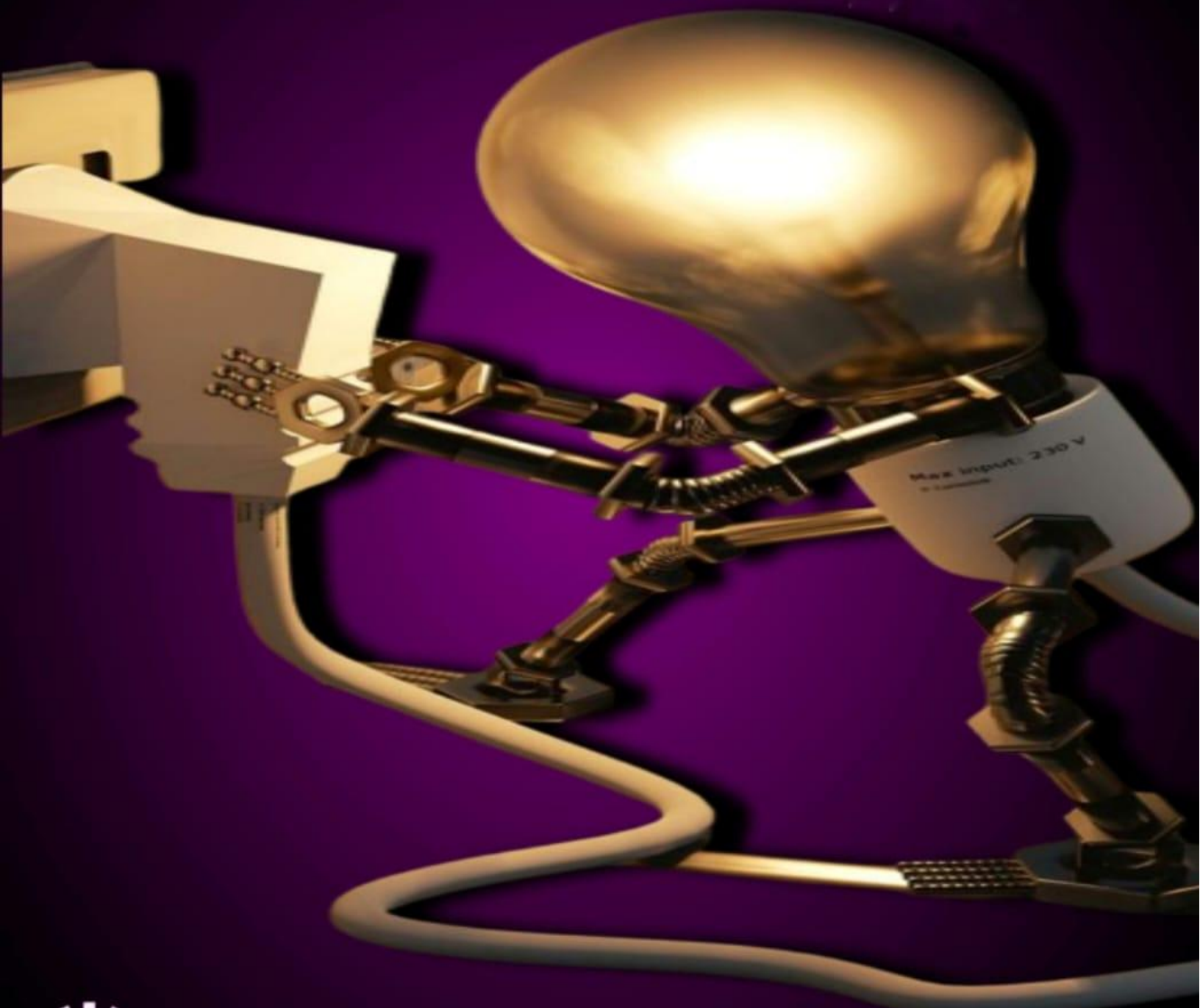
ELECTRIC ECO

Dept.of EEE Magazine 2022-23 Issue-1



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

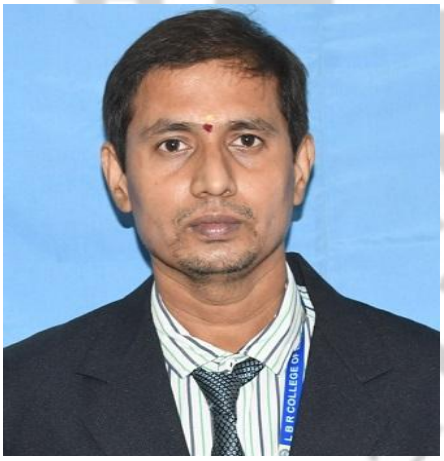
LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (A)

Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada

FOREWARD

PRINCIPAL

I am delighted to present this edition of our Electrical and Electronics Engineering (EEE) department magazine, a testament to the creativity and hard work of our students and faculty. This publication not only showcases remarkable projects and achievements but also reflects our commitment to innovation and excellence in the ever-evolving field of engineering. I encourage everyone to engage with the content and celebrate the spirit of collaboration that defines our EEE community. Together, we can continue to inspire and shape the future of technology.



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It is with immense pride that I introduce this edition of our Electrical and Electronics Engineering (EEE) department magazine. This publication is a celebration of the talent, innovation, and dedication that our students and faculty bring to the field. Inside, you will find an array of projects, research highlights, and insightful articles that showcase the dynamic learning environment we foster. As we navigate the challenges and opportunities in technology, this magazine reflects our commitment to academic excellence and collaboration. I encourage all readers to immerse themselves in the inspiring stories within these pages and to continue pushing the boundaries of knowledge and creativity in our field.

About the Department:

The department of Electrical and Electronics Engineering is one of the oldest and major departments of the Institute. Since its inception in 1998, the department has been actively engaged in teaching and research in diverse fields of Electrical and Electronics Engineering. The department offers B.Tech in EEE and M.Tech in Power Electronics and Drives programmes. All its programmes are approved by AICTE, New Delhi. The department is strong with few faculty members holding Ph.D degrees and expertise in various fields. Initially B.Tech program was started with an intake of 40 in 1998 and subsequently increased to 120 in the year 2012. M.Tech (PE & D) program was started in the year 2011 with an intake of 18 students. The department of EEE has adequate and well-qualified faculties spanning all major areas of Electrical Engineering like Power Systems, Power Electronics, Control Systems, Energy Systems, High Voltage Engineering etc.

VISION:

To contribute to the country and the world through technical education, research and consultancy in Electrical and Electronics Engineering.

MISSION:

1. provide broad based education in Electrical and Electronics Engineering.
2. To keep the curriculum industry friendly.
3. To undertake sponsored research and provide consultancy services in industrial, educational and society relevant areas in Electrical and Electronics Engineering.
4. To promote ethical and moral values among the students so as to make them them emerge as responsible professionals

Program Educational Objectives (PEOs):

PEO1: Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.

PEO2: Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.

PEO3: Work effectively as individuals and as team members in multidisciplinary,projects.

PEO4: Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

CONTENTS

ARTICLES

SMART GRID

A Smart Grid is a modern electric power system that uses advanced technology to enhance the efficiency, reliability, and sustainability of electricity distribution. Unlike traditional grids, which only deliver electricity one way, smart grids enable two-way communication between utility providers and consumers, allowing for real-time monitoring and management. Key components include smart meters, which provide point-of-use energy consumption data, and smart load control switches, which help optimize distribution during peak usage.

Smart grids also integrate renewable energy sources like solar and wind power, offering greater flexibility to manage the variability of these sources. They support demand-side management, which means electricity use can be adjusted based on real-time demand, reducing waste and lowering costs. Additionally, smart grids enhance the resilience of the electrical system by quickly detecting and responding to outages or faults.

Overall, the implementation of smart grids leads to a more efficient, reliable, and environmentally friendly power system, paving the way for a sustainable energy future.

- K. KARTHIK

Green Energy Technologies

Green Energy Technologies encompass innovative methods to harness power from renewable resources like solar, wind, hydro, geothermal, and biomass. These technologies are crucial in transitioning towards a sustainable energy future by reducing greenhouse gas emissions and mitigating climate change impacts. Solar energy technology captures sunlight using photovoltaic panels or solar thermal systems, converting it into electricity or heat. Wind turbines convert the kinetic energy from wind into electricity, while hydropower uses flowing water to spin turbines and generate power. Geothermal energy exploits the Earth's internal heat for electricity generation and heating, while biomass energy is derived from organic materials like plant and animal waste.

