

Paper Id: 01

**Performance Assessment of External Source-Driven Binary Vapor Cycles
with Ammonia-Water and Trans-Critical CO₂ The Impact of Reheating
and Pressure Variations**

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Abstract:

This paper investigates the thermodynamic performance of binary vapor cycles, focusing on two working fluid combinations—ammonia-water mixtures and trans-critical carbon dioxide (CO₂). The analysis evaluates how system performance is influenced by incorporating reheating processes and varying operating pressures, which are key parameters in optimizing cycle efficiency and energy recovery. By leveraging external heat sources and exploring these configurations, the research aims to provide insights into improving the efficiency of industrial processes, power generation, and waste heat recovery systems. This work contributes to advancing sustainable energy technologies by assessing the trade-offs and potential of these alternative cycle configurations under diverse operating conditions.

Keywords: Trans critical cycle, Reheating, Absorber pressure, Binary vapor cycle.

Paper Id: 02

CMOS-Based Process-Scalable Analog Circuits for Machine Learning: A Comprehensive Review and Future Directions

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Abstract

Analog computing techniques are gaining attention for machine learning (ML) applications due to their ability to reduce computational complexity. Continuous operations such as addition and subtraction offer a simpler and more efficient approach compared to probabilistic product decoding, which can be sensitive to noise and inconsistent measurements. This paper presents a simulated VLSI implementation of a broadcast edge connection, independent of the MOS component model, along with experimental results. The implementation requires in-loop circuit training to address device incompatibilities and reduce artifacts. To speed up wafer-in-the-loop training, circuits are reweighted to ensure that simulated functions remain unchanged during training and inference. We propose a simulation paradigm and circuit using "positive" functions that remain invariant to transistor bias and ambient temperature variations. Additionally, we describe a 3-layer neural network based on S-AC (Shape-Based Analog Computing) with six hidden nodes. This design utilizes differential compressive input and in-memory computing to store weights, significantly reducing data movement energy. Experimental results demonstrate that S-AC circuits are tunable, conflict-free, and capable of operating under various biasing conditions and temperatures. The S-AC framework allows a trade-off between computational accuracy, speed, power, and area. This architecture is ideal for high-speed ML training in the SI regime and energy-efficient inference in the WI regime, making it suitable for both server and edge applications.

Keywords: Shape-Based Analog Computing, CMOS, Machine Learning, Processor

Paper Id: 03

Implementation of STATIC-RANDOM-ACCESS-MEMORY-Based In-Memory Computing-architecture for improving Energy Efficiency

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Abstract

The in-memory-computing architecture the improvement of big data and high-performance computing. In memory-computing (IMC) as reduces the latency and power consumption of data processing. Proposed research paper static random-access memory-based IMC architecture. By completing internal write-back, NMOS transistors increase computational efficiency and eliminate the need to read the computational output right away. A 128X128 STATIC-RANDOM-ACCESS-MEMORY-IMC macro chip is designed using the 78-nm technology. The energy efficiency of 55.3TOPS/W with supply voltage 1.2V and a throughput of 224.1 GOPS/mm². A neural network using the suggested STATIC-RANDOM-ACCESS-MEMORY IMC architecture achieves 95% accuracy with the Mixed Signal.

Keywords: In-memory-computing (IMC), STATIC-RANDOM-ACCESS-MEMORY, ROW BY ROW ADC

Paper Id: 04

A Review on Cognitive Radio Sensor Networks for Internet of Things

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Abstract

Clustering is an effective method to manage communications in cognitive radio sensor networks (CRSNs). This paper reviews on Cognitive Radio Sensor Networks for Internet of Things. Cognitive Radio (CR)-based Internet of Things (IoT) system is an effective step towards a world of smart technology. Many frameworks have been proposed to build CR-based IoT systems. The CR-based IoT frameworks are the key points on which this survey focuses.

Keywords - Internet of Things, cognitive radio, wireless sensor networks, clustering protocol, WI MAX.

Paper Id: 05

Image Enhancement Techniques for Digital Images

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Abstract:

Image enhancement is one of the difficult problems of image processing. The purpose of image enhancement is to process an image so that the result is more suitable for a particular application than the original image. Digital image enhancement techniques offer various ways to improve the visual quality of images. The appropriate selection of these techniques is very important. This document provides an overview and analysis of the various techniques commonly used for image enhancement. Image enhancement plays a vital role in image processing applications. A lot of work has recently been done in the area of image enhancement. Numerous techniques have been proposed to improve digital images. In this article, a study was conducted on different image enhancement techniques.

Keywords: image enhancement, digital image processing, components, inferred image.

Paper Id: 06

A Study on Security Requirements of IOT

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Abstract

In technology, Internet technologies have been faster than other technologies. However, the fast pace of the Internet has kept the Internet's full potential and, in the meantime, poses many threats to data security. The growing dimension of the Internet was IOT, which needed to connect devices and systems more than ever. The space that worried about the devices and systems interconnected in the biological system was the security of the Internet of Things. Although IOT plays an important role in society and technology, there are fundamental threats such as security and data protection. Things (in the processing devices of the IOT ecosystem and in the integrated systems) have been able to collect, send and receive data by communicating on the network because they have a unique identifier. This document is a summary document on the security aspects of IOT. He deals with security problems based on security architecture and protocol, RFID technologies, WSN integration and RFID technologies for security problems.

Keywords: security, IOT, RFID, challenge, protocol.

Paper Id: 07

A Review Natural Ventilation by Using Solar Chimney

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Abstract

A solar chimney is a technology that can be used to enhance the ventilation of a residential or commercial structure and uses the same principle at play in a fireplace. Heat naturally rises—like air from a fire will rise through a chimney—creating draft and taking the smoke with it. Solar or photovoltaic (PV) fans operate using solar energy to expel superheated air from your attic, allowing cooler outside air to flow in as a replacement. This process reduces the workload on your HVAC system, making it easier to cool the upstairs living areas. This paper explores the classification and working principles of solar chimneys.

Keywords: Solar Chimney, Classification, Natural Ventilation, SP-PCM, SCPP.

Paper Id: 08

Wireless Sensor Networks and Its Clustering Algorithm

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Abstract

Due to the short battery life of sensor nodes, designing a routing protocol that uses energy efficiently to increase the network's lifespan is one of the most difficult tasks in heterogeneous wireless sensor networks (WSNs). This paper provides a complete assessment of the many routing protocols used by many researchers to extend the life of the network and lower node energy consumption. It also provides an overview of heterogeneous networks.

Keywords – WSN, Heterogeneous wireless sensor networks, clustering algorithm

Paper Id: 09

**Transformative Impact of Artificial Intelligence on Telecommunications:
Network Optimization, Predictive Maintenance, and Personalized User
Experience**

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ABSTRACT

This paper explores the transformative impact of Artificial Intelligence (AI) in telecommunications, focusing on network performance optimization, predictive maintenance, personalized user experiences, and ethical and regulatory challenges. AI technologies enhance communication networks by optimizing resource allocation, reducing latency, and increasing throughput through real-time adjustments and predictive analytics. Predictive maintenance, enabled by AI, helps prevent failures, reduce downtime, and lower maintenance costs by anticipating issues. The study also delves into AI's role in customizing communication services, delivering tailored content based on user preferences and behaviour. Ethical, social, and regulatory concerns, including data privacy and algorithmic bias, are examined, emphasizing the need for updated regulatory frameworks. Best practices for AI implementation in telecom networks are documented, providing guidelines for effective integration while mitigating risks. The findings highlight substantial benefits of AI for network optimization and maintenance, stressing careful management to address associated challenges. This investigation enriches the understanding of AI in telecommunications and offers valuable insights for industry practitioners.

KEYWORDS: Artificial Intelligence (AI), Communication networks, 5G technology, Machine learning, deep learning, Network optimization, Predictive maintenance, Latency, Throughput, Data privacy, Transparency, Social implications, Regulatory frameworks.

Paper Id: 10

Development and Performance Analysis of Pyramid Shaped Novel Solar Water Heater

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ABSTRACT: Solar water heating is an environmentally clean technology that utilizes solar energy as a renewable energy source for heating water. Several publications indicate that the interest in residential solar heating using flat-plate solar collectors remains high and current. The optimal tilt angle for solar collectors is estimated to be around 40°, resulting in energy savings, solar fraction, and collector efficiency of 1284 kWh, 29.6%, and 37.9%, respectively, for the entire year. The performance of solar water heating systems can be improved by considering factors such as solar insulation variations throughout the day and months of the year. Overall, solar water heating is a promising technology with ongoing research and potential for energy savings and environmental benefits.

