ISBN - 978-81-954945-9-0

A CONFERENCE PROCEEDING

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SECOND INTERNATIONAL CONFERENCE ON INNOVATIONS IN SCIENCE, HYBRID MATERIALS AND VARIOUS TECHNOLOGICAL ADVANCES

IC-ISHVA

IC-ISHVA 2025

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16th & 17th December 2025

In Association with

RESEARCH ASSOCIATION OF MASTERS IN ENGINEERING

CCET

Managed by St. Thomas Mission, Bhilai

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(Founder, CCET, Bhilai)

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Conference Proceeding

Second International Conference on

Innovations in Science, Hybrid System and Various Technological Advances

16th & 17th December 2025

ISBN - 978-81-954945-9-0

Editors

Dr. Jeetendra Kumar Tiwari
Dr. Manoj. S. Baseshankar
Dr. P. S. Rao
Dr. Archana Chowdhury
Dr. Radheshyam H. Gajghat
Mr. Uttam Kumar Kar

In Association with

RESEARCH ASSOCIATION OF MASTERS IN ENGINEERING

INDIA

Published by RAME Publishers (Research Association of Masters in Engineering),

Megh Sparsh, Ambegaon (kh), Pune, Maharashtra, India.

First Printing Edition, 2025. Volume 1

This is the Abstract book of the Second International Conference on Innovations in Science, Hybrid System and Various Technological Advances held on 16th & 17th December 2025 was organized by Christian College of Engineering and Technology, Bhilai, Chhattisgarh, India.

ISBN - 978-81-954945-9-0

Publisher and Editorial Service – Dr. Manoj A. Kumbhalkar

D I S C L A I M E R

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Prepared and Printed by RAME Publishers

Typeset at Christian College of Engineering and Technology, Bhilai, India and Printed at Research Association of Masters in Engineering , Pune , Maharshtra, India

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PREFACE

The Second International Conference on Innovations in Science, Hybrid Systems, and Various Technological Advances (IC-ISHVA 2025) was held on 16–17 December 2025 with the objective of providing an international platform for researchers, academicians, industry professionals, and students to share and discuss recent advancements in Engineering, Science, and Technology. The conference emphasized innovative ideas, hybrid and interdisciplinary systems, emerging methodologies, and futuristic technological solutions addressing global challenges.

The conference commenced with a warm welcome by the Conference Chair and Principal, CCET, Bhilai, Dr. Jeetendra Kumar Tiwari, who greeted the dignitaries and participants and presented an overview of the institute along with the vision and objectives of IC-ISHVA 2025. This was followed by an address from the Convener of IC-ISHVA 2025, Dr. P. S. Rao, who outlined the scope, themes, and significance of the conference in promoting research collaboration and effective knowledge dissemination.

We were honoured to have Rev. Fr. Dr. P. S. Varghese, Executive Vice Chairman, Christian College of Engineering and Technology, Bhilai, C.G., as the Chief Guest, whose inspiring presence and guidance greatly enriched the inaugural ceremony.

The technical program was strengthened by insightful keynote lectures delivered by Dr. Sheetal Dewangan and Dr. Manoj S. Choudhari, Department of Materials Science and Engineering, Ajou University, Suwon, South Korea, who shared valuable perspectives on advanced materials, interdisciplinary research, and emerging technological trends.

Organized by Christian College of Engineering and Technology (CCET), Bhilai, in association with the Research Association of Masters in Engineering (RAME), IC-ISHVA 2025 successfully fostered academic excellence, industry–academia interaction, and the exchange of innovative ideas. The organizers express sincere gratitude to all contributors for making the conference a meaningful and successful event.

ABOUT THE EDITORS

Dr. Jeetendra Kumar Tiwari is the Principal In-Charge of Christian College of Engineering and Technology (CCET), Bhilai. With extensive academic and administrative experience, he has played a pivotal role in strengthening academic quality, research culture, and institutional development. His leadership has been instrumental in promoting innovation, collaboration, and professional excellence.

Dr. Manoj A. Kumbhalkar serves as the President of the Research Association of Masters in Engineering (RAME), India. He is actively involved in research promotion, scholarly publishing, and international academic collaborations, and is committed to providing quality peer-reviewed platforms for researchers and academicians.

Dr. P. S. Rao is Professor and Head of the Department of Mechanical Engineering at CCET. He has significant teaching and research experience in mechanical engineering and has contributed extensively to academic administration, conference organization, and research mentoring.

Dr. Archana Chowdhury is Professor and Head of the Department of Computer Science and Engineering at CCET. Her academic interests include emerging areas of computer science and interdisciplinary research, and she has actively contributed to curriculum development and research activities.

Dr. Radheshyam H. Gajghat is a Member of the Research Association of Masters in Engineering (RAME), India. He is associated with academic research, conference coordination, and scholarly activities aimed at fostering innovation and research dissemination.

