2nd International Conference on Multidisciplinary Science and Technology towards Sustainability

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Proceedings of 2nd International Conference on Multidisciplinary Science and Technology towards Sustainability

ICMSTS 2025

March 23, 2025

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ABOUT CONFERENCE

The **2nd International Conference on Multidisciplinary Science and Technology towards Sustainability, scheduled for March 23, 2025,** will be held in virtual mode, offering a global platform for researchers, academicians, and industry professionals to share insights and innovations aimed at advancing sustainability across various disciplines. The conference will explore the intersection of science, technology, and sustainability, addressing pressing global challenges such as climate change, resource management, and environmental conservation. Through technical sessions, participants will gain valuable knowledge and contribute to the collective effort of fostering a sustainable future.

The event will bring together experts from diverse fields, including environmental science, engineering, management, social sciences, and sustainable development, to present cutting-edge research and discuss solutions that can drive progress towards achieving sustainability goals. With an emphasis on collaboration and innovation, this conference will provide an opportunity for participants to network, exchange ideas, and inspire new projects that can make a tangible impact on both local and global levels. By utilizing virtual technologies, the conference aims to promote inclusivity and facilitate a wider reach, allowing individuals from around the world to engage in this important conversation on sustainable development.

ABOUT ORGANIZER

Scientific Research Reports is an innovative publishing company that publishes digital books in a wide range of arts, social, science, and technology fields and is registered and approved as a digital book publisher with the Government of India. The goal of the Scientific Research Reports is to encourage the dissemination of both fundamental and applied research across the various academic fields and research communities located all over the world. In addition to this, it intends to create research networking among the many different research groups and encourage conversation on emerging research standards

Dr. ABHISHEK SHARMA is an accomplished academic with a robust background in Mechanical Engineering. He holds a Bachelor's degree in Mechanical Engineering from Pt. Ravi Shankar Shukla University, Raipur, a Master's degree in Thermal Engineering from Maulana Azad National Institute of Technology, Bhopal, and a Doctoral degree in Mechanical Engineering from the National Institute of Technology Rourkela. Currently, he serves as an Assistant Professor in the Department of Mechanical Engineering at Government Engineering College Palamu, Medininagar, Jharkhand, India.

Dr. Sharma's research interests are centered around renewable energy, waste-to-energy conversion, alternative fuels for internal combustion engines, and air pollution. He was the principal investigator for a research project focused on converting waste plastic into liquid fuel, sponsored by the Ministry of Human Resource Development, Government of India. With over 150 research publications in international peer-reviewed journals, conferences, and book chapters, he has more than 2800 citations and holds an h-index of 29. Additionally, he has been granted six Indian patents and registered two copyrights for his innovative work.

Dr. Sharma's exceptional scholarly achievements are recognized globally, as he is ranked among the top 2% of the world's most distinguished and impactful scientists, a distinction awarded by Stanford University in collaboration with the Elsevier International Foundation. He further contributes to the academic community through his editorial roles in renowned international journals and has peer-reviewed manuscripts for many journals indexed in the Science Citation Index.

Dr. ARASU RAMAN is an Associate Professor of Marketing and Director of International Relations and Collaborative Centre at INTI International University, where he has been contributing for 26 years. With a diverse teaching portfolio, he has taught 42 different subjects and tutored approximately 285 seminars. His academic journey spans multiple countries, holding a Bachelor of Commerce in Management from New Zealand, an MBA in Strategic Management from Australia, and a PhD in Business Administration from the Philippines. He is a Fellow Member of the World Business Institute, Australia, and a Professional Member of the Chartered Institute of Marketing, UK. His professional affiliations also include the Australian Institute of Management (AIMM), and he has received specialized training in teaching methodologies, including Case Method training from Harvard Business School and professional teacher training from the University of Hertfordshire. Additionally, he is a certified trainer for IBM, Alibaba GDT (3T), and HRDCorp (3T), further enhancing his expertise in industry-based learning.

With a 27-year background in marketing and management, Dr. Arasu has demonstrated sustained excellence in academia and research. His contributions extend to entrepreneurial science consultancy, and he has been recognized for his research impact as a Research Fellow. His scholarly achievements include receiving the Best Conference Paper Award at an International Conference in Dubai in 2010, reflecting his dedication to advancing knowledge in marketing and business management. Through his extensive academic and professional experience, he continues to shape the learning landscape, integrating strategic insights with global perspectives.

DR. S. GANESAN, Professor & Head of the Department of Mechanical Engineering, joined Sathyabama Institute of Science and Technology as an Assistant Professor in June 2009. He completed his B.E. from Government College of Technology, Coimbatore, and M.E. from Alagappa Chettiar Government College of Engineering and Technology, Karaikudi. Before transitioning to academia, he worked as a Senior CAE Analyst at Mahindra & Mahindra. With 21 years of teaching and research experience, his primary research focus is on alternative fuels. He has made significant contributions to the field, publishing over 200 research papers in reputed national and international journals. Additionally, he has served as a reviewer for 40 refereed international journals and as a Doctoral Committee Member for institutions such as Anna University, VELS University, Vel Tech University, and Bharath University. He is also a Board of Studies member for Alagappa Chettiar Government College of Engineering and Technology, Karaikudi, and Annapoorna College of Engineering, Salem.

Dr. Ganesan has received several prestigious awards, including the Innovative Research and Best Academician Award from The Society of Innovative Educationalists & Scientific Research Professionals, Chennai (2021–22), and the Best Researcher Award from Knowledge Research Academy (2022–23). In the realm of research, he has successfully guided three research scholars in the IC Engine domain and is currently mentoring six scholars in the Faculty of Mechanical Engineering at Sathyabama Institute of Science & Technology. His scholarly contributions include numerous technical research papers in internationally refereed journals, with a Scopus Index of 171 and an h-index of 26. He has also contributed to over 20 Springer book chapters, further solidifying his expertise in mechanical engineering research.

Mr. A. ARUN is a seasoned academic and hospitality industry expert with over 19 years of combined experience in academia and industry. He currently serves as an Assistant Professor in the Department of Hotel and Catering Management at Vels Institute of Science Technology and Advance d Studies, Chennai. Passionate about advancing hospitality education, he is also pursuing his doctorate in Hotel and Catering Management at Jamal Mohamed College, Trichy, under Bharathidasan University. With expertise in Accommodation Operations, Hospitality, and Tourism Studies, Mr. Arun A has made significant scholarly contributions, including authoring three books, contributing to 14 book chapters, and publishing 62 research articles in national and international journals. His research focuses on employee retention, ethical leadership, and sustainable hospitality practices. A dedicated educator, Mr. Arun has played a pivotal role in curriculum development, designing courses on accommodation operations and tourism. His academic impact is further highlighted by his participation in over 20 conferences, where he has presented research on key hospitality and tourism topics.

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ICMSTS – E001

BIO-INSPIRED NANOMATERIALS: SUSTAINABLE SYNTHESIS AND APPLICATIONS

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Abstract:

The rapid advancement of nanotechnology has led to a growing demand for sustainable and eco-friendly synthesis methods. Bio-inspired nanomaterials, derived from biological resources such as plant extracts, microorganisms, algae, and biomolecules, offer a green and cost-effective approach to nanomaterial fabrication. This method eliminates the need for toxic chemicals, reduces energy consumption, and aligns with the principles of green chemistry. The synthesis of nanomaterials using bio-resources enables the development of nanoparticles with diverse properties, including enhanced biocompatibility, stability, and functionalization potential. These nanomaterials have wide-ranging applications in medicine, environmental remediation, energy storage, and catalysis. The integration of bio-inspired strategies in nanotechnology has the potential to revolutionize material synthesis while promoting sustainability and reducing environmental impact. This paper explores various bio-synthesis techniques, their advantages over conventional methods, and the emerging applications of bio-inspired nanomaterials in diverse scientific and industrial sectors.

Keywords: Bio-inspired nanomaterials, green synthesis, sustainable nanotechnology, eco-friendly nanoparticles, biological resources, biomolecule-assisted synthesis.

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ICMSTS – E002

DEVELOPMENT OF BIOPLASTICS DERIVED FROM NANOSPONGE OF TAMARIND SEEDS AND ITS CHARACTERIZATION

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Abstract:

As demand grows for sustainable substitutes for common plastics, bioplastics are being researched; they are created using renewable resources. This study focuses on the creation of bioplastic from tamarind seed nanosponge cellulose. Each aspect of the synthesis comprised cellulose isolation. Nanoparticle formation and bioplastic film casting also comprised each aspect. The total yield of the bioplastic was exactly 2 g. The presence of well-defined crystalline domains was shown by major diffraction peaks at 27.7°, 32.1°, as well as 38.1°, and XRD analysis confirmed the nanosponge's crystalline nature. Since the crystallite size was observed to be between 24.3 Å along with 304 Å, the structure is nanoscale, making it suitable for multiple bioplastic applications. Fourier-transform infrared spectroscopy (FTIR) analysis firmly confirmed the presence of functional groups important for biopolymer formation, revealing distinctly characteristic absorption peaks at 3299 cm^{-1} (O-H stretching), 2922 cm^{-1} (C-H stretching), 1647 cm^{-1} (C=O stretching), 1335 cm^{-1} (C-H bending), and 996 cm^{-1} (C-O stretching). These structural attributes cause several characteristics of the material. The material shows biodegradability, mechanical stability, and compatibility with eco-friendly applications. According to this study, bioplastic from tamarind seed-derived nanosponges shows promise as a biodegradable material and for sustainable packaging. Learning more of its mechanical traits and breakdown could improve sales.

Keywords: Bioplastic, Tamarind Seed, Nanosponge, XRD, FTIR, sustainable and important materials, and biodegradability are absolutely important keywords.

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ICMSTS – E003

THE POTENTIAL OF LIQUID BIOPSIES IN THE DIAGNOSIS AND TRACKING OF PROSTATE CANCER

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Abstract:

Prostate cancer is a malignant tumor formed in the prostate gland that produces seminal fluid. It has significant mortality rates and is slow-growing. Prostate cancer is the second leading cause of cancer death in men, with an estimated 34,130 deaths expected in 2024 in the United States. Some types are more aggressive and spread quickly. Symptoms include difficulty urinating, blood in the urine, and pelvic discomfort, though many cases have no symptoms in the early stages. Early-stage prostate cancer has a survival rate of 100%, while late detection lowers it to 30%. Early detection, treatment, and monitoring are crucial for improving patient outcomes. Traditional diagnostic methods like tissue biopsies, imaging techniques, prostate-specific antigen (PSA), digital rectal exam (DRE), transrectal ultrasound (TRUS), computed tomography (CT) scans, magnetic resonance imaging (MRI), bone scans, and genetic testing have limitations, including invasiveness, discomfort, and lack of real-time monitoring. Advancements in medical technology introduce liquid biopsies as a promising tool. This non-invasive method analyses blood or bodily fluids to detect cancer-related biomarkers, such as circulating tumor cells (CTCs) and cell-free DNA (cfDNA). Liquid biopsies enable early detection, real-time monitoring, and personalized treatment, providing insights into disease progression and treatment response.In conclusion, liquid biopsies offer a less invasive, more comprehensive, and dynamic approach, improving prostate cancer detection, monitoring, and management, ultimately enhancing patient outcomes and survival rates.

Keywords: Prostate cancer, Liquid biopsy, Early detection, Circulating tumor cells (CTCs), Cell-free DNA (cfDNA), Real-time monitoring, Personalized treatment.

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ICMSTS – E005

INVESTIGATION OF MACHINING CHARACTERISTICS IN DIE-SINKING EDM OF INCONEL WITH COPPER ELECTRODE

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Abstract:

Inconel 800, a nickel-based superalloy, is widely used in high-temperature engineering applications. However, limited research has been conducted on its machinability. This study focuses on the machinability of Inconel 800 using die-sinking Electrical Discharge Machining (EDM) with an electrolytic copper electrode. Key process parameters—pulse-on time, pulse-off time, and peak current—were analyzed to evaluate their effects on surface roughness, material removal rate, and tool wear rate. A Taguchi full-factorial design was employed to structure the experiments, and the contribution of each parameter was thoroughly examined.

Keywords: EDM, Inconel 800, Taguchi Method, Surface Roughness, Tool Wear Rate, Material Removal Rate.

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ICMSTS – E006

EVOLUTIONARY COMPUTING FOR ADVANCED BIN PACKING OPTIMIZATION

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Abstract:

This research focuses on the bin packing problem using a hybrid genetic approach. The efficient and optimal packing of goods for transportation and distribution while satisfying practical constraints is a key concern in the logistics industry. Due to the unpredictable number and varying sizes of boxes, achieving an optimal packing arrangement is crucial. This study proposes a Heuristic Genetic Algorithm (HGA) to solve the Three-Dimensional (3D) Single Container Arbitrary-Sized Rectangular Prismatic Bin Packing Problem, optimizing empty volume within the container.

The algorithm considers practical constraints such as box orientation, stack priority, container stability, weight distribution, overlapping restrictions, and shipment placement. The study models the bin packing problem with 'n' boxes to be packed into a container of standard dimensions to maximize volume utilization and reduce transportation costs. The input data, including bin size, shape, weight, and constraints, are stored in a database and encoded into chromosome format for processing through a Genetic Algorithm (GA). GA operators are applied to these encoded strings to determine the best packing arrangement.

Keywords: Genetic Algorithm, Bin Packing, Multi-Dimensional Packing, Heuristic Optimization.

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ICMSTS - E007

SUSTAINABLE PRODUCTION OF IRON INCORPORATED BIO BANDAGES FOR ECO FRIENDLY WOUND HEALING SOLUTION

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Abstract:

This project develops a novel bio bandage incorporating iron nanoparticles (FeNPs) synthesized using a combined extract of *Citrus limon* and *Centella asiatica* as natural reducing and stabilizing agents. The optimized FeNPs are embedded into a biodegradable, biocompatible bandage matrix composed of bacterial cellulose derived from SCOBY (Symbiotic Culture of Bacteria and Yeast) technology, polyvinyl alcohol (PVA), and polycaprolactone (PCL). This design enhances wound healing, promotes tissue regeneration, and provides antimicrobial protection. *Citrus limon* offers antioxidant and antimicrobial properties, while *Centella asiatica* stimulates collagen synthesis and tissue repair. The bio-bandage combines natural extracts and FeNPs to maintain a moist wound environment, accelerate healing, and reduce infection risk. FeNPs exhibit strong antibacterial properties, especially against antibiotic-resistant microbes. Bacterial cellulose from SCOBY fermentation ensures biocompatibility, high water retention, and ECM-like structure, promoting cell adhesion and regeneration. Integrating bacterial cellulose with PVA and PCL enhances mechanical strength, flexibility, and durability for practical use. By combining green synthesis with advanced wound care technology, this project introduces an innovative and sustainable solution for wound healing. The results indicate that a 0.06M $FeSO_4$ concentration in the combined extracts yielded optimal nanoparticle formation and antimicrobial efficacy, confirming its suitability for bio bandage applications.

Keywords: Bio Bandage, FeNP, SCOBY technology, green technology, wound healing, plant-based extract.

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ICMSTS - E008

INCORPORATION AND DEVELOPMENT OF ANTHOCYANIN-BETALAINS BASED SUNSCREEN LOTION FOR THE PROTECTION OF SKIN CELLS

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Abstract:

An environmentally beneficial substitute for traditional UV filters is provided by the creation of sunscreens based on natural pigments. The extraction, characterization, and encapsulation of pigments produced from vegetables for use in sunscreen applications are the main objectives of this work. Three main peaks were found in the FTIR analysis of the extracted pigments, suggesting the presence of important bioactive functional groups. The successful extraction of these pigments was confirmed by a confirmation test that produced positive findings. Encapsulation helps prevent pigment degradation, improves dispersibility, and ensures controlled release for prolonged UV protection. Chitosan-based encapsulation was used to increase pigment stability and bioavailability. Two formulations showed high encapsulation efficiency, demonstrating strong pigment stability. These high-performing formulations suggest that chitosan encapsulation effectively preserves the pigments' functional properties while protecting them from environmental degradation. A total of 17 encapsulation trials were planned, and 10 have been completed thus far. Following FTIR analysis, confirmation tests, and encapsulation trials, the remaining encapsulation trials will be completed, and the encapsulated pigments will be incorporated into a sunscreen formulation. These natural pigments have a great deal of potential for use in sunscreen formulations.

Keywords: UV-protective, antioxidant, FTIR, bioactive compounds, photoprotective.

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ICMSTS - E009

DEVELOPMENT AND EVALUATION OF GARLIC EXTRACT AND CILASTAZOL-LOADED NANOPARTICLES FOR NUMEROUS MEDICAL APPLICATIONS

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Abstract:

Integrating bioactive compounds with nanotechnology is a promising strategy to enhance therapeutic efficacy and stability. This study mainly focuses on developing zinc nanoparticles encapsulating garlic extract and cilostazol for multiple medical applications. Garlic extract was obtained using dimethyl sulfoxide (DMSO) and chloroform, ensuring optimal extraction of its bioactive constituents, confirmed by FTIR. The FTIR values closely matched literature standards for allicin, diallyl disulfide, diallyl trisulfide, ajoene, saponins, phenolics, polysaccharides, amino acids, and alcohols. The nanoparticle formulation was optimized using response surface methodology (RSM) for the Zinc Sulfate, Tween 80 and the Reaction time with garlic extract inorder to determine its efficient encapsulation and stability. The RSM was employed to systematically evaluate the influence of formulation parameters, enabling the identification of optimal conditions for nanoparticle synthesis. The results obtained from RSM states that the experimental trials with the highest encapsulation efficiency (i.e., 94%) were chosen as the optimized range and repeated in large batches. This statistical approach facilitated enhancing encapsulation efficiency and particle stability while minimizing experimental variability. Further the synthesized nanoparticles will be analysed using X-Ray Diffraction analysis for their physicochemical properties, including size distribution and morphology; also the formulated compound will be applied for various medical application.

Keywords: Garlic extract, cilostazol, nanoparticles, RSM, Zinc Sulfate.

