a practical setting.

Link:

www.vlab.co.in/broad-area-electrical-engineering



Prof. Anojkumar Yadav



Robotic Process Automation

Robotic Process Automation (RPA) is a technology used to automate various tasks and processes in electrical engineering. It can improve efficiency, accuracy, and productivity in the field. Here are some key applications of RPA in electrical engineering:

Data Entry and Processing

RPA can automate data entry tasks by extracting information from various sources such as invoices, purchase orders, or equipment specifications. It eliminates manual data entry, reducing errors and saving time.

Report Generation

RPA bots can generate reports automatically by extracting data from multiple sources, performing calculations, and formatting the output according to predefined templates. This streamlines the report generation process and ensures consistency.

Design and Drafting

RPA can automate design and drafting tasks in electrical engineering. It can generate schematic diagrams, electrical layouts, and panel designs based on predefined rules and specifications. This accelerates the design process and improves accuracy.

Testing and Quality Control

RPA bots can be programmed to perform automated testing and quality control checks on electrical equipment or systems. They run test

scripts, compare results with expected values, and generate reports. This enhances the testing process and reduces manual effort.

Maintenance and Monitoring

RPA assists in the monitoring and maintenance of electrical systems. Bots collect data from sensors or monitoring devices, analyze it for anomalies or performance issues, and trigger alerts or maintenance requests. This proactive approach improves system uptime.

Inventory Management

RPA automates inventory management tasks in electrical engineering. It tracks stock levels, generates purchase orders when inventory reaches a threshold, and updates inventory databases. This optimizes inventory control and reduces manual workload.

Compliance and Documentation

RPA ensures compliance with regulations and standards by automating compliance checks and documentation processes. Bots verify safety standards, perform audits, and generate compliance reports. This reduces the risk of non-compliance and enhances efficiency.

It is important to note that RPA is a tool that enhances electrical engineering processes. While it automates many tasks, human expertise is still essential for complex decision-making, troubleshooting,

and design creativity. RPA enables electrical engineers to focus on higher-value activities, leveraging their knowledge and skills

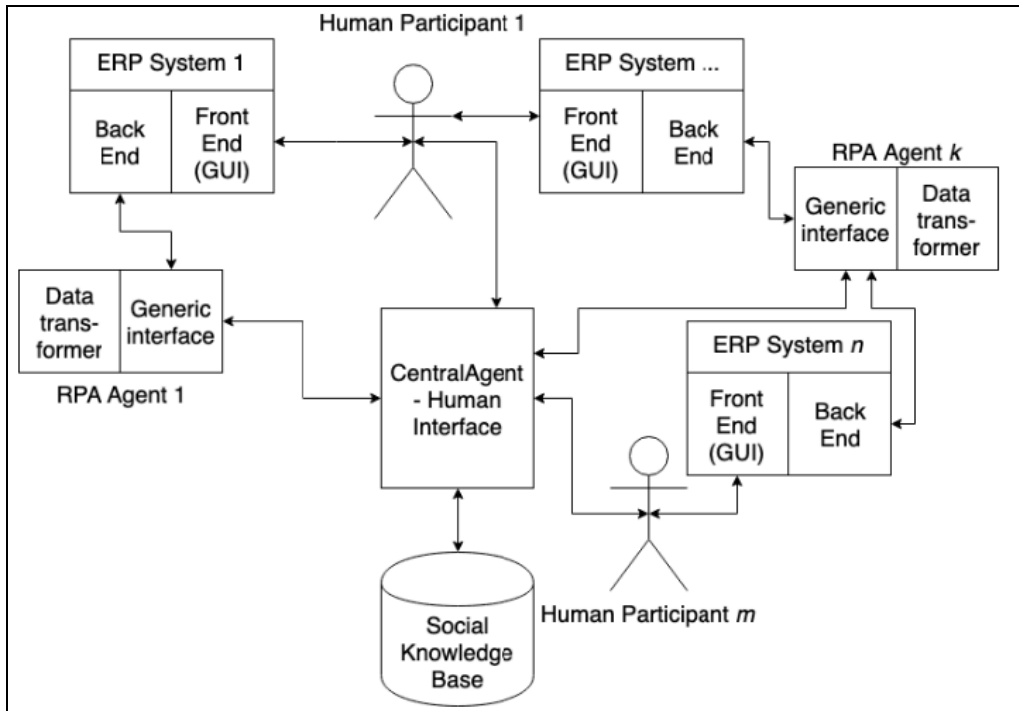


Fig: The Architecture of RPA



Prof. Mukeshkumar Mishra



Predictive Maintenance: Harnessing Data Science for Enhanced Equipment Health and Performance

Introduction

In today's rapidly advancing technological landscape, data science has emerged as a powerful tool for optimizing various industries. In the field of electrical technology, one area where data science techniques, specifically machine learning and predictive analytics, have shown tremendous promise is in predictive maintenance. By harnessing the power of data, organizations can monitor and predict the health and performance of electrical equipment, enabling proactive maintenance strategies and minimizing costly downtime. This article explores the concept of predictive maintenance and highlights the transformative impact of data science in this domain.

The Importance of Predictive Maintenance

Traditionally, maintenance activities were typically reactive or based on predefined schedules, often resulting in unexpected failures and inefficient use of resources. Predictive maintenance takes a proactive approach by leveraging data-driven insights to anticipate and prevent equipment failures. By detecting early signs of deterioration or anomalies in real-time data, predictive maintenance helps organizations address issues before they escalate, improving equipment reliability,

extending lifespan, and reducing downtime and associated costs.

Data Science Techniques in Predictive Maintenance

Data science techniques, such as machine learning and predictive analytics, form the backbone of predictive maintenance systems. By analyzing large volumes of historical and real-time data, these techniques identify patterns, correlations, and anomalies, enabling the prediction of equipment failures and performance degradation.