Advancements in Battery Energy Storage Systems (BESS) are also pivotal for storing and managing renewable energy, ensuring a stable supply despite resource intermittency. The integration of smart grid technologies further optimizes energy distribution and consumption by enabling real-time monitoring and efficient energy management. Additionally, green hydrogen production represents a promising field, using renewable energy to produce hydrogen, which can be stored, transported, and used as a clean fuel.

-K. NITHIN

Industrial Automation

Industrial Automation refers to the use of control systems, such as computers and robots, to operate machinery and processes in various industries without significant human intervention. This technological advancement enhances productivity, quality, and efficiency while reducing costs and minimizing human error. Automated systems can perform repetitive tasks with high precision and speed, making them ideal for manufacturing, assembly lines, and material handling.

Key components of industrial automation include programmable logic controllers (PLCs), which are used to control and monitor equipment, and human-machine interfaces (HMIs), which provide a graphical representation of the automation system. Robotics plays a crucial role, especially in tasks requiring high accuracy and consistency. Advanced automation systems often incorporate technologies like artificial intelligence (AI) and machine learning (ML) to improve performance and decision-making.

Industrial automation also integrates with Industrial Internet of Things (IIoT), enabling real-time data collection and analysis to optimize operations and maintenance. This integration facilitates predictive maintenance, reducing downtime and extending the lifespan of machinery.

-K. SYAMALA.DEVI

Faults Effecting Photovoltaic Array

Photovoltaic (PV) Arrays are susceptible to various faults that can significantly impact their performance and efficiency. Common fault types include open circuits, short circuits, ground faults, and degradation of PV modules. Open circuits occur when a break in electrical continuity disrupts the flow of current, leading to a drop in power output. Short circuits happen when unintended connections create a path of low resistance, causing excess current that can damage the PV modules.

Ground faults result from a conductor making contact with the ground, creating a leak path for current, which reduces power output and can pose safety risks. Degradation, such as potential-induced degradation (PID) or corrosion, affects the longevity and efficiency of PV modules. Environmental factors like shading, soiling, and temperature variations also impact PV array performance.

Effective fault detection, involving visual inspections, real-time monitoring systems, and advanced diagnostic tools, is crucial for maintaining optimal PV array performance. Advanced machine learning algorithms and data acquisition systems are increasingly used to identify and classify faults accurately, ensuring reliable and efficient operation of PV systems.

-U.GANGA BHAVANI

Power Quality: Ensuring Optimal Performance and Efficiency

Maintaining high power quality is critical for ensuring the reliability, efficiency, and minimal interruptions of electrical power supply. Poor power quality can lead to various issues, such as voltage sags, swells, transients, harmonic distortions, and interruptions, which can result in equipment malfunctions, reduced efficiency, and increased operational costs.

Voltage sags and swells occur when the voltage dips or peaks momentarily, often due to abrupt load changes. These fluctuations can cause sensitive equipment to malfunction or shut down. Harmonic distortions, caused by non-linear loads like variable speed drives and electronic devices, lead to distorted voltage and current waveforms. This distortion can result in inefficiencies, overheating, and damage to equipment.

Transients, or temporary over-voltages, are frequently caused by switching operations or lightning strikes. These transients can lead to insulation breakdowns and component failures, posing significant risks to equipment and system stability. Power interruptions, whether momentary or sustained, can disrupt sensitive processes and cause data loss, impacting productivity. Improving power quality involves implementing solutions such as surge protectors, harmonic filters, uninterruptible power supplies (UPS), and advanced power conditioning equipment. These measures can significantly enhance power quality, ensuring smooth and efficient operations. Modern industries heavily rely on power quality management to achieve better productivity, extend equipment lifespan, and improve overall operational efficiency.

-V. MAHESH BABU

FACULTY PUBLICATIONS

K. Ramalingeswara Prasad

Design of Mobile Robot Navigation Controller using Neuro-Fuzzy Systems:

Focuses on integrating neural networks with fuzzy logic to enhance autonomous mobile robots' navigation capabilities. Neuro-fuzzy systems combine the adaptive learning ability of neural networks with the human-like reasoning style of fuzzy logic. This hybrid approach helps in handling the inherent uncertainties and dynamic nature of real-world environments.