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ICMSTS - E010

STUDY ON OVERVIEW OF NANOMATERIALS

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Abstract:

Nanomaterials are quickly becoming recognized as the most potent substance in the universe. Due to the fact that it has a strong foundation in the "Nanotechnology". Aerogel, fullerene, and carbon nanotube are three distinct nano materials that are discussed in detail here, and their applications range from tissue engineering and cancer medicines to sports equipment and lithium-ion batteries to solar panels. The impact of nano materials on human existence is greatly expanding daily. People should therefore be aware of the significance of nanotechnology and nano materials. The content covered in the current study spans "Green nanotechnology" to the beginnings of nanotechnology. Additionally, it examines contemporary developments in nanotechnology. The general information about nanotechnology and nano materials is well-equipped, allowing people to understand the topic with ease.

Keywords: Universe, nanotechnology, tissue engineering, nano materials.

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ICMSTS – E011

NANO COATING: ADVANCED PROTECTIVE AND FUNCTIONAL SURFACE TECHNOLOGY

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Abstract:

Nano coating technology involves the application of ultra-thin layers at the nanoscale to enhance surface properties such as durability, corrosion resistance, water repellency, and self-cleaning capabilities. These coatings, often composed of nanoparticles or nanostructured materials, create protective barriers that improve performance in various industries, including automotive, healthcare, electronics, and construction. By modifying surface characteristics at the molecular level, nano coatings offer superior adhesion, transparency, and long-lasting effects compared to traditional coatings. This paper explores the principles, types, applications, and future prospects of nano coating technology, emphasizing its role in advancing material science and industrial innovation.

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ICMSTS – E012

MECHANICAL, VISCOELASTIC, AND VIBRATION PROPERTIES OF KENAF AND JUTE FIBER-REINFORCED COMPOSITES

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Abstract:

This study aims to systematically assess the mechanical attributes and damping properties of polyester composites that are enhanced with jute and kenaf fibers, while concurrently incorporating 5 wt.% of both rice husk and wood dust. The approach adopted for this inquiry will encompass mechanical testing, dynamic mechanical analysis executed across a range of temperatures and frequencies, as well as Scanning Electron Microscopy (SEM) for comprehensive investigation. The experimental methodologies will measure tensile strength, flexural strength, impact resistance, hardness, natural frequency, and the damping coefficient (tan δ). SEM imaging will enable the thorough analysis of the fractured surfaces of tensile specimens. The composites will be fabricated utilizing a manual layup technique that integrates mat fiber with 5 wt.% of both rice husk and wood dust. Initial findings suggest that the addition of fibers results in a decrease in damping curves (tan δ), whereas the integration of rice husk and wood dust demonstrates a positive relationship with the natural frequency and damping factor of the composite material.

Keywords: *Natural fiber, Polyester resin, Mechanical Properties, Dynamic Mechanical Analysis (DMA), Free Vibration Test (FVT) and SEM.*

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ICMSTS – E013

MACHINING CHARACTERISTICS AND MICROSTRUCTURE ANALYSIS OF AA 8011 USING WIRE CUT EDM

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Abstract:

This study analyzes the machining characteristics and microstructural changes of Aluminum Alloy 8011 (AA 8011) processed through Wire Cut Electrical Discharge Machining (WEDM). The research focused on optimizing critical WEDM parameters including pulse-on time, pulse-off time, gap current, and wire feed rate to achieve enhanced surface quality and good dimensional accuracy. Experimental trials were conducted using the Taguchi L9 orthogonal array design to systematically analyse the effects of these parameters on material removal rate (MRR), surface roughness (Ra), and kerf width. Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS) analyses revealed characteristic microstructural modifications in the heat-affected zone (HAZ), including recast layer formation, micro-cracks, and thermal stress-induced deformations. The study demonstrates that pulse-on time and peak current significantly influence MRR, while pulse-off time predominantly affects surface quality. Optimal parameter combinations were determined using Analysis of Variance (ANOVA) and Response Surface Methodology (RSM), yielding maximum MRR of mm^3/min with surface roughness values of µm Ra. These findings provide valuable insights for industrial applications of AA 8011 in precision manufacturing sectors *where high surface integrity and consistent mechanical properties are essential.*

Keywords: *AA8011, Surface roughness, Kerf width, Material Removal Rate*

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ICMSTS – E014

TRIBOLOGICAL AND SURFACE MORPHOLOGY STUDY ON ALTIN/ALTICRN COATED USING CATHODE RAY ARC DEPOSITION TECHNIQUE

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Abstract:

This study investigates the tribological properties and surface morphology characteristics of AlTiN/AlTiCrN multilayer coatings deposited on AISI 440 C Stainless Steel as substrates using the cathode arc deposition technique. Coatings with varying Cr content (0-15 at.%) and bilayer periods (10-100 nm) were synthesized under optimized deposition parameters. Surface morphology was characterized using field emission scanning electron microscopy (FESEM) revealing a dense columnar structure with average surface roughness (Ra) values ranging from 0.05-0.12 µm.. Tribological properties were evaluated using pin-on-disc tests against SiC counterparts under dry sliding conditions at room temperature and elevated temperatures (500°C and 700°C). The AlTiN/AlTiCrN coatings exhibited superior wear resistance compared to conventional TiN and AlTiN monolayer coatings, with coefficient of friction values ranging from 0.35-0.45 and specific wear rates of 2.1-4.8×10^{-15} m^3/Nm.. Nano indentation measurements indicated hardness values of 32-38 GPa and elastic modulus of 380-420 GPa, with the highest values corresponding to coatings with 10 at.% Cr content and 50 nm bilayer periods. This study demonstrates that optimized AlTiN/AlTiCrN multilayer coatings deposited by cathode arc deposition offer promising potential for high-temperature cutting and forming applications where excellent wear resistance is required.

Keywords: AlTiN/AlTiCrN, multilayer coating, cathode arc deposition, tribology, surface morphology, wear resistance, high-temperature performance

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ICMSTS – E015

EMISSION STUDY ON JATROPHA ENGINES

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Abstract:

The increasing demand for sustainable and eco-friendly energy sources has driven research into alternative fuels. Jatropha curcas, a non-edible oilseed plant, has emerged as a promising biofuel source due to its high oil content, adaptability to arid regions, and minimal competition with food crops. This study explores the feasibility of using Jatropha biodiesel in internal combustion engines, analyzing its performance, emissions, and efficiency compared to conventional diesel. The findings indicate that Jatropha-based biodiesel exhibits comparable thermal efficiency with reduced carbon monoxide (CO), hydrocarbon (HC), and particulate matter emissions. However, a slight increase in nitrogen oxides (NOx) emissions was observed, which could be mitigated through engine modifications and exhaust treatment technologies. Additionally, the study examines the economic viability and sustainability of large-scale Jatropha cultivation for biofuel production. The results suggest that Jatropha biodiesel is a viable alternative fuel that can contribute to reducing fossil fuel dependency and mitigating environmental impacts. Further research is recommended to optimize engine compatibility and improve biodiesel processing techniques.

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ICMSTS – E016

SECURE SMART CONTRACTS: AN ALGORITHMIC APPROACH UTILIZING BLOCKCHAIN DATA SECURITY MECHANISMS

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Abstract:

Smart contracts, autonomously executing code stored on a blockchain, have emerged as a promising technology for automating various processes across diverse industries. However, ensuring the security and integrity of smart contracts remains a significant challenge, given the immutable and transparent nature of blockchain technology. This paper presents an algorithmic approach to enhance the security of smart contracts by leveraging advanced blockchain data security mechanisms. We propose a comprehensive framework that integrates cryptographic techniques such as hash functions, digital signatures, and encryption algorithms to safeguard the confidentiality, integrity, and authenticity of smart contract data. Furthermore, we explore consensus mechanisms and access control strategies to mitigate potential vulnerabilities and unauthorized access. Through a detailed analysis and implementation of our algorithm, we demonstrate its effectiveness in bolstering the security of smart contracts, thereby enabling trust and reliability in blockchain-based applications.

Keywords: Smart contracts, Blockchain, Data security, Cryptography, Consensus algorithms, Access control, Hash functions, Digital signatures, Multi-signature transactions, Permissioned blockchains.

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ICMSTS – E017

COMPUTATIONAL INTELLIGENCE TOWARDS SUSTAINABILITY

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Abstract:

Computational Intelligence (CI) related to sustainability involves using advanced computational methods—such as artificial intelligence (AI), machine learning (ML), neural networks, fuzzy logic, and evolutionary algorithms—to tackle sustainability issues. It focuses on optimizing resource utilization, decreasing environmental harm, and improving efficiency across various sectors like energy, agriculture, transportation, and climate science. The integration of Computational Intelligence (CI), Artificial Intelligence (AI), and Machine Learning (ML) is transforming sustainability initiatives in numerous fields. These sophisticated computational methods facilitate effective resource management, reduce ecological footprints, and improve decision-making in vital areas. AI-enhanced renewable energy optimization boosts power generation efficiency by using predictive analytics and smart grid management. Intelligent urban environments exploit AI and the Internet of Things (IoT) to enhance energy usage, manage traffic flow, and improve waste handling. In the field of climate science, machine learning models enhance the accuracy of forecasts, allowing for proactive strategies to mitigate climate change impacts. AI-driven eco-friendly manufacturing minimizes waste, streamlines supply chains, and supports circular economy efforts. Additionally, precision agriculture employs AI and machine learning for real-time monitoring of crops, improved irrigation techniques, and sustainable farming methods. Despite these advancements, there are still issues such as data privacy, ethical use of AI, and energy consumption in computation that need to be tackled to ensure sustainable application of AI. The collaborative interaction of AI, machine learning, and sustainability holds significant promise for creating greener, more effective, and resilient solutions that align technological advancement with environmental stewardship.

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ICMSTS – E018

CHITOSAN EXTRACTION FROM SHRIMP SHELLS (*Litopenaeus Vannamei*) AND CHITOSAN-SILVER NANOPARTICLE COMPOSITE AS A NATURAL ANTIFUNGAL PRESERVATION OF POSTHARVEST BANANA (*Musa Paradisiaca*) AND DRAGON FRUIT (*Selenicereus Undatus*)

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Abstract:

Postharvest fungal infections significantly impact fruit shelf life and quality, leading to economic losses and increased food waste. Conventional synthetic preservatives pose environmental and health concerns, necessitating sustainable alternatives. This research explores the extraction of chitosan from *Litopenaeus vannamei* shrimp shells and its enhancement with silver nitrate nanoparticles (AgNPs) for use as a natural antifungal preservative for bananas (Musa paradisiaca) and dragon fruits (*Selenicereus undatus*). Chitosan was extracted and characterized for its degree of deacetylation, antioxidant activity, and antifungal efficacy. AgNPs were synthesized using a green approach and incorporated into the chitosan matrix to enhance antimicrobial properties. The antifungal activity of the chitosan-AgNP composite was tested against *Aspergillus niger,* a major postharvest pathogen, using antifungal assays. Results demonstrated that the composite exhibited significantly enhanced antifungal activity compared to chitosan alone, effectively inhibiting fungal growth. The application of the chitosan-AgNP composite extended the shelf life of bananas and dragon fruits by preventing fungal contamination while preserving quality. Its eco-friendly, biodegradable nature makes it a promising alternative to synthetic preservatives. This study highlights the potential of chitosan-based nanocomposites for sustainable postharvest management, contributing to food safety and waste reduction.

Keywords: Chitosan, Silver Nanoparticles, Antifungal, Postharvest Preservation, Aspergillus niger, Banana, Dragon Fruit.

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ICMSTS – E019

GREEN SYNTHESIS OF DOXORUBICIN LOADED SILVER NANOPARTICLES AND EVALUATION OF ITS EFFECT IN LUNG CANCER

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Abstract:

Lung cancer, one of the leading causes of cancer-related deaths globally, poses significant challenges in treatment due to its aggressive nature and the limited effectiveness of current chemotherapy regimens. To address this, natural compounds such as Centella asiatica, a plant known for its medicinal properties, were explored for their potential to enhance the therapeutic effects of chemotherapeutic agents. Centella asiatica has been shown to possess anti-inflammatory, antioxidant, and anticancer properties, making it an ideal candidate for combination therapies. In silico screening of its bioactive phytochemicals against key lung cancer targets was performed to identify potential inhibitors with strong therapeutic potential. The primary objective of this study is to develop a novel, targeted drug delivery system that enhances the therapeutic efficacy of Doxorubicin (DOX) while minimizing its systemic toxicity, commonly observed in conventional chemotherapy. Silver nanoparticles (AgNPs) were synthesized using a biological reduction method and subsequently loaded with DOX to create a nanocarrier system designed for improved cancer therapy. DOX-loaded AgNPs were characterized using UV-Vis spectroscopy, TEM, and SEM to assess size, shape, stability, and drug-loading efficiency. In vitro studies showed a controlled, sustained DOX release, enhancing pharmacokinetics. Cytotoxicity assays on A549 lung cancer cells demonstrated increased apoptosis and reduced viability compared to free DOX, with lower toxicity toward normal cells. This targeted system improved cellular uptake and retention in cancer cells, leading to higher therapeutic efficacy and reduced side effects, ensuring better biocompatibility and selectivity.

Keywords: Lung cancer, Centella asiatica, Silver nanoparticles, Doxorubicin, targeted drug delivery, nanocarrier system, in silico screening, phytochemicals, lung cancer targets.

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ICMSTS – E020

ISOLATION, IDENTIFICATION AND CHARACTERISATION OF HEAVY METAL DEGRADING BACTERIA FROM COPPER AND PETRO CHEMICAL INDUSTRIAL WASTEWATER

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Abstract:

The discharge of heavy metals from copper and petrochemical industries poses a significant threat to environmental and public health due to their toxic and persistent nature. Bioremediation, employing microorganisms capable of degrading or transforming these pollutants, offers a sustainable solution to this problem. This study aims to isolate, identify, and characterize bacteria with the ability to degrade heavy metals from industrial wastewater. Wastewater samples were collected from copper and petrochemical industrial sites, and bacterial strains were isolated using selective media designed to promote the growth of heavy metal-resistant organisms. The isolated strains were then identified through morphological, biochemical, and molecular techniques, including 16S rRNA gene sequencing. Further characterization of these bacteria focused on their resistance profiles, heavy metal degradation efficiency, and the specific mechanisms employed in metal reduction or transformation. This study highlights the potential of utilizing indigenous bacterial strains for the bioremediation of industrial wastewater, providing an eco-friendly approach to mitigating heavy metal pollution.

Keywords: Heavy metals, Bioremediation, Petrochemicals, Waste water, Pollution

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ICMSTS – E021

COMBINING RESIDUAL NETWORKS: AN ENSEMBLE METHOD FOR MULTI-STAGE CLASSIFICATION OF ALZHEIMER'S DISEASE IN MULTIMODAL IMAGES

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Abstract:

Alzheimer's disease is a progressive brain disorder that gradually impairs memory, thinking, and daily functioning. In our study, we present a deep learning framework that not only uses residual networks (ResNets) to extract detailed features from brain MRI scans but also incorporates an ensembling technique to improve classification accuracy. By combining predictions from multiple ResNet models through a weighted ensembling approach, our method captures diverse aspects of the imaging data, enabling it to accurately distinguish between early, moderate, and advanced stages of Alzheimer's disease. We evaluated our ensemble model on the ADNI dataset, and the results demonstrate enhanced performance over individual models and traditional convolutional methods. This improved, automated staging system has the potential to support clinical decision-making by providing a more reliable assessment of disease progression.

Keywords: Alzheimer's Disease, Residual Networks, Deep Learning, Multi-Stage Classification, Brain MRI, ADNI Dataset, Early Diagnosis, Ensembling approach

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ICMSTS – E022

IoT DRIVING SUSTAINABILITY THROUGH MULTIDISCIPLINARY INNOVATION

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Abstract:

The Internet of Things (IoT) serves as a transformative force in driving sustainability through its multidisciplinary applications. By integrating technologies like sensors, data analytics, and cloud computing across diverse sectors, IoT enables innovative solutions to address critical environmental challenges. One key area is energy efficiency, where IoT-powered smart grids monitor and optimize energy usage, reducing waste and supporting renewable energy integration. Similarly, in precision agriculture, IoT systems enhance resource management by minimizing water, fertilizer, and pesticide use, thus promoting sustainable farming practices. IoT also plays a pivotal role in waste management, as connected devices facilitate real-time tracking of waste collection and recycling processes, ensuring efficient resource utilization. Furthermore, IoT enhances urban sustainability through smart cities, which employ IoT technologies to optimize traffic management, reduce pollution, and improve water distribution. These applications demonstrate the potential of IoT to create interconnected systems that support long-term environmental and economic sustainability. The success of IoT in advancing sustainability stems from its multidisciplinary collaboration, bridging engineering, environmental science, artificial intelligence, and policy-making. This holistic approach fosters innovative solutions tailored to diverse challenges, emphasizing the need for cooperative efforts across fields. As IoT continues to evolve, its integration with green technologies and edge computing promises further progress toward reducing carbon footprints and enhancing ecological resilience. By leveraging IoT's capabilities, societies can make significant strides in addressing climate change, conserving resources, and achieving sustainable development goals, ensuring a balanced coexistence between technological advancement and environmental stewardship.

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ICMSTS – E023

FORMULATION AND PHYSICOCHEMICAL ASSESSMENT OF VEGAN MEATBALLS UTILIZING ANTIBACTERIAL COMPOSITE FLOURS

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Abstract:

This study focuses on the formulation and physicochemical assessment of vegan meatballs using antibacterial composite flour, aimed at enhancing nutritional value and ensuring food safety. Docking analysis identified Shiitake mushrooms, Kabuli chickpeas, and Quinoa as optimal ingredients based on their antibacterial potential. Proximate analysis revealed their carbohydrate and protein contents: Shiitake mushrooms (carbohydrate: 7.768%, protein: 7.68%), Kabuli chickpeas (carbohydrate: 59.683%, protein: 19.84%), and Quinoa (carbohydrate: 68.048%, protein: 13.218%). These results formed the basis for creating a composite flour for the vegan meatball formulation .The formulation process involved blending these ingredients with optimal binding agents and seasonings to replicate the texture, flavor, and appearance of traditional meatballs. Physicochemical assessments, including texture, pH, color, and water-holding capacity, were conducted to ensure quality and safety. The antibacterial properties of the composite flour were key in inhibiting common foodborne pathogens and extending the product's shelf life. Sensory evaluation validated the acceptability of the final product, particularly in taste and texture.Future work will focus on monitoring pH and temperature stability during storage to evaluate shelf-life consistency. Additionally, TLC analysis will be conducted to study amino acid sequences for further nutritional profiling. Shelf-life extension strategies, including packaging innovations and microbial studies, will also be explored to ensure commercial viability.This study demonstrates the potential of vegan meatballs as a sustainable, nutritious, and safe alternative to meat products, aligning with global trends toward environmentally friendly and health-conscious food systems

Keywords: vegan meat ball, sustainable, antibacterial composite flour, shelf life, proximate analysis.