The following are key steps involved in implementing predictive maintenance using data science:

1. Data Collection and Integration

Data from various sources, such as sensors, IoT devices, maintenance logs, and historical records, are collected and integrated into a centralized data repository. This data encompasses factors like temperature, pressure, vibration, energy consumption, and other relevant parameters.

2. Data Preprocessing and Feature Engineering

Before applying machine learning algorithms, the collected data undergoes preprocessing and feature engineering. This involves cleaning the data, handling missing values, normalizing or standardizing variables, and extracting relevant



features that best represent the equipment's health and performance.

3. Machine Learning Model Training

Based on the preprocessed data, machine learning models are trained to learn the relationship between the equipment's operational parameters and its health. Various algorithms, such as decision trees, random forests, support vector machines, and neural networks, can be employed to build accurate predictive models.

4. Anomaly Detection and Failure Prediction

Trained machine learning models are utilized to detect anomalies and predict potential failures by analyzing real-time data. Deviations from normal patterns or predefined thresholds trigger alerts or notifications, allowing maintenance teams to take proactive measures.

Benefits of Predictive Maintenance

The adoption of predictive maintenance powered by data science techniques offers numerous benefits for organizations in the electrical technology domain:

Increased Equipment Reliability

By identifying potential failures in advance, predictive maintenance enhances equipment reliability and uptime, minimizing unexpected breakdowns and disruptions to operations.

Optimized Maintenance Schedules

Predictive maintenance enables organizations to schedule maintenance activities based on actual equipment condition rather than arbitrary time-based intervals. This maximizes the utilization of maintenance resources and minimizes unnecessary maintenance.

Cost Reduction

Proactive maintenance reduces the costs associated with unplanned downtime, emergency repairs, and replacement of critical components. It also helps in optimizing spare parts inventory by enabling more accurate forecasting of maintenance requirements.

Enhanced Safety

Predictive maintenance improves safety by addressing equipment issues before they escalate into hazardous situations, reducing the risk of accidents and ensuring a safe working environment.

Efficient Resource Allocation

By focusing maintenance efforts on equipment that requires attention, organizations can allocate resources more efficiently, optimizing labor, spare parts, and maintenance budgets.

Conclusion

Predictive maintenance, driven by data science techniques such as

machine learning and predictive analytics, has revolutionized the electrical technology industry. The ability to monitor and predict the health and performance of equipment empowers organizations to take proactive measures, preventing failures, improving reliability, and optimizing maintenance efforts. By embracing predictive maintenance, organizations can minimize

downtime, reduce costs, enhance safety, and achieve operational excellence in today's dynamic and competitive landscape. The continued advancement of data science and its integration with electrical technology promises a future where maintenance is truly predictive, unlocking new levels of efficiency and productivity.



Prof. Kavita Mhaskar



Enhancing Electrical Equipments Maintenance in Extra High Voltage Power Systems with Augmented Reality

Introduction

In the realm of electrical engineering, the maintenance of equipment in extra high voltage (EHV) power systems is a critical task. It requires precision, expertise, and an in-depth understanding of complex electrical components. However, with the advent of augmented reality (AR) technology, a new era of maintenance practices is emerging. AR offers immense potential to revolutionize electrical equipment maintenance in EHV power systems by providing real-time information, visual guidance, and enhanced efficiency. This article explores the application and benefits of AR in maintaining electrical equipment within EHV power systems.

Visualizing The Complex Electrical Systems

AR technology allows electrical engineers to visualize intricate electrical systems in a more intuitive and immersive manner. By overlaying digital information onto the physical environment, AR provides technicians with a clear and detailed representation of equipment such as transformers, circuit breakers, and switchgear. This visual enhancement facilitates better understanding, identification of components, and helps streamline maintenance procedures.

Real-time Data & Information

AR empowers technicians with real-time data and information overlays, enhancing their decision-making abilities during maintenance tasks. For instance, maintenance personnel can access live data such as voltage levels, current flows, and temperature readings directly through AR interfaces. This enables quick analysis, identification of anomalies, and informed decision-making regarding repairs or replacements.

Interactive 3D Models & Simulations

AR enables the creation of interactive 3D models of electrical equipment, allowing technicians to explore components virtually. This capability is particularly beneficial when dealing with complex machinery in EHV power systems. Technicians can interact with virtual models, rotate them, and zoom in to inspect individual parts. Simulations can also be integrated to demonstrate equipment behavior under different conditions, aiding in predictive maintenance and troubleshooting.

Step by step Instructions for Maintenance

AR technology provides technicians with step-by-step maintenance instructions directly overlaid onto the equipment they are working on. This feature helps ensure accuracy,

consistency, and adherence to maintenance protocols. AR-guided instructions can include visual cues, text prompts, and even audio assistance, making complex procedures more manageable and reducing the risk of errors.

Remote Assistance & Collaboration

AR facilitates remote assistance and collaboration, which is particularly valuable for EHV power systems maintenance. Experts located off-site can provide guidance and support to technicians in real-time through AR interfaces. They can visualize the equipment, annotate on-screen instructions, and even mark areas of interest for further examination. This capability improves efficiency, reduces downtime, and fosters knowledge sharing among maintenance teams.

Conclusion

Augmented reality is revolutionizing electrical equipment maintenance in extra high voltage power systems. By leveraging AR technology, technicians can visualize complex systems, access real-time data, interact with virtual models, follow step-by-step instructions, and receive remote assistance. These benefits enhance maintenance procedures, increase efficiency, and ultimately contribute to the reliability and safety of EHV power systems. As AR continues to evolve, it holds tremendous potential to transform the way electrical engineers maintain and manage electrical equipment in the power industry. Embracing AR in EHV power system maintenance is a significant step towards an optimized and sustainable electrical infrastructure.