In present project a novel prototype harnessing solar thermal system is developed. This system consists of a pyramid shaped glass structure with an insulated chamber of base measuring 600 x 600 mm with axis height of 600 mm, all slant faces are sealed with insulated glass. A copper coil of 5 mm diameter is placed inside featuring both inlet and outlet. The system is connected to water tank for natural circulation.

During testing, the system demonstrated its capability to significantly elevate temperatures and effect of different time periods of the day, the system's temperature is observed 84.8 degrees Celsius and the outlet water temperature in the tank 40.6 degrees Celsius. These encouraging results suggest that with further design and development, it is feasible to create a solar water heating system that effectively meets the specific requirements of house hold/ industrial water heating facilities.

KEYWORDS: Solar energy, Solar water heating, Renewable energy, Thermal efficiency, Solar collector, Sustainability.

Paper Id: 11

Advancing Sustainability: A Comprehensive Review of Environmental, Social, and Governance (ESG) Practices

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Abstract: A Critical Frame of Reference for Sustainability In Current Business And Investment Contexts Is Environmental, Social, And Governance. This Review Would Discuss the All-Inclusive Role of ESG Practices In Supporting Environmental Stewardship, Social Equity, And Good Governance. ESG Initiatives Minimize Ecological Footprints While Enabling Innovation and Operational Efficiency by Addressing Climate Change, Resource Conservation, And Biodiversity Issues. Among The Social Components, Employee Well-Being, Diversity, And Community Engagement Are Prioritized, Leading to Higher Stakeholder Trust and Societal Influence. Governance Frameworks Emphasize Accountability, Transparency, And Ethical Management as A Safeguard Against Organizational Integrity and Long-Term Success. While There Exist Drawbacks to The Implementation of ESG Practices, Such As The Prohibitive Cost Of Implementation, The Lack Of Standards, And The Risk Of Greenwashing, Technological Advancements, Regulatory Backing, And The Efforts Of Various Stakeholders Have Shown The Transformative Potential These Practices Can Offer. This Paper Will Discuss How ESG Has, As Part of The United Nations' Sustainable Development Goals, Been Seen To Drive Corporate Actions To Ensure That Every Soul Has A Fair And Sustainable Future.

Keywords: ESG, Sustainability, Environmental Stewardship, Social Equity, Ethical Governance, Climate Change, Corporate Responsibility, Sustainable Development Goals (Sdgs), Renewable Energy, Stakeholder Trust.

Paper Id: 12

Exploring the Evolution of Environmental, Social, and Governance (ESG) Practices: A Comprehensive Review

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Abstract: ESG practices have indeed undergone significant changes over the past few decades, mainly because of the increasing understanding of the interconnection of corporate activities, social responsibility, and environmental stewardship. This review explores the evolution of ESG practices, including their historical development, key drivers, and shifts in priorities across industries and regions. The paper explores the three core dimensions of ESG: environmental, social, and governance, and their implications for corporate strategy, stakeholder relationships, and long-term sustainability goals. It also discusses the challenges and opportunities that come with implementing ESG principles, such as regulatory frameworks, market pressures, and the increasing role of technology in monitoring and reporting. The review draws insights from vast literature in academic sources, industrial reports, and case studies to assert the integration of ESG factors into business decision-making toward responsible corporate behavior and sustainable economic growth. The paper concludes with a thought on the future directions of ESG, tracking emerging trends, and providing advice to the corporation, the policymaker, and the investor to expedite the progress of integration of ESG practices amid an increasingly complicated global framework.

Keywords: ESG, sustainability, corporate governance, environmental responsibility, social equity, regulatory frameworks.

Paper Id: 13

Advancements and Emerging Trends in Thermal Energy Storage Technologies for Sustainable Energy Systems.

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ABSTRACT: - Thermal energy storage (TES) technologies have become a cornerstone in advancing sustainable energy systems by enhancing energy efficiency, enabling integration of renewable energy sources, and reducing greenhouse gas emissions. This paper reviews the recent advancements and emerging trends in TES systems, focusing on innovative materials, system designs, and applications in both residential and industrial contexts. Key areas include phase change materials (PCMs), thermochemical energy storage, and advanced sensible heat storage solutions. Emerging trends such as hybrid TES systems, nanotechnology-based materials, and AI-driven optimization for TES operations are also discussed. Furthermore, the paper highlights the challenges in scalability, cost-effectiveness, and material durability, along with potential pathways for overcoming these barriers. The findings underscore the transformative role of TES technologies in shaping a sustainable energy future.

Keywords: Thermal energy storage, sustainable energy, phase change materials, thermochemical storage, sensible heat storage, renewable energy integration, energy efficiency, hybrid TES systems, nanotechnology, artificial intelligence.

Paper Id: 14

A Comparative Study of the Uttar Pradesh and Madhya Pradesh Junior National Boys Boxing Teams

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Abstract: - Comparing the athletic motivation of state boxers from Madhya Pradesh and Uttar Pradesh was the goal of the current study. Forty national boxers under the age of 19 from Madhya Pradesh and Uttar Pradesh took part in the study. The extrinsic, intrinsic, and a motivational motivational effects of boxing players from Madhya Pradesh and Uttar Pradesh were compared using the sports motivation scale (SMS-28), which was developed by Luc G. Pelletier et al. in 1995. The results of the descriptive statistics (mean, standard deviation) were examined using the independent "t-test."

Factors influencing extrinsic motivation in Madhya Pradesh and Uttar Pradesh Regarding all of the intrinsic-motivation factors [to know, accomplish, and also experience stimulation], there was no discernible difference between boxers. [Recognized, introduced] There was no discernible difference in the motivation of boxers from Madhya Pradesh and Uttar Pradesh, with the exception of [External Regulation]. To test the hypothesis, a significance level of 0.05.

Keywords: Motivation can come from three sources: internal, external, and a motivation factors.

Paper Id: 15

Solar Energy for Sustainable and Efficient Agriculture

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Abstract: - Agriculture is the mainstay of Indian economy and a sustainable agriculture the need of the hour. Today in the developing world where technology is dominating all aspects of life, agriculture is no longer untouched. It would be very right to say that agriculture and technology are going hand in hand and its technological advancement has taken agriculture at new heights. However technological advancements have its own disadvantages including climate change, pollution, new health issues and hazards, depletion of non-renewable resources etc., that needs to be addressed cautiously and intelligently. Use of renewable energy source that too which is dependable and consistent could be an answer to all these issues without affecting the sustainability and efficiency of a sector like agriculture which is today striving for its sustainability. Sustainable and efficient agriculture is essential for maintaining the food security and livelihood of a strong and developing nation. Solar energy is one such source of renewable energy which can support agricultural development in its all areas including mechanical techniques, fertilizer applications, seed development, crop growth and maintenance, water efficient irrigation, post-harvest management and many more. The present review envisages the use of solar energy and its applications in the growth and development of sustainable and efficient agriculture. There are many uses of solar energy in agriculture including power

pumps, solar dryers, power bulbs, heaters, fences and many more mechanical and electrical devices which can be better utilized with the help of solar energy.

Key words: solar energy, sustainable agriculture, efficient agriculture.

Paper Id: 16

Advances in Multiclass Oral Cancer Detection Using Spectroscopic and AI Techniques

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Abstract: - The early and accurate detection of oral cancer is critical for improving patient outcomes and survival rates. Recent advances in spectroscopic techniques, combined with artificial intelligence (AI), have revolutionized the field of multiclass oral cancer detection by enabling precise classification and diagnosis. This paper reviews the integration of advanced spectroscopic methods, such as Raman, infrared, and fluorescence spectroscopy, with cutting-edge AI algorithms, including machine learning and deep learning models. The synergy of these technologies facilitates non-invasive, rapid, and highly accurate detection of various stages and types of oral cancer. Challenges such as data variability, model interpretability, and clinical translation are addressed, along with strategies to overcome them. This study underscores the potential of spectroscopic and AI-driven approaches to transform oral cancer diagnostics, paving the way for personalized and timely treatment interventions.

Keywords:- Oral cancer detection, Multiclass classification, Spectroscopic techniques, Raman spectroscopy.

Paper Id:17

**Advancements and Challenges in Solar Water Heating Systems: A
Sustainable Solution for Energy Conservation and Environmental Impact
Reduction**

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ABSTRACT: In today's world, the over-reliance on traditional fuels such as coal, diesel, and gas has led to significant environmental challenges, including global warming, air pollution, and resource depletion. As a result, the need for transitioning to renewable and clean energy sources like solar energy has become urgent. Solar energy is abundant, sustainable, and offers great potential to meet the world's energy demands without compromising environmental health. Among various applications of solar energy, solar water heating (SWH) systems are particularly valuable due to their practicality, cost-effectiveness, and positive environmental impact. These systems are instrumental in reducing household energy bills, decreasing reliance on fossil fuels, and lowering greenhouse gas emissions. In this paper, we examine the components, design, working principles, and diverse applications of SWHs, highlighting their advantages and limitations. We also explore how optimized design and careful consideration of geographical and user-specific factors can enhance the reliability and efficiency of SWHs across different sectors, making them a sustainable and efficient alternative for water heating.