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ICMSTS – E024

OPTIMIZING MOUTH ULCER THERAPY: NANO-LIPOSOMAL ENCAPSULATION OF *Foeniculum vulgare*

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Abstract:

Mouth ulcers or Canker sores are the common and troublesome condition that most of the people across the world. The traditional or conventional treatments that are being used for treating mouth ulcer use synthetic drugs that brings adverse side effects and limited effect. Although Foeniculum vulgare is known for its anti-inflammatory, antimicrobial and antioxidant properties, its application in treating mouth ulcer is limited. This research mainly aims to improve the treatment of canker by Nano liposomal encapsulation technique that uses the healing properties like anti-inflammatory, antimicrobial and antioxidant of the plant. Using fennel extract, thin-film hydration and sonication were used in this work to create nanoliposomes. The application of thin-film hydration to incorporate fennel extract into nano-liposomes resulted in an encapsulation efficiency of 81.79 µg/mg phenolic content in the pellet and 60 µg/mg in the supernatant. Antimicrobial tests revealed a significant inhibition toward Streptococcus mutans with a maximum inhibition zone of 25 mm at 1000 µg/ml, which was comparable to the standard control. Similarly, the nano-encapsulated fennel extract exhibited significant antioxidant activity in both the DPPH and phosphomolybdate assays, recording 68.63% and 89.4% inhibition at 120 µg/ml, respectively. The structural integrity of nano-liposomal encapsulation was supported by the findings of UV-Vis spectrophotometry which showed increased absorbance at 300 nm and FTIR analysis which revealed the presence of functional phenolic groups attributed to the encapsulation of Foeniculum vulgare. The study progressed towards product development by formulating a mucoadhesive film for effective application. Anti-inflammatory activity was assessed through a human red blood cell (HRBC) membrane stabilization assay, which demonstrated comparable effects between the nano-liposomal extract and the standard drug diclofenac sodium, particularly at higher concentrations.

Keywords: *Foeniculum vulgare*, nano-liposomes, mouth ulcer, mucoadhesive film, wound healing

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ICMSTS – E025

DEVELOPMENT OF ECO-FRIENDLY THERMOCOL FROM COCONUT HUSK

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Abstract:

The excessive pollution caused by polystyrene, a non-biodegradable thermocol commonly used for its light weight and insulation properties has continued to escalate. Whenever foams are considered, polymers macromolecules obtained from petroleum have been predominantly used in history. On the other hand, its persistent nature has made it an important source of pollution and ecosystem deterioration. There is surge need for eco-friendly replacements in the packaging sector due to the increasing environmental concerns around conventional thermocol (polystyrene). Biodegradable polymers can decay into water and carbon dioxide throughout various environmental microorganisms' action like bacteria and fungi. This Project aims on innovative developments of biodegradable thermocol exploring some aspects like material composition; manufacturing procedures as well as packing uses. This project proposes an inventive fungal mycelium-based bio foam. In addition, an antimicrobial film is being coated on the bio foam in order to prevent unwanted contamination and increase the shelf life of the biofoam. Moreover, it discusses its future prospects within plastic waste reduction strategies framework in relation to circular economy. Integrating sustainability into packaging options, thus reducing the environmental impact of packaging fibres and meeting the needs of packaging industries.

Keywords: Polystyrene, Packaging, Bio foam, Biodegradable, Eco-friendly.

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ICMSTS – E026

STRENGTHENING SECURITY AND EFFICIENCY IN FILE EXCHANGE WITH A FORTIFIED SOLUTION

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Abstract:

Today's File Exchange Systems often lack the security measures that are important to safeguard the data from harmful threats such as data manipulation. On the other hand, it does have performance and susceptibility issues. So, after observing all these cases, we led to a pressing need of a Fortified File Exchange System that enables the user to perform the data transmission with ease and security that would decrease the chances of critical security issues or any malicious activities such as data leakage or malware infiltration. When we looked into the conventional data transmission methods such as sending files as e-mail attachments or sharing them over insecure cloud-based systems or storage devices, the sender and the receiver face problems such as data leakage and slow transfer speeds and unavailability of real-time location of the data packets over the internet. Our project's emphasis is on the security of user data and user- credentials while he/she is using our Fortified File Exchange system with having a good efficiency and a better User-Experience (UX) with enhanced data transmission speeds and secure data transfer protocols. Using data encryption standards such as AES, DES, TripleDes, RC6 and ECC with a combination of Secure File Transfer Protocols (SFTPs) would help us in solving the ever-existing problems in the digital world. Since, Data is the new gold, our project Fortified File Exchange (FFE) aims to overcome the drawbacks that exist in the today's file exchange systems. Starting from the roots of an organization's digital infrastructure to the pinnacle of its cyber threats we aim to develop UI as per the user requirement

Keywords: Fortified File Exchange, Secure File Transfer Protocols, User-Experience, data encryption standards

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ICMSTS – E027

DEVELOPMENT OF ANTHOCYANIN LOADED POLYMERIC NANOPARTICLE TARGETING ALPHA - SYNUCLEIN OF PARKINSON'S DISEASE

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Abstract:

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the accumulation of α-synuclein aggregates. Existing therapeutic treatments, including L-Dopa, have significant side effects, necessitating alternative strategies. This study aims to develope Anthocyanin - loaded polymeric nanoparticles as a potential therapeutic agent targeting α-synuclein. Anthocyanins were extracted from *Hibiscus rosa-sinensis* and *Beta vulgaris* using ethanol-based ultrasonic extraction. Phytochemical analysis confirmed the presence of anthocyanins and further characterization was performed via Thin-layer chromatography (TLC) to determine Rf values, followed by Fourier-transform infrared (FTIR) spectroscopy for structural elucidation. Partial purification of anthocyanins was achieved using column chromatography, with fraction verification using TLC. The results validated the successful extraction and purification of anthocyanins, setting the foundation for nanoparticle formulation. To enhance bioavailability and targeted delivery, the purified anthocyanins were encapsulated using pectin and polyethylene glycol (PEG)-nanoparticles. Pectin, a natural polysaccharide, aids in sustained release and stability, while PEG enhances nanoparticle solubility and blood-brain barrier penetration. This nanoencapsulation process ensures the controlled release of anthocyanins, potentially improving their neuroprotective effects against α-synuclein aggregation. These findings support the potential of anthocyanin-loaded nanoparticles as a promising alternative for PD treatment, paving the way for further in-vitro and in-vivo studies.

Keywords: Parkinson's disease, Anthocyanin, Pectin, PEG, Hibiscus, Beetroot, alpha-synuclein, nanoencapsulation,

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ICMSTS – E028

ENHANCING PRODUCTIVITY IN TIG WELDING THROUGH INNOVATIVE EQUIPMENT DESIGN

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Abstract:

Measurement and continuous improvement are critical at all levels of industrial management, from optimizing equipment effectiveness and quality at the operational level to maximizing labor utility, production efficiency, and capacity utilization at the managerial level. This case study, conducted at a government boiler factory in India, employed a scientific approach to identify and eliminate non-value-added activities in the TIG welding process. A custom-designed mechanized system was developed and installed, resulting in an 85% productivity improvement in a single day. The new equipment, capable of 360° rotation, streamlined loading and unloading processes, reduced handling time, and optimized space utilization, significantly enhancing overall efficiency.

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ICMSTS – E029

CASE STUDY OF CYCLE TIME REDUCTION BY MECHANIZATION IN MANUFACTURING ENVIRONMENT

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Abstract:

Research and Innovation offer facilitation, fulfil the day to day requirements, and bring sophisticated things to the society. In industries such facilitation reduces the fatigue, employee morale and improves productivity. The research is focused on such requirement for gear box manufacturing industries. The Six sigma approach of Eliminate, Combine, Rearrange, Simplify (ECRS) method and cycle time analysis were carried out to understanding the problem and solution requirements. The newly mechanized equipment was installed and tested. The result shows that cycle time reduced significantly and reduced employee fatigue and raised morale to a great extent. The designed equipment is a general purpose to improve the productivity of similar industries.

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ICMSTS - E030

STUDIES ON GERANIOL DERIVATIVES TARGETING KRASG12D GENE OF PANCREATIC DUCTAL ADENOCARCINOMA

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Abstract:

Kristen rat sarcoma virus (KRAS) mutations are central to the molecular framework, which are present in 90% of Pancreatic Ductal Adenocarcinoma (PDAC) cases and play a pivotal role in pancreatic carcinogenesis. Research has highlighted the varying prognostic and therapeutic implications of different KRAS mutations and their complex interactions with downstream and parallel signalling pathways. In this study, Gas Chromatography-Mass Spectrometry (GC MS) analysis was conducted to profile chemical components of geranium oil, Lipinski, and ADME screening, followed by molecular docking of screened geranyl derivatives to explore their potential as KRAS G12D inhibitors and preparation of geraniol loaded biopolymeric nanoparticle to elevate the drug availability and controlled-release. *In-silico* tools helped to identify the suitable ligand Neryl isobutyrate for further studies as it's amino acid interaction with protein and binding energy were most probably similar and close to the drug MRTX1133 (control) respectively. The optimization of geranium oil loaded chitosan/PEG nanoparticle was done using Box-Behnken design (Response Surface methodology) by examining the effects of processing variables (chitosan concentration (mg/ml), PEG concentration (%), surfactant concentration (%)) through calculating encapsulation efficiency (%). The optimized nanoparticles were characterized by X-ray diffraction (XRD), zeta potential, Dynamic light scattering (DLS) and Scanning electron microscopy (SEM) to check the size and surface area of the prepared nanoparticle. Comparative in-vitro studies on cell line are studied by releasing geranium oil and geranium oil loaded chitosan/PEG nanoparticle.

Keywords: Pancreatic ductal adenocarcinoma (PDAC), Geraniol derivatives, KRASG12D gene, *In-silico* studies, Response surface methodology (RSM), chitosan/PEG nanoparticle

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ICMSTS - E031

ARTIFICIAL INTELLIGENCE BLOCKCHAIN BASED FAKE NEWS DISCRIMINATION

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Abstract:

This project presents a hybrid deep learning framework designed to advance fake news detection using FastText embeddings and Explainable AI (XAI) techniques. The proposed system leverages real-time data from Twitter, a dynamic platform rich in textual content, to identify fake news. FastText embeddings are used to capture the context of news articles more effectively, resulting in improved semantic understanding. The XGBoost algorithm is employed to classify news articles as real or fake, using these embeddings as input features. The integration of XAI ensures transparency in the model's decision-making, providing users with interpretability and trust in the results. Data is stored and managed through a PHP-based front-end interface and SQL database, allowing efficient retrieval and management of information. This hybrid framework offers a scalable, interpretable, and accurate solution for addressing the challenge of fake news in online ecosystems.

Keywords: Deep Learning, FastText , XGBoost algorithm, Fake news, XAI.

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ICMSTS - E032

EXPLORATION OF LIGHT-INDUCED PIGMENT VARIATION IN ENDOPHYTIC FUNGI FROM *AEGLE MARMELOS* AND THEIR BIOACTIVITIES

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Abstract:

Endophytic fungi are a rich source of bioactive secondary metabolites, including pigments with potential applications in pharmaceuticals, food, and cosmetics. Environmental factors, particularly light, can influence the production of these pigments. This study explores the effect of different light conditions on pigment production in endophytic fungi isolated from Aegle marmelos (Vilvam). The experiment involved exposing fungal isolates to different light spectra (visible, ultraviolet, and darkness) to observe changes in pigment intensity, composition, and yield. Pigments were extracted using solvent-based techniques, followed by spectroscopic and chromatographic analyses to characterize their structural variations and identify active compounds. Additionally, the bioactivity of the pigments, including antimicrobial and antioxidant potential, was evaluated using standard assays, such as disc diffusion and DPPH radical scavenging methods, respectively. The antimicrobial and antioxidant activities of the pigments were also evaluated. Results indicate that light significantly influences pigment biosynthesis, with certain wavelengths enhancing both pigment yield and bioactivity. This study highlights the potential of light as a regulatory factor in fungal pigment production, paving the way for optimized biotechnological applications.

Keywords: Endophytic fungi, Aegle marmelos, pigment production, light-induced variation, antimicrobial activity, secondary metabolites.

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ICMSTS - E033

DENSITY-BASED SPATIAL CLUSTERING OF APPLICATIONS WITH NOISE (DBSCAN) FOR DETECTING OUTLIERS

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Abstract:

Density-Based Spatial Clustering of Applications with Noise (DBSCAN) is an unsupervised machine learning algorithm used for clustering and anomaly detection. Unlike traditional clustering methods such as k-means, DBSCAN does not require the number of clusters to be predefined. Instead, it identifies dense regions in data based on two key parameters: epsilon (ε), which defines the neighborhood radius, and minPts, the minimum number of points required to form a dense region. DBSCAN efficiently detects outliers as noise points that do not belong to any dense region, making it highly effective for anomaly detection in various real-world applications, such as fraud detection, network security, and medical diagnosis. Additionally, its ability to identify clusters of arbitrary shapes provides an advantage over centroid-based clustering methods. Points that do not belong to any dense region are classified as noise, making DBSCAN an effective method for detecting outliers. This capability is particularly useful in applications such as fraud detection, network intrusion detection, and medical diagnostics, where identifying anomalies is critical. Moreover, DBSCAN performs well on large datasets with varying densities and is resistant to noise, making it a robust choice for real-world data analysis. This paper explores the theoretical foundation of DBSCAN, its advantages and limitations in outlier detection, and its practical applications across different domains.

Keywords: DBSCAN, Density-Based Clustering, Outlier Detection, Anomaly Detection, Unsupervised Learning, Noise Identification

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ICMSTS - E034

AI POWERED MENTAL HEALTH ASSISTING CHATBOT

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Abstract:

The presented project introduces an AI-driven Mental Health Assisting Chatbot, implemented as a web application using Django, designed to provide personalized emotional support and mental health guidance. By leveraging machine learning, natural language processing (NLP), and deep learning techniques, the chatbot effectively understands user concerns and delivers contextually relevant responses. The integration of Transformers and Keras enhances its conversational capabilities, while Django ensures a seamless and responsive user experience. The chatbot offers users a confidential and interactive platform to seek coping strategies, self-care tips, and mental well-being recommendations.

The envisioned future work focuses on expanding intent recognition, refining sentiment analysis, and improving response generation for more empathetic interactions. Dataset augmentation and model adaptations will ensure adaptability to diverse mental health concerns. Privacy measures, rigorous testing, and continuous deployment monitoring are essential for maintaining accuracy, reliability, and ethical compliance. In conclusion, this project contributes to the advancement of AI-powered mental health support systems, setting a foundation for more adaptive, accessible, and user-friendly digital well-being solutions.

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ICMSTS - E035

BIOMARKERS AND THEIR SIGNIFICANCE IN BREAST CANCER DETECTION

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Abstract:

Breast cancer is one of the most prevalent malignancies affecting women worldwide, and early detection is crucial for improving patient outcomes. Biomarkers play a significant role in the early diagnosis, prognosis, and treatment of breast cancer. These molecular indicators, which include genetic, protein, and metabolic markers, help in identifying cancer at its nascent stage, predicting disease progression, and determining therapeutic responses. Common biomarkers such as HER2, estrogen receptor (ER), progesterone receptor (PR), and BRCA1/BRCA2 mutations guide personalized treatment strategies. Advances in liquid biopsy techniques and emerging biomarkers, including circulating tumor cells (CTCs) and microRNAs, further enhance diagnostic accuracy and non-invasive monitoring. This review highlights the significance of biomarkers in breast cancer detection, emphasizing their role in precision medicine and improved patient management. Emerging biomarkers such as PIK3CA mutations, Ki-67, and tumor-infiltrating lymphocytes (TILs) further enhance diagnostic precision and treatment personalization. The integration of biomarker-based strategies with artificial intelligence and machine learning is also revolutionizing early detection and risk assessment. This review explores the significance of biomarkers in breast cancer detection, highlighting their evolving role in precision oncology. By improving diagnostic accuracy, predicting treatment response, and enabling real-time disease monitoring, biomarkers contribute to enhanced patient outcomes and personalized cancer care. Further research and clinical validation of novel biomarkers will continue to refine breast cancer management and improve survival rates.

Keywords: Breast cancer, biomarkers, early detection, diagnosis, prognosis, estrogen, tumour

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ICMSTS - E036

ENHANCING DATA TRANSMISSION SECURITY THROUGH STEGANOGRAPHY WITH RC5 AND AES

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Abstract:

In today's interconnected digital landscape, ensuring the secure transmission of sensitive data is paramount. This research proposes a comprehensive approach to address this concern by integrating blockchain and Homomorphic encryption with steganography based robust cryptographic algorithms, specifically RC5 and AES. The study aims to enhance data security by concealing information within digital media and fortifying it against potential transmission attacks. Steganography, the art of hiding information within seemingly innocuous cover media, provides an additional layer of confidentiality during data transmission. The research explores the efficiency of steganographic techniques in concealing data within digital images, audio, or video files. By leveraging the concealment capabilities of steganography, the proposed system aims to thwart eavesdropping attempts and unauthorized access to sensitive information. To further fortify the concealed data, the RC5 algorithm is employed for its proven cryptographic strength and efficiency in handling both encryption and decryption processes. Additionally, the Advanced Encryption Standard (AES) algorithm, renowned for its robust security features, is implemented to ensure an added layer of protection. The combination of these cryptographic algorithms with steganography creates a multi-layered defense mechanism, safeguarding data against various types of transmission attacks.