Mr. Uttam Kumar Kar is an Assistant Professor in the Department of Mechanical Engineering at CCET. He is actively engaged in teaching, research support, and academic event coordination, contributing to the successful organization of conferences and academic programs.

ABOUT THE INSTITUTE

Christian College of Engineering and Technology (CCET) was established by Late Lamented Bishop H.G. Dr. Stephanos Mar Theodosius in 1998. It has a world-class campus with lush green and well-manicured lawns spread all around and peaceful atmosphere which provides an ideal setting for an intensive learning experience. It is approved by All India Council for Technical Education (AICTE) and affiliated to Chhattisgarh Swami Vivekananda Technical University (CSVTU), Bhilai (C.G.). It offers four years UG courses in Mechanical Engineering, Computer Science & Engineering, Electronics & Telecommunication Engineering, Electrical Engineering; and two years PG courses in CAD/CAM & Robotics in Mechanical Engineering, Nanotechnology in Electronics & Telecommunication Engineering and High Voltage in Electrical Engineering. The institute always endeavors to be in research, training, collaborations & projects and for opening more avenues for training and employment of its students.

Institute Vision

CCET will be the center of excellence by providing quality technical education inculcating high moral and social values with a human face thereby providing world class competent engineers for the progress and transformation of society.

Institute Mission

- Run accredited Graduate and Post-Graduate programmes.
- Have state-of-the-art infrastructure facilities.
- Develop effective partnerships with industries.
- Transfer appropriate technology to society.
- Ensure placement of all students through campus interviews.
- Offer quality teaching and learning environment.
- Help in the upliftment of society by offering need based technical education facilities.
- Ensure quality services for all aspects of the campus.
- Create an ambience for the total development of staff and students.
- Become a deemed university.

ABOUT THE CONFERENCE IC-ISHVA 2025

IC-ISHVA 2025: Second International Conference on Innovations in Science, Hybrid Systems, and Various Technological Advances is a two days event aims to showcase state-of-the-art methodologies and technologies in Engineering, Science and technology. It focuses new ideas and paves way to disseminate latest innovations and practices. It facilitates opportunities to collaborate and exchange ideas with renowned leaders, scientists and researchers of Engineering and Science. It acts as crucial platform for industry and academia to foster innovative ideas, theories, frameworks and applications. IC-ISHVA 2025 will encourage on recent and futuristic advancements, challenges and new strategies in frontiers of Engineering, Science and Technology.

Conference Website - https://ishva.rame.org.in/

College Website – https://ccetbhilai.ac.in/

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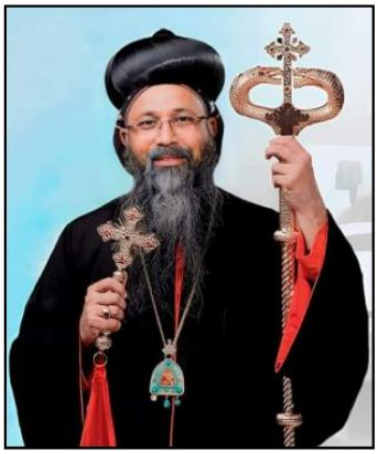
Institute of plasma research, Ahmedabad, Gujarat, India

MESSEGE FROM THE DESK OF CHAIRMAN



My appreciations to Christian College of Engineering and Technology (CCET) for having successfully conducted the Third International Seminar on Innovations and Hybrid Materials and Various Technological Advances (IC-ISHVA 2025) in collaboration with the Research Association of Masters in Engineering (RAME).

It was heartening to learn about such initiatives that promoted the dissemination of knowledge, interactive learning, skill development and meaningful networking among students and faculty. In the context of rapid scientific and technological progress, particularly in the area of hybrid materials that integrate diverse functionalities, this seminar served as an important platform for keeping the academic community abreast of emerging trends. It enabled the sharing of cutting-edge research, encouraged interdisciplinary collaboration and helped translate theoretical insights into practical technological applications.

I congratulate the organizers, participants and contributors for the successful conduct of the seminar. I am confident that this third seminar in the series, along with the vision to organize such international seminars annually, will continue to strengthen academic engagement, foster innovation and promote global collaboration in the years ahead.

I would like to specially applaud the efforts of the Executive Vice Chairman Fr. Dr. P. S. Varghese, Principal in charge Dr. J. K. Tiwari, Conveners of the Seminar Dr. P. S. Rao, Dr. Archana Chowdhury, Dr. R. H. Gajghat, Co-Conveners Dr. Uttam Kumar Kar and Dr. Jagdish Kene in organising this seminar, which was informative and well-coordinated.

I hope this abstract book will serve as a valuable reference document for researchers and faculty alike. My best wishes and blessings for its successful publication and for all your future seminars.