KEYWORDS: Solar energy, Solar water heating, Renewable energy, Thermal efficiency, Solar collector, Sustainability.

Paper Id :18

A Study on Security Requirements of IOT

Mr. Jeetendra Singh Yadav, Dr Tripti Arjariya, Ateek mansoori

Abstract: In technology, Internet technologies have been faster than other technologies. However, the fast pace of the Internet has kept the Internet's full potential and, in the meantime, poses many threats to data security. The growing dimension of the Internet was IOT, which needed to connect devices and systems more than ever. The space that worried about the devices and systems interconnected in the biological system was the security of the Internet of Things. Although IOT plays an important role in society and technology, there are fundamental threats such as security and data protection. Things (in the processing devices of the IOT ecosystem and in the integrated systems) have been able to collect, send and receive data by communicating on the network because they have a unique identifier. This document is a summary document on the security aspects of IOT. He deals with security problems based on security architecture and protocol, RFID technologies, WSN integration and RFID technologies for security problems.

Keywords: security, IOT, RFID, challenge, protocol.

Paper Id: 19

Understanding SHRM Practices and Innovation through Global Capabilities

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ABSTRACT: - Strategic Human Resource Management (SHRM) practices play a critical role in driving organizational innovation and achieving global competitiveness. This paper explores the intersection of SHRM practices and innovation, emphasizing the development and utilization of global capabilities. By examining contemporary SHRM frameworks and their alignment with innovation strategies, the study highlights how organizations can leverage talent management, cross-cultural collaboration, and knowledge sharing to foster a culture of continuous innovation. The paper also discusses emerging trends, challenges, and the implications of digital transformation on SHRM practices. Findings underscore the importance of integrating global perspectives into HR strategies to enhance organizational adaptability and sustain competitive advantage in an increasingly interconnected world.

KEYWORDS: - Strategic Human Resource Management (SHRM), Innovation, Global capabilities.

Paper Id: 20

Advancements in Digital Twin Technology, AI, and ML: Applications in Energy Systems, Digital Forensics, and Cybersecurity

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Abstract: - This review synthesizes advancements in digital twin (DT) technology, artificial intelligence (AI), and artificial intelligence (ML) across three critical domains: energy systems, digital forensics, and cybersecurity. It explores how these technologies are transforming operational efficiency, investigative precision, and threat mitigation. By examining the integration of DTs with AI and ML in smart grids, renewable energy, and electric vehicles, as well as the application of AI/ML in automating digital forensic processes and enhancing cybersecurity defenses, the review highlights key contributions, current challenges, and research gaps. The findings emphasize the urgent need for robust, scalable, and standardized frameworks to fully leverage these technologies while addressing issues like data quality, model interpretability, and cybersecurity vulnerabilities. This paper also outlines future research directions to drive interdisciplinary innovation and improve practical applications.

Keywords: - Artificial Intelligence, Artificial Intelligence, Digital Twin

Paper Id: 21

**AI-Driven Hybrid Neural Network Architecture for Medical Image
Segmentation: A Novel Approach for Early Disease Detection**

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ABSTRACT: - Medical image segmentation is a critical step in the early detection and diagnosis of diseases, providing detailed insights into anatomical structures and pathological regions. This paper presents a novel AI-driven hybrid neural network architecture specifically designed for medical image segmentation. By integrating convolutional neural networks (CNNs) with transformer-based attention mechanisms, the proposed architecture achieves superior accuracy and robustness across diverse medical imaging modalities, including MRI, CT, and ultrasound. The model leverages the strengths of CNNs in capturing spatial features and transformers in modeling global context, resulting in enhanced segmentation performance. Experimental results demonstrate the architecture's ability to detect early-stage diseases with high precision, surpassing traditional methods. The study also discusses its potential applications in clinical workflows and future advancements in AI-powered medical imaging.

Keywords: - Medical image segmentation, AI-driven architecture, Hybrid neural networks, Convolutional neural networks (CNNs).

Paper Id: 22

**Performance and analysis of FACTS controller SVC and STATCOM used
with MLI to improve the power quality for Symmetrical and Asymmetrical
Sources using MATLAB/Simulink.**

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Abstract: - Flexible AC Transmission Systems (FACTS) controllers have been used in power systems since the 1970s with the objective of improving system dynamic performance. Due to the environmental, right-of-way, and cost problems in both bundled and unbundled power systems, many transmission lines have been forced to operate at almost their full capacities worldwide. FACTS controllers enhance the static performance viz. increased loading, congestion management, reduced system loss, economic operation, etc., and dynamic performance viz. increased stability limits, damping of power system oscillation, etc. In this paper, an overview of FACTS controllers is explained. Various FACTS controller several devices in FACTS family are also discussed. The thesis explains various power quality problems and the FACTS controllers that are used to mitigate the power quality problems. Proposed FACTS controller for a particular type of problem is also given. The simulation results give the clear observation of how the FACTS devices improve the power quality. The simulation work is done on Static Var Compensator (SVC) and STATCOM

Keywords: FACTS, Matlab/Simulink, Real and reactive power, SVC and STATCOM.

Paper Id: 23

A Survey on Intrusion Detection in Wireless Sensor Network

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Abstract: Wireless Sensor Networks (WSNs) are composed of an array of vehicles and sensors strategically deployed across a designated acoustic region. These networks are designed to perform collaborative tasks, such as monitoring environmental conditions and collecting data. WSNs function through the interactive communication between various nodes and ground stations, allowing for real-time data transmission and analysis. This paper offers a comprehensive overview of the communication challenges inherent in WSNs, highlighting issues such as signal interference, energy consumption, and data latency. Additionally, the paper summarizes the contributions of other researchers who have made significant efforts to optimize WSN protocols, hardware design, and overall network efficiency. The paper also provides an in-depth discussion on the different types of WSN architectures and explores various techniques for detecting intruder nodes within these networks. In conclusion, the paper presents a detailed list of evaluation parameters that can be used to compare the effectiveness of different techniques and solutions proposed in the field.

KEYWORDS: - Energy Optimization, Clustering, WSN, Routing, Channel Optimization.

Paper Id: 24

Optimization of Solar Drying Parameters for Turmeric and Papaya Leaves: Effects on Nutritional and Bioactive Compound Retention

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Abstract: This study focuses on the optimization of solar drying parameters for turmeric and papaya leaves, based on their impact on retention of nutritional and bioactive compounds. Solar drying is one of the most important postharvest processes, as it decreases the moisture content in plant materials, thereby increasing shelf life and preserving quality. This study considers traditional methods such as open sun drying (OSD) and advanced solar drying techniques, including Hybrid Indirect Passive (HIP) and other innovative dryers. It stresses the role of drying conditions in retaining bioactive compounds like curcumin and flavonoids, which are very important for food and pharmaceutical applications. The study compares solar drying with conventional methods, emphasizing energy efficiency, environmental impact, and preservation of nutritional properties. This study aims to recommend sustainable and efficient drying technologies that can be applied in industrial practices.

Keywords: Solar drying, turmeric, papaya leaves, bioactive compounds, nutritional retention, drying optimization.

Paper Id: 25

**Effect of electrical and non-electrical process parameters on machining of
semiconductor materials using wire edm**

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Abstract: - Wire Electrical Discharge Machining (Wire EDM) has emerged as a precise and effective technique for machining semiconductor materials, which are critical in advanced electronic and photonic applications. This study investigates the effect of both electrical and non-electrical process parameters on the performance of Wire EDM when machining semiconductor materials such as silicon, gallium arsenide, and silicon carbide. Key electrical parameters, including pulse duration, discharge current, and voltage, are analyzed for their impact on material removal rate (MRR), surface roughness, and dimensional accuracy. Additionally, non-electrical parameters such as wire tension, feed rate, and dielectric fluid characteristics are examined to optimize the machining process. Experimental results reveal the interplay between these parameters and their influence on machining efficiency, thermal damage, and surface integrity. The findings provide insights for improving the precision and reliability of semiconductor material machining using Wire EDM, making it suitable for high-precision applications in electronics and microfabrication.

Keywords: - Wire Electrical Discharge Machining (Wire EDM), Semiconductor materials, Electrical process parameters, non-electrical process parameters.