Keywords: Data, Steganography, Homomorphic encryption, RC5 and AES algorithm.

ISBN 978-819840061-1

ICMSTS – E037

DECENTRALIZED AND TRANSPARENT CLIMATE ACTION: LEVERAGING GREEN DAOS AND BLOCKCHAIN FOR EFFICIENT FUND MANAGEMENT AND ECO-FRIENDLY INCENTIVES

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Abstract:

This paper explores the integration of blockchain technology and Decentralized Autonomous Organizations (DAOs) to establish a decentralized framework for climate action. By leveraging smart contracts, Green DAOs enable automated, tamper-proof fund allocation, ensuring transparency and eliminating intermediaries. This approach enhances trust and accountability in climate financing, reducing corruption while optimizing fund distribution. Furthermore, tokenized incentives encourage individuals, businesses, and communities to engage in eco-friendly practices by rewarding sustainable actions such as carbon offsetting, renewable energy adoption, and waste reduction. Blockchain's immutable ledger provides real-time tracking of funds, carbon credits, and environmental impact, ensuring measurable and verifiable sustainability efforts. Additionally, decentralized governance empowers stakeholders worldwide, fostering collaborative decision-making for climate action. This research highlights the transformative potential of blockchain in revolutionizing climate finance, promoting sustainability, and driving global participation in environmental conservation. By integrating blockchain-based governance with transparent fund distribution, Green DAOs offer an innovative model to address climate challenges and accelerate the transition toward a greener, more sustainable future.

Keywords: *Blockchain, Green DAOs, Climate Action, Smart Contracts, Decentralized Finance (DeFi), Sustainability, Fund Transparency, Tokenized Incentives, Environmental Conservation, Carbon Offsets, Renewable Energy, Climate Governance, Circular Economy.*

ISBN 978-819840061-1

ICMSTS – E038

BLOCKCHAIN FOR SOCIAL GOOD: TACKLING GLOBAL CHALLENGES THROUGH DECENTRALIZED TECHNOLOGIES

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Abstract:

Blockchain technology, initially known for powering cryptocurrencies, has evolved into a transformative tool with the potential to address a wide range of global challenges. This paper explores the application of blockchain for social good, focusing on how decentralized technologies can offer innovative solutions to issues such as poverty, education, healthcare, and climate change. By providing transparency, security, and efficiency, blockchain can empower individuals, enhance trust in systems, and facilitate equitable access to resources. Through case studies and emerging applications, this research demonstrates how blockchain is being leveraged to create positive social impact, from enabling transparent charity donations to promoting sustainable supply chains. The paper also examines the challenges and ethical considerations associated with implementing blockchain in these contexts, offering recommendations for fostering widespread adoption and maximizing its potential for social change.

Keywords:
Blockchain, Social Good, Decentralized Technologies, Global Challenges, Transparency, Security, Equity, Poverty Alleviation, Healthcare Innovation, Climate Change, Sustainable Supply Chains, Charitable Donations, Ethical Considerations, Social Impact, Digital Trust.

ISBN 978-819840061-1

ICMSTS – E039

ENERGY EFFICIENCY IN CONSENSUS ALGORITHMS: A DEEP DIVE INTO PROOF-OF-AUTHORITY (POA) AND PRACTICAL BYZANTINE FAULT TOLERANCE (PBFT)

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Abstract:

As blockchain networks continue to evolve, energy efficiency has become a critical concern, particularly with the environmental impact of Proof-of-Work (PoW) and other energy-intensive consensus algorithms. This paper explores the energy efficiency of alternative consensus mechanisms, focusing on **Proof-of-Authority (PoA)** and **Practical Byzantine Fault Tolerance (PBFT)**. Both PoA and PBFT are designed to reduce the computational resources required for consensus while maintaining security and decentralization, making them promising solutions for blockchain networks aiming to reduce energy consumption. **Proof-of-Authority (PoA)** relies on a small set of trusted validators to validate transactions, significantly lowering energy usage compared to PoW, which requires massive computational effort. PoA offers scalability and low latency, making it suitable for permissioned blockchain systems. In contrast, **Practical Byzantine Fault Tolerance (PBFT)** is a fault-tolerant consensus algorithm that enables reliable transaction validation by multiple validators, ensuring network integrity while consuming minimal energy. PBFT is especially beneficial for permissioned blockchains, where nodes are known and trusted. This paper compares these two consensus algorithms in terms of energy efficiency, scalability, security, and decentralization, analyzing their performance in various blockchain applications, such as supply chain management, enterprise solutions, and financial services..

Keywords: Energy efficiency, Proof-of-Authority (PoA), Practical Byzantine Fault Tolerance (PBFT), blockchain, consensus algorithms, scalability, security, decentralization, sustainability, permissioned blockchain.

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ICMSTS – E040

BLOCKCHAIN TOKENIZATION OF ASSETS: A NEW ERA IN REAL ESTATE AND GLOBAL PROPERTY INVESTMENT

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Abstract:

The tokenization of assets, particularly in the real estate sector, marks a transformative shift in global property investment. This research explores how blockchain technology enables the digitization and fractionalization of real estate assets, making global property markets more accessible, transparent, and efficient. By leveraging blockchain's decentralized nature, tokenized assets allow for fractional ownership, enhancing liquidity, transparency, and inclusivity in traditionally exclusive investment markets. The study investigates the opportunities created by tokenization, including the reduction of entry barriers for small investors and the facilitation of cross-border investments. Challenges such as regulatory concerns, security issues, and market adoption are also addressed. This work contributes to understanding the potential of tokenization in reshaping global property investment and it's broader implications on financial markets.

Keywords: *Tokenization, Blockchain, Real Estate Investment, Global Property Market, Asset Fractionalization*

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ICMSTS – E041

THE FUTURE OF BLOCKCHAIN: EMERGING TRENDS AND INNOVATIONS

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Abstract:

Blockchain technology is evolving rapidly, moving beyond its origins in cryptocurrency to reshape various industries. This transformation is fueled by innovations in decentralized finance (DeFi), artificial intelligence (AI) integration, and the emergence of blockchain-powered metaverses. Sustainable blockchain solutions are addressing environmental concerns, while central banks explore digital currencies (CBDCs) as the future of money. Enhanced privacy features, cross-chain interoperability, and decentralized governance models are redefining how businesses and communities operate. With quantum computing on the horizon, the development of quantum-resistant blockchains ensures long-term security. This article explores these groundbreaking trends and their potential to revolutionize the digital landscape. The integration of AI, the growth of decentralized finance, and the expansion of blockchain in the metaverse are just a few of the major developments shaping the future.

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ICMSTS - E042

FORMULATION & DEVELOPMENT OF ORGANIC SUNSCREEN FROM MICROALGAE RICH IN PHENOLIC ACID

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Abstract:

Increased interest in biocompatible and sustainable skincare products has fueled the desire for microalgae-based sunscreens as alternatives to chemical sunscreens. The present work deals with the formulation and characterization of an organic sunscreen fortified with microalgae phenolic compounds and zinc oxide nanoparticles (ZnO NPs) to increase photo protection and reduce environmental footprint. Freshwater microalgae were grown, isolated, and treated with metabolite extraction to yield phenolic compounds. Quantitative analysis showed the maximum phenol content of 429.8095 mg/GAE, which exhibited high antioxidant and UV-absorbing activity. These bioactive metabolites were integrated into ZnO nanoparticles that were synthesized using an algal extract. The ZnO nanoparticles prepared exhibited a characteristic UV absorption peak at 260 nm, thereby confirming their effectiveness in ultraviolet protection. Structural and functional characterization was performed using UV-Vis spectroscopy, Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and energy-dispersive X-ray spectroscopy (EDAX).Sunscreen formulation was achieved through the oil-in-water (O/W) emulsion process, maintaining optimal dispersion of active ingredients. Major tests such as SPF measurement, stability, antioxidant activity, microbial resistance, and shelf life were carried out to confirm product efficacy and safety. Results showed that phenolic compounds of microalgae, when incorporated with ZnO NPs, provided extensive UV protection and antioxidant stress reduction as a stable, efficient alternative to synthetic sunscreens. Refinement of extraction protocols to maximize phenolic content, nanoparticle synthesis for greater UV-blocking performance, and human trials to establish dermatological safety are the next areas of focus in future studies. Further studies will investigate formulation enhancements, long-term stability determinations, and potential commercial use. This study recognizes the potential of sunscreens originating from microalgae as biodegradable, non-toxic, and environmentally sustainable skin care products in response to consumer demands for green cosmeceuticals.

Keywords: Microalgae-based sunscreen, Phenolic compounds, Zinc oxide nanoparticles, UV protection, Antioxidant activity, Sustainable skincare.

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ICMSTS – E043

ADVANCES IN SUPERPLASTIC FORMING OF TITANIUM ALLOYS: A COMPREHENSIVE REVIEW

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Abstract:

Superplastic forming (SPF) of titanium alloys is a transformative manufacturing technique that enables the production of complex, lightweight, and high-strength components across multiple industries. This paper explores the applications of SPF titanium alloys in aerospace, automotive, and medical fields, highlighting their role in structural components, engine parts, lightweight vehicle components, and biocompatible implants. Additionally, the hybrid process of SPF and diffusion bonding (SPF/DB) is discussed, emphasizing its advantages in creating multi-layered structures with enhanced mechanical properties and weight reduction. Recent advancements in SPF technology, including grain refinement techniques, process modeling, and new alloy development, have significantly improved the efficiency and performance of titanium alloys. These innovations allow for lower-temperature forming, improved material properties, and extended tool life, making SPF a more sustainable and cost-effective process. The continuous evolution of SPF technology is expected to drive further adoption in high-performance applications, reinforcing its importance in advanced manufacturing industries.

Keywords: *Superplastic Forming, Titanium Alloys, Aerospace Industries*

ISBN 978-819840061-1

ICMSTS – E044

AN EXPERIMENTAL INVESTIGATION AND PROCESS PARAMETER OPTIMIZATION OF WATER JET MACHINING ON ALUMINIUM-MOLYBDENUM-TUNGSTEN CARBIDE

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Abstract:

*T*his study investigates the optimization of process parameters in Abrasive Water Jet Machining (AWJM) for Aluminium-Molybdenum-Tungsten Carbide composites. The research focuses on the effects of water pressure, cutting speed, and stand-off distance on surface roughness, circular error, and kerf taperness. The Taguchi method was employed to design the experiments, and the results were analyzed using Minitab software. The findings indicate that optimal machining conditions can significantly improve the quality of the machined surface, with stand-off distance being the most influential parameter.

Keywords: *Abrasive Water Jet Machining, Aluminium-Molybdenum-Tungsten Carbide, Taguchi Method, Surface Roughness, Kerf Taperness*

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ICMSTS – E045

CATEGORIZATION OF WEAR RATE OF AL8011 WC/MOS2 UNDER DRY SLIDING CONDITION

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Abstract:

Results of an experimental investigation of hybrid metal matrix composites utilizing the stir-casting technique are the focus of this research. Samples of aluminum alloy (Al 8011) reinforced with molydedneum di sulfide and tungsten carbide (WC) are provided. To make the hybrid composite, the aluminum alloy was combined with 2 weight percent, 4 weight percent, and 6 weight percent of MoS2 and 3 weight percent, 6 weight percent, and 9 weight percent tungsten carbide. Under dry sliding conditions, the Pin on Disc Method was used to investigate the tribological properties of aluminum composites. Increasing the weight % of tungsten carbide may increase the hardness of the hybrid composites, according to testing on the material.

Keywords: *Tungsten Carbide, Molybdenum di sulphide, Wear, Taguchi, dry sliding wear.*

ISBN 978-819840061-1

ICMSTS – E046

A STUDY IN SUPERPLASTIC FORMING IN ALUMINIUM METAL MATRIX COMPOSITES

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Abstract:

This paper presents a review of Superplastic forming process in Aluminium Metal Matrix Composites. The advantage of superplastic forming is to develop the complex shapes which is mainly used in Aerospace applications. The metal matrix composites are brittle in nature because of the reinforcements present in the matrix. The normal metal forming process cannot be adopted for metal matrix composites due to the brittle property. Superplstic forming the metals were heated one half of the melting temperature of the metal, due to that the composites have advantage in superplatic forming over other forming methods. Superplastic forming was formed through grain boundary siding mechanism. For the grain boundary sliding need optimum temperature and method to be followed. This paper broadly discus about the methods followed in the superplastic forming for composites.

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ICMSTS – E047

AI-DRIVEN PICK-AND-PLACE ROBOTIC ARM WITH COMPUTER VISION AND ARUCO MARKER-BASED OBJECT RECOGNITION

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Abstract:

The integration of Artificial Intelligence (AI) with robotic systems offers a paradigm shift in automation, presenting opportunities for enhanced adaptability and learning capabilities. This research delved into the development and testing of an AI-driven robot arm equipped with computer vision, aiming to optimize object recognition and task execution. Preliminary experiments, specifically the Object Recognition Test, showcased an accuracy rate of 87%, highlighting the potential of the system. The robot's proficiency in recognizing basic geometric shapes was commendable, although challenges arose with reflective objects and similar-coloured items. Comparisons with traditional robotic methods revealed the adaptability of AI-driven models, though with a caveat of occasional misidentifications. Potential real-world applications span sectors from manufacturing to e-commerce, indicating a future trend towards intelligent automation. The research concludes with an optimistic outlook on the convergence of AI and robotics, suggesting future avenues for refinement and emphasizing the importance of human-AI collaboration in upcoming innovations.

Keywords: *AI, ArUco markers, Robotics*

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ICMSTS – E048

EFFECT OF BONDING STRENGTH ON THE IMPACT PERFORMANCE OF SHAPE MEMORY ALLOY INCORPORATED GLASS FIBER REINFORCED EPOXY COMPOSITES

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Abstract:

Shape memory alloy (SMA) embedded composite systems have gained considerable attention for their exceptional mechanical properties, adaptive behaviour, and potential for high-impact applications. This paper examines how variations in interfacial bonding strength influence the impact performance of shape memory alloy-incorporated glass fiber reinforced epoxy (GFRP) composites. Using a series of controlled experiments, the research focuses on processing methodologies, characterization of interfacial bonding, and the analysis of impact behaviour under different loading conditions. It was observed that optimized interfacial bonding significantly enhanced impact strength, energy absorption capability, and post-impact damage tolerance. Both microscopic and macroscopic evaluations indicate that efficient load transfer between the shape memory alloy wire/particle reinforcements and the glass fiber-epoxy matrix is crucial for superior impact properties. A series of tables and figures illustrate how modifications to the bonding interface alter the mechanical response, while critical discussions are included regarding microstructural aspects and fractographic analysis. The paper concludes that controlling the bonding interface is an essential parameter that can be engineered to maximize the performance of SMA-based hybrid composites.

Keywords: Shape Memory Alloy (SMA), Glass Fiber Reinforced Polymer (GFRP) Composites, Epoxy Composites, Interfacial Bonding Strength

ISBN 978-819840061-1

ICMSTS – E049

METHOD OF EXTRACTION OF BIODIESEL FROM CALOPHYLLUM INOPHYLLUM SEED

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Abstract:

The global energy requirement for running the vehicles in the world is skyrocketing. The world has been now focusing on utilization of renewable energy sources. Biodiesel obtained from vegetable oils has been recognized world over as one of the strong contenders for reductions in exhaust emissions. Several countries including India have already begun deputizing the conventional diesel by a certain amount of biodiesel. Renewable fuels, such as vegetable oils and alcohols are an alternative. Hence, it is necessary to reduce the viscosity of vegetable oil more approximate to that of diesel. The solution to the problems has been approached in several ways, such as preheating the oils, blending them with diesel, thermal cracking and transesterification. The present investigation used one such oil called Calophyllum inophyllum oil which is extracted from its seed and after transesterification the bio fuel can be used as an alternate fuel for diesel oil in a DI diesel engine. Calophyllum inophyllum oil is extracted from the seeds by expeller pressing, cold pressing, or solvent extraction. The oil is yellowish-orange to brown in color. It is toxic and will induce nausea and vomiting if eaten but it is used in many traditional remedies. This study comprises about the method of extracting of biodiesel from Calophyllum inophyllum seed. The oil which is crushed out of the seed is then undergoes tranesterification process and then converted into Calophyllum inophyllum methyl ester oil.

Keywords: *Calophyllum inophyllum, Transesteification, , Biodiesel*

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ICMSTS – E050

SOLAR ENERGY STORAGE USING PCM MATERIALS AND A FOCUSING LENS

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Abstract:

This experimental study focuses on water desalination processes utilizing phase change material (PCM) integrated with a solar system. The PCM is employed to store solar thermal energy as latent heat during the daytime, ensuring continuous operation by providing heat at night. The thermal energy storage (TES) system consists of components such as a basin, tray, cooled glass, and a focusing lens. Water in the basin is heated by direct solar radiation, while the PCM absorbs and retains thermal energy. The desalinated water is collected in a tray fixed within the basin. Water vapor produced in the basin condenses on the inner surface of the water-cooled glass cover, effectively converting saltwater into fresh water. The study also examines the impact of using a focusing lens to enhance freshwater production. Results indicate that the desalination rate increases with rising ambient temperature and hot water circulation flow rate. Additionally, an optimal cooling water flow rate of approximately 12 ml/s was identified, at which the system achieved its highest productivity. However, increasing the water level in the basin led to a decline in efficiency. The system demonstrated a capability of producing 5600 ml/day·m^2, with 55% of the yield occurring after sunset. This technology is particularly beneficial for use in desert and rural areas, and evaluations suggest that such units are highly feasible, especially in remote locations.