Prof. Rahul Abhyankar



CYBER SECURITY THREATS AND REMEDIES FOR INDIAN POWER SECTOR

India is currently undergoing revolution in communications, automation and IT systems to become the largest technology manufacturer across the globe. With ever evolving technologies, protection of users, institutions and nation is equally important. The concerned regulatory bodies of the country are continuously evaluating possible threats to any entity of the country through cyber communications and other services. These regulatory bodies through their continuous evaluation and to impart zero tolerance for cyber crimes publish various directives and guidelines for cyber security.

However, being an integral part of any nation the power system networks are most prone to such attacks to destabilize the nation, thus making it a precious commodity for good governance. Even though India has good infrastructure and technological innovation to deal with cyber threats there are no guidelines for power systems specific cyber security. Also as compared to global security norms our country lags the required technological intelligence to adapt and follow global standards for power system protection against cyber threats.


In this article, the current situation of the Indian power system against cyber threats is analyzed with

identification of threats. Also immediate preventive measures for cyber security are discussed briefly.

Common cyber threats for power system

Privacy, transparency, responsibility, and interruption of service have grown in prominence in the current situation due to the conjunction of the information architecture over the electrical architecture. Recent incidents on corporate operating technologies have demonstrated the critical necessity to strengthen the power grid's endurance and reliability. The key objective of any country is to protect its critical infrastructure, which includes things like energy, transportation, banking and finance, communication and IT, defense, space, law enforcement, sensitive government organizations, critical manufacturing, and e-governance, among others. The power sector is given top priority in this regard. Security of industrial control systems has grown in importance as a result of the confluence of electrical, communication, information, and automation technologies in a smart grid. The reliability of the power system infrastructure is directly influenced by the security of the information infrastructure.

Industrial control system security, prior to the development of smart



grids, was only concerned with guarding against internet threats. However, the current situation necessitates the security of crucial cyber assets, such as load dispatch centers, substations, and control centers for electric utilities (Generation, Transmission, and Distribution). Therefore, "cyber-physical security" perfectly describes the current situation. We have used the terms "cyber security" and "cyber physical security" interchangeably throughout this manual.

It is crucial to have many lines of defense in place for the utility's daily operations in the current environment of frequent assaults on electric utilities. For example, as shown in the picture below, a layered security strategy will increase its cyber security posture. With regard to cyber security, this gives the system redundancy.

Preventive Measures for Cyber Security

CISO appointment

An organization's senior-level executive designated as the Chief Information Security executive (CISO) is in charge of developing and implementing the enterprise's vision, strategy, and programme to guarantee that information assets and technologies are effectively safeguarded. The CISO oversees employees' efforts to identify, create, implement, and manage risk-reduction initiatives across the Organisation. The CISO must be aware

of the significance of implementing cyber security measures and the consequences of doing so.

Department of Information Security (ISD) establishment

An organization's information security department (ISD) is a crucial component. Every organization has to have a capable and independent ISD. The important IT assets of the organization must be secured and protected, and this department must be responsible for doing so. Planning, development, management, and oversight of the organization's security posture are the four main tasks that the ISD is involved in. The Organisation may hire ISD specialists who are dedicated to protecting its cyberspace. Additionally, the ISD assesses threats, risks, and vulnerabilities and creates solutions for maintaining the Organization's cyber security. The Organization's ISD must run continually.

Framework for Critical Information Infrastructure (CII) Identification

Every organization has a variety of essential cyber assets that allow for smooth functioning. The organization is in charge of identifying and categorizing the Critical Information Infrastructure (CII) that is present in their systems based on factors like functionality, criticality scale, degree of complementarity, political, economic, social, and strategic values, degree of dependence, sensitivity, etc.

An inventory of dependents

Critical infrastructure activities interact and share information with each other in a complicated way, creating interdependencies that might be horizontal (across organizations) or vertical (inside organizations). The Organisation must consider all interdependencies alongside its CII rather than in isolation.

Partnership with NCIIPC

The National Critical Information Infrastructure Protection Centre (NCIIPC) has been appointed as the national nodal agency for all actions to protect India's critical information infrastructure under section 70A of the IT Act. According to its mandate, the NCIIPC would require regular information from all the organizations managing the critical information infrastructure in order to safeguard it from cyberterrorism, cyberwarfare, and other threats and to maintain situational awareness.

Risk-Based Cyber Security Policy

Cyberspace security in the power industry refers to safeguarding information, infrastructure, and systems that are essential to the stability and livelihood of those connected to the organization as well as to the smooth running of the organization. Information and communications technology (ICT) is becoming more and more important to organizations. Because of increased connection, dangers to ICT are also increasing along with its economic worth to organizations. An organization that enjoys security may

be sure that it is better positioned for opportunity and development.

References

The following references have been used for the preparation of this Manual:

1. NERC CIP Standards Version 5
2. 'Top 10 Findings & Recommendations of Cyber Security Preparedness Survey' published by ISGF and NCIIPC in 2015



Prof. Ritesh Chavan



Revolutionizing Electrical Industries: Artificial Intelligence & Machine Learning

Introduction

In recent years, the fields of artificial intelligence (AI) and machine learning (ML) have gained significant momentum and are transforming various industries. The electrical sector is no exception, as AI and ML technologies are revolutionizing the way electrical-based industries operate. From power generation and distribution to smart grids and energy management, the integration of AI and ML is driving innovation, improving efficiency, and ensuring sustainability. This article explores the remarkable impact of AI and ML in electrical industries and highlights their potential for a brighter and more intelligent future.

Enhancing Energy Generation and Distribution

AI and ML techniques are being leveraged to optimize energy generation and distribution processes. Advanced algorithms can analyze vast amounts of data, weather patterns, demand forecasts, and historical trends to predict energy requirements accurately. This enables utilities to optimize their energy production, minimize downtime, and reduce costs. Additionally, AI-powered systems can optimize energy distribution by intelligently routing electricity through the grid,

balancing loads, and ensuring uninterrupted power supply.