Paper Id: 26

Advanced Modeling Approaches for Assessing Human Health Impacts of Environmental Changes

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Abstract: - Understanding the human health impacts of environmental changes is crucial for developing effective mitigation strategies and public health policies. This paper explores advanced modeling approaches used to assess these impacts, with a focus on the integration of environmental, epidemiological, and socio-economic data. Techniques such as machine learning, dynamic systems modeling, and Geographic Information Systems (GIS) are highlighted for their ability to analyze complex interactions between environmental factors—such as air pollution, climate change, and water quality—and health outcomes, including respiratory diseases, vector-borne illnesses, and mental health disorders. The study emphasizes the importance of spatial-temporal analysis, predictive modeling, and uncertainty quantification in addressing the challenges posed by environmental changes. Case studies and applications are presented to demonstrate the utility of these models in guiding evidence-based decision-making for sustainable health interventions.

Keywords: - Human health impacts, Environmental changes, Advanced modeling approaches, Machine learning, Dynamic systems modelling, Geographic Information Systems (GIS).

Paper Id: 27

Automated Suspicious Activity Detection in Video Surveillance

Using Deep Learning: A Review

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Abstract: In the current era of advanced security systems, video surveillance plays an essential role in ensuring safety by detecting suspicious activities. With the increase in real-time data, manual monitoring has become impractical, paving the way for automated surveillance systems utilizing machine learning (ML) and artificial intelligence (AI) technologies. This paper explores the integration of ML and AI models, specifically convolutional neural networks (CNNs) and long short-term memory (LSTM) networks, for suspicious human activity detection in video streams. The proposed system involves video data collection, preprocessing, feature extraction, and model training to identify abnormal behavior. We review existing literature on human activity detection, discussing several models and techniques for video anomaly detection and object tracking. The study demonstrates how these intelligent systems can be applied in various environments, providing real-time insights and proactive security measures. The paper also highlights the challenges related to deep learning, such as overfitting, computational requirements, and the need for extensive labeled data for effective model training.

Keywords: Suspicious Activity Detection, Video Surveillance, Machine Learning, Convolutional Neural Networks (CNN), Long Short-Term Memory (LSTM) Networks

Paper Id: 28

IMPLEMENTING MACHINE LEARNING IN DATA CLASSIFICATION

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Abstract: - Data classification is a crucial component of artificial intelligence (AI) and soft computing, playing an essential role in converting raw data into meaningful insights for a wide range of applications, including fraud detection, medical diagnostics, and natural language processing. This paper explores the challenges and advancements in data classification, addressing issues such as scalability, handling noise, and optimizing feature selection. It reviews traditional classification methods, including decision trees, support vector machines (SVMs), and ensemble learning algorithms, and contrasts them with modern deep learning architectures like convolutional neural networks (CNNs) and recurrent neural networks (RNNs). Additionally, it examines how soft computing approaches, such as fuzzy logic and genetic algorithms, contribute to improving performance in scenarios involving noisy, incomplete, or high-dimensional data. The paper outlines the integration of AI and soft computing, leveraging hybrid models that combine neural network learning with fuzzy systems to provide more accurate and interpretable classifications. The methodology section highlights the use of popular frameworks such as TensorFlow, PyTorch, and MATLAB for model development, along with hyperparameter tuning strategies like grid search, random search, and Bayesian optimization. Evaluation metrics, including accuracy, precision, recall, F1 score, and

AUC-ROC, are applied across different use cases—specifically, facial recognition, medical imaging, and financial fraud detection—to demonstrate the impact of proposed techniques. The findings reveal that hybrid approaches not only outperform traditional models in noisy and complex datasets but also offer enhanced scalability, adaptability, and interpretability. Results from case studies illustrate improvements in classification accuracy and robustness.

Keywords: TensorFlow, F1 score, SVM, CNN, RNN

Paper Id: 29

**Advancements in Digital Twin Technology, AI, and ML Applications in Energy Systems,
Digital Forensics, and Cybersecurity**

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Abstract : This review synthesizes advancements in digital twin (DT) technology, artificial intelligence (AI), and machine learning (ML) across three critical domains: energy systems, digital forensics, and cybersecurity. It explores how these technologies are transforming operational efficiency, investigative precision, and threat mitigation. By examining the integration of DTs with AI and ML in smart grids, renewable energy, and electric vehicles, as well as the application of AI/ML in automating digital forensic processes and enhancing cybersecurity defenses, the review highlights key contributions, current challenges, and research gaps. The findings emphasize the urgent need for robust, scalable, and standardized frameworks to fully leverage these technologies while addressing issues like data quality, model interpretability, and cybersecurity vulnerabilities. This paper also outlines future research directions to drive interdisciplinary innovation and improve practical applications.

Keywords: artificial intelligence (AI), and machine learning (ML), renewable energy

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Paper Id: 30

PREDICTION OF PERINEAL TRAUMA DURING CHILDBIRTH BY ASSESSMENT OF STRIAE GRAVIDARUM SCORE

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Abstract: - Perineal trauma during childbirth is a significant concern due to its implications for maternal health and postpartum recovery. This study investigates the potential of using the Striae Gravidarum Score (SGS) as a predictive tool for assessing the risk of perineal trauma during delivery. The research evaluates the correlation between SGS, a widely used measure of skin elasticity and stretching during pregnancy, and the likelihood of perineal tears or episiotomy requirements. Data from expectant mothers were analyzed to determine the effectiveness of SGS in predicting different degrees of perineal trauma. The results demonstrate a statistically significant relationship between higher SGS values and increased risk of trauma, providing a non-invasive and accessible method for early risk assessment. This study highlights the value of SGS in personalized delivery planning, promoting better outcomes for both mothers and newborns.

Keywords: - Perineal trauma, Childbirth, Striae Gravidarum Score (SGS), Risk assessment, Maternal health, Skin elasticity, Perineal tears.

Paper Id: 31

Fuzzy Logic for Personalized Healthcare Decision Support Systems

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Abstract: Healthcare systems often face challenges in providing personalized treatment recommendations due to the variability and uncertainty in patient data. This paper proposes a fuzzy logic-based decision support system to address these challenges by incorporating expert-defined rules and fuzzy inference mechanisms. The model is designed to assist healthcare professionals in personalized treatment planning, ensuring adaptability to diverse patient profiles. Through simulations and case studies, we demonstrate the system's effectiveness in handling ambiguous medical data, improving decision-making accuracy, and enhancing patient outcomes. Prospects include integration with AI for hybrid models in clinical environments.

Keywords - Fuzzy Logic, Personalized Healthcare, Decision Support Systems (DSS), Uncertainty Management, Clinical Decision-Making.

Paper Id: 32

Improvement in Output Power by Designing Adaptive Reference Control for Boost Converter in Solar System

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Abstract-: Maximum power point tracking (MPPT) techniques are used in photovoltaic (PV) systems to maximize the PV array output power by tracking continuously the maximum power point (MPP) which depends on panel's temperature and on irradiance conditions. In this work we have made a comparison between P & O algorithm with proposed adaptive reference algorithm. It has been concluded that The power output with adaptive reference algorithm at the load terminal is coming to be 6.5 kilo Watts approximately where as with P & O it is calculated to be 1.5 kilo watts approximately. Hence it is a better proposed algorithm as compared to traditional P & O technique

Keywords-: photovoltaic, MPPT, maximum power point, P & O technique.

Paper Id: 33

Fault Detection in Solar PV Systems Integrated with the Power Grid: Evaluating Logistic Regression through Confusion Matrix Analysis

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Abstract - In this study, an approach for grid-integrated solar photovoltaic, or PV, system failure detection is presented. It classifies and identifies seven different problem types using logistic regression analysis and real-time sensor data. For various problem kinds and operational modes, the suggested model obtains excellent rate of accuracy in finding faults, with performance in the range of 93% to 96.5%. The study emphasizes the importance of particular independent factors and offers a confusion matrix to show the similarities and discrepancies between actual and projected fault states visually.

Keywords:- solar photovoltaic, PV, logistic regression analysis, real-time sensor data.

Paper Id: 34

Enhancing Production Line Efficiency: Simulating and Optimizing Single and Parallel Line Processes

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Abstract - This study focuses on the simulation-based optimization of both serial and parallel line operations. Complex linkages and dependencies are frequently missed by traditional methods for improving manufacturing line efficiency. A thorough and organized method is provided by simulation-based optimization utilising Siemens Tecnomatix and Plants Simulation software. Data on plant layout, material flow, and production procedures are gathered and analysed in the research. In order to understand manufacturing variations and their effects, simulation models take into account internal as well as external supply networks, production assets, and business processes. Statistical analysis, graphical displays, and performance and parameter evaluation are all made possible by the analytical tools. The results emphasize the value of simulation-based optimization in raising the effectiveness of manufacturing lines.

Keywords - single line process, parallel line process, simulation, production lines, efficiency, Siemens Tecnomatix, Plant Simulation.