In such systems, sensor data (like obstacle distances and directions) are processed through a neuro-fuzzy controller to determine the optimal path. The neuro-fuzzy structure learns from environmental interactions, enhancing its decision-making process over time. By using an Adaptive Neuro-Fuzzy Inference System (ANFIS), the controller adapts to unpredictable scenarios, allowing for precise adjustments during navigation.

The primary benefit of this design is its robustness in obstacle detection and avoidance, ensuring safe and efficient movement of the mobile robot. It also optimizes path planning, reducing energy consumption and travel time. Simulation results in various studies have demonstrated the practicality of neuro-fuzzy controllers in dynamic and unstructured environments.

Computer Vision and Electrical System Technologies, 457906 July 2022 SCIE

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Dr.G.Nageswara Rao

Securing Online Web Application for IoT Management:

Securing online web applications for IoT management is crucial to protect sensitive data, ensure system integrity, and maintain user trust. IoT devices are increasingly integrated into critical infrastructures, making them prime targets for cyber-attacks. Common threats include unauthorized access, data breaches, cross-site scripting (XSS) attacks, and inadequate authentication measures.

To mitigate these risks, several best practices should be implemented. These include using secure coding practices, regularly updating and patching software, and incorporating encryption techniques to protect data in transit and at rest. Employing robust authentication and authorization protocols is essential to prevent unauthorized access. Additionally, deploying security controls such as firewalls, intrusion detection systems, and security patches can help in identifying and responding to threats promptly.

Continuous monitoring and real-time analysis of web application performance are vital for detecting and addressing vulnerabilities. Integrating AI and machine learning to predict and prevent potential security breaches can enhance the overall security posture. By prioritizing these security measures, organizations can safeguard their IoT ecosystems, ensuring reliable and secure operation of online web applications for IoT management.

IEEE Xplore 1499-1508 July 2022 SCOPUS

K. Harinadha Reddy

Machine Learning k-Means Cluster Support S-FSCV Algorithm to Estimate Integrated Network Operating State:

The k-means clustering algorithm combined with the Support Soft Fuzzy Set Control Vector (S-FSCV) forms a robust approach in machine learning for estimating the integrated network operating state. K-means clustering efficiently groups data into clusters by minimizing the distance between points within each cluster. This algorithm is particularly effective for handling large datasets and identifying patterns within the network data.

The integration with S-FSCV enhances the k-means approach by incorporating fuzzy logic, which accounts for the uncertainty and imprecise information often present in network operations. S-FSCV facilitates soft classification, allowing for partial membership of data points in multiple clusters, thus providing a more flexible and accurate representation of the network's operating state. This hybrid method helps in accurately estimating the network state, improving the prediction of potential failures and optimizing the performance and reliability of the network.

By combining the strengths of k-means clustering and S-FSCV, this innovative algorithm aids in real-time monitoring and decision-making processes. It enables more efficient network management by continuously updating and analyzing the network's operating state, leading to enhanced operational efficiency and reduced downtime.

Arabian Journal for Science and Engineering., 1319-8025 October 2022 SCIE

P. Sobha Rani

Optimal Switching Operations of Soft Open Points in Active

Optimal Switching Operations of Soft Open Points in active distribution networks play a crucial role in enhancing the flexibility and reliability of power systems. Soft Open Points (SOPs) are power electronic devices that enable the control of power flow, voltage regulation, and fault management. SOPs can dynamically reconfigure network topology, helping to integrate renewable energy sources, such as photovoltaic (PV) systems and electric vehicles (EVs), while managing the variability and uncertainty associated with these sources.

Effective switching operations involve determining the optimal location and timing for SOP activation to minimize power losses, improve voltage profiles, and enhance system reliability. This requires advanced algorithms, such as Artificial Rabbits Optimization. By implementing SOPs in a strategic manner, active distribution networks can better handle fluctuating loads and generation, reducing the impact of faults and improving overall performance.

SOPs offer a flexible solution for modern power grids by addressing the challenges posed by decentralized and intermittent renewable energy sources. Optimal switching operations not only enhance the efficiency and reliability of distribution networks but also contribute to more sustainable and resilient energy systems.

PROCESS INTEGRATIO N AND OPTIMIZATI ON FOR SUSTAINABI LITY 25094246 December 2022 SCIE

P.Deepak Reddy

Alternative Design Modifications for Enhancement of PV Panel Efficiency

Photovoltaic (PV) panels are instrumental in harnessing solar energy, and enhancing their efficiency is crucial for maximizing energy output. Several alternative design modifications have proven effective in boosting PV panel performance. One such modification includes light reflector arrangements, which involve the strategic placement of reflective materials around the PV panels to catch and redirect more sunlight onto the panel surface. This arrangement increases photon energy absorption, resulting in higher power generation.