Keywords: *thermal energy storage system, phase change material, focusing lens, productivity*

ISBN 978-819840061-1

ICMSTS – S001

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING CAPSICUM FRUTESCENCE AND ITS INTENSIFIED ANTIBACTERIAL ACTIVITY

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Abstract:

This study deals with the green synthesis of silver nanoparticles using the fruit extract of Capsicum frutescence (Sweet pepper) to act as reducing and stabilizing agent. Water soluble organics played a vital role for the reduction silver ions into silver nanoparticles. The fruit extract was exposed to silver ions and the resultant bio-synthesized silver nanoparticles characterized by UV-Vis spectrophotometry indicated the surface plasmon resonance band at 385-435 nm. X-ray diffraction spectrum showed crystalline structure while scanning electron microscope analyses exposed the monodispersed distribution and particle size of 20-25 nm. The elemental analysis displayed strong signal at 3 keV that agrees to silver ions and confirms the presence of metallic silver.The antibacterial activity of silver nanoparticles was determined by agar well diffusion method against gram positive and gram negative bacteria. Maximum and minimum zones of inhibition were renowned against *Escherichia coli* (11.5 mm) and *Bacillus subtilis* (10.5 mm), respectively.

Keywords: *Green Synthesis, Silver nanoparticles, Sweet pepper fruit extract, Capsicum frutescence , Antibacterial Activity.*

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ICMSTS – S002

IMPACT OF ANTIVIRAL DRUGS IN HUMAN LIFE: A REVIEW ON ADVANCEMENTS, CHALLENGES, AND FUTURE PERSPECTIVES

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Abstract:

Antiviral drugs play a crucial role in the treatment and management of viral infections by inhibiting various stages of the viral life cycle. These drugs are designed to target specific viral components, such as enzymes or structural proteins, to prevent viral replication and spread within the host. Antivirals can be classified into different categories based on their mechanism of action, including nucleoside and nucleotide analogs, protease inhibitors, neuraminidase inhibitors, and polymerase inhibitors. Recent advancements in antiviral therapy have led to the development of broad-spectrum antivirals, which target multiple viruses, and host-directed therapies that enhance the immune response. The emergence of viral resistance due to mutations presents a significant challenge in antiviral drug development, necessitating the continuous discovery of novel therapeutic agents. Furthermore, the use of combination therapies has been explored to improve efficacy and reduce resistance. The rapid development of antiviral drugs was exemplified during the COVID-19 pandemic, where repurposed and newly designed drugs played a vital role in managing infections. Future research focuses on innovative strategies such as RNA-based therapeutics, CRISPR-based antivirals, and artificial intelligence-driven drug discovery to combat emerging and re-emerging viral threats. Antiviral drug development remains a dynamic field that requires interdisciplinary collaboration to address global health challenges effectively.

Keywords: Antiviral drugs, viral infections, nucleoside analogs, protease inhibitors, viral resistance, RNA therapeutics.

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ICMSTS – S003

MARINE PHARMACOLOGY: UNLOCKING THE THERAPEUTIC POTENTIAL OF OCEAN-DERIVED BIOACTIVE COMPOUNDS

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Abstract:

Marine pharmacology is a promising pathway for drug development, focusing on the study of bioactive substances obtained from marine organisms. The ocean's complex environment harbors unique chemical structures with strong antibacterial, anticancer, anti-inflammatory, and neuroprotective properties. Several bioactive substances derived from marine sources have shown significant potential in modern medicine. Notably, drugs like trabectedin and cytarabine have been successfully developed for anticancer treatment, while others are being explored for their ability to combat antibacterial-resistant infections. However, challenges such as complex extraction processes and the limited availability of these natural compounds remain. Advances in synthetic biology and biotechnology are helping to address these issues by improving sustainable production methods and enabling large-scale drug synthesis. Additionally, continuous research into marine biodiversity is uncovering novel compounds that may revolutionize future treatments for various diseases. With its vast potential, marine pharmacology remains a crucial and evolving field in the search for innovative therapies to address global health challenges.

Keywords: Marine pharmacology, Bioactive substances, antibacterial, anticancer, synthetic biology, biotechnology

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ICMSTS – S004

PHARMACOLOGICAL CHAPERONE THERAPY: AMBROXOL ROLES IN NEURONOPATHIC GAUCHER DISEASE

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Abstract:

Neuronopathic Gaucher disease (NGD) is a severe type of Gaucher disease that affects the central nervous system, causing serious neurological symptoms. Traditional therapies, such as enzyme replacement therapy (ERT), have limited efficacy in treating these neurological symptoms due to they are unable to cross the blood-brain barrier. Ambroxol, a well-known mucolytic substance, has emerged as an alternative pharmacological chaperone therapy for NGD, with potential benefits beyond its present use. Recent research has demonstrated Ambroxol's capacity to improve glucocerebrosidase (GCase) function, an enzyme lacking in Gaucher disease, by stabilize misfolded forms to encourage accurate lysosomal trafficking. Notably, Ambroxol's ability to cross the blood-brain barrier defines it as a novel therapy potential for neuronopathic forms of the disease. An open-label pilot study of five NGD patients found that high-dose oral Ambroxol was well tolerated and resulted in significant neurological benefits, including reduced myoclonus and seizure frequency, as well as improved gross motor skills. These clinical effects were linked to higher lymphocyte GCase activity and lower cerebrospinal fluid glucosyl sphingosine levels, indicating proper central nervous system involvement. While the preliminary results are encouraging, they also show variation in patient responses, indicating that factors such as genotype, disease severity, and age at treatment beginning may influence outcomes. As a result, large-scale, controlled clinical trials are required to validate Ambroxol's efficacy and safety characteristic in NGD, optimize dose regimens, and identify patient subgroups that will benefit most from this therapeutic approach. In conclusion, Ambroxol provides a potential paradigm shift in the treatment of neuronopathic Gaucher disease, providing promise for better neurological results where existing medications fall short.

KEYWORDS: Ambroxol, Chaperone therapy, Gaucher disease, neuronopathic gaucher disease, GCase

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ICMSTS – S005

STEM CELLS & DRUGS: A SYNERGISTIC SPELL AGAINST CANCER

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Abstract:

Stem cell therapy, when combined with targeted drug treatments, is revolutionizing cancer care by offering a powerful synergy that enhances precision, efficacy, and recovery. Stem cells possess the unique ability to regenerate tissues, modulate immune responses, and deliver therapeutic agents directly to tumors, while anticancer drugs specifically inhibit tumor growth, block pathways, and induce apoptosis. This dual approach not only improves treatment outcomes but also minimizes side effects, paving the way for personalized, next-generation oncology solutions. From leukemia to solid tumors, this magic-like combination is reshaping the battle against cancer, offering hope where conventional treatments fall short. Furthermore, stem cells act as biological carriers, ensuring sustained drug release and enhanced tumor penetration, reducing resistance that often limits chemotherapy efficacy. By integrating immunotherapy, this strategy also empowers the body's natural defense mechanisms, creating a comprehensive, long-term solution to cancer treatment. With continuous advancements in biotechnology and regenerative medicine, the future holds immense potential for curing cancer with precision, minimal toxicity, and improved patient outcomes.

Keywords: Stem Cell Therapy, Targeted Drugs, Cancer Treatment, Regenerative Medicine, Immunotherapy

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ICMSTS – S006

POLYPHARMACY AND ASTHMA CONTROL AMONG ADULTS: A CROSS-SECTIONAL REVIEW

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Abstract:

Asthma, a chronic respiratory disease, often necessitates pharmacological management. Polypharmacy, defined as the concurrent use of multiple medications, poses a significant challenge to medication adherence. However, its implications for asthma control remain understudied.A cross-sectional analysis of data from the 2005-2020 National Health and Nutrition Examination Survey (NHANES) was conducted. Weighted prevalence estimates of polypharmacy were calculated, and multivariable logistic regression models were employed to identify factors associated with polypharmacy and its impact on asthma-related outcomes.The weighted prevalence of polypharmacy was significantly higher among adults with asthma (34.3%) compared to those without asthma (14.1%). Multivariable analysis revealed that older age, non-Hispanic Black ethnicity, health insurance coverage, frequent healthcare visits, and multiple comorbidities were significantly associated with polypharmacy. Furthermore, polypharmacy was linked to increased risks of asthma attacks (OR, 1.38; 95% CI, 1.08-1.76) and asthma-related emergency department visits (OR, 1.46; 95% CI, 1.09-1.94) among adults with asthma. This study highlights the pervasive issue of polypharmacy among adults with asthma in the United States, with significant disparities observed in vulnerable populations. Further research is warranted to elucidate the impact of polypharmacy on asthma control and to inform the development of targeted interventions.

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ICMSTS – S007

THE INCREASING ANTIBIOTIC RESISTANCE CRISIS: AN EXTENSIVE ANALYSIS OF ITS REVIEW EFFECTS, AND COUNTERMEASURES

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Abstract:

The effectiveness of antibiotics in treating bacterial infections has been jeopardized by the rise of antibiotic resistance (ABR), which has caused a serious worldwide health crisis. The purpose of this review is to critically analyse the current situation of ABR, clarifying its root causes, extensive effects, and potential mitigating techniques. To identify relevant studies on ABR, a thorough literature search was carried out. We extracted, examined, and consolidated information about the risk factors, processes, and prevalence of ABR. The review shows concerning ABR rates worldwide, with significant regional and bacterial species-specific variances. The growing ABR epidemic has been exacerbated by the overuse and abuse of antibiotics, poor infection control procedures, and a lack of new antibiotic development. In conclusion, antibiotic resistance is a serious threat to world health that requires immediate attention, teamwork, and a multipronged strategy. To reduce the spread of ABR and maintain the effectiveness of antibiotics, it is essential to implement antimicrobial stewardship programs, encourage innovation in antibiotic discovery, and improve infection control procedures.

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ICMSTS – S008

STRUCTURE BASED DRUG DESIGN OF SHIKIMIC ACID AS A PUTATIVE DRUG TARGET FOR BRCA VIA INSILCO METHOD

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Abstract:

Cancer is a type of tumor that exhibits aberrant cell proliferation and has the capacity to infiltrate or spread from its original organ (the "site") to other body parts. Breast cancer is heterogenous disease which may due to both genetic and environmental factors. Breast cancer accounts for 23% of all cancer fatalities in postmenopausal women, making it one of the top causes of death in this population. The "shikimate pathway," also known as the "shikimic acid pathway," is a metabolic process consisting of seven steps used by various organisms, including plants, bacteria, algae, fungi, and certain protozoans, to produce folates and aromatic amino acids. Molecular Docking Studies to conduct the molecular docking simulations and analyze the binding interactions between shikimic acid and the target proteins BRCA1 and BRCA2 and analyzed the binding interactions, including hydrogen bonds, hydrophobic contacts, and electrostatic interactions. The BRCA 1 and BRCA2 were docked with shikimic acid and Niraparib using the lipin rule, rerank score, and mol dock score, as well as in vitro investigations - DPPH free-radical scavenging assay and nitric oxide radical inhibition assay - to correlate with anticancer efficacy. The shikimic acid and niraparib have a good interaction in holding the molecule in place (binding) of the active site, and docking investigations have been carried out using Molegro Virtual Docker (MVD).

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ICMSTS – S009

ADVANCES IN GENE THERAPY AND DRUG-BASED TREATMENTS FOR BREAST CANCER: A TARGETED APPROACH

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Abstract:

Breast cancer remains one of the most prevalent malignancies worldwide, necessitating innovative therapeutic approaches for improved patient outcomes. Gene therapy has emerged as a promising strategy, leveraging genetic modifications to correct oncogenic mutations, enhance immune responses, and sensitize tumors to treatment. Recent advancements integrate gene-editing techniques like CRISPR-Cas9, viral and non-viral delivery systems, and RNA-based therapies, aiming to reprogram cancer cells and inhibit tumor progression. Additionally, the combination of gene therapy with targeted drug treatments has demonstrated synergistic potential in personalized medicine. Pharmacological agents such as monoclonal antibodies, small-molecule inhibitors, and hormone therapies complement gene-based interventions by enhancing therapeutic efficacy and minimizing resistance. This review explores the latest developments in gene therapy and drug-based treatments for breast cancer, highlighting their translational potential and future clinical applications.

Keywords: Gene therapy, Breast cancer, Targeted drug therapy, Genetic modulation, Precision medicine.

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ICMSTS – S010

RECENT DEVELOPMENTS IN ANTI-INFLAMMATORY NATURAL PRODUCTS

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Abstract:

Clinically used anti-inflammatory drugs have the drawbacks of side effects and high treatment costs (for biologics). Many inflammatory diseases are becoming more prevalent in the world's aging population. Natural products and traditional medicines are alternatives to these medications, and they hold out hope for the discovery of bioactive lead compounds and the subsequent development of medications to treat inflammatory conditions. Phytopharmaceuticals and traditional medicines have been utilized to treat inflammatory and other conditions since ancient times. The current review article details natural anti-inflammatory products that have been reported over the past ten years and are derived from plants and marine sources. Alkaloids, steroids, terpenoids, polyphenolics, phenylpropanoids, fatty acids and lipids, and other miscellaneous substances are among the chemical classes to which the molecules described belong.An attempt is also made to list possible potential customers, for example, curcumin, Resveratrol, Baikalein, Boswell ACID, Betulinic, urasoles acid and oleanolic acid, for subsequent development by research on structures-activity (SAR) and their current state. This review explains the inflammatory activity of flavonoid compounds and clinical studies carried out on a natural anti-inflammatory.

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ICMSTS – S011

HOMOSEXUALITY IN HINDU MYTHOLOGY: HISTORICAL REPRESENTATIONS AND EVOLVING PERSPECTIVES

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Abstract:

In 1869, Hungarian journalist Károli Mária Kertbeny first coined the terms "homosexual" and "homosexuality" in a political treatise against Paragraph 143, a Prussian law later codified in Germany's that criminalized male homosexual behaviour. Kertbeny put forward his theory that homosexuality was inborn and unchangeable, arguments that it was a normal variation, as a counterweight against the condemnatory moralizing attitudes that led to the passage of sodomy laws. The recent chronicles of homosexuality began in the mid-19th century, most specifically with the treatise of Karl Heinrich Ulrichs. He was Master of Law, theology, and history and considering his hypothesis, he is rightly remembered as one of the first gay rights advocate of modern history who wrote a series of socio-political articles against laws of Germany criminalizing sexual relationships between men. In this paper, we discuss on homosexuality in Hindu mythology.

Key words: Homo-sexuality, Hindu Mythology and sexual relationships.

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ICMSTS – S012

A STUDY ON HUMAN PSYCHE, IDENTITY AND DIVERGENCES IN SIGMUND FREUD, LUCE IRIGARY AND JUDITH BUTLER'S CONCEPTS

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Abstract:

This article explores the intersections and divergences of Sigmund Freud's, Luce Irigaray's, and Judith Butler's ideas on the human psyche and identity. While Freud's psychoanalytic theory, Irigaray's feminist philosophy, and Butler's performative theory share some commonalities, such as the recognition of the importance of the unconscious mind and the social and cultural construction of identity, they also exhibit significant divergences in their understanding of human nature, identity, and power dynamics. This article examines the intersections and divergences of their ideas, highlighting the contributions and limitations of each theory.

Key words: Performative, power dynamics, divergences, intersections, human psyche

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ICMSTS – S013

BETWEEN TRADITION AND MODERNITY: WOMEN'S AGENCY IN HANAN AL-SHAYKH *THE OCCASIONAL VIRGIN*

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Abstract:

Hanan al-Shaykh's *The Occasional Virgin* tradition and modernism discovers the struggles of Arab women navigating, especially in contexts of faith, sexuality and self-expression. The novel follows Yavon and Huda, two women, who, despite their shared Lebanese heritage, adopt a different approach to incorporate personal freedom with cultural expectations. This paper investigates the representation of the female agency in the virgin seriously - the focus on how the heroes challenged patriarchal norms by struggling with internal cultural sanctions. By analyzing major themes such as religious effects, sexual autonomy and migration, this paper highlights the contribution of the novel to the contemporary feminist discourse on the experiences of Middle Eastern women. Through a close reading of the text, Hanan al-Shaykh presents a fine picture of femininity that defies binary classifications of the East vs. West, which reflects fluid and often reflects the disputed nature of the female agency.

Keywords: Patriarchy, Self-expression, Femininity Migration, Freedom

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ICMSTS – S014

BREAKING THE RULES: UNRELIABLE NARRATION IN *THE MURDER OF ROGER ACKROYD*

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Abstract:

Agatha Christie's *The Murder of Roger Acroid* (1926) is one of the most groundbreaking detective novels of all times, mainly due to the controversial use of an incredible narrator. Dr. James Shepard, the narrator of the novel and the reliably trusted crossesler of the events, eventually reveal themselves as the killer. This letter investigates how Christie influenced the conferences of the classic detective novel through the use of Katha deception, reader manipulation and the challenge of the "Fair Play" rule. By analyzing the role of Shepard as both the narrator and the criminal, the study examines the moral and literary implications of the incredible statement in the crime story and how Christie's innovative technology impressed the style.

Keywords: Detective Novels, Investigation, Deception, Manipulation, Criminal

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ICMSTS – S015

NANOCOMPOSITE OF SILVER NANOPARTICLES SYNTHESIZED FROM BANANA PEEL INCORPATED WITH CHITOSAN NANOPARTICLE FOR TISSUE REGENERATION

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Abstract:

Tissue regeneration requires biomaterials with enhanced antimicrobial, biocompatible, and wound-healing properties. This study focuses on synthesizing a nanocomposite by incorporating silver nanoparticles (AgNPs) synthesized from banana peel extract with chitosan nanoparticles derived from prawn shell waste. The green synthesis of AgNPs was achieved using aqueous banana peel extract from different Musa species, with confirmation via UV-visible spectroscopy at an absorption peak of 420–450 nm, indicating the surface plasmon resonance of AgNPs. The stability of AgNPs was monitored over different durations (24 hours, 3rd day, and 7th day) to assess long-term effectiveness. Chitosan extraction followed a sequential process of demineralization, deproteinization, and deacetylation, confirmed via FTIR analysis, which showed characteristic peaks at 1025 cm^{-1} (C-O), 1619 cm^{-1} (C=O), and 3404 cm^{-1} (N-H), indicating the successful formation of chitosan. The chitosan nanoparticles were stabilized using tripolyphosphate (TPP) and characterized for UV absorption at 280–300 nm, confirming nanoscale properties. The AgNP-chitosan nanocomposite was formulated by conjugating silver nanoparticles with chitosan nanoparticles and evaluated for in vitro antibacterial and cytotoxicity assays. The antimicrobial assay demonstrated strong antibacterial activity, particularly against *Escherichia coli,* with an inhibition zone of 14 mm, indicating its potent efficacy in preventing infections. The nanocomposite's superior antimicrobial properties make it a promising candidate for infection prevention in wound healing and tissue regeneration. This study presents an eco-friendly, cost-effective approach to biomaterial synthesis, offering significant potential in biomedical applications.