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Paper Id: 35

Reviewing the Latest Developments in Wearable Electronics: Sensors, Energy Management, and Health Monitoring

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Abstract-: The realms of medical treatment, fitness tracking, and personalised monitoring have all been revolutionised by substantial recent breakthroughs in wearable electronics. With an emphasis upon sensors, energy management, and health monitoring, this abstract offers a summary of the most recent advancements in wearable electronics. The review includes studies from a variety of research fields, such as the health of plants tracking, remote health monitoring for diabetic patients, soft and wearable electronic devices for health monitoring in various environments, wearable sensors to distant wellness monitoring in the context of COVID-19, and wearable and biodegradable detectors for human wellness monitoring. These studies focus on new developments and trends in wearable sensor technologies, Internet of Things (IoT) integration, harvesting energy strategies, and future uses of wearable electronics in illness monitoring, fitness tracking, and early diagnosis. The results highlight the value of wearable electronics for ongoing, real-time monitoring of health, enabling personalised healthcare

management, and enhancing general wellbeing. As wearable technology develops, it has enormous opportunity to improve healthcare systems and provide people the tools they need to actively control their own health.

Keywords-: Emphasis upon Sensors, Health Monitoring, COVID-19, Energy Management.

Paper Id: 36

Emerging Trends in 5G and Beyond-5G Wireless Networks

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Abstract-: This review paper explores the rapid advancement of wireless communication technologies, focusing on the emergence of 5G networks and the ongoing development of beyond-5G wireless networks. The main goals of 5G networks are outlined, including a 1000-fold increase in capacity, 10 Giga Bits per second to a single user, increased quality-of-service, higher spectrum efficiency, ultra-reliable connectivity, and extended battery life. The importance of less expensive and massive machine-type communication in the 5G era is also emphasized. Through a literature review, emerging trends and technologies in wireless communication, particularly the evolution of 5G networks, are highlighted. This comprehensive review paper serves as a valuable resource for understanding the current state and future prospects of 5G and beyond-5G wireless networks.

Keywords-: 5G networks, wireless networks, light.

Paper Id: 37

A Next Gen Encryption and Decryption Analysis based on Golay Codes

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Abstract— secure data transfer is a top priority in today's digital communication environment. Numerous applications of the principles of arithmetic and computing are explored via data coding and decoding. Both in the domains of digital communication and cryptography and cryptanalysis. for enhancing the codes' security via the use of the Galious field (G.F. Algebra and number theory researchers are actively studying computation over finite fields, often known as Galois fields, which have several uses in combinatorial design, error control coding, and cryptography. The literature review of golay code in digital communication is presented in this survey article. This study effort presents a comprehensive overview of Golay code. The error-correcting phenomenon is addressed by a Golay code. Field programmable gate arrays (FPGAs) employ this. Different scholars describe their methods for fixing the error check. This study examines that work.

Keywords— Architecture, decoder, encoder, field programmable gate array (FPGA), Golay code etc.

Paper Id: 38

FPGA Improved I2C Protocol for Multiple Slave Device Using VHDL

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Abstract— RTC, EEPROM, and an OV7620 image sensor are the slave devices that interact with the FPGA in this case (functioning as the I2C master device). Using the VHDL language, the process proceeds from system definition to functional design. The thesis presents the findings of simulated waveforms used for design verification. Additionally, hardware verification is carried out, and useful outcomes are shown. The development of an efficient architecture for many device interfaces on a single I2C bus is completed, and the outcomes are contrasted with previous reference work in the field.

Keywords—I2C protocol, communication, transmit 8-bit, Inter Integrated Circuit, EEPROM, SCL and SDA etc.

Paper Id: 39

Breakthroughs in Solar and Wind Energy Technologies

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ABSTRACT: - The increasing urgency to combat climate change and transition toward sustainable energy systems has positioned solar and wind energy as cornerstone technologies in the global energy landscape. This paper, titled “*Breakthroughs in Solar and Wind Energy Technologies*,” explores recent innovations and trends that have significantly enhanced the efficiency, reliability, and affordability of these renewable energy sources.

Key advancements discussed include breakthroughs in photovoltaic technologies, such as perovskite solar cells and bifacial modules, as well as innovations in wind turbine design, including taller towers and advanced blade engineering. The paper also examines the role of energy storage solutions.

KEYWORDS: - wind turbine design, taller towers, advanced blade engineering.

Paper Id: 40

**Leveraging Management Frameworks and Academia-Industry
Collaboration for Enhanced Efficiency and Productivity in Startups**

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Abstract:- Startups play a vital role in driving innovation and economic growth, yet they often face challenges in achieving operational efficiency and productivity. This research focuses on leveraging management frameworks across the two critical phases of a startup's lifecycle: the pre-opening phase and the post-opening phase.

In the pre-opening phase, strategic planning and market analysis are emphasized, with Michael Porter's Five Forces model and SWOT analysis providing tools to evaluate industry dynamics, competitive positioning, and potential challenges. Academia-industry collaboration further enriches this phase by offering startups access to cutting-edge research and expertise, enabling them to make informed decisions and establish a strong foundation for growth.

In the post-opening phase, operational alignment and scalability take center stage. Management frameworks such as the McKinsey 7S model, Issue Trees, and the Business Model Canvas are explored for their role in improving efficiency and driving continuous improvement. These frameworks help startups align internal structures, address operational bottlenecks, and refine their business models for sustainable growth.

This study underscores the importance of combining structured management frameworks with academic insights to address the unique challenges faced by startups. By focusing on both the strategic and operational dimensions of startup management, this research provides a roadmap for entrepreneurs to enhance efficiency and productivity, ensuring long-term success.

Keywords: Startups, Management Frameworks, McKinsey 7S, Issue Trees, Business Model Canvas, Michael Porter's Five Forces, SWOT Analysis, Academia-Industry Collaboration, Strategic Planning, Operational Efficiency, Productivity, Scalability.

Paper Id: 41

Radiopharmaceuticals use as a nuclear medicine for a Treatment of Disease

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ABSTRACT: Radiopharmaceuticals are radioactive compounds which have a bound radionuclide in their structure, whose purpose is directing the radionuclide to allocation to be treated or to obtain images. Nuclear medicine is the medical specialty that employs radiopharmaceuticals, which has presented itself as a tremendously useful ally for medicine assisting in various diagnoses and treatments, especially for cancer. The general objective of this work is to identify the main radionuclides and metal complexes currently used as radiopharmaceuticals. The main metal complexes used as radiopharmaceuticals are compounds of technetium (^{99m}Tc) like sodium pertechnetate and methylenediphosphonate MDP- ^{99m}Tc and other compounds of indium(^{111}In), thallium (^{201}Tl), gallium(^{67}Ga , ^{68}Ga), iodine (^{123}I and ^{131}I), chromium (^{51}Cr), sulphur (^{35}S), phosphorus (^{32}P), fluorine (as fluorodeoxyglucose, ^{18}F -FDG and sodium fluorine, Na^{18}F), which are widely used in the nuclear medicine for diagnosis by imaging. They have been of great importance for the early diagnosis of numerous diseases, mainly cancer. Currently, technetium compounds are the majority of radiopharmaceuticals used in all countries. In Brazil, Institute of Energy and Nuclear Research (IPEN) is one of the most important distributors of radiopharmaceuticals, producing, importing and distributing them to clinics and hospitals over the country.

Key Word: - Nuclear Research, diagnosis.

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Paper Id: 42

Data Mining for E-Commerce and Social Media: Insights and Future Research Directions

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Abstract: The rapid growth of e-commerce and social media has ushered in a new era of data-rich environments where vast volumes of user interactions, preferences, and transactions are generated daily. Data mining has emerged as a pivotal approach to harness these datasets, enabling businesses to derive actionable insights and drive decision-making. In e-commerce, data mining facilitates personalized recommendations, customer segmentation, fraud detection, and dynamic pricing, enhancing operational efficiency and user satisfaction. Similarly, in social media, it powers sentiment analysis, influencer identification, trend prediction, and content recommendation, revolutionizing marketing strategies and engagement optimization.

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However, the implementation of data mining is not without challenges. Issues such as data privacy, quality, scalability, and ethical concerns require a balanced approach to maximize the benefits while mitigating risks. The study explores the techniques, tools, and applications of data mining in e-commerce and social media and identifies the future directions to address existing limitations, offering a comprehensive perspective on its transformative potential.

Keywords: Data mining, e-commerce, social media, machine learning, personalization, sentiment analysis.

Paper Id: 43

A Review of Machine Learning Applications in Web Data Mining

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Abstract: - Web data mining has become an essential tool for extracting meaningful patterns and insights from the vast amount of data generated on the internet. Machine learning (ML) techniques have significantly enhanced the efficiency and accuracy of web data mining by enabling automated analysis, pattern recognition, and predictive modeling. This review provides a comprehensive overview of machine learning applications in web data mining, focusing on key domains such as web content mining, web structure mining, and web usage mining. It highlights the role of ML algorithms, including supervised, unsupervised, and reinforcement learning, in solving complex challenges like sentiment analysis, user behavior prediction, and anomaly detection. Additionally, the paper discusses emerging trends such as

deep learning, natural language processing (NLP), and graph-based techniques in the context of web mining. Challenges related to data quality, scalability, and privacy are also addressed, along with potential future research directions.