Smart Grid Management

The concept of the smart grid relies heavily on AI and ML to create a more efficient and reliable energy infrastructure. AI algorithms can analyze data from various sensors and devices embedded throughout the grid, enabling real-time monitoring and control. This allows for the identification and mitigation of power outages, quick response to faults, and efficient integration of renewable energy sources. Furthermore, AI-powered analytics help utilities gain valuable insights into energy consumption patterns, enabling demand response programs and promoting energy conservation.

Predictive Maintenance

Maintenance plays a crucial role in electrical industries to prevent equipment failures and optimize operational efficiency. AI and ML techniques enable predictive maintenance, which utilizes data from sensors and monitoring systems to predict equipment failures before they occur. By analyzing historical data and identifying patterns, AI algorithms can detect anomalies, estimate remaining useful life, and schedule maintenance activities accordingly. This approach minimizes

downtime, reduces costs associated with unscheduled repairs, and increases the lifespan of critical electrical infrastructure.

Energy Efficiency and Conservation

AI and ML technologies are instrumental in promoting energy efficiency and conservation. With the help of smart meters and IoT devices, AI algorithms can collect real-time data on energy consumption patterns in residential, commercial, and industrial settings. By analyzing this data, ML models can provide personalized recommendations to consumers on how to optimize their energy usage, reduce wastage, and lower their carbon footprint. Furthermore, AI-powered energy management systems can automatically adjust energy consumption based on demand, optimizing efficiency and reducing energy costs for businesses and households.

Renewable Energy Integration

The integration of renewable energy sources such as solar and wind power poses unique challenges for electrical industries. AI and ML techniques aid in the efficient integration of these intermittent energy sources into the

grid. AI algorithms can forecast renewable energy generation based on weather conditions, historical data, and other variables, enabling grid operators to manage the supply-demand balance effectively. ML models can also optimize the operation of energy storage systems, ensuring the maximum utilization of stored energy during peak demand periods.

Conclusion

Artificial intelligence and machine learning are reshaping the electrical industry, paving the way for a more intelligent, efficient, and sustainable future. The application of AI and ML in energy generation, smart grid management, predictive maintenance, energy efficiency, and renewable energy integration is transforming the way electrical-based industries operate. As these technologies continue to evolve and advance, we can expect further innovations, increased reliability, and greater cost savings in the electrical sector. By harnessing the power of AI and ML, electrical industries are poised to meet the challenges of the future while building a greener and more resilient energy infrastructure.



Prof. Sangita Kamble



Power Electronics for Electric Vehicle Battery Management Systems

Introduction

Electric vehicles (EVs) have emerged as a promising solution for reducing greenhouse gas emissions and dependence on fossil fuels. The heart of any EV is its battery management system (BMS), which plays a critical role in monitoring and controlling the battery pack. Power electronics technologies are essential for efficient and reliable operation of BMSs in electric vehicles. This article explores the key advancements in power electronics for EV BMSs, highlighting their significance and potential impact on the future of electric transportation.

Introduction to Electric Vehicle Battery Management Systems

This section provides an overview of the architecture and functionalities of a typical BMS in an electric vehicle. It explains the importance of battery monitoring, state estimation, cell balancing, and thermal management for optimal battery performance, safety, and lifespan.

Power Electronics in Battery Monitoring

Here, the article focuses on power electronics techniques used for battery voltage and current sensing. It discusses the challenges associated with accurate measurement in

high-power and high-voltage battery packs and presents innovative solutions, such as galvanically isolated measurement techniques and wide-bandgap semiconductor-based sensing circuits.

State Estimation and Control in BMS

This section explores the role of power electronics in state estimation and control algorithms of BMSs. It discusses various techniques, including extended Kalman filtering, adaptive observers, and model-based control strategies, for accurate estimation of battery state of charge (SoC), state of health (SoH), and remaining useful life (RUL).

Cell Balancing Techniques

Cell balancing is crucial to equalize the voltages and capacities of individual cells within a battery pack. This section examines different power electronics-based cell balancing strategies, such as passive and active balancing, hybrid techniques, and their trade-offs in terms of cost, efficiency, and complexity.

Thermal Management in Battery Packs

Effective thermal management is essential for maintaining safe operating temperatures and prolonging battery life. This part discusses power electronics-based

cooling and heating strategies, including active liquid cooling, phase change materials, and thermoelectric coolers, emphasizing their advantages and challenges.

Future Trends and Challenges

The article concludes by discussing emerging trends and challenges in power electronics for EV BMSs. It highlights the potential of wide-bandgap semiconductor devices, advanced control algorithms, and integration of power electronics with other vehicle systems to enhance the overall efficiency, reliability, and safety of electric vehicles.

Power electronics technologies play a vital role in the development of efficient and reliable battery management systems for electric vehicles. By enabling accurate battery monitoring, state estimation, cell balancing, and thermal management, power electronics advancements pave the way for enhanced performance, extended battery life, and improved safety in electric transportation. Continued research and innovation in this field will be crucial to drive the widespread adoption of electric vehicles and achieve a sustainable future.

Conclusion



Prof. Tejas Sankpal

BRUSHLESS DC MOTOR

A Brushless Direct Current Motor or commonly known as a BLDC Motor is powered by DC voltage and commutated electronically and not by brushes as in traditional DC motors. Although these are in trend nowadays, they were invented in the 1960s when semiconducting devices were developed.

As the name suggests, it does not require brushes for commutation. Commutation is nothing but the act of changing motor phase current at the appropriate times to produce rotational torque. A conventional DC motor uses carbon brushes that wear out over time and may cause sparking. A BLDC motor uses a sensor and commutator as it is needed to know the position of the rotor to produce rotational torque. This is achieved by the use of hall sensors. BLDC motors can be single phases, two phases, or three phases. Out of this 3-phase, BLDC motors are most widely used. On the basis of construction, BLDC motors can also be designed in two types: inner rotor and outer rotor.

Torque Speed Characteristics

For a BLDC motor, the torque is constant for a range of speed up to the rated speed. The BLDC motor can be loaded up to the rated torque. The rotor can be rotated at a higher speed than the rated speed but the torque starts to drop. Peak Torque (T_p) and Rated Torque (T_r) are the two torque

parameters considered for torque speed characteristics of BLDC motor.