Alexios Mar Eusebius

Metropolitan

MESSEGE FROM THE DESK OF EXECUTIVE VICE CHAIRMAN

It gives me immense pleasure to note that Christian College of Engineering & Technology (CCET), Bhilai, in collaboration with the Research Association of Masters in Engineering (RAME), is organizing the International Seminar on Innovations in Science, Hybrid Materials and Various Technological Advances (IC-ISHVA 2025) on 16–17 December 2025.

The seminar brings together academicians, researchers, and scholars on a common platform to deliberate on emerging trends and innovations in science and technology. The participation of eminent keynote speakers from Ajou University, South Korea, and the presentation of 21 research papers in hybrid mode, reflect the academic depth and global relevance of this programme.

Since its inception in 2002, CCET has been consistently organizing national seminars, thereby fostering a strong culture of research and academic discourse. From 2023 onwards, the institution has elevated this academic tradition from the national level to the international arena, enabling greater global engagement and exchange of ideas. This seminar marks the third international seminar conducted under this expanded vision.

In today's technologically advanced world, learning is a continuous and dynamic process. Knowledge and innovation transcend geographical boundaries, making global ideas accessible at the local level. Such seminars nurture in students and researchers the AAA effect—the right Aptitude to seek knowledge, the right Attitude for collaboration and assimilation, and the aspiration to reach greater Altitude in academic and professional pursuits.

I strongly encourage that the outcomes of these deliberations should not remain confined to papers and projects alone, but should be transformed into practical products and solutions for the betterment of humanity through meaningful collaboration.

I congratulate the conveners and collaborators for organizing this two-day academic brainstorming and wish them every success in the deliberations and future initiatives. It is our vision to conduct at least one international seminar every semester, thereby strengthening our commitment to lifelong learning and academic excellence.

With best wishes.
Fr. Dr. P. S. Varghese
Executive Vice Chairman
Christian College of Engineering & Technology, Bhilai

MESSAGE FROM THE PRINCIPAL & CONFERENCE CHAIR

It gives me immense pleasure to be a part of the hosting team of 2nd International Conference IC-ISHVA - 2025 on Innovations in Science, Hybrid Systems, and Various Technological Advancements in association with Research Association of Masters of Engineering (RAME), Pune.

Conference is one of the important means of sharing of knowledge that Christian College of Engineering and Technology (CCET), offers to the community of professionals and researchers concerned with technological advancements.

The conference intends to bring together researchers, academicians, scholars, and experts from various backgrounds in the recent field of engineering and science. It aimed to showcase state-of-the-art methodologies and technologies in engineering and science. It focused on new ideas and paves the way to spread the latest innovations and practices. It acts as a crucial platform for industry and academia to foster innovative ideas, theories, frameworks, and applications. This conference encourages recent and futuristic advancements, challenges, and new strategies in the frontiers of engineering and science.

I take this opportunity to welcome all the delegates of the conference. On behalf of whole IC-ISHVA 2025 team, I would like to thank all the authors, invited session chairs and keynote speakers for their exemplary contributions and co-operation. The conference IC-ISHVA 2025 has been crafted to challenge the hurdles and we are fortunate to have leading speakers to share their experience and perspectives to achieve smart solutions through their innovation.

I am confident, that as a participant, you will enrich yourself immensely from this conference. I hope that the conference serves as a locus for interdisciplinary, a space for discourse and collaboration. We would like to thank Research Association of Masters of Engineering (RAME), Pune, for providing us with the platform for the publication. I would like to express my appreciation to the organizing committee for their dedicated efforts to materialize the conference I hope all the participants will have a fruitful and beneficial experience.

I wish all success for the International Conference.

Dr. Jeetendra Kumar Tiwari

Principal, CCET, Bhilai

MESSAGE FROM THE PRESIDENT, RESEARCH ASSOCIATION OF MASTERS IN ENGINERING & CONFERENCE CHAIR

It gives me great pleasure to express my sincere appreciation for the continued and fruitful association between the Research Association of Masters of Engineering (RAME), India and Christian College of Engineering & Technology (CCET), Bhilai. Over the past three to four years, this collaboration has grown stronger, reflecting our shared commitment to promoting quality research and academic excellence.

The successful organization of this conference marks the third international conference jointly conducted by RAME and CCET Bhilai, which stands as a testament to our effective teamwork, mutual trust, and collective vision. Each collaborative effort has contributed meaningfully to providing a dynamic platform for researchers, academicians, and industry professionals to exchange knowledge, present innovative research, and foster interdisciplinary collaboration.

I sincerely congratulate the organizing committee, faculty members, reviewers, and volunteers for their dedication and meticulous planning, which ensured the smooth and successful conduct of the conference. I also extend my heartfelt appreciation to all authors and participants for their valuable contributions and enthusiastic participation.

I am confident that this continued partnership will lead to many more impactful academic initiatives in the future and will further strengthen research culture and innovation at both institutional and national levels.