Keywords: - Machine learning, Web data mining, Web content mining, Web structure mining, Web usage mining, Sentiment analysis.

Paper Id: 44

**Vocational Education in Higher Secondary Schools: A Review of Factors
Influencing Student Interest and Attitudes**

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Abstract: The study examines the critical factors influencing student interest and attitudes toward vocational education in higher secondary schools, highlighting its evolving role in modern education systems. Vocational education, which emphasizes hands-on training and real-world applications, is instrumental in bridging the gap between academic learning and the labour market. Despite its potential to foster employability, inclusivity, and economic development, vocational education faces significant challenges, including societal stigmas, inadequate resources, and misaligned curricula. The study also explores strategies to enhance student engagement, such as integrating modern technology, aligning programs with student aspirations and industry needs, and fostering inclusive learning environments. The study underscores the importance of government policies and industry collaboration in transforming vocational education into a viable, respected, and impactful educational pathway.

Keywords: Vocational education, student engagement, government policies, skill development, labour market alignment, educational inclusivity.

Paper Id: 45

Grid Connected Renewable Energy System

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Abstract: The demand for electricity increases day by day, which cannot be achieved at a satisfying level without non-renewable energy sources. Renewable energy sources such as wind and sun are universal and ecological. These renewable energy sources are the best options for meeting global energy needs but are not foreseeable due to natural conditions. The use of the hybrid solar and wind system for renewable energies is the best option for using these available resources. The purpose of this article is to examine the different aspects of the solar and wind hybrid system. This article also discusses the application and various theories related to hybrid development.

Keywords: Solar energy, Hybrid system, Wind energy, Grid system, fossil fuels.

Paper Id: 46

A Review on Energy Storage System Enhancing the Stability of Micro grids

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Abstract - A micro grid is a self-sufficient energy system that supplies a specific geographic footprint, such as a college campus, medical facility complex, business center, or neighborhood. A variety of distributed energy sources, such as solar panels, wind turbines, combined heat and power plants, and generators, can be found in micro grids. A lot of the more recent micro grids also have energy storage, usually in the form of batteries. In order to improve the quality of the power, this paper describes the classification of micro grids and the function of energy storage systems in them. We also covered how stability problems in micro grids can be categorized.

Keywords – micro grid, energy storage system, stability issues.

Paper Id: 47

Optimizing Power Output in Solar Chimney Power Plants: Influence of Collector Area and Chimney Height

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Abstract: This research paper investigates the crucial factors that determine the power output of solar chimney power plants, specifically the collector area and chimney height. A larger collector area efficiently collects and heats a larger volume of air, while a taller chimney height increases pressure differences through the stack effect, leading to enhanced power generation. The study explores the significance of heat retention within the collector area, enabling continuous operation, even 24 hours a day. Additionally, the research explores the role of thermal capacity and inertia enhancement through water, bags, tubes, or brine thermal sinks within the collector. It also considers the impact of wetness and condensation within the chimney on energy flux. The installation of turbines, particularly those with horizontal axes, and their positioning in a ring around the tower base are investigated. The paper also discusses

the potential applications of solar chimneys in architectural settings, such as natural ventilation and passive cooling, to reduce energy consumption and greenhouse gas emissions.

Keywords: Solar chimney power plants, power output optimization, collector area, chimney height, heat retention, thermal capacity, condensation, turbines.

Paper Id: 48

**Improvement in Output Power by Designing Adaptive Reference Control
for Boost Converter in Solar System**

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Vidyapeeth institute of science and technology

Abstract-: Maximum power point tracking (MPPT) techniques are used in photovoltaic (PV) systems to maximize the PV array output power by tracking continuously the maximum power point (MPP) which depends on panel's temperature and on irradiance conditions. In this work we have made a comparison between P & O algorithms with proposed adaptive reference algorithms. It has been concluded that the power output with adaptive reference algorithm at the load terminal is coming to be 6.5 kilo Watts approximately whereas with P & O it is calculated to be 1.5 kilo watts approximately. Hence it is a better proposed algorithm as compared to traditional P & O technique

Keywords-: photovoltaic, MPPT, maximum power point, P & O technique.

Paper Id: 49

**Fault Detection in Solar PV Systems Integrated with the Power Grid:
Evaluating Logistic Regression through Confusion Matrix Analysis**

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Abstract - In this study, an approach for grid-integrated solar photovoltaic, or PV, system failure detection is presented. It classifies and identifies seven different problem types using logistic regression analysis and real-time sensor data. For various problem kinds and operational modes, the suggested model obtains excellent rate of accuracy in finding faults, with performance in the range of 93% to 96.5%. The study emphasizes the importance of particular independent factors and offers a confusion matrix to show the similarities and discrepancies between actual and projected fault states visually.

Keywords-: solar photovoltaic, PV, logistic regression analysis, real-time sensor data.

Paper Id: 50

Applications of Trans-Conductance Amplifier in CMOS Technology

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Abstract: An output voltage proportionate to an input current is produced by the operational trans conductance amplifier. It is identical to the fundamental operation of the solid-state devices utilized in its realization in this way. The OTA has uses in sensors, bio-medical signal amplification, compact devices, filters, and analogue to digital converters. Both first-order active filters and second-order active filters can use the operational trans conductance amplifier (OTA) in place of a traditional op-amp.

Keywords: OTA, Filters, VOA, CMOS Technology.

Paper Id: 51

**Analysis of Temperature in Copper and Aluminum Material Dome
Receiver for Dish Collector using CFD**

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Abstract: - Solar thermal energy is one form of energy and different technologies are available for harnessing solar energy to generate thermal energy for different applications. The thermal energy generation using concentrated solar power with the parabolic dish type collector is one of the important areas of focus among researchers, since higher temperature can be attained through dish collector by increasing the concentration ratio as compared to other solar collectors.

In a dish type collector, the receiver is a crucial component that absorbs highly concentrated solar energy reflected from the dish reflector and transfers it to the working fluid within the

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receiver. In the present study the effect of aluminum and copper material is numerically tested and compared for a dome type receiver using CFD.

Key words: - CFD, dish collector, dome receiver, receiver material, solar thermal, thermal efficiency.

Paper Id: 52

Development of a Solar Dryer for Mushroom Preservation in Rainy Season

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Abstract: - Drying by solar energy is a rather economical procedure for agricultural products, especially for medium to small amounts of products. It is still used from domestic up to small commercial size drying of crops, agricultural products and foodstuff, such as fruits, vegetables, aromatic herbs, wood, etc., contributing thus significantly to the economy of small agricultural communities and farms. The present work provides solutions to M/S Kamesh Mushroom world, Jabalpur, a mushroom producing unit having monthly production of 100000 KG. in rainy season since sale is not good and production is high, mushroom being a perishable product they were facing problem of storage. For this problem a mushroom dryer is developed, able to operate in rainy and cold season, exhaust fans operate able with PV panel, equipped

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with evacuated-tube collector. The outcomes are then experimentally tested for weight loss V/S total weight- time- temperature- moisture etc

Keywords: Drying mushroom, dryer efficiency, moisture content, solar energy, thermal analysis.

Paper Id: 53

**Mathematical Modeling and Analysis of Plasma Combustion System with
Various Operational Parameters and Mesh refinement Using Fluent**

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M.tech Scholar Mechanical Engg. Dept. VIST, Bhopal

PANKAJ KUMAR²

Asst. Professor Mechanical Engg. Dept. VIST, Bhopal

ABSTRACT: - At the present time there is an increased interest to the study of heat-and-mass transfer in high temperature environments in the presence of burning. These processes occur in strong turbulent and non-isothermal flows, multiphase fluids, in the conditions of significant impact of nonlinear effects of thermal radiation, interfacial interactions and multistage chemical reactions. To solve the problems of modern power engineering and ecology it is especially important to study the processes of heat-and-mass transfer in the high-temperature reacting media and to simulate physical and chemical processes that occur during the combustion of pulverized coal. These problems are related, on the one hand, to the concept of

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“energy safety” of the country and, on the other hand, to the development of processes of “clean” fuel combustion under strict standards of emission of harmful substances into the environment.

In the present study various parameters like mass flow rate, wall enhancement and mesh refinement of plasma combustion system were investigated by CFD Simulation. Simulation results show that the wall temperature is more effective compared to other parameters. Temperature and pressure is getting a higher range when we increase the wall temperature and emissions is decreased due to high combustion rate. When we update the whole Plasma combustion system from coarse to fine Mesh slight change is shown on the simulation results which means mesh refinement is also effective for Numerical investigation of any computational fluid Dynamics system.