KEY WORDS: Tissue regeneration, Nanocomposite, Silver nanoparticles (AgNPs), Chitosan nanoparticles, Antibacterial properties.

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ICMSTS – S016

VALORIZING *SOLANUM TRILOBATUM AND LEUCAS ASPERA*: HARNESSING ITS NATURAL ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES AS FUNCTIONAL COMPOUNDS FOR SUSTAINABLE FOOD PRESERVATION

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Abstract:

The increasing health risks and environmental concerns associated with synthetic food preservatives have driven the search for natural, sustainable alternatives. This study presents the development of a biodegradable active packaging film incorporating bioactive compounds from *Solanum trilobatum*, *Leucas aspera*, *Sargassum wightii* (brown algae), and green-synthesized iron nanoparticles(Fenps), enhanced with Fenps pellets and calcium chloride ($CaCl_2$) to improve its mechanical and functional properties. The resulting film demonstrates a significant improvement in tensile strength (up to 25%) and elasticity (up to 30%), making it a viable option for food packaging applications. Phytochemical analysis reveals the presence of high concentrations of phenolic compounds (749.34 µg/mg), flavonoids (188.83 µg/mg), and tannins (920.26 µg/mg), contributing to the film's strong antioxidant and antimicrobial properties. Antioxidant assays indicate high inhibition rates (85.2%) and reduction rates (75.1%), while antimicrobial tests show inhibition zones of up to 13 mm against bacterial and fungal strains. Notably, the film effectively extends the shelf life of tomatoes by up to 21 days and exhibits promising antidiabetic potential, reducing glucose levels by 50%. Fourier-transform infrared spectroscopy (FTIR) analysis confirms the successful incorporation of functional groups essential to the film's composition, including O-H stretching (3369.79 cm^{-1}) from glycerol, sodium alginate, and plant extracts; C-H stretching (2921.53 cm^{-1}) from glycerol, and sodium alginate; and Fe-O stretching (479.08 cm^{-1}), verifying the presence of iron nanoparticles. The results highlight the film's potential as a natural and environmentally friendly alternative to synthetic food preservatives, offering enhanced food safety, cleaner labeling, and a sustainable solution for food packaging, underscoring the significance of plant-based bioactive compounds and green nanotechnology in advancing food preservation strategies.

Keywords: Edible Film, Food Preservation, *Solanum trilobatum, Leucas aspera,* Iron nanoparticles.

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ICMSTS – S017

SOVEREIGNTY, SURVEILLANCE, AND SUBJUGATION: *NINETEEN EIGHTY-FOUR* THROUGH AGAMBEN'S BIOPOLITICAL THEORY

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Abstract:

This paper explores George Orwell's Nineteen Eighty-Four (1949) through the lens of Giorgio Agamben's biopolitical theory, particularly the concepts of *homo sacer, bare life*, and *the state of exception*. The Party's totalitarian regime exemplifies the reduction of individuals to bare life, where the suspension of legal rights and absolute sovereign control determine their existence. Drawing from Agamben's *Homo Sacer: Sovereign Power and Bare Life (1998)* and *State of Exception (2005)*, this study argues that Orwell's dystopia reflects the extreme realization of biopolitical subjugation, where power is exerted through linguistic control, surveillance, and torture. This paper also integrates contemporary scholarly discourse on Orwell's relevance in biopolitical studies.

Keywords: Biopolitics, Giorgio Agamben, Homo Sacer, State of Exception, Orwell, Totalitarianism, Bare Life

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ICMSTS – S018

ECO-CONSCIOUS SYNTHESIS OF CUO NANOPARTICLES AND THEIR ROLE IN COMBATTING BACTERIAL INFECTIONS

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Abstract:

The use of plant extracts in the green synthesis of nanoparticles has gained significant attention. Over the past few decades, copper oxide nanoparticles have been widely applied in various fields. This study aimed to produce copper oxide nanoparticles using Myrtus plant extract and evaluate their antibacterial properties. The aqueous leaf extract was combined with a copper sulfate ($CuSO_4.5H_2O$) solution and sodium hydroxide, which served as a precipitating agent. The green-synthesized CuO nanoparticles were analyzed through UV-visible spectroscopy, FT-IR, XRD, and SEM techniques. The UV-Vis spectrum displayed a peak at 330 nm, likely attributed to the Surface Plasmon Resonance effect. XRD analysis confirmed the crystalline structure of copper oxide nanoparticles. FT-IR analysis identified the functional groups of the active components in the extract, which are involved in the reduction and capping of CuO nanoparticles. On the other hand, SEM images revealed that the nanoparticles were not agglomerated. The synthesized CuO nanoparticles were evaluated for their antibacterial properties against various bacterial pathogens. The findings demonstrated that CuO nanoparticles exhibited the strongest antimicrobial activity against all the tested bacterial pathogens.

Keywords: Myrtus plant, Precipitating agent, XRD, UV-Visible spectroscopy & Antibacterial activity.

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ICMSTS – S019

BELOVED – THE HAUNTING OF SLAVERY: MEMORY, TRAUMA, AND MOTHERHOOD

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Abstract:

Toni Morrison's *Beloved* (1987) is a landmark novel that explores the haunting legacy of slavery through the psychological trauma of its characters. Centered around Sethe, a formerly enslaved woman who is haunted by the ghost of her dead daughter, *Beloved* examines the impact of generational trauma, the struggle for identity, and the complex dynamics of motherhood. Morrison masterfully weaves historical memory, supernatural elements, and fragmented narrative techniques to depict how slavery's horrors persist long after physical emancipation. This research paper analyses *Beloved* through the lens of postcolonial trauma theory and psychoanalysis, exploring how memory, guilt, and maternal sacrifice shape Sethe's identity. The paper examines the function of the ghostly Beloved as a metaphor for unresolved historical trauma, the psychological consequences of slavery on the Black female body, and how Morrison challenges traditional narratives of motherhood and freedom. By interrogating the intersections of race, gender, and historical memory, this study positions *Beloved* as a critical intervention in the discourse of slavery's lingering psychological scars.

Keywords: *Beloved, Slavery and Trauma, Historical Memory, Generational Trauma, Motherhood and Infanticide, Magical Realism*

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ICMSTS – S020

LIMITATIONS & DISENFRANCHISEMENT OF WOMEN IN THE SELECT OF CHITRA BANERJEE DIVAKARUNI'S NOVELS

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Abstract:

Woman is a very strong character than a man as she not only take care of herself but whole family as a mother, wife, daughter-in-law, granddaughter, sister, sister-in-law, daughter, mother-in-law, grandmother, etc. Earlier women in India were facing many problems. New and modern-day challenges and tribulations have cropped up making life uneasy for women. Issues facing women still consume the attention of researchers in social sciences, governments, planning groups, social workers and reformers. Society lays down the patterns of life for a woman much before she takes birth by conceiving fixed identities for her. It confines her existence through binary divisions between the general conception of men and women defining her as feminine as opposite to the masculine, the characteristics marked in the formation of gender by society. The private sphere assigned to woman in the patriarchal system limits her role as daughter, sister, wife and mother and also facilitates the control of her body by the opposite sex. In this paper, I have to discuss about the women on one side are celebrated as mothers and on one side are harassed in the form of an object. Women are the best creation of God but here the reality is something different.

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ICMSTS – S021

LITERARY LANDSCAPES: MAPPING NATIONAL IDENTITY IN 19TH-CENTURY AMERICAN LITERATURE THROUGH DIGITAL TOOLS

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Abstract:

This paper explores the intersection of digital humanities, historical cartography, and literary analysis in 19th-century America, drawing on Susan Schulten's *Mapping the Nation: History and Cartography in Nineteenth-Century America*. Schulten's study illustrates how maps were not only tools of geography but also vehicles of cultural narratives that shaped national identity. By integrating digital tools such as interactive mapping, text mining, and spatial analysis, this paper demonstrates how the digital humanities can offer new insights into historical literature, specifically how maps and geographical representations were used in the literature of the time to reflect, critique, and construct American national identity. The paper discusses the potential of digital tools to reimagine literary studies through spatial narratives and interactive experiences. The paper demonstrates how **Digital Humanities tools**, such as **Geographic Information Systems (GIS)**, **interactive mapping**, and **text mining**, can be applied to 19th-century American literature to reveal new patterns in how geographical space, territorial boundaries, and national identity were represented. It also explores how literary works—ranging from the frontier narratives of **James Fenimore Cooper** to the maritime journeys of **Herman Melville**—engage with the maps and geographical understandings of their time, framing national expansion and cultural belonging within literary forms. By integrating digital methods, this paper seeks to reimagine how scholars approach the study of **literature** and **cartography**, offering a fresh perspective on how space and place shaped the American narrative. It further discusses the potential of **digital tools** to create interactive and immersive learning experiences, allowing students and scholars to explore these literary landscapes in dynamic ways. Ultimately, the paper considers the broader implications of using digital tools in literary studies, particularly the ethical and practical challenges of integrating technology with historical analysis.

Keywords: Digital Humanities, Cartography, National Identity, 19th-Century American Literature, Spatial Analysis, Interactive Mapping, Text Mining

ICMSTS – S022

GLOBAL INFLUENCE DEMANDS MORAL INTEGRITY AND RESPECT FOR HUMANITY: INSIGHTS FROM AMITAV GHOSH'S *THE GREAT DERANGEMENT: CLIMATE CHANGE AND THE UNTHINKABLE*

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Abstract:

The whole world who cares about that intricate thing called climate change have dealings with some facts and figures about it, and thinks he's generating his efforts to reduce it. The track, but who wants to get a better power on the forces that manipulated it through scientific articles written by Indian author Amitav Ghosh. What makes this thing but condensed study such an imperative read is its thoroughly personal devoir, its affability, its plausible argument, its freedom from statistics, and the entire storytelling art that the author delivers to it. Even a tough one, criminal questions trigger Ghosh's investigate into the historical, political, and cultural roots of climate change.

Keywords: political, culture, climate change, nature, art, and literature.

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ICMSTS – S023

A SOCIO- REALISTIC STUDY ON *UNTOUCHABLE* AND *COOLIE*: A COHORT ANALYSIS

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Abstract:

Artistic expressions evolve alongside humanity's development. Examples of such forms include hunting, painting, music, sculpture, literature, and cinema. This article explores two novels from Indian literature through the lens of social realism, which highlights the experiences of marginalized individuals within society. Authors who embrace social realism aim to illuminate the lives and struggles of oppressed communities in contemporary settings. Art enriches human existence by providing both entertainment and education, breaking the monotony of daily life and leaving a lasting impression on its audience. Since the dawn of civilization, humans have engaged in diverse artistic pursuits. As a social realist observer, the novels reflect genuine societal occurrences. Anand, the author, presents *Coolie* and *Untouchable* through a socially realistic perspective. Social realism is a hard term to define because it depends on historical and political context. It exposes the true nature of society and the psychology of its members as well as a particular social objective. The narratives detail the protagonist's suffering and articulate their hardships extensively. These two works hold a significant position in Indian literature, as *Untouchable* and *Coolie* articulate the silent struggles of humanity under challenging circumstances.

Keywords: Indian Literature, Social Realism, Suppression and oppression

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ICMSTS – S024

A MATHEMATICAL MODEL FOR STOCK MARKET USING BROWNIAN MOTION

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Abstract:

Stochastic processes are used to simulate systems that fluctuate randomly over time, such as particle motion, weather patterns, or stock prices. The economy of a nation depends on the stock market because they serve two purposes: first, they provide a decision-making tool for investors or a way for businesses to raise money from investors: second, they enable society to invest in financial instruments, including stocks. The idea of uncertainty is essential to stochastic processes in finance that are used to model market behaviour, manage risk, and price derivatives. The present stock price influences the prediction of the future stock price through the Markov chain process. Brownian motion is a wiener process, which is an essential representation of a stochastic process, which is a system that changes at random throughout time. Brownian motion, a concept originated from probability theory that simulates continuous random motion, serves as its foundation. In financial markets, the Geometric Brownian Motion (GBM) model, which describes the random evolution of stock prices, interest rates, and exchange rates, is based on Brownian motion. This paper obtains a mathematical frame work for explaining the erratic behaviour of asset values.

Keywords: Stock prices, Stochastic Processes, Markov Chain, Geometric Brownian Motion.

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ICMSTS – S025

SHORTEST-PATH ALGORITHMS FOR AIR TRAFFIC MANAGEMENT SYSTEM USING HEDETNIEMI MATRIX SUM

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Abstract:

In many applications such as transportation, routing, communications, economical, and so on, graphs emerge naturally as a mathematical model of the observed real-world system. In computational geometry as well as adjacent fields like graph algorithms, geographic information systems and robotics, shortest path problems are among the key problems being discovered. The Euclidean metric is frequently utilised to find the shortest path in application domains like the use of geographical information systems more ineffectively than metrics that include weights that take into consideration for the terrains many different features. The Hedetniemi matrix operator always selects the shortest. Airline industry is an incredibly exclusive sector that offers a transportation service in which aircraft are used to move people or goods from various locations to the desired destinations. A set of airports and connections can be utilized to predict and reduce a number of moving features associated with dynamic systems using graphs, which can be applied to anywhere from cityscape layouts to computing data. This paper obtains an implementation of shortest path algorithms for the weighted and geometric metrics on trapezoidal irregular networks using Hedetniemi matrix sum concepts for Air Traffic management system.

Keywords: Graph algorithms, Hedetniemi Matrix, Air Traffic Management System.

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ICMSTS - E051

RECENT TRENDS IN NATURAL COMPOSITES-A REVIEW

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Abstract:

Materials created from naturally existing substances mixed to improve their mechanical qualities—such as strength, durability, or flexibility—are known as natural composites. Usually, these composites consist of two primary parts: a matrix (the binding material) and reinforcement (like fibers). The matrix gives the composite its structure and binds the reinforcement together, while the reinforcement offers strength. The matrix and reinforcement in natural composites are derived from natural sources. For instance, the matrix could be a natural resin, wax, or another biopolymer, and the reinforcing could be either plant-based fibers (like hemp or flax) or animal-based fibers.

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ICMSTS - E052

CHARACTERIZATION OF AA7065 REINFORCED WITH BORON CARBIDE (B_4C) AND GRAPHITE HYBRID

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Abstract:

Composite materials, particularly metal matrix composites (MMCs), have gained significant attention due to their unique properties such as high strength-to-weight ratio and excellent wear resistance. This study focuses on the fabrication and characterization of AA7065 aluminum alloy reinforced with boron carbide (B_4C) and graphite as hybrid reinforcements. The research aims to explore the mechanical, tribological, and machining characteristics of these hybrid composites, which have not been extensively studied in previous literature. The composites were fabricated using the stir casting method, and their properties, including density, porosity, hardness, and tensile strength, were evaluated. Additionally, the tribological behavior and drilling characteristics of the composites were investigated. The results indicate that the addition of B_4C and graphite significantly enhances the mechanical and wear properties of the AA7065 matrix, making it suitable for high-stress applications such as aerospace and defense.

Keywords: Metal Matrix Composites (MMCs), AA7065, Boron Carbide (B_4C), Graphite, Hybrid Composites, Stir Casting, Tribological Properties, Machining Characteristics

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ICMSTS - E053

INNOVATING SITUATION AWARENESS AND USER PRIVACY PROTECTION MODELS TO REVOLUTIONIZE NETWORK SECURITY

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Abstract:

In the era of ubiquitous social informatization and digital connectivity, network security has become paramount. This thesis addresses critical network security challenges by proposing innovative models for situation awareness and user privacy protection. We introduce a novel Deep Convolutional Neural Network (DCNN) model for detecting network security topics in social networks, achieving record-breaking 96.17% recognition accuracy. Additionally, we present an Improved Niche Genetic Algorithm (INGA)-optimized Wavelet Neural Network (WNN) for predicting network security states, which outperforms existing models in convergence speed and prediction accuracy. Finally, we propose an enhanced BP neural network model for network security analysis, leveraging big data technologies to improve real-time applicability and accuracy. These models collectively advance the field of network security, offering robust solutions for the dynamic digital landscape.

Keywords: Network Security, Deep Convolution Neural Network (DCNN), Wavelet Neural Network (WNN), Improved Niche Genetic Algorithm (INGA), Situation Awareness, Big Data

ISBN 978-819840061-1

ICMSTS – E054

A DECENTRALIZED INFORMATION GOVERNANCE FRAMEWORK FOR IMPLEMENTING BLOCKCHAIN IN HEALTHCARE

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Abstract:

Blockchain technology has the potential to transform health information management and inter-organizational collaboration in healthcare. However, its practical impact has been limited. This study employs a three-layer theoretical framework and critical interpretive synthesis to analyze the role of blockchain in the healthcare value chain, ultimately proposing an information governance (IG) framework tailored for healthcare blockchain. The findings indicate that blockchain can empower patients, extend the traditional value chain, and facilitate connections among stakeholders. Effective IG is essential for realizing the value of information and transforming the healthcare ecosystem, necessitating a blend of in. The proposed framework leverages the inherent characteristics of blockchain—transparency, immutability, and decentralization—to create a secure and efficient environment for managing healthcare data. By utilizing smart contracts, the framework enables automated and secure transactions between stakeholders, ensuring that patient consent is respected and that data sharing occurs only under predefined conditions. This not only empowers patients with greater control over their health information but also fosters trust among healthcare providers, insurers, and patients. The rapid evolution of healthcare technology has necessitated innovative approaches to data management, particularly in the realm of patient information. Traditional centralized systems often face challenges related to data security, privacy, interoperability, and patient consent, leading to inefficiencies and potential breaches of sensitive information. This paper proposes a decentralized information governance framework for implementing blockchain technology in healthcare, aiming to address these critical issues while enhancing the overall quality of care.