It works on a similar principle to that of the traditional DC motor. When the stator winding is switched by a DC supply it acts as an electromagnet that produces a uniform field. Though the supply is DC, the switching makes it a square wave or a trapezoidal shape wave. The permanent magnet on the rotor experiences a force due to which it starts to rotate. The hall sensor on the stator senses the poles of magnets.

Advantages of BLDC motors

- A) Due to the absence of brushes, losses and other problems related to it are not present in this motor.
- B) Maintenance is less because there are no brushes as a commutator.
- C) They have high dynamic responses.
- D) High efficiency, as the magnets are the rotor.
- E) High torque and high speed even when loaded.
- F) Compared to conventional DC or AC motors they are lightweight, small, and have quiet operation. A major drawback of these motors is their cost. The electronic circuitry to control the BLDC motor is complex and expensive.

Applications

Nowadays many new applications are available for BLDC motors, the most common known application is of BLDC Fans. Along with that, they are also used in pumps and blowers.



Where there is a constant load. Other applications are where there is varying load, where the motor varies over a range of speed, with high dynamic response and high-speed control. Eg, electric vehicles, dryers, washers, compressors, electric steering, robotics, and gyroscopes. These have a feedback control or

close loop control. There is a trend in HVAC and refrigeration industries where BLDC motors are used rather than AC motors. The reason is the power required to run DC is dramatically less. BLDC motors also have higher efficiency as compared to AC motors.

Shubh Arekar

Student

BE Electrical

SAND BATTERY

Introduction to Thermal Energy Storage

Thermal energy storage (TES) is one form of energy storage. In this case, when the temperature is increased material gains energy, and when the temperature is decreased material loses its energy. TES can help to balance energy demand and supply on a daily, weekly, and even seasonal basis, presented in thermal systems. TES can also help to reduce peak demand, energy consumption, CO₂ emissions, and costs and also increase the overall efficiency of energy systems. Thermal energy storage is much cheaper than electrical energy storage. TES provides several benefits to heating and cooling networks (DHC), including reducing peak thermal demands, increasing the efficiency of the system, and integrating other heat sources such as industrial waste heat or seawater. The application of thermal energy storage with renewable energy sources, waste heat, or surplus energy production can replace heat or cold generation from fossil fuels, reducing greenhouse gas (GHG) emissions and reducing the need for the thermal power capacity of the generators.

Problems with Renewable Energy

- The very first issue of Renewable energies such as solar and wind power is their weather dependency.


- They cannot be used as continuous sources 24x7 which brings the issue of storage.
- Large space required for Installation of solar and wind plants.
- In many cases, it costs more to store electricity than to make it.
- Wind and solar energy are quite cheaper as compared to gas and coal but when we add the cost of storage, these renewables can lose to fossil fuels, so a cheaper alternative is required.

What is a Sand Battery?

A “sand battery” is a high-temperature thermal energy storage that uses sand as its storage medium. It stores energy in the sand as heat. The sand does not store electricity but stores energy in the form of heat. Sand is a very effective medium for retaining heat over a long period, storing power for months at a time. Its main purpose is to work as a high-power and high-capacity reservoir for excess wind and solar energy. The energy is stored as heat, which can be used to heat homes or to provide hot steam and high-temperature process heat to industries that are often fossil-fuel dependent.

How Sand Battery Works

It receives electricity through cheaper renewable sources like solar and wind. And that Electricity is



converted to heat and transferred to sand. It has a Heat Exchanger buried inside and is capable of storing 8-megawatt hours of Energy at a nominal power rating of 100KW with sand heated to somewhere around 500 to 600 degree Celsius.

During the discharge phase air or another gas is pumped through heated sand, extracting the stored thermal energy and converting back into electricity. As the gas flows through heated sand it absorbs heat which is then used to generate steam, drive turbines and generate electricity.

Energy is stored as heat which is used to heat homes or to provide hot steam and high-temperature process heat to industries that are often fossil-fuel dependent. The sand battery's ability to store and release thermal energy efficiently makes it a versatile and adaptable energy solution.

Advantages of Sand Battery

Large-scale sand batteries can meet energy demands, providing balance to national grids. Most batteries are currently made up of lithium and

lithium is expensive and has a large carbon footprint since it requires mining. Mining involves fossil fuels, uses large amounts of water, and generates pollution, which can cause environmental degradation.

Sand batteries are low-cost as sand is free and easy to obtain. Sand is a non-toxic and non-hazardous material ensuring that sand battery poses minimum environmental risks. Heating devices in many countries consume a significant part of total electricity generated and this cheaper method could eliminate a major part of Consumption.

Conclusion

The Sand battery represents a remarkable innovation in the field of energy storage. By leveraging the unique properties of sand this technology offers cost-effective, scalable, and environmentally friendly solutions for storing and releasing energy. As research and development continue, the sand battery holds the promise of transforming the energy landscape and driving us closer to a sustainable future.

Mayur Pathare
Student-BE Electrical

ARTIFICIAL INTELLIGENCE AND AUGMENTED REALITY

Abstract

In recent years, ground-breaking technologies such as artificial intelligence (AI) and augmented reality (AR) have become potent tools that have changed how we interact with the environment. AI refers to the development of computer systems capable of replicating human intelligence, whereas AR refers to the overlaying of virtual elements onto the real environment. With new opportunities for immersive experiences, improved decision-making, and increased productivity across multiple industries, the combination of AI and AR has enormous potential.

This paper offers a succinct summary of the interaction between AI and AR, showing both their unique strengths and the beneficial impacts that can result from their combination.