With best wishes,

Dr. Manoj A. Kumbhalkar
President
Research Association of Masters of Engineering (RAME), India

MESSAGE FROM THE CONVENER

It gives me immense pleasure to serve as the Convener of the 21st conference "Technologia 2025" – International Conference on Innovations in Science, Hybrid Materials, and Various Technological Advances, to be held at Christian College of Engineering and Technology, Bhilai. This conference serves as a vital platform for the global scientific community to come together, exchange pioneering ideas, and explore the transformative potential of emerging technologies and advanced materials.

The conference has received an overwhelming response in the form of research papers from talented researchers. I am confident that the deliberations and interactions during this event will help strengthen the collaboration between academia and industry experts in the fields of Mechanical Engineering, Computer Science & Engineering, Electrical Engineering, Electronics and Information Technology. This forum will undoubtedly encourage constructive dialogue on theoretical concepts, practical innovations, and state-of-the-art technological advancements. I firmly believe that the conference proceedings published on this occasion will be of great value to researchers working in these domains.

I would like to express my heartfelt gratitude to our keynote speakers, session chairs, reviewers, and contributors for their invaluable efforts in enriching the intellectual quality of this event. A special word of appreciation is extended to the organizing committee, technical team, and volunteers whose dedication and meticulous planning have made this conference possible. Their commitment has ensured a dynamic and engaging environment for scholarly exchange.

I wish all participants a rewarding and intellectually stimulating experience.

Dr Archana chowdhury
Professor & Head (CSE Dept.)
Convener, Technologia 2025 – IC-ISHVA2025

MESSAGE FROM THE CONVENER

It gives me immense pleasure to state that the Second International Conference on Innovations in Science, Hybrid Systems, and Various Technological Advances (IC-ISHVA 2025) was successfully conducted on 16–17 December 2025. The conference was organized by Christian College of Engineering & Technology (CCET), Bhilai, in association with the Research Association of Masters in Engineering (RAME), Pune.

The conference provided a vibrant platform for researchers, academicians, industry professionals, and students from across the globe to present and exchange their latest research findings, innovative ideas, and technological advancements in the broad domains of Science, Engineering, and Technology. Conducted in hybrid mode, the event ensured wide international participation and effective academic interaction.

All accepted and presented papers underwent a rigorous peer-review process and were recommended for publication in reputed Web of Science–indexed and other peer-reviewed journals, in accordance with the publication policies and quality standards.

I sincerely thank the organizing committee, advisory board members, reviewers, session chairs, and volunteers for their dedicated efforts in making this conference a success. I also extend my heartfelt appreciation to all authors and participants for their valuable contributions and active involvement.

I am confident that the scholarly outcomes of IC-ISHVA 2025 will contribute significantly to ongoing research and future innovations. I look forward to continued collaboration and participation in our forthcoming academic endeavors.

Dr. P. S. Rao,
HOD, Mechanical Engineering,
Christian College of Engineering and Technology, Bhilai

MESSAGE FROM THE CO-CONVENER

It is a privilege to present the proceedings of IC-ISHVA 2025: Second International Conference on Innovations in Science, Hybrid Systems, and Various Technological Advancements. This edition of the conference continues our commitment to creating a collaborative platform where pioneering ideas, transformative research, and emerging technologies converge.

IC-ISHVA 2025 has attracted high-quality contributions from diverse domains ranging from advanced materials, intelligent systems, hybrid technologies, sustainability solutions, and next-generation engineering applications. The papers included here reflect both academic excellence and practical relevance, offering valuable insights for researchers, industry professionals, and future innovators.

I extend my sincere appreciation to all authors, reviewers, session chairs, and the organizing team for their dedicated efforts in ensuring the quality and success of this conference. I hope these proceedings serve as an important reference and inspire further research collaborations.

I wish all participants a productive, intellectually stimulating, and memorable conference experience.

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Dr. Uttam Kumar Kar
Co-Convener, IC-ISHVA 2025

SCHEDULE OF CONFERENCE

SECOND INTERNATIONAL CONFERENCE ON INNOVATIONS IN SCIENCE, HYBRID SYSTEM AND VARIOUS TECHNOLOGICAL ADVANCES

(IC-ISHVA 2025)

Program Schedule

DAY – 1 (16th December 2025)	
Time (IST)	**Activity**
10.15 AM	Online Platform Open
10:30 AM – 11:00 AM	Inaugural Ceremony ***Chief Guest: Rev. Fr. Dr. P. S. Varghese*** Executive Vice Chairman Christian College of Engineering & Technology, Bhilai, C.G.
11:00 AM – 11:30 AM	Keynote Session ***Keynote Speaker: Dr. Sheetal Dewangan*** Department of Materials Science and Engineering, Ajou University, Suwon, South Korea
11:30 AM – 12:00 NOON	**Tea Break**
12:00 NOON – 2:30 PM	***Technical Session I*** Innovations in Science and Technology
DAY – 2 (17th December 2025)	
10:30 AM – 11:00 AM	Keynote Session ***Keynote Speaker: Dr. Manoj S. Choudhari*** Department of Materials Science and Engineering, Ajou University, Suwon, South Korea
11:00 AM – 01:00 PM	***Technical Session II*** Various Technological Advances
01:00 PM – 1:15 PM	**Short Break**
1:15 PM – 2:00 PM	Valedictory Session (Announcement of Best Papers & Feedback)
End of Conference	