Keywords: *Blockchain, health information management, information governance (IG), transparency, immutability, and decentralization, smart contracts, data management, data security*

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ICMSTS - E055

ANALYSIS OF CLASSROOM PROCESSES BASED ON DEEP LEARNING WITH VIDEO AND AUDIO FEATURES

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Abstract:

This project present a machine learning based recommend system to enhance students e- learning experience. Developed using MATLAB the system integrates a user- friendly GUI that displays keywords associated with educational topics. User selection, corresponding video is played. Midway through the video. The system employee learners engagement and understanding. If the detected emotions indicates differently of lack interest, the system automatically recommends a lower level video using a dynamic recommendation models. This adaptive learning approach ensures personalized content delivery. Catering to the learners comprehensive level and emotional state. By combining video based education, real time emotions analysis, and tailored contents suggestions. This system aims to improve knowledge retention and provide an engaging. Students centric e- learning experience. The project highlights the potential of machine learning in creating intelligent and responsive educational tools.

Keywords: Deep learning, Features extraction, Vectors, Accuracy, Long short term memory, Training, Manuals, Classification algorithms, Deep learning, Learning systems, Education, Videos, Audio systems

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ICMSTS – E056

PERFORMANCE EVALUATION OF RAMIE-SISAL FIBER REINFORCED EPOXY COMPOSITES FOR SUSTAINABLE PARTICLE BOARD APPLICATIONS

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Abstract:

This research examines the mechanical, absorption, and thermal behavior of hybrid composites reinforced with short ramie and sisal fibers in an epoxy resin matrix. Different fiber lengths (10, 15, 20, and 25 mm) and weight fractions (20%, 25%, 30%, and 35%) were evaluated. The optimal combination of 20 mm fiber length and 30% fiber content yielded the highest tensile and flexural strength. Scanning Electron Microscopy (SEM) illustrated fiber pullout and fracture characteristics, while Fourier Transform Infrared Spectroscopy (FTIR) and X-ray diffraction (XRD) provided insights into chemical structure and crystallinity. Thermogravimetric analysis (TGA) confirmed high thermal stability, with a decomposition temperature of 378°C. The results suggest that these composites hold promise for lightweight and eco-friendly particle board applications, providing enhanced strength, reduced water absorption, and improved thermal resistance.

Keywords: Ramie fiber, Sisal fiber, Epoxy resin, Mechanical properties, Particle board applications.

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ICMSTS – E057

TRANSFORMING THE FUTURE: SCIENCE, TECHNOLOGY, AND SUSTAINABILITY IN HARMONY

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Abstract:

The future of our planet depends on the balance between scientific progress, technological innovation, and sustainable practices. As global challenges such as climate change, resource depletion, and pollution continue to rise, the need for a multidisciplinary approach has never been greater. This paper explores the integration of science and technology with sustainability to address these pressing issues while ensuring economic growth and social well-being. Scientific advancements in renewable energy, environmental conservation, and sustainable agriculture have paved the way for greener solutions. Technologies such as artificial intelligence, nanotechnology, and biotechnology are driving innovations that reduce carbon footprints, optimize resource use, and promote circular economies. From energy-efficient smart cities to biodegradable materials, these innovations demonstrate how science and technology can work in harmony with nature. However, achieving true sustainability requires collaboration across disciplines, industries, and governments. Policymakers, scientists, engineers, and businesses must work together to develop and implement solutions that balance technological progress with environmental responsibility. Education and awareness also play a key role in fostering sustainable mindsets and encouraging responsible consumption.

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ICMSTS – E058

IOT FOR GREEN SOLUTIONS: MULTIDISCIPLINARY INSIGHTS INTO SUSTAINABLE TECHNOLOGY

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Abstract:

The rapid growth of the Internet of Things (IoT) has opened new avenues for advancing sustainability across multiple sectors, offering innovative solutions to tackle environmental challenges. "IoT for Green Solutions: Multidisciplinary Insights into Sustainable Technology" explores the transformative potential of IoT in driving sustainable practices through interdisciplinary approaches that integrate science, technology, and environmental responsibility. IoT enables real-time data collection, monitoring, and automation, fostering smarter resource management in sectors such as energy, agriculture, transportation, and waste management. This paper discusses the intersection of IoT with sustainable technologies, highlighting how it can optimize energy consumption, reduce carbon footprints, and promote environmental stewardship. By leveraging IoT-enabled smart devices, sensors, and networks, industries can track and analyze environmental parameters, leading to informed decision-making and efficient resource usage. Additionally, the integration of IoT with renewable energy systems, smart grids, and sustainable agriculture offers innovative solutions to mitigate climate change and achieve long-term sustainability goals. Through a multidisciplinary lens, this work draws on expertise from fields such as computer science, environmental engineering, and data analytics to present a holistic view of IoT's role in sustainability. The paper also addresses the challenges and opportunities in deploying IoT solutions at scale, including issues related to data privacy, interoperability, and infrastructure. Ultimately, IoT represents a crucial tool in the pursuit of a more sustainable and environmentally conscious future, offering new pathways for collaboration and innovation across industries and disciplines.

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ICMSTS – E059

BREAST CANCER DIAGNOSIS USING CONVOLUTIONAL NEURAL NETWORK (CNN)

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Abstract:

Breast Cancer is the most often identified cancer among women and major reason for increasing mortality rate among women. As the diagnosis of this disease manually takes long hours and the lesser availability of systems, there is a need to develop the automatic diagnosis system for early detection of cancer. Image processing along with Data mining and machine learning techniques contribute a lot in the development of such system. For the classification of benign and malignant tumour we have used classification techniques of machine learning in which the machine is learned from the past data and can predict the category of new input. Digital mammograms are utmost operative source that helps in early detection of cancer in women with no symptoms and diagnose cancer in women with symptoms like pain in lump, nipple discharge which diminutions deaths and upsurges chances of survival. Usually clinician cannot spare more time on a patient to weigh the complaints and suggest a possible diagnosis by considering past records. During this stage, there is more chance to medical errors and wrong diagnosis. By using machine learning in diagnosing breast cancer improves accuracy by reducing misclassifications and saves time in diagnosing. Thus in our proposed system, we used Convolutional Neural Network (CNN) on the dataset taken from the public repository. With respect to the results of accuracy, precision, sensitivity, specificity and False Positive Rate the efficiency of each algorithm is measured and compared. These techniques are coded in python and executed in google colab, the Scientific Python Development Environment.

Keywords: Breast Cancer, Convolutional Neural Network, precision, diagnosis, symptoms

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ICMSTS – E060

INTEGRATING BIG DATA, AI, AND ENVIRONMENTAL SCIENCE FOR WATER SUSTAINABILITY IN INDIA

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Abstract:

Water scarcity and mismanagement pose significant challenges to India's sustainability goals, necessitating innovative and data-driven solutions. This chapter explores the integration of Big Data, Artificial Intelligence (AI), and Environmental Science to address India's water challenges through a multidisciplinary approach. By leveraging real-time data from municipal sources, remote sensing, IoT sensors, and hydrological models, AI-driven analytics can optimize water resource management, predict shortages, and enhance conservation efforts. The synergy between environmental science and data-driven technologies enables more accurate demand forecasting, pollution monitoring, and climate impact assessments. Case studies of successful AI-powered water management systems in India are analysed to highlight the potential of these technologies in policy-making and sustainable governance. Additionally, the chapter discusses the challenges of data availability, infrastructure, and ethical concerns in deploying AI for water sustainability. The integration of Big Data, AI, and Environmental Science provides a scalable, predictive, and proactive framework for achieving water security and resilience in India.

Keywords: Big Data Analytics, Artificial Intelligence (AI), Water Sustainability, Environmental Science, Smart Water Management

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ICMSTS – E061

SMART HEALTHCARE: DEVELOPING A DJANGO BASED DOCTOR APPOINMENT SYSTEM WITH ADVANCED BOOKING AND SCHEDULING

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Abstract:

The proposed project is a smart appointment booking system that provides patients or any user an easy way of booking a doctor's appointment online. This is a web-based application that overcomes the issue of managing and booking appointments according to user's choice or demands. The task sometimes becomes very tedious for the compounder or doctor himself in manually allotting appointments for the users as per their availability. Hence this project offers an effective solution where users can view various booking slots available and select the preferred date and time. The already booked space will be marked yellow and will not be available for anyone else for the specified time. This system also allows users to cancel their booking anytime. The system provides an additional feature of calculating monthly earnings of doctor. Doctor has to just feed the system regularly with daily earnings and the system automatically generates a report of total amount earned at the end of the month. The application uses Asp.net as a front-end and Sql database as the back end.

Keywords: Web-based application, django (python), SQLite, Bootstrap, visual studio code

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ICMSTS – E062

EXPERIMENTAL INVESTIGATION ON THE EFFECT OF CERIUM OXIDE NANOPARTICLE FUEL ADDITIVES ON TOMATO SEED OIL IN CI ENGINE

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Abstract:

Major portion of today's energy demand in the world is being satisfied with fossil fuels. On the record of confronting the up and coming energy crisis, bio oils have come up as a promising source of fuel for IC Engines. As India is an agricultural country, there is a wide extension for the generation of vegetable oils (both edible and non-edible) from various plant assets. This is the reason that colossal research work is going ahead to utilize bio oil as fuel. But there is a serious perception that the performance and efficiency of bio oils is found to be less than that of mineral diesel. This research work is to prove that with necessary modifications in Compression ignition engine the efficiency can be improved and it can be made equivalent or still better than mineral diesel. Tomato Seed Oil is one among them that is available abundantly in India and all over the world. An experimental investigation was made to evaluate the performance and emission characteristics of a diesel engine using different blends of Tomato seed oil with cerium oxide Nano particle additive is added in diesel. Tomato seed Oil was blended with diesel in proportions of 10%, 20%, and 30% by volume, performance and Emission parameters was studied under different loading conditions in compression ignition engine.

Keywords: *compression ignition engine, Tomato seed Oil, cerium oxide additives, performance, emission*

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ICMSTS – E063

ENHANCING PALM BIODIESEL PERFORMANCE WITH NANOADDITIVES IN INTERNAL COMBUSTION ENGINES: A COMPREHENSIVE REVIEW

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Abstract:

Palm biodiesel has emerged as a promising alternative fuel for internal combustion engines (ICEs) due to its renewable nature, biodegradability, and potential to reduce greenhouse gas emissions. However, its lower energy density, higher viscosity, and poor oxidative stability hinder its widespread adoption. The incorporation of nanoadditives in palm biodiesel has gained significant attention as an effective approach to enhance combustion characteristics, emission performance, and engine efficiency. This review critically analyzes recent advancements in nanoadditive applications for palm biodiesel, focusing on their impact on fuel properties, engine performance, and emission characteristics. The study also highlights challenges, economic feasibility, and future research directions for the sustainable implementation of nanoadditives in biodiesel-fueled ICEs.

Keyword: *IC Engines, Biodiesel, nanoadditives, performance, emission, palm biodiesel.*

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ICMSTS – E064

INVESTIGATION OF ORANGE SEED OIL BIODIESEL WITH CERIUM OXIDE NANOPARTICLE IN CI ENGINE

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Abstract:

Because of increasing automobiles, power plants and factories, increasing of this automobiles, power plants produce the more emissions like CO, HC and NOx. So that the world is searching for the alternative fuel, which will not create any harm to the environment and also it would be less in cost. Biodiesel is one of the main solutions to the global energy crisis. In this present work studied the performances and emission characteristics of Orange Seed Oil Bio-diesel (GSO). Use of additives for better combustion characteristics to the biodiesel. The blends of Orange Seed oil (GSO) with the additives Aluminum oxide are B10+20 PPM CeO_2, B20+20PPM CeO_2, B30+20 PPM CeO_2. This blends were analyzed and their performance and emissions characteristics compared with performance and emission characteristics of diesel. Tests were carried out over entire range of engine operation at varying conditions of load. The engine exhaust gas emissions are reduced with increase biodiesel concentration.

Keywords: *Orange Seed oil (GSO); Cerium oxide (CeO2); Engine Performance characteristics, Exhaust emission characteristics,*

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ICMSTS – E065

THERMAL STUDIES ON A DIESEL ENGINE USING PALM OIL BLENDS

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Abstract:

Environmental concerns and energy crisis of the world has led to the search of alternate to the fossil fuel. FAME (Fatty Acid Methyl Ester) is environment friendly, alternative, and non-toxic, safe; biodegradable has a high flash point and is also termed as Bio-Diesel. The growing economic risk of relying primarily on fossil fuels with limited reserves and Increasing prices has increased the interest on alternative energy sources. Clean and renewable biofuels have been touted as the answer to the issue of diminishing fossil fuels. INDIA the largest producer of palm oil has committed to focus interest on biofuels, namely palm biodiesel. Since palm oil has a high fossil energy balance, it is a key source of raw material for biodiesel production. This paper presents palm biodiesel as an alternative source of green renewable energy through a survey conducted from previously researched findings. In this experimental study testing of emission characteristics and performances test of palm Bio-diesel at various ratios form (B25%, B 50%, B75%, B100%) of Bio-diesel. As we compared with fossil fuel (diesel) and palm bio-diesel on base of various emission elements (CO, CO2, NOX, O2, and HC).

Keywords: Biodiesel, Engine, Performance, Emission

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ICMSTS – E066

SYNTHESIS OF SILICON CARBIDE NANOPARTICLES FOR ENHANCING ENGINE OIL EFFICIENCY

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Abstract:

The aim of the work is to enhance the performance of the diesel injection engine and to simultaneously increase the engine life span it has been proposed to develop Silicon carbide or TiO_2 dispersed lubricant oil and study its characteristics. A nanofluids are innovative new class of fluids which can be engineered by suspended Nano sized (1-100nm) in conventional base fluids and these fluids have improved load carrying capacity, anti-wear and friction reduction properties. Sol-gel method was used to synthesize Nano Silicon carbide or TiO2.The powder thus synthesized was characterized using XRD, SEM and TEM. The average crystalline size was 6nm and the phase was found to be anatase. These nanoparticles are mixed with engine oil in some proportion and the tests are conducted in pin on disc tribometer. This blend is used in tribometer in order to measure the oil properties like wear, friction and cof. Thus the project deals with an alternate approach to increase the life span of the engine and the results will be compared with the engine oil

Keywords: Nano particle, silicon carbide, engine oil, micro structure, XRD

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ICMSTS – E067

REDUCING ELECTRICITY CONSUMPTION IN GEYSER USING WASTE HEAT RECOVERY SYSTEM

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Abstract:

Energy is an important unit for development. India is a developing country. Energy needs of various sectors has increased rapidly. In the present energy crisis scenario, many people think in terms of alternate energy sources and conservation methodologies. In the context of great uncertainty over future energy supplies, attention is being paid to conserve energy and use it as an alternate source.. Air conditioning units are designed to remove heat from interior spaces and reject it to the ambient air. While this heat is of low grade variety it still represents wasted energy. From an energy conservation point it would be desirable to reclaim this heat in a usable form. The best and most obvious form of heat recovery is for heating water. The main objective of this paper is experimental analysis of waste heat recovery system and utilization of the recovered heat as an source for generating hot water and thus saving electricity.

Keywords: *Energy, alternate source of energy, low grade energy, high grade energy, payback period.*

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ICMSTS – E068

ELECTRIC POWER GENERATION USING NUCLEAR-POWERED STIRLING ENGINES – A CASE STUDY

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Abstract:

Power generation in a large scale is of vital importance considering the huge population of our country as well as the technological advances in manufacturing various electronic gadgets. The paper starts with the elementary ideas that underline the working of a nuclear power plant and builds up to clear explanations of how Stirling engines can replace steam turbines by simplifying the plant to yield greater efficiency in terms of power generated and providing a pristine environment by reducing radioactive byproducts. The paper also focuses on the configurations, operations and merits of Stirling engines over the conventional steam turbines.

Keywords: alpha configuration, stirling engine, Schmidt analysis, recuperator.

ISBN 978-819840061-1

ICMSTS – E069

DESIGN AND ANALYSIS OF A STEERING KNUCKLE COMPONENT FOR AN OFF-ROAD VEHICLE

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Abstract:

Steering Knuckle is a non-standard component linking the suspension, steering & braking systems and the wheel hub to the chassis of a vehicle. This study aims to redesign the steering knuckle in order to reduce the weight while retaining a satisfactory safety factor for better performance of the vehicle. A two-step process has been used for the same. First step is modeling the knuckle as per the structural considerations and design constraints set by suspension, steering and brake assemblies & determination of loads acting on the knuckle. The second step is stress analysis using finite element software and design adjustments for reducing weight without compromising on the structural strength. According to the analysis results, material can be added to parts that are subjected to higher stress than the safety factor permits. Material can also be removed from low stress areas, thus, helping to reduce the component weight.

Keywords: *Steering Knuckle, vehicle, design, modeling, analysis*

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ICMSTS – E070

INVESTIGATION OF LEMON SEED OIL BIODIESEL WITH CERIUM OXIDE NANOPARTICLE IN CI ENGINE

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Abstract:

Because of increasing automobiles, power plants and factories, increasing of this automobiles, power plants produce the more emissions like CO, HC and NOx. So that the world is searching for the alternative fuel, which will not create any harm to the environment and also it would be less in cost. Biodiesel is one of the main solutions to the global energy crisis. In this present work studied the performances and emission characteristics of Lemon Seed Oil Bio-diesel (GSO). Use of additives for better combustion characteristics to the biodiesel. The blends of Lemon Seed oil (GSO) with the additives Aluminum oxide are B10+20 PPM CeO_2, B20+20PPM CeO_2, B30+20 PPM CeO_2. This blends were analyzed and their performance and emissions characteristics compared with performance and emission characteristics of diesel. Tests were carried out over entire range of engine operation at varying conditions of load. The engine exhaust gas emissions are reduced with increase biodiesel concentration.