Another effective modification is the use of multi-junction cells. These cells consist of multiple layers, each designed to absorb different wavelengths of sunlight, thereby capturing more energy compared to traditional single-junction cells. Additionally, integrating cooling systems helps maintain optimal panel temperatures, as overheating can reduce PV panel efficiency. Passive cooling techniques like heat sinks or active methods like liquid cooling systems are employed to dissipate excess heat.

Anti-reflective coatings on the PV panel surface can also enhance efficiency by minimizing light reflection loss and ensuring more sunlight enters the cells. Lastly, incorporating tracking systems allows PV panels to follow the sun's trajectory, optimizing the angle of incidence and maximizing exposure throughout the day.

These innovative design modifications collectively contribute to significant improvements in PV panel efficiency, paving the way for a more sustainable energy future.

IEEE Xplore 1499-1508 August 2022 SCOPUS

R. Anjaneyulu Naik

A hybrid deep learning for patient activity recognition (PAR): Real time body wearable sensor network from healthcare monitoring system (HMS):

Hybrid Deep Learning for Patient Activity Recognition (PAR) involves combining advanced machine learning techniques to accurately identify and monitor patient activities in real-time. This approach utilizes a network of body-wearable sensors that collect comprehensive physiological data. By integrating convolutional neural networks (CNN) and long short-term memory (LSTM) networks, the system captures spatial and temporal features, enabling precise activity recognition.

Wearable sensors continuously monitor metrics like heart rate, body temperature, and movement, transmitting data to a cloud-based healthcare monitoring system (HMS). This system processes the data using the hybrid deep learning model, which enhances accuracy in detecting various activities and potential health anomalies. The CNN extracts spatial features from sensor data, while the LSTM processes the sequential nature of activities, providing robust recognition capabilities.

The hybrid model's real-time analysis ensures timely alerts and interventions, improving patient care and safety. With an accuracy rate exceeding 99%, this approach significantly enhances the reliability of patient monitoring systems. Consequently, it promotes proactive healthcare management, reduces response times, and supports better health outcomes by leveraging cutting-edge deep learning techniques.

Journal of Intelligent & Fuzzy Systems 1875-8967 2022 SEPTEMBER SCIE

PATENTS

Name of Inventor : Dr.K.R.L.Prasad, Dr.J.S.V. prasad & Dr.G.Nageswara Rao

Title of Patent : A Robust Optimal Controller for Generator Side Converter of Wind Driven Energy Conversion System

Published Year & Month: September 2022

PATENT APPLICATION ID: 202241053890 A

Status Published

The design of a Robust Optimal Controller is crucial for the efficient operation of the generator-side converter in wind-driven energy conversion systems. This controller ensures stable and optimal performance by controlling the power electronic devices that interface the Permanent Magnet Synchronous Generator (PMSG) with the grid. The controller employs advanced algorithms to manage the bi-directional power flow, adjust the voltage and current, and optimize the energy conversion process.

By integrating robust control strategies, such as sliding mode control or model predictive control, the system can withstand various disturbances and uncertainties, ensuring reliable operation even under fluctuating wind conditions. The optimal controller also facilitates Maximum Power Point Tracking (MPPT), which maximizes the energy captured from the wind by adjusting the turbine speed and generator-side converter parameters accordingly.

Name of Inventor : Dr.G.Nageswara Rao

Title of Patent : Designing a framework of IoT Integrated with PV Solar Cells to increase the renewable energy extraction by capturing the solar rays

Published Year & Month: September 2022

PATENT APPLICATION ID: 202241046904 A

Status : Published

Incorporating the Internet of Things (IoT) with photovoltaic (PV) solar cells significantly enhances the efficiency of renewable energy extraction by meticulously capturing solar rays. This integration leverages smart sensors and connected devices to monitor and control the orientation and performance of PV panels in real-time. By employing advanced tracking systems, IoT enables dynamic adjustment of the panels' angles, ensuring they are always aligned with the sun's trajectory for maximum energy absorption.