Key words: Repowering, Thermal power plant, Energy, Plasma combustion Plasma CFD, Fluent etc.

Paper Id: 54

Optimizing Power Output in Solar Chimney Power Plants: Influence of Collector Area and Chimney Height

Dr. Arvind Gwatiya¹, Dr. Amit Sharma², Rahul Rajput³, Arunesh Mishra⁴

Abstract: This research paper investigates the crucial factors that determine the power output of solar chimney power plants, specifically the collector area and chimney height. A larger collector area efficiently collects and heats a larger volume of air, while a taller chimney height increases pressure differences through the stack effect, leading to enhanced power generation. The study explores the significance of heat retention within the collector area, enabling continuous operation, even 24 hours a day. Additionally, the research explores the role of thermal capacity and inertia enhancement through water, bags, tubes, or brine thermal sinks within the collector. It also considers the impact of wetness and condensation within the chimney on energy flux. The installation of turbines, particularly those with horizontal axes, and their positioning in a ring around the tower base are investigated. The paper also discusses the potential applications of solar chimneys in architectural settings, such as natural ventilation and passive cooling, to reduce energy consumption and greenhouse gas emissions.

Keywords: Solar chimney power plants, power output optimization, collector area, chimney height, heat retention, thermal capacity, condensation, turbines.

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Paper Id: 55

**Modeling and Simulation of a Grid-Connected Solar-Wind Hybrid Renewable Energy
System with Controlled Inverter**

Brijesh Kumar Pandey¹, Dr. Abhimanyu Kumar², Rohit Gedam³, Ambrish Pati Tripathi⁴

Abstract-: Solar and wind energy offer eco-friendly and renewable options to conventional energy sources, holding great promise for the future. This research delves into the modeling and simulation of a grid-connected solar-wind hybrid renewable energy system employing a controlled inverter. The study examines the individual photovoltaic (PV) and wind energy conversion systems and investigates their seamless integration to create a powerful hybrid generation system. The implementation of Maximum Power Point Tracking (MPPT) algorithms is explored to optimize energy utilization. Through comprehensive simulations, the paper validates the feasibility, stability, and reliability of the proposed hybrid system, underlining its potential as a sustainable and efficient energy solution.

Keyword-: Solar energy, Wind energy, Hybrid renewable energy, Grid-connected system, Controlled inverter, Simulation, Sustainability.

Paper Id: 56

**Integration of Wind and Solar Energy with Fuzzy Logic Control MPPT for Grid-
Connected Hybrid Renewable Power Generation**

Dr. Abhimanyu Kumar¹, Ambrish Pati Tripathi², Brijesh Kumar Pandey³, Rohit Gedam⁴

Abstract-: The utilization of renewable energy sources, such as wind and solar energy, has gained significant attention due to their eco-friendly nature and sustainability. This research paper explores the mechanisms behind wind generation and its integration with solar power, focusing on the adoption of Fuzzy Logic Control (FLC) for Maximum Power Point Tracking (MPPT) in a grid-connected hybrid renewable energy system. The paper outlines the principles of wind and solar energy conversion, the working of wind turbines, and the role of FLC in improving MPPT efficiency. Furthermore, the study presents the objectives of developing and simulating a hybrid power system that connects to the grid through an inverter capable of stabilizing the DC bus voltage during variable energy conditions. The application of fuzzy controllers for improved power quality and performance is investigated. The simulation and result analysis highlight the advantages of FLC-based MPPT in enhancing the efficiency and power output of the integrated wind-solar system. This research aims to contribute to the

advancement of knowledge in renewable energy utilization and the implementation of intelligent control techniques for efficient power generation.

Keyword-: Wind Energy, Solar Energy, Maximum Power Point Tracking, Fuzzy Logic Control, Grid-Connected Hybrid Renewable System, Simulation, Power Quality.

Paper Id: 57

A Review on Different Types of Solar Collectors

Rahul Rajput¹, Arunesh Mishra², Dr. Arvind Gwatiya³, Dr. Amit Sharma⁴

Abstract - A solar collector is a device that absorbs solar radiation and transforms it into heat or electricity to collect energy from the sun. To increase the absorption of solar energy, a solar collector's material and coating are utilized. There are two types of solar collectors: non-concentrating and concentrating. Solar collectors come in a wide variety of forms, but they are all built on the same fundamental principles. Generally speaking, there is a substance that is used to gather and concentrate solar energy and use it to heat water. This essay examines the solar collector and several collector types.

Keywords – Solar Collectors, Flat-plate, parabolic trough, parabolic dish,

Paper Id: 58

Heat Sink: An Overview and Recent Advances

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Abstract:

Heat sinks are integral components in thermal management systems, designed to dissipate heat generated by electronic and mechanical devices. This paper provides an overview of the principles, design, and applications of heat sinks. Furthermore, it highlights recent advances in heat sink technology, including novel materials, manufacturing techniques, and design innovations that address the growing demand for efficient thermal management in various industries. A comparison between pin-fin and straight-fin heat sinks of similar dimensions is also included to elucidate performance differences.

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Keywords: electronic and mechanical devices, heat sinks.

Paper Id: 59

**Development of Hybrid Solar Thermal System with Dish Concentrators and
Fresnel Lens for Hot Water Generation**

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Abstract: - Solar water heating is the only solar energy-based technique that's been widely commercialized because of its great reliability and low cost compared to other methods. The components of a solar water heating system usually include solar collectors, a water storage tank, pipes, and an auxiliary heating device, among other components. A solar heating system's core component, the collector or receiver, converts solar energy into heat and then transmits that heat to a fluid passing through it. In previous project a 4 foot diameter parabolic solar collector for experimental testing in order to create a commercial water heating system for residential usage is designed and fabricated. After three sets of studies, we've discovered an average temperature increase of 35 degrees centigrade above ambient while the receiver is focused open to the air and the incoming water flow rate is 600 ML per Minute. Second, at a mass flow rate of 600 ML per Minute with a receiver at focus covered with a black box, we found an average temperature of 45 degrees centigrade higher than ambient. Third, in a pump-provided system for 20L water, we noticed an average 46-degree centigrade rise in temperature over the course of an hour when the receiver was covered with a black box. The average temperature found at the receiver part was around 150 degree centigrade but we have not received this amount of thermal energy in useful cause as indicated in the results above. In current project a Fresnel lens of 12*8 inches is fixed at optimum height near focus of the dish and the radiations are intensified with it. Thermal energy generated is further received on same receiver and found increment in it.

Key words: - concentrated solar energy, dish collector, Fresnel lens, receiver material, solar thermal, thermal efficiency.

Paper Id: 60

Mathematical modeling and Investigation of Mixing characteristics in combustion system of Jet Engine using CFD

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ABSTRACT: - Among the three critical components of the scramjet engine, the combustor presents the most formidable problems. The complex phenomenon of supersonic combustion involves turbulent mixing, shock interaction and heat release in supersonic flow. The flow field within the combustor of scramjet engine is very complex and poses a considerable challenge in design and development of a supersonic combustor with an optimized geometry. Such combustors shall promote sufficient mixing of the fuel and air so that the desired chemical reaction and thus heat release can occur within the residence time of the fuel-air mixture. In order to accomplish this task, it requires a clear understanding of fuel injection processes and thorough knowledge of the processes governing supersonic mixing and combustion as well as the factors, which affects the losses within the combustor.

Development of scramjet engines of satisfactory performance requires enhancement of the fuel-air mixing and flame stabilization. The effect of geometrical shape of fuel injector on fuel-air mixing and flame stabilization is investigated numerically in the current study. A numerical tool is developed using the Reynolds Average Navier-Stokes equations. Chemical kinetics model is employed to compute the finite rates of the chemical reactions. The topics covered include the fundamental problem of supersonic mixing layers, high-speed combustion modeling efforts, and actual calculations of realistic scramjet combustors. In present investigation we compare the two different type of fuel injector on the basis of combustion rate, shock wave structure and stability of flow field. Simulative results show that in Pylon injector total temperature and energy is increased due to rapid mixing of air-fuel as compared to the central wedge shape injector. Shock wave absorbing capacity and stability of flow field is balanced in case of Pylon Injector as per stream line flow.

Keywords: Scramjet Engines; Computational Fluid Dynamics; Chemically- Reacting Flows; Reynolds-Averaged Navier-Stokes; Turbulent Flows; Supersonic Combustion, Central strut injector, Pylon Injector.