Keywords: *Lemon Seed oil (GSO); Cerium oxide (CeO2); Engine Performance characteristics, Exhaust emission characteristics,*

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ICMSTS – M002

A STUDY ON WORK PLACE BEHAVIOUR: ROLE OF PERSON-ORGANIZATION FIT, PERSON-JOB FIT & EMPOWERMENT

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Abstract:

Managing the workforce sufficiently is ungainly and is furthermore one of the key accomplishment components of any affiliation. While supervising workforce an overseer deals with various factors affecting the execution of affiliation including workplace lead. It has basic part in choosing the execution of agents on account of this reason now the hugeness of workplace lead is being seen relentlessly. This examination researched the connection b/w singular affiliation fit (PO-fit) and legitimate citizenship direct (OCB), singular business fit (PJ-fit) and various leveled citizenship lead (OCB), singular affiliation fit (PO-fit) and oddity rehearses (DB), singular occupation fit (PJ-fit) and savage practices (OCB) and the piece of reinforcing as mediator has been be penniless down. Responses were accumulated from 307 respondents, through surveys, from organization division of Pakistan where telecom and banks were taken under investigation. Backslide examination were use to test the theory. Results demonstrated basic positive relationship of PO-fit and PJ-fit with that of OCB. Association of DB with that of PO-fit remains disconfirmed however unsupported with of PJ-fit. Other than reinforcing was found to coordinate just between PJ-fit and OCB, yet not between PO-fit and OCB. Further examinations are relied upon to research increasingly about forerunner and results of DB and the exploring more segments that effect OCB.

Keywords: Authoritative citizenship conduct (OCB), Freak conduct (DB), individual association fit (PO-fit), Individual employment fit (PJ-fit), Strengthening

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ICMSTS – M003

A STUDY ON THE IMPORTANCE OF BRAND AWARENESS IN BRAND CHOICE OF INDIAN CUSTOMERS

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Abstract:

The sponsors are in consistent desiring to progress and invigorate their picture name in the customer's cerebrum. Thing circumstances started course back in mid-1950's which is as of now used as an extreme gadget to propel marks inside the association of movies, arrange appears, etc. Thing positions are insightful elevating methodologies used to assemble detectable quality of the thing, signage, trademark or logo in the motion picture. It should be perfectly done to make a sentiment of credibility with the goal that the watcher not the smallest piece feels isolated while watching the screen. Sensibly, Alain d'Astous and Francis Chartier (2000) have borne witness to that thing circumstances are channels which successfully draw thought of the watchers inciting affirmation of the brand plans took after by brand survey while shopping. The paper moreover attempts to look into changed estimations associated with thing plans viz; enormous name supports, references and emotions which add to audit of the brand and thusly customer unwaveringness. From a coherent point of view it may be comprehended that by perception effects of various factors and sorts of thing plan, sponsors are subject to envision and organize the exercises in using the channel. The objective in the present investigation is to perceive whether thing courses of action particularly impacts a customers' decision to grow believability of obtainment by survey.

Keywords: item position, buyer purchasing, brand review, consumer loyalty, promotion.

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ICMSTS – M004

A STUDY ON WORK-LIFE STABILITY OF EMPLOYEES IN EDUCATION SECTOR

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Abstract:

The outside condition of the affiliation is in a constant state of motion. Affiliations must be vigilant for this and must ensure that they change themselves in a way that affiliation acclimates to the necessities of the earth. The challenges stood up to by the affiliation are realizing some portion of weight on the delegates at the helpful level. As a result, affiliations need to demand their agents to lock in. A field study was finished to survey the impression of people who were working in guidance division of Joined Kingdom and Kuwait. It was discovered that impression of the all-inclusive community who had been working in Kuwait contrasts from the people who had been working in the preparation fragment of Joined Kingdom. It was discovered that people who had been working in the guidance part were increasingly stressed over their prosperity as the work-life-adjustment was expediting Weight on their wellbeing. In like way, people who had been working in the guidance division of Kuwait moreover showed up their stress over their job development. Furthermore, agents working in Kuwait in like manner showed their stress that they have been mentioned that work on ends of the week which is certainly not a beautiful thing for them. It was in like manner discovered that for agents it isn't needed by laborers that they have to work while requiring some genuine vitality out of their common calendars And association get in contact with them after accessible time. In like way, it was represented by agents who were working in the preparation part of Joined Kingdom that delegates are peppy that their affiliation and executives are stressed over their family issues which rise up out of work life balance. Considering the revelations that began from this investigation, it is suggested by authority that in both Kuwait and Joined Kingdom, informative establishments should dispatch a broad work life equality support as inn the two countries agents who were working in preparing area had been going up against related troubles. Affiliations should ensure that extra work should not be associated with the employment development. In case in any condition, an affiliation wishes that it's agents work more than the standard conditions, at that point affiliation should bestow this to specialist early with the objective that delegate can manage his daily practice as necessities be.

Keywords - Representatives health, outside condition, Kuwait, work life balance

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ICMSTS – M005

SUSTAINABLE PRACTICES IN HOSPITALITY: BALANCING ENVIRONMENTAL RESPONSIBILITY WITH BUSINESS PROFITABILITY

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Abstract:

The hospitality industry is at the forefront of environmental sustainability due to its significant ecological footprint and its dependence on natural and cultural resources. However, as the sector grows, it faces a dual challenge: mitigating environmental impacts while maintaining business profitability. This chapter explores how sustainable practices can be strategically integrated into hospitality operations to address this balance. It examines key areas such as energy efficiency, waste reduction, sustainable sourcing, and community engagement. Additionally, it highlights the role of technological innovation and stakeholder collaboration in overcoming barriers to sustainability. Through real-world examples and evidence-based analysis, the chapter demonstrates that sustainability can be a driver of financial performance, brand loyalty, and regulatory compliance. While initial investment costs and operational complexities present challenges, these can be mitigated through strategic planning, innovative solutions, and long-term vision. By embracing sustainability, the hospitality industry not only contributes to global environmental goals but also secures its resilience and competitiveness in a changing marketplace.

Key Words: Environment; Hospitality; Hotel Industry; Waste Management

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ICMSTS – M006

THE EFFECT OF SERVICE QUALITY ON CUSTOMER SATISFACTION IN THE HOTEL SECTOR

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Abstract:

In the hotel industry, client happiness is largely determined by the quality of the services provided. Hotels are expected to deliver exceptional service experiences in a global market that is becoming more and more competitive in order to retain customers and encourage positive word-of-mouth. With an emphasis on important models like SERVQUAL and SERVPERF, this article investigates the connection between customer satisfaction and aspects of service quality. The study investigates important elements that affect consumer perceptions and satisfaction levels, including tangibles, responsiveness, empathy, certainty, and dependability. This study examines theoretical frameworks and empirical research to identify ways to raise customer happiness and service quality.

Keywords : SERVQUAL, Customer Satisfaction, Hotel Industry

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ICMSTS – M007

SUSTAINABLE TOURISM DEVELOPMENT IN SAUDI ARABIA A CRITICAL ANALYSIS

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Abstract:

This article provides a critical analysis of the sustainable tourism development practices in Saudi Arabia. The country has been growing its tourism industry steadily over the past few years, and the government has identified tourism as a key sector for economic growth. To promote sustainable tourism, the Saudi Commission for Tourism and National Heritage (SCTH) has implemented various initiatives, including the National Tourism Strategy 2019-2022 and regulations to protect natural and cultural resources. However, the tourism industry in Saudi Arabia faces challenges such as a lack of infrastructure and services in some destinations and a shortage of trained personnel. The article suggests opportunities such as developing cultural and heritage tourism products and eco-tourism activities to overcome these challenges. The article emphasizes the importance of sustainable tourism development for the long-term success of the tourism industry in Saudi Arabia and highlights the need to address the challenges and leverage the opportunities. Overall, this article provides valuable insights into the current state and future prospects of sustainable tourism in Saudi Arabia.

Keywords: Sustainable Tourism Development, Saudi Arabia, Economic Growth

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ICMSTS – M008

UNVEILING DIVINE POWER: A JOURNEY THROUGH DURGA PUJA

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Abstract:

This project explores the multifaceted celebration of Durga Puja, a major Hindu festival observed with grandeur, particularly in Kolkata, India. The research delves into the historical, cultural, culinary, and artistic dimensions of Durga Puja, highlighting its significance as a symbol of divine triumph and community unity. The festival, which dates back to ancient times, is deeply rooted in mythology, commemorating the victory of Goddess Durga over the demon Mahishasura. Over centuries, it has evolved from a localized religious ritual into a massive cultural event, marked by elaborate pandals, artistic idol-making, and grand processions. The project also examines the role of food during Durga Puja, focusing on traditional offerings and festive dishes that bring people together. Special attention is given to the intricate process of idol-making, exploring how skilled artisans craft life-sized representations of Durga, blending traditional techniques with modern artistic influence. Additionally, the research addresses the economic impact of Durga Puja, particularly its influence on the hotel industry, tourism, and local businesses in Kolkata. By attracting millions of tourists and creating a festive atmosphere, Durga Puja plays a crucial role in the city's cultural and economic landscape. The study concludes by highlighting the enduring relevance and cultural resilience of Durga Puja in the contemporary world.

Key word: Culture, Goddess Durga, Idol making, Kolkata

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ICMSTS – M009

SUSTAINABLE TRAVEL TRENDS: DISCUSSION ON TRAVEL AND TOURISM

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Abstract:

The travel and tourism industry are a significant industrial sector worldwide. It promotes unity, creates jobs, boosts social advancement, and drives economic growth. Around the world, hundreds of millions of people are employed in the travel sector. Not only is the travel and tourist industry the biggest job in many island economies, but it is also almost the only one. The function involves helping to create sustainable economies. With millions of enterprises and jobs, the travel and tourism industry are a vast sector that includes everything from the biggest global travel brands to the tiniest tour operator or hostel owner. A strong voice can be produced when we form a band.

Examining the growth and evolution of the travel and tourism industry on a worldwide scale is the goal. The travel and tourism industry are one of the most important industrial sectors globally. It promotes social advancement, creates jobs, boosts economic growth, and promotes peace. The industry employs hundreds of millions of people worldwide. In many island economies, the travel and tourism industry are not only the biggest employment but also, for the most part, the sole one. The role is to help create sustainable economies. The travel and tourism sector are a diverse industry with millions of companies and employers, ranging from the biggest global travel brands to the smallest tour operators or hostel owners.

Keywords: tourism, tourism trends, tourism sustainability

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ICMSTS – M010

EMBRACING ROOTS OF MADURAI AND CHITHIRAI FESTIVAL

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Abstract:

An important city in the Indian state of Tamil Nadu, Madurai was once known by its colonial name Madura. The Madurai Municipal Corporation, which was founded on November 1, 1866, is in charge of Madurai District's administration and serves as the cultural centre of Tamil Nadu. According to the 2011 census, it is the 27th largest urban agglomeration in India and the third-largest metropolis in Tamil Nadu, behind Chennai and Coimbatore. With a recorded history spanning over 2500 years, Madurai, an important settlement for two millennia, is situated on the banks of the River Vaigai., "Thoonga Nagaram", “the city that never sleeps" is a common moniker for it, The Project is Based on Beautiful City Madurai and its Cithirai festival and other wise called as Thiruvizha, The Socio Culture of the particular district of south Tamil nadu are Discussed in the below historical project. The celestial marriage of Lord Sundareswaran (Shiva) and Goddess Meenakshi (Parvati), which is thought to have occurred in Madurai, is reenacted during this lavish event. And also the Alazhar- lord Vishnu visited the vaigai river and the sister Meenakshi marriage. It was the 12 days’ festival celebrated in the Maduari. The Tamil language is closely linked to Madurai. It is reported that the city hosted the third Tamil Sangam, a significant gathering of Tamil academics. Megasthenes, the Greek envoy to the Mauryan Empire, and Kautilya, a minister of the Mauryan emperor Chandragupta Maurya, both made reference to the city's history, which dates back to the third century BCE. Archeological Survey of India excavations in Manalur have shown evidence of human dwellings and Roman trade connections as early as 300 BCE.Variously ruled by the Pandyan monarchy, Chola Empire, Madurai Sultanate, Vijayanagar Empire, Madurai Nayaks, Carnatic monarchy, and the British Raj of the British East India Company, the city is thought to be very old.

KEY WORDS: Madurai, Chithirai, Meenakshi, Festival.

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ICMSTS – M011

HOSPITALITY IN A POST-PANDEMIC WORLD: CHALLENGES AND OPPORTUNITIES

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Abstract:

The global hospitality industry has undergone a seismic transformation in the wake of the COVID-19 pandemic, facing unprecedented challenges while uncovering new opportunities for growth and innovation. This article explores the multifaceted impact of the pandemic on the hospitality sector, including operational disruptions, shifting customer expectations, and the adoption of health and safety protocols as a standard. Hotels and other hospitality enterprises have adapted embracing digital transformation, contactless services, and personalized guest experiences to rebuild trust and ensure safety. The paper highlights the emergence of wellness tourism, local travel, and sustainable practices as pivotal trends reshaping the industry. The article outlines practical strategies for navigating the post-pandemic hospitality landscape, focusing on building workforce resilience, integrating advanced technologies, and implementing effective crisis management practices. It emphasizes the critical role of adaptability, innovation, and a customer-focused approach as key drivers for hospitality businesses to succeed in a dynamic and rapidly changing environment.

KEY WORDS: Hospitality; Post-Pandemic; Challenges; Opportunities; Innovation

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ICMSTS – M012

AN INVESTIGATION INTO THE MARKETING STRATEGIES USED BY COMMERCIAL BANKS IN MANAGEING SERVICE BREAKDOWN AMONG SME CUSTOMERS

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Abstract:

In the dynamic landscape of financial services, Small and Medium Enterprises (SMEs) play a pivotal role in driving economic growth and fostering innovation. However, despite their significance, SMEs often face challenges in accessing banking services tailored to their unique needs. Service breakdowns, encompassing issues such as delays, inefficiencies, and mismatches in service delivery, can significantly impede the growth and sustainability of SMEs. Commercial banks serve as vital partners to SMEs, providing essential financial services ranging from loans and credit facilities to payment solutions and advisory services. Effectively managing service breakdowns is crucial for commercial banks to maintain trust and loyalty among their SME clientele. This requires strategic marketing approaches that not only address existing issues but also anticipate and prevent future breakdowns. Through comprehensive research and analysis, this study aims to identify the primary types of service breakdowns experienced by SME customers in their interactions with commercial banks. These breakdowns may include delays in loan processing, inadequate customer support, cumbersome documentation processes, or limited access to tailored financial products. By examining case studies, surveys, and interviews with industry experts, this investigation seeks to elucidate the marketing strategies currently employed by commercial banks to address service breakdowns among SME customers. These strategies may encompass proactive communication, personalized service offerings, digital innovation, and relationship-building initiatives. Evaluating the effectiveness of various marketing strategies in mitigating service breakdowns and enhancing overall customer satisfaction is crucial. This assessment will involve analyzing key performance indicators such as customer retention rates, Net Promoter Scores (NPS), and customer feedback metrics. Based on the findings of this investigation, recommendations will be provided to commercial banks for refining and optimizing their marketing strategies in managing service breakdowns among SME customers. These recommendations may involve leveraging emerging technologies, enhancing staff training programs, streamlining processes, and fostering a customer-centric organizational culture. In conclusion, the effective management of service breakdowns is paramount for commercial banks to cultivate enduring relationships with SME customers and drive mutual success.

Keywords: SME customers, Net promoter scores, Service breakdowns, Market strategies, Digital innovation.

ICMSTS – M013

THE IMPACT OF MIXED METHODS RESEARCH ON ENHANCING SCIENTIFIC INQUIRY: A COMPREHENSIVE ANALYSIS

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Abstract:

Mixed Methods Research (MMR) has emerged as a powerful approach in research methodology, combining qualitative and quantitative techniques to enhance scientific inquiry. This paper explores the principles, applications, advantages, and challenges of MMR across different disciplines. By integrating case studies, the journal highlights how MMR provides a holistic understanding of complex research problems. The study also addresses ethical considerations and methodological rigor in MMR, making a case for its increasing adoption in contemporary research.

Keywords:

Mixed Methods Research, Qualitative Research, Quantitative Research, Research Methodology, Data Triangulation

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ICMSTS – M014

IMPACT OF NUTRITION EDUCATION PROGRAM ON DIETARY CHOICES AMONG INDUSTRIAL WORKERS

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Abstract:

Nutrition education plays a pivotal role in fostering positive dietary behaviour, particularly among industrial workers who face unique challenges due to demanding work environments. This study evaluates the impact of a structured nutrition education program on the dietary choices of industrial workers, assessed through pre- and post-intervention scores. The intervention aimed to improve knowledge, attitudes, and practices related to nutrition, promoting healthier dietary habits. A total of 500 industrial workers participated in the program, which included interactive sessions, individual counselling and group counselling. The participants' dietary knowledge and practices were evaluated using a standardized questionnaire, yielding a pre-test mean score of 7.22. Following the intervention, the post-test mean score significantly increased to 16, indicating substantial improvements in dietary awareness and behaviour. The results underscore the effectiveness of targeted nutrition education in addressing dietary gaps and fostering healthier eating patterns among industrial workers. Improved dietary choices can potentially mitigate risks associated with occupational health challenges, such as obesity, cardiovascular diseases, and metabolic disorders. This study highlights the importance of integrating nutrition education programs into workplace wellness initiatives. It recommends scaling such interventions to reach broader populations in industrial settings, emphasizing continuous education to sustain positive dietary behaviours.

Keywords: Nutrition education, workplace health, dietary behaviour, industrial workforce, intervention outcomes.

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ICMSTS – E071

EXPLORING PRODUCTION FORECASTING THROUGH DECLINE CURVE ANALYSIS: A PRACTICAL APPROACH USING EXCEL

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Abstract:

This project applies Decline Curve Analysis (DCA) using Arps' Exponential, Hyperbolic, and Harmonic models to forecast oil production rates and support reservoir management decisions. The analysis is based on an initial production rate (Qi) of 