Introduction

In today's fast-changing technology landscape, artificial intelligence (AI) and augmented reality (AR) have become key drivers of innovation, revolutionizing industries and transforming how people and technology interact. Artificial intelligence refers to the development of intelligent computer systems capable of perceiving, learning, reasoning and making decisions, while augmented reality involves the integration of virtual elements into

the real world, thereby enhancing our perception and interaction with the world. AI has made great strides in areas such as machine learning, natural language processing, and computer vision, enabling computers to analyze vast amounts of data, recognize patterns, and derive insights.

AR, on the other hand, has attracted attention due to its ability to overlay digital information, such as 3D models, graphics or text, into the physical world, seamlessly merging virtual and real spheres. The convergence of AI and AR combines the cognitive capabilities of AI with the immersive experiences of AR, creating a symbiotic relationship that opens up many possibilities. By integrating AI algorithms and machine learning models with augmented reality applications, we can make augmented environments smarter and more interactive. This fusion enables the creation of intelligent AR systems that understand user context, adapt to user preferences, and deliver personalized experiences. The potential applications of AI and AR span different areas. In healthcare, AI-powered AR systems can support medical staff during surgeries by providing real-time guidance and visualization. In education, AI and AR technologies have the potential to revolutionize the learning experience



through interactive and personalized instruction.

The entertainment industry can leverage AI algorithms to personalize content recommendations, while AR can provide an immersive gaming experience. In addition, the integration of artificial intelligence and augmented reality can optimize manufacturing processes, which enables efficient production processes and best quality control. The convergence of artificial intelligence and augmented reality offers great opportunities but also poses challenges. To ensure responsible and secure implementation, confidentiality, ethical considerations, and technological constraints must be taken into account. Balancing potential benefits and risks is key to realizing the full potential of these technologies while protecting user privacy and ethical standards.

Artificial Intelligence

Artificial intelligence (AI) is a multidisciplinary field focused on developing intelligent systems capable of performing tasks that would normally require human intelligence. AI systems rely on algorithms and models to process data, recognize patterns, and make decisions or predictions. With advancements in computing power, data availability, and algorithmic techniques, AI has gained significant attention and has the potential to

transform various industries and aspects of our daily lives.

The AI process includes several important steps

Data acquisition and pre-processing


AI systems need access to relevant data in order to learn. This data can come from various sources, such as text, images, videos or sensor readings. The first step is to collect this data and ensure its quality. The data then undergoes pre-processing where it is cleaned, filtered and converted into a format suitable for analysis. This step aims to remove noise, handle missing values, and standardize the data.

Feature Extraction

In many AI applications, the raw data is often highly dimensional or complex. Feature extraction is the process of identifying relevant features or attributes of data that capture essential information. This step helps reduce the dimensionality of the data and extract meaningful patterns or plots. When processing natural language, features can be word frequencies or syntactic structures, for example.

Model Choice

AI models are mathematical representations that capture patterns and relationships within data. There are different types of models used in AI such as neural networks, decision trees, support vector machines and Bayesian networks. The choice of



model depends on the nature of the problem, the data available and the desired performance. Each model has its own set of assumptions and algorithms that allow it to learn and make predictions.

Training

Training is a crucial step in AI, where the selected model is trained on labeled data. In supervised learning, the model receives input data along with the appropriate desired output or annotation. The model iteratively adjusts its internal parameters to minimize the difference between its predictions and actual labels. This optimization process involves using algorithms such as gradient descent to update the model parameters.

Evaluation and Validation

After training, the model must be evaluated and validated to assess its performance. This includes testing the model against unseen data to measure its accuracy, precision, recall, or other relevant metrics. Cross-validation techniques are often used to ensure the model's generalizability and to avoid overfitting, where the model performs well on the training data but poorly on the new data.

Implementation and Iteration

Once a satisfactory AI model has been developed, it can be implemented in real applications. The model can take input data and make predictions or decisions based on its learned patterns. AI systems are often

iterative and the performance of the models used is continuously monitored and improved. Feedback loops are built in to update the models based on new data or changing requirements.

Augmented Reality

Augmented Reality (AR) is a technology that enhances the real environment by overlaying virtual information or digital objects with the physical world, creating an immersive and interactive experience. AR systems use various components and techniques to seamlessly merge virtual and real elements.


Detailed explanation of how AR works

Sensing and Tracking

AR systems rely on sensors and tracking technologies to understand the real-world environment. Cameras, depth sensors and motion sensors are used to record the user's surroundings. These sensors collect data about the position, orientation and movement of the user and surrounding objects. Sophisticated algorithms analyze the data from this sensor to create a digital representation of physical space.

Scene Reconstruction

Once sensor data is captured, AR systems digitally reconstruct the physical environment. Depth information is used to determine the position and shape of objects in the real world. This process includes



techniques such as Simultaneous Localization and Mapping (SLAM), where the system maps the user's environment in real time while also tracking the user's location within that environment. By reconstructing the scene, AR systems can precisely position and orient virtual objects in the user's field of view.

Virtual Object Placement

Once the real environment is understood, AR systems overlay virtual objects onto the user's view. Virtual objects can be 2D images, 3D models, videos or interactive elements. The system uses the tracked position and orientation of the user and objects to determine where and how to place the virtual content in the user's field of view. Advanced algorithms handle occlusions and ensure virtual objects appear integrated into the real world, even when objects in the physical environment obstruct them.

Rendering and Display

AR systems render virtual content and display it to the user in real time. Virtual content is combined with the view of the real world, allowing the user to view both at the same time. This requires powerful graphics processing and real-time rendering capabilities. AR devices such as smartphones, tablets or data glasses serve as a viewing platform and present the user with the expanded view. The screen can take the form of a screen, transparent screen, or

heads-up display, depending on the device.

Interaction and User Interface


AR systems provide users with ways to interact with virtual content and control their experience. This can be done via touch screens, voice commands, gestures or other input modalities. User interfaces in AR aim to be intuitive and integrate seamlessly with the real environment. For example, users can manipulate virtual objects by touching, dragging, or using gestures that mimic real-world actions.