ABSTRACTS OF THE PRESENTED PAPERS

EV VS ICE MARKET SHARE IN INDIA: A SEGMENT-WISE COMPARATIVE ANALYSIS (2021-2025)

Deepika Sarwate, Poonam Khot, Shravani Yelbhar, Manisha Kadam

MCA, JSPM Narhe Technica Campus, Pune

Abstract: The global automotive industry is undergoing a historic transition as electric vehicles (EVs) begin to challenge the dominance of internal combustion engine (ICE) vehicles. India, one of the fastest-growing automotive markets, is witnessing a significant surge in EV adoption supported by government policies, technological improvements, and growing consumer awareness. However, most reports highlight EV penetration rates in isolation without offering a systematic comparison with ICE vehicles across different categories. This study aims to conduct a formal comparative analysis of EV versus ICE market share in India from 2021 to 2025, covering two-wheelers (2W), three-wheelers (3W), and four-wheelers (4W). Using official datasets such as VAHAN, NITI Aayog's ICED, and SIAM, this research investigates trends, growth rates, and the factors influencing adoption. The findings will provide policymakers, industry leaders, and researchers with evidence-based insights into the transition from ICE to EV in India.

Keywords: EV adoption, ICE vehicles, VAHAN, SIAM, market share, India, 2W/3W/4W

A COMPREHENSIVE STUDY ON THE INTERNET OF THINGS (IOT) & ITS APPLICATIONS

Sushma. N, N. Sandeep Babu

Assistant Professor at Department of CSE, Gopalan College of Engineering and Mangement Bengaluru,India

Abstract: The Internet of Things (IoT) has emerged as a transformative technological paradigm, enabling seamless interconnection among physical and digital entities. Through embedded sensors, actuators, and communication networks, IoT facilitates the exchange of data for automation, analytics, and intelligent decision-making. This paper presents a comprehensive review of IoT concepts, evolution, and real-world applications across domains such as healthcare, industry, agriculture, smart cities, and transportation. It also examines the underlying challenges involving security, scalability, and interoperability. The study emphasizes how IoT continues to revolutionize modern systems, driving the transition toward sustainable and data-driven ecosystems

Keywords: Internet of Things (IoT), energy management, smart sensors, real-time monitoring, wireless communication, cloud computing, edge computing, user preference modeling, predictive analytics, sustainable systems

INTELLIGENT VIBRATION PREDICTION OF THERMALLY STRESSED ROTATING FUNCTIONALLY GRADED BEAMS USING NEURAL NETWORKS APPROACH

Uttam Kumar Kar[1], Milan Banerjee[2], Pushpita Dasgupta[3], Vinay kumar[4], P.S. Rao[5]

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[3]Assistant Professor, Department of Science and Humanity, CCET, Bhilai, India

[4]Assistant Professor, Department of Mechanical Engineering, CCET, Bhilai, India

[5]Professor, Department of Mechanical Engineering, CCET, Bhilai, India

Abstract: This paper presents a novel artificial intelligent based approach for the comprehensive vibration analysis of thermally-stressed rotating functionally graded (FG) beams. Components like rotating beams are critical in various engineering applications, and their reliable operation is significantly impacted by vibrational behavior, particularly under high-temperature conditions. Existing analytical and numerical methods often struggle with the inherent non-linearity and complex interactions between thermal fields, rotational effects, and material properties that characterize these systems. The proposed neural network (NN) model leverages its robust learning capabilities to effectively map the intricate relationships between operational parameters (such as temperature gradients, rotational speeds, and material properties) and the resulting vibrational characteristics. Through extensive simulations, the NN approach demonstrates superior accuracy and computational efficiency compared to conventional techniques in predicting the vibrational response of thermally-stressed rotating FG beams. This study highlights the potential of intelligent approach as a powerful tool for predictive modeling, condition monitoring, and design optimization in environments where high temperatures significantly influence structural dynamics.

Keywords: FG Beams, Neural Network, Thermal environment, Vibration analysis, Rotating effect.