Paper Id: 61

Comparative Analysis of Sustainable Materials in Road Construction: A Review

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**Annual International Conference on Recent Advances in Engineering Technology,
Healthcare & Management (AIC-RAETHM 2025)**

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Abstract: - The rapid development of infrastructure necessitates sustainable solutions in road construction. This paper reviews recent advancements in utilizing industrial and natural waste materials for road construction, focusing on four innovative approaches: recycled aggregates from construction and demolition (C&D) waste, feldspar powder from lithium extraction, dam sediments with eucalyptus ash, and calcium carbide residue (CCR) with dredged sludge. The comparative analysis highlights mechanical performance, environmental impacts, cost efficiency, and challenges associated with these materials. The findings reveal that adopting these alternatives significantly reduces environmental footprints, offers cost savings, and promotes circular economy principles.

Keywords: - construction and demolition, calcium carbide residue, cost savings, reduces environmental footprints.

Paper Id: 62

**Comparative Review of Innovations in Self-Compacting Concrete (SCC)
Technologies**

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Abstract: - This review paper examines three recent studies focused on enhancing self-compacting concrete (SCC) through innovative approaches, including high-volume fly ash and calcined calcium carbonate replacement, incorporation of aluminium oxide (Al_2O_3) nanoparticles and glass fibers, and the utilization of domestic wastewater with varying chemical oxygen demand (COD). A comparative analysis highlights the methodologies, findings, and implications of these studies, underscoring advancements in SCC performance, sustainability, and practical applications. The insights derived from these innovations address key challenges in the construction industry, including environmental sustainability, resource optimization, and durability enhancement.

Keywords: - self-compacting concrete, aluminium oxide, chemical oxygen demand.

Paper Id: 63

**Review of Research on Pozzolanic Materials for Cement Blending and
Concrete Applications**

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**Annual International Conference on Recent Advances in Engineering Technology,
Healthcare & Management (AIC-RAETHM 2025)**

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Abstract: - This review article summarises the results of three recent studies on the use of pozzolanic materials derived from agricultural and industrial waste in cement and concrete applications. The study examines basil plant ash (BPA), rice husk ash (RHA), and stored fly ash (FA) to identify their potential as supplemental cementitious materials (SCM). Thermal treatments, mechanical activation, microstructural changes, and their influence on concrete properties are among the major subjects studied. This synthesis highlights the potential of these materials to minimise cement use, promote sustainability, and improve the mechanical and durability of concrete.

Keywords: - Basil Plant Ash, Rice Husk Ash, Supplemental Cementitious Materials, Stored Fly Ash.

Paper Id: 64

**Innovations and Comparative Analyses in Foam Concrete: A Review of
Emerging Techniques and Materials**

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Healthcare & Management (AIC-RAETHM 2025)**

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Abstract: - This review consolidates advancements in foam concrete technologies based on three pivotal studies, focusing on enhancing its mechanical and thermal properties. The integration of nanomaterials, alternative lightweight aggregates, and natural fibers has led to significant improvements in compressive strength, microstructural optimization, and environmental sustainability. This synthesis highlights the transformative potential of foam concrete as a versatile and high-performance building material, suitable for applications ranging from structural reinforcements to sustainable housing. The review also identifies future directions, emphasizing hybrid reinforcement methods and lifecycle assessments to expand its applicability.

Keywords: - Lightweight Aggregates, Natural Fibers, Microstructural Optimization, Compressive Strength.

Paper Id: 65

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HUMAN RESOURCE INOVATIONS IN RECENT TRENDS AND BEST PRACTICE FOR WORKPLACE

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ABSTRACT: - The Human resource sector has undergone important innovative changes in the past few years. Technological advancement and the way of working have synergized to shape the world of human resources in many organizations. Managers and HR professionals should be aware of the Current Trends in Human Resource Management and adapt them quickly to ensure the company is at the forefront of innovation. Employees today don't just want a good paycheck but a quality culture and healthy work environment as well. As a part of trends in HRM, a good remuneration retains an employee, and a qualified environment and experience assist in the choice too.

HR leaders should bring about methods to encourage positive workforce health, making the employees more flexible to changes and interruptions.

Organizations today are offering products, services, and methods to enhance not their own but other firms employee experiences as well. Employee management, time & attendance management, employee self-service portals, leave management, etc., are all a part of the trends in HRM culture today.

Keywords: Human Resource, Innovations, Remuneration, Retain, Synergized, Interruptions.

Paper Id: 66

Advancements in Thermal Performance of Solar Flat Plate Collectors: A Comprehensive Review

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Abstract: - This review examines recent innovations aimed at enhancing the thermal performance of solar flat plate collectors (FPSCs). It presents a comprehensive analysis of material improvements, such as advanced coatings, high-conductivity metals, and nanostructured additives. Innovative transparent cover technologies, including polymeric films and anti-reflective treatments, are discussed, along with novel insulation approaches like aerogels and vacuum panels. The integration of phase change materials and hybrid photovoltaic/thermal systems is also highlighted, illustrating their potential to improve both energy capture and storage. In addition, the review addresses thermo-economic considerations to ensure that the proposed advancements remain financially viable. Collectively, these developments underscore the evolving role of FPSCs in sustainable energy systems and provide a roadmap for future research and commercialization.

Keywords: Solar Flat Plate Collectors, Thermal Performance, Nanofluids, Phase Change Materials, Hybrid PV/T Systems, Material Innovations.

Paper Id: 67

Exploring the Luminescent Behaviour of Dysprosium-Doped Halo-sulphate Compounds

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Abstract: - This study investigates the photo-luminescent properties of Dy³⁺-doped halosulphates, focusing on the synthesis, characterization, and luminescent behavior of these materials. Dysprosium ions are incorporated into halo-sulphate matrices to explore their potential for solid-state lighting applications. The research aims to elucidate the mechanisms behind the photo luminescence of Dy³⁺, analyze the influence of doping concentration on luminescence efficiency, and assess the thermal stability of the emitted light. The findings are expected to contribute to the development of advanced luminescent materials with improved performance characteristics.

Keywords: - solid-state lighting, luminescent, synthesis.

Paper Id: 68

A Comparative Study of Solar, Wind, and Biomass Energy for Decentralized Power Generation

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Abstract: The need for clean, renewable energy sources is growing as decentralized power generation gains popularity due to its ability to provide reliable power to remote areas and reduce transmission losses. This paper compares three popular renewable energy sources—solar, wind, and biomass—evaluating their feasibility, efficiency, costs, environmental impact, and sustainability in the context of decentralized power generation. Findings indicate that while each energy source has distinct advantages and challenges, a hybrid approach combining multiple sources may offer optimal reliability and efficiency for decentralized power systems. This study aims to provide a comparative analysis of solar, wind, and biomass energy as options for decentralized power generation, assessing each technology's strengths, weaknesses, and practical applications.

Keywords: - Renewable Energy, Power Generation, Solar, Wind, And Biomass.

Paper Id: 69

The Role of 3D Modeling in Additive Manufacturing: Advances and Applications

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Abstract:

This paper explores the pivotal role of 3D modeling in additive manufacturing (AM), detailing the technological advancements and applications that define this synergy. By delving into the principles of 3D modeling, key software tools, and their integration into AM processes, this study highlights the transformative impact of digital design on modern manufacturing. Case studies from industries such as aerospace, healthcare, and automotive illustrate practical implementations and potential future directions for this interdisciplinary field.

Keyword: 3D model, additive manufacturing (AM)

Paper Id: 70

Development and Performance Analysis of Pyramid Shaped Novel Solar Water Heater

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ABSTRACT: Solar water heating is an environmentally clean technology that utilizes solar energy as a renewable energy source for heating water. Several publications indicate that the interest in residential solar heating using flat-plate solar collectors remains high and current. The optimal tilt angle for solar collectors is estimated to be around 40°, resulting in energy savings, solar fraction, and collector efficiency of 1284 kWh, 29.6%, and 37.9%, respectively, for the entire year. The performance of solar water heating systems can be improved by considering factors such as solar insulation variations throughout the day and months of the year. Overall, solar water heating is a promising technology with ongoing research and potential for energy savings and environmental benefits.

In present project a novel prototype harnessing solar thermal system is developed. This system consists of a pyramid shaped glass structure with an insulated chamber of base measuring 600 x 600 mm with axis height of 600 mm, all slant faces are sealed with insulated glass. A copper coil of 5 mm diameter is placed inside featuring both inlet and outlet. The system is connected to a water tank for natural circulation.

During testing, the system demonstrated its capability to significantly elevate temperatures and effect of different time periods of the day, the system's temperature is observed 84.8 degrees Celsius and the outlet water temperature in the tank 40.6 degrees Celsius. These encouraging results suggest that with further design and development, it is feasible to create a solar water heating system that effectively meets the specific requirements of household/ industrial water heating facilities.

KEYWORDS: Solar energy, Solar water heating, Renewable energy, Thermal efficiency, Solar collector, Sustainability.

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