Integration with data and services

AR systems can be integrated with various data sources and services to improve the user experience. You can access real-time data from the Internet, such as weather updates, traffic information or live event broadcasts, and overlay them from the user view. Additionally, AR systems can be connected to other technologies such as AI, computer vision or IoT devices to provide additional context and functionality.

AI and AR

The convergence between artificial intelligence (AI) and augmented reality (AR) creates a symbiotic relationship that holds enormous potential for the development of advanced technologies in different fields. By synergistically integrating AI skills with AR systems, we are able to create a perfect combination of interactive interfaces, intelligent



algorithms and realistic virtual extensions. This merger will equip AR systems with advanced computer vision techniques that use deep learning algorithms to enable real-time object detection, location and tracking. Using convolutional neural networks (CNNs) and recursive neural networks (RNNs), AI algorithms can leverage huge data sets to recognize complex visual patterns and optimize spatial mapping in an AR environment. This increases the accuracy and reliability of virtual object placement and improves the fidelity of user interaction.

Furthermore, the combination of artificial intelligence and augmented reality enables the generation of intelligent content that leverages generative adversarial networks (GANs) and reinforcement learning algorithms to dynamically synthesize realistic and life-sensitive virtual objects and environments. This includes training AI models on vast archives of 3D models, textures and animations to generate responsive and personalized augmented experiences tailored to user preferences and situational context. In addition, AI-powered augmented reality systems leverage user-centric data, contextual information, and deep learning algorithms to deliver contextual and personalized insights in real time. Using user behavior analytics, natural language processing (NLP), and deep reinforcement learning, these systems can decipher user queries, infer


intent, and proactively provide personalized recommendations and guidance in an AR environment.

In addition, the fusion of artificial intelligence and augmented reality provides fertile ground for the development of intelligent virtual assistants that leverage artificial intelligence algorithms for speech recognition, gesture recognition, and contextual understanding. Using machine learning and natural language understanding (NLU) techniques, these assistants can seamlessly understand user commands, interpret contextual cues and provide intelligent responses, or perform complex tasks in a large space, promoting effective and engaging user interactions. In addition, the synergy of AI and AR opens up possibilities for collaborative and remote work scenarios. Artificial intelligence algorithms enable seamless communication and interaction between remote users using computer vision, speech recognition and gesture recognition. This enables real-time collaboration, information sharing, and immersive AR conference calls, allowing remote teams to effectively participate in interactive virtual workspaces.

AI and AR powered Tools

Here are some of the best powerful AI and AR tools which one can experience using Software.

1. TensorFlow



TensorFlow is an open-source machine learning framework developed by Google. It provides a comprehensive ecosystem of tools and libraries for building AI models, including deep learning models. TensorFlow can be used for tasks such as image and speech recognition, natural language processing, and more.

2. Unity3D

Unity3D is a popular cross-platform game engine that also supports AR development. It provides a robust set of tools and features for creating interactive AR experiences, including scene creation, physics simulation, animation, and scripting. Unity3D supports various AR platforms, including ARKit (iOS) and ARCore (Android).

3. OpenCV

OpenCV (Open-Source Computer Vision Library) is a widely used open-source computer vision library. It provides a rich collection of algorithms and functions for image and video processing, object detection, feature extraction, and more. OpenCV is a valuable tool for developing AI applications that require computer vision capabilities in conjunction with AR.

4. Vuforia

Vuforia is an AR development platform that offers computer vision technology for creating augmented reality experiences. It provides tools

for image recognition, object tracking, and virtual content placement. Vuforia supports multiple platforms, including iOS, Android, and Unity.

5. ARKit

ARKit is Apple's AR framework for iOS devices. It enables developers to create AR experiences using features like motion tracking, scene understanding, and light estimation. ARKit provides tools for placing virtual objects in the real world, face tracking, and creating immersive AR applications.

6. ARCore

ARCore is Google's AR platform for Android devices. It allows developers to build AR experiences with features like motion tracking, environmental understanding, and light estimation. ARCore provides tools for creating interactive AR applications, including object placement, surface detection, and cloud anchors for shared AR experiences.

7. Amazon Sumerian

Amazon Sumerian is a web-based platform for creating AR, VR, and 3D experiences. It offers a drag-and-drop interface and supports the creation of interactive scenes and characters. Amazon Sumerian can be used to develop AR applications for various platforms, including web browsers, mobile devices, and headsets.

8. Microsoft Azure Cognitive Services

Microsoft Azure Cognitive Services provide a range of AI- powered APIs and services for developers. These services include computer vision, speech recognition, natural language processing, and more. They can be integrated into AR applications to add intelligent capabilities, such as object recognition, text-to-speech, and language understanding.

9. MaxST AR SDK

MaxST AR SDK is a robust AR development toolkit that offers features such as marker-based and marker-less tracking, 3D object recognition, and virtual content placement. It supports multiple platforms, including Android, iOS, Windows, and Unity, making it versatile for AR application development.

10. NVIDIA AR SDK

The NVIDIA AR SDK (formerly known as ARToolKit) is an open-source AR library that provides computer vision capabilities for marker-based tracking, camera calibration, and pose estimation. It offers cross-platform support and can be used for AR application development across various devices and frameworks.


Conclusion

The synergistic revolution brought about by the combination of artificial intelligence (AI) and augmented reality (AR) has the potential to

transform industries, revolutionize human-computer interactions and open new possibilities for immersive experiences. By integrating AI capabilities into AR systems, we can enhance interactivity, intelligence, and realism, paving the way for advanced object recognition, intelligent content generation, personalized information delivery, collaborative workspaces, and more.

The convergence of AI and AR enables developers and innovators to create powerful applications that blur the lines between the physical and digital worlds. It opens the doors to creating intelligent virtual assistants, dynamic and contextual augmented content, and personalized experiences tailored to user preferences and situational context. This technology has the potential to transform gaming, education, healthcare, retail and manufacturing, among others, for greater productivity, efficiency and user engagement. The combined powers of AI and AR allow us to explore uncharted territory where intelligent algorithms analyze the environment, interpret user interactions, and augment reality with seamless digital information.