STUDIES OF STRUCTURAL, MORPHOLOGICAL AND OPTICAL PROPERTIES OF GREEN SYNTHESIZED CADMIUM OXIDE NANOPARTICLES FOR BIOMEDICAL APPLICATIONS

Sandhya Minj and Anju Singh

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Abstract: The present work reports on the bio-synthesis and characterization of cadmium oxide nanoparticles (CdO) which were prepared via green synthesis method. This synthesis was performed by Ficus Benghalensis plants extract in the presence of capping agent (PVP). The prepared nanoparticles were characterized by various techniques such as X-rays diffraction, Scanning Electron Microscopy, Fourier transform infrared, Photoluminescence. Synthesized samples annealed at the temperature of 3000C reveal Bragg peaks which were matched to fcc structure of CdO while FTIR analysis show absorption bands at 548 and 617 cm characteristic of CdO. Cadmium ions are reduced at room temperature, resulting in the formation of nanoparticles in agglomerated form. The SEM analysis of the structure of CdO nanoparticles and their morphological dimensions revealed that the average particle size was 20-55 nm. The shape was amorphous. Photoluminescence spectroscopy analysis shows emission peaks centred at 480 nm and 660 nm. The antimicrobial activities of CdO at different temperature were tested by e-coil culture with CdO nanoparticles. Antimicrobial activities were performed against three bacteria and fungi strains by the agar well diffusion method, and from the observed zones of inhibition, it is confirmed that the as-synthesized CdO nanopowders act as an effective antimicrobial agent against pathogenic microorganisms.

Keywords: Biomedical, Cadmium Oxide, Photoluminescence, SEM, Green synthesis

COMPREHENSIVE SURVEY ON GRADIENT DESCENT AND BACK PROPAGATION ALGORITHMS

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Abstract: This survey provides an extensive examination of Gradient Descent (GD) and Back propagation (BP), the foundational algorithms enabling modern deep learning. GD governs how model parameters are iteratively optimized, whereas BP efficiently computes gradients across deep neural architectures. This paper reviews classical and advanced GD variants, mathematical formulations, computational complexities, training dynamics, hyper parameter sensitivities, and comparative evaluations. Additional sections discuss optimization pitfalls, convergence behaviors, and emerging research directions.

Keywords: Gradient Descent (GD), Back propagation (BP), Deep Learning Optimization, Neural Networks, Gradient Computation, Optimization Algorithms, Convergence Analysis, Hyper parameter Sensitivity, Training Dynamics.

COMPARATIVE ANALYSIS OF CRYPTOGRAPHIC ALGORITHMS FOR INTERNET OF VEHICLES

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Abstract: This paper analyzes four important cryptographic algorithms—Elliptic Curve Cryptography (ECC), RSA, SHA, and AES—for use in Internet of Vehicles (IoV) systems. The study evaluates key performance measures including speed, delay, memory usage, processor load, and energy consumption for each algorithm. The research uses standard Python cryptographic libraries and computing tools to ensure reliable and meaningful results.

Keywords: Internet of Vehicles, Cryptographic Algorithms, Performance Analysis, Hybrid Security, Vehicle Communication, Statistical Evaluation, Energy Efficiency, Security Implementation, Vehicular Networks

STUDYHUB: A COMPREHENSIVE ED-TECH PLATFORM FOR DIGITAL LEARNING AND SKILL DEVELOPMENT

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Abstract: StudyHub is a user-friendly educational platform designed to make learning more engaging and accessible. It allows students to easily access educational content and rate their learning experience. Instructors can showcase their expertise gl obally, reaching a wider audience. The platform utilizes modern technology to provide interactive features, making it a valuable too lf or both students and instructors in the education sector.

Keywords: ed-tech platform; online learning; educational technology; e-learning; user experience; student engagement; instructor platform; mernstack; reactjs; nodejs; mongodb; restfulapi; user interface design; course management

DETECTION AND CLASSIFICATION OF FAULTS DURING POWER SWINGS USING THE S-TRANSFORM AND SUPPORT VECTOR MACHINE

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Abstract: To ensure the reliable operation of a power system network, protective devices are intentionally blocked during power oscillation conditions. However, if a fault occurs during such oscillations, the protective device must still be capable of accurately identifying the fault and issuing a trip command without delay. Fault detection under power swing conditions is particularly challenging because significant variations in electrical signals are already present before the disturbance occurs. This challenge becomes even more pronounced for symmetrical faults, as the electrical signatures observed during power swings closely resemble those of three-phase faults. In this study, a combined approach employing a signal processing technique and an intelligent classification method is proposed to discriminate faults occurring during power swings. Features extracted from current signals using the S-Transform are supplied to a Support Vector Machine (SVM) classifier for further analysis. The proposed scheme is evaluated for various fault scenarios during power swings using a three-machine, nine-bus test system modeled in PSCAD.

Keywords: Power Swing Blocking, Artificial Neural Network, S-Transform, Support Vector Machine, PSCAD.