Furthermore, the IoT framework facilitates remote monitoring and maintenance, allowing for prompt detection and rectification of any issues. This real-time data collection and analysis lead to improved energy management and optimization. Additionally, IoT-enabled systems can predict weather patterns and adjust operations accordingly to maintain optimal performance during varying environmental conditions.

The fusion of IoT with PV solar cells plays a crucial role in enhancing the efficiency and reliability of solar energy systems, contributing to a more sustainable and robust renewable energy

Name of Inventor : Dr. AVGA.MARTHANDA

Title of Patent : A Machine Learning Algorithm To Assess Autism And Its Symptoms In Computer Vision Technique Tools

Published Year & Month: September 2022

PATENT APPLICATION ID: 202241046904 A

Status : Published

Leveraging machine learning algorithms to assess autism and its symptoms using computer vision techniques represents a significant advancement in healthcare. These algorithms can analyze visual data to identify atypical behavioural patterns and facial expressions associated with Autism Spectrum Disorder (ASD). By employing techniques like Convolutional Neural Networks (CNNs), machine learning models can be trained to recognize and classify these patterns efficiently Computer vision in autism spectrum disorder research.

In real-time applications, body-wearable sensor networks provide continuous monitoring of patients, capturing data such as movement, facial gestures, and social interactions Computer vision in autism spectrum disorder research. This data is processed through the machine learning algorithm, which complements traditional diagnostic methods. The integration of computer vision with machine learning not only enhances the accuracy of ASD detection but also reduces the time and cost involved in assessments.

BOOKS WRITTEN

1)

Name of the Author: Dr.A V G A Marthanda

Title of the Book / Chapter: Renewable Energy Sources

Name of the Publisher with Address: GCS Publishers India

ISBN number: 978-93-94304-12-3

2)

Name of the Author: Dr.G. Nageswara Rao

Title of the Book / Chapter: Detection and Analysis of Mental Stress in Online Learning Using IoT Devices

Name of the Publisher with Address: Nova Science publishers, Inc

ISBN number: 979-8-88697-185-9

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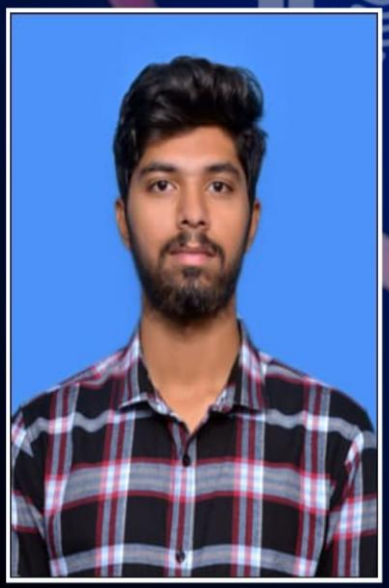

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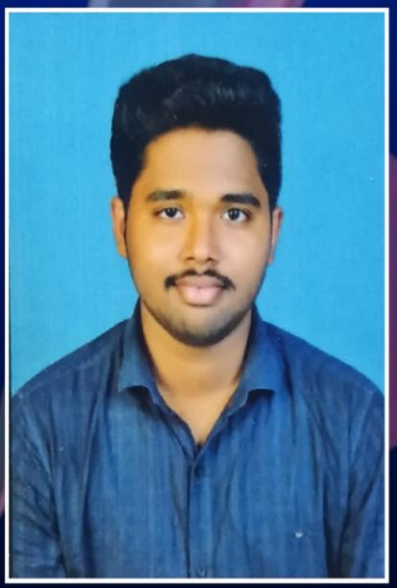

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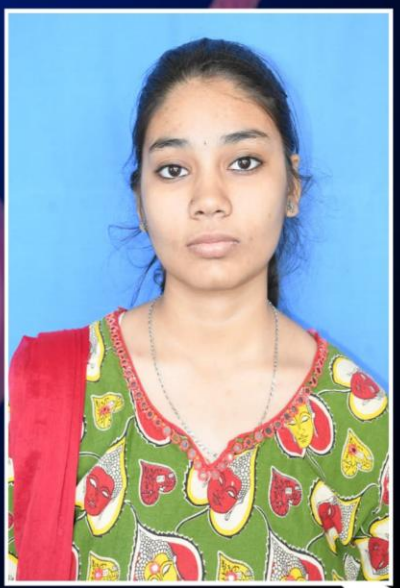

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