The revolution continues as advances in AI algorithms, computer vision and deep learning techniques merge with AR hardware and software innovations. Moving forward, fostering collaboration, research and development in AI and AR is critical to unlocking the full potential of this synergistic revolution. By harnessing



the power of AI and AR, we can create transformative experiences that shape the future of technology, empower people, and bring us closer to a world where the boundaries between the physical and virtual worlds seamlessly merge.

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Raj Saroj

Student- BE Electrical

STUDENT ACHIEVEMENTS

Sr. No	Participants	Paper Title/ Workshop/Project Competition	Presented At	Date	Rank
1	Adwait Harishchandra Malashe	Ranked "2nd" In “ Technovation 2023”, Development Of An Android App For Designing Of Stepper Motor Using Kodular Software	Viva Institute Of Technology	6th April 2023	2nd
	Affan Mukadam				
	Akash Ashok Holmukhe				
2	Amitkumar Subhashchandra Vishwakarma	Ranked ' 1st ' In “Project Competition" At” Icarus," In "2023", Battery Swapping Station	Rajiv Gandhi Institute Of Technology , Mumbai	Mar 2023	1st
	Jigar patel				
	Rohan Gawai				
3	Amitkumar Subhashchandra Vishwakarma	Ranked ' 3rd ' In “Project Competition" At” Technovation, Battery Swapping Station	Viva Institute Of Technology	6th April 2023	3rd
	Jigar patel				
	Rohan Gawai				
4	Amitkumar Subhashchandra Vishwakarma	Ranked ' 1st ' In “Poster Competition" At” Icarus, Battery Swapping Station	Rajiv Gandhi Institute Of Technology	Mar 2023	1st
	Jigar patel				
	Rohan Gawai				
5	Amitkumar Subhashchandra Vishwakarma	Ranked ' 2nd ' In “Paper Presentation" At” Ncrenb, Battery Swapping Station	Viva Institute Of Technology	Mar 2023	2nd
	Jigar patel				
	Rohan Gawai				
6	Amitkumar Subhashchandra Vishwakarma	Ranked ' 1st At Division Level' In “Project Model Exhibition", Battery Swapping Station	IEEE Bombay Section, Rajiv Gandhi	Mar 2023	1st
	Jigar patel				
	Rohan Gawai				

			Institute Of Technology		
7	Anuj Ramakant Kap	Ranked '2nd' In " Technovation 2023", Design Of Digital Synchroscope Based On Arduino For Synchronization Of Alternators	Viva Institute Of Technology	6th April 2023	2nd
8	Anuj Ramakant Kap	Ranked ' 2nd Consolation' In " Prakalpa 23", Design Of Digital Synchroscope Based On Arduino For Synchronization Of Alternators	K.J. Somaiya College Of Engineering	13th April 2023	2nd
9	Shubh Arekar	Ranked 1st In Technovation 2023, Multipurpose Swimming Pool Cleaning Device For Observation, Cleaning And Life Guarding With Ph Indicator	Viva Institute Of Technology	6th April 2023	1st
	Hrithik More				
	Rohan Gopinath Shinde				
10	Shubh Arekar	Ranked 1st In "Prakalpa 2023 Paper Presentation", Multipurpose Swimming Pool Cleaning Device For Observation, Cleaning And Life Guarding With Ph Indicator	K.J. Somaiya College Of Engineering	13th April 2023	1st
	Hrithik More				
	Rohan Gopinath Shinde				
11	Shubh Arekar	1st Ranked In Paper Presentation, Multipurpose Swimming Pool Cleaning Device For Observation, Cleaning And Life Guarding With Ph Indicator	K.J. Somaiya College Of Engineering	13th April 2023	1st
	Hrithik More				
	Rohan Gopinath Shinde				



ALUMNI CORNER

My name is Anuj Ramakant Kap, a student of BE Electrical Engineering at the Viva Institute of Technology. I'm excited to share my experience with the electrical department and the VIVA Institute of Technology.

One of the things that really stand out about the department is the exceptional infrastructure and resources available to us. The faculty members are highly experienced and passionate about their subjects, and they are always ready to help and guide us.

The department always focuses on the practical learning and the co

curricular and extra curricular activities. They also organize the events, workshops and seminars to keep us updated with the latest trends and technology in the field.

Another aspect worth mentioning is the career guidance and the placement support we received. The overall experience at the Electrical department was incredible. They have played a vital role in shaping my career, so I'm very, very thankful to the Electrical Department and the VIVA Institute of Technology.



Anuj Kap
Batch 2022-23

Greetings to all!

I am a student of the Electrical Department at VIVA Institute of Technology of the 2023 batch. I am here to express my heartfelt appreciation for our institute and the remarkable electrical department.

Throughout my journey here, I have been fortunate to receive an education from experienced and exceptional faculty members of an electrical department. They have wholeheartedly demonstrating their experience and dedication to our growth and development.

Their ability to simplify the complex concept and provide the practical

examples has made the learning both enjoyable and inviting. Moreover, the practical sessions in well equipped laboratories has been a key strength of this institution.

In the end, I sent my heartfelt gratitude to thank the institute and department for the great teaching-learning experience and shaping our future.

Thank you.



Shubh Arekar
Batch 2022-23

Toppers List

B.E. Electrical (Semester VII)

Sr. No.	Rank	Name	CGPI
1.	First	Danesh Patil & Prerna Ramteke	8.89
2.	Second	Rinkal Patil	8.86
3.	Third	Anuj Kap	8.84

T.E. Electrical (Semester V)

Sr. No.	Rank	Name	CGPI
1.	First	Harsh Shukla	8.12
2.	Second	Mayur Pathare	8.07
3.	Third	Akash Naik	7.66

S.E. Electrical (Semester III)

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3.	Third	Rushikesh Pawar	7.42



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