USING TAGUCHI TECHNIQUE THE PILOT STUDY OF MACHINING PARAMETERS AND TO EVALUATE OF VARIABLE IN THE TURNING OPERATION OF ALUMINIUM ALLOY (AL6463)

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Abstract: The manufacturing cost can be minimized by reducing the machining cost through optimization of machining environment by optimizing the machining parameters like cutting speed, feed, depth of cut, etc. and proper setting of various parameters during machining. Since machining operation is one of the major cost centres in manufacturing the product, the production cost can also be reduced by reducing the lead time and proper selection of machine tools, cutting tool material, tool geometry and cutting parameters. These variables govern the economics of machining operations. Therefore an attempt has been made to carry out an experimental investigation by using Taguchi technique mainly to find and correlate the technological factors to the economics of machining process. The Taguchi method is systematic application of design and analysis of experiments. It is an effective approach to produce high quality products at relatively low cost. Therefore Taguchi method is used to investigate the multiple performance characteristics in the turning operation. This research work deals with experimental investigations carried out to optimize machinability of commercially available Aluminium alloy (Al6463) and to obtain optimum process parameters. The experiments were carried out on the CNC machines taking Al6463 as the workpiece materials with carbide tools of various nose radii for turning operation. Levels of cutting speeds, depth of cuts, feed rates etc. will be selected as most important parameters which influence the machinability characteristics of Aluminium alloy.

Keywords: Machining process, Taguchi technique, Turning operation, Machinability, Al6463

"JARVIS"-AI VOICE ASSISTANT

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Abstract: This paper presents the design and implementation of J.A.R.V.I.S. (Just A Rather Very Intelligent System), an AI-powered voice assistant integrating speech recognition, facial authentication, and multimodal API interactions. The system leverages natural language processing (NLP) for voice command interpretation, OpenCV-based facial recognitionfor user authentication, and APIs such as WolframAlphaand OpenWeatherMap fordynamic responses. Builtusing Pythonanda web-based GUI (Eel), JARVIS executestasks including email automation, web navigation, system control, and real-time calculations. Experimental results demonstrate 85%accuracy in speech recognition and 92% reliability in facial authentication, highlighting its potential as a personalized assistant.

Keywords: VoiceAssistant,FacialRecognition,NLP, OpenCV, API Integration, Eel Framework

POTATO LEAF DISEASE DETECTION USING A CONVOLUTIONAL NEURAL NETWORK APPROACH

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Abstract: A Convolutional Neural Network (CNN) is employed to classify potato leaf diseases using deep learning techniques. The proposed approach involves preprocessing leaf image data, training a CNN model on the processed dataset, and evaluating the model's performance on a dedicated test set. Experimental results demonstrate that the CNN achieves an overall accuracy of 99.1%, indicating its high effectiveness in identifying three categories of potato leaf conditions: Early Blight, Late Blight, and Healthy.

The proposed method provides a reliable and efficient solution for detecting potato diseases, a critical task for ensuring food security and reducing economic losses in agriculture. Notably, the model is capable of accurately recognizing disease types even in cases of severe infection. These findings underscore the potential of deep learning-based approaches for automated and precise disease classification, offering valuable support for timely and effective disease management in potato farming.

Keywords: potato leaf disease classification, deep learning, convolution neural network, image processing, computer vision, plant disease diagnosis, agricultural technology, crop protection

PERFORMANCE ANALYSIS OF FLAT-PLATE SOLAR COLLECTORS ENHANCED WITH NANOFLUIDS

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Abstract: This research presents overview about Nano fluid with solar collector applications, an existing emerging class of heat transfer fluid, in terms of barriers, future research and environmental challenges. Nano fluids are used to increase the performance of many thermal engineering systems.

By referring the experimental investigation [55], the main objective is to prepare a CFD model and using Nano fluid as flowing fluid, which investigate the efficiency of square flat plate solar collector and enhancement in heat transfer with the use of different Nano fluid as compare to water . Therefore we are adopting the simulation method to resolve the problem of Use of Nano fluid in the flat plate collector and to get the improved results by using computational fluid analysis in ANSYS 15.0 by FLUID FLOW FLUENT solver.

The center point was to evaluate the use of different Nano fluid in the developed region of the tube flow containing water + Nanofluid (Al203 and Ti2O, CuO, and SiO2) on heat transfer characteristics. It was perceived that all Nano fluids (Al203 and Ti2O, CuO, and SiO2) revealed higher heat transfer characteristics than that of the base fluid (water). Furthermore the Nusselt number and the surface heat transfer coefficient is higher for CuO + Water Nano fluid as compare to other Nano fluid which are investigated on the basis of Reynolds and Nusselt number. Moreover we investigate the heat transfer characteristics with different pipe diameter for the (CuO + water) Nano fluid..

Keywords: CAD model of flat plate solar collector, Nano fluid, Reynolds number, Nusselt number, heat transfer

HIGH-EFFICIENCY PV-FED FAST ELECTRIC VEHICLE CHARGERS: MPPT METHODS, BUCK CONVERTER TOPOLOGY AND FUTURE RESEARCH DIRECTIONS

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Abstract: The rapid expansion of electric mobility and the global drive toward renewable energy integration have renewed interest in photovoltaic (PV)-supplied fast charging systems for electric vehicles (EVs). Achieving high efficiency in such systems depends heavily on robust maximum power point tracking (MPPT) strategies and well-engineered DC–DC conversion stages capable of handling fast charging requirements. This review delivers an in-depth evaluation of prominent MPPT approaches—including perturb and observe, incremental conductance, and advanced intelligent algorithms—and assesses their ability to sustain optimal PV energy extraction under varying environmental and load conditions. Buck converter technologies are analyzed with respect to switching behavior, control stability, ripple suppression, and their compatibility with high-current lithium-ion battery charging. The discussion further highlights recent developments such as wide-bandgap power devices, interleaved converter topologies, and adaptive digital controllers that enhance efficiency and dynamic response. Key technical challenges are identified, including the need for accurate converter–battery interaction models, real-time validation frameworks, and seamless integration of hybrid renewable sources. The review concludes by outlining emerging research opportunities that can enable the next generation of high-performance, PV-driven fast EV charging infrastructure.

Keywords: Photovoltaic systems; MPPT; Buck converter; Fast EV charging; Lithium-ion batteries; Power conversion efficiency.

USE OF CHEMICAL ADDITIVES IN ACCELERATING THE DELIGNIFICATION OF NON WOOD PULP

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Abstract: Different additives are used in delignification, pulping and biomass processing, enhance lignin removal and improve pulp yield quality. Laboratory scale alkaline pulping studies on non-wood samples were carried out by the addition of different quinone based additives at different dosages. It was observed that varied physical properties were seen by the addition of different anthraquinone and other quinone additives. In this study, anthraquinone was more effective in improving the yield. Chemical additives react with lignin during the process of delignification and thus, accelerate delignification and stabilize carbohydrate to give higher pulp yield.

Keywords: Anthraquinone, Delignification, Alkaline pulping, Additives.

A CONCISE REVIEW ON MODELLING AND PERFORMANCE CHARACTERISTICS OF MULTISTAGE BUCK CONVERTERS FOR DEEP STEP-DOWN APPLICATIONS

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Abstract: Multistage buck converters have gained significant attention as an effective solution for deep step-down DC–DC conversion in modern power-electronic applications where conventional single-stage buck converters suffer from severe limitations. Extremely low duty cycles, elevated switching stress, increased ripple, and poor dynamic performance restrict the viability of single-stage topologies in systems requiring high conversion ratios. By distributing the voltage reduction across multiple cascaded stages, multistage buck converters provide improved operating conditions, enhanced ripple suppression, and reduced electrical and thermal stress on power devices. This review presents a comprehensive examination of modelling principles, including steady-state behaviour, current distribution, and simulation methodologies, as well as performance characteristics such as efficiency trends, ripple attenuation, and component stress analysis. The comparative insights drawn from existing literature demonstrate that while multistage converters offer notable advantages in stability, ripple performance, and stress management, they also introduce challenges related to increased component count, potential interstage resonance, and complex control requirements. The findings highlight the importance of accurate modelling, optimized stage design, and advanced control strategies for achieving high-performance deep step-down conversion. This review serves as a consolidated reference for researchers and engineers working toward the development and optimization of cascaded buck converter architectures.

Keywords: Buck converter; Cascaded topology; Step-down DC–DC conversion; Power electronics; Efficiency analysis.

DIGITAL TWIN OF A THREE-PHASE TRANSMISSION LINE WITH INTEGRATED FIRE AND FAULT MONITORING IN MATLAB/SIMULINK: A REVIEW

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Abstract: Digital Twin have the potential to transform modern power systems by providing virtual models that truly mirror system behaviour in real time, health, and environmental interactions. This review paper presents a comprehensive overview of different DT applications across power transmission and distribution networks in general and their contribution to fault detection, predictive maintenance, and fire-risk monitoring in particular. We present a systematic overview of relevant research articles from the last seven years (2019–2025), outlining recent trends, modelling approaches, data-driven techniques, and implementation challenges. The review concludes that today, there are some remarkable developments with regard to DT-based monitoring: real-time simulation, sensor integration, deep-learning-assisted diagnostics, and intelligent protection schemes. However, despite this development, the analysis exposes critical gaps in research concerning multi-domain DT models, exacerbated by a lack of environmental, and specifically fire-related, parameters and missing line-level digital twin frameworks to allow the early detection of hazards. These findings underpin future research directions, emphasizing the need for unified DT platforms able to incorporate electrical behaviour with environmental factors and intelligent decision mechanisms. The goal of this review paper is to assist researchers and practitioners develop resilient, safe, and intelligent power-system infrastructures.

Keywords: Digital Twin Modelling, Transmission Line Monitoring, Power System Reliability, Electrical Fault Analysis, Fire Hazard Assessment, Smart Grid Technologies, Virtual Replication, System Health Monitoring

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ISBN - 978-81-954945-9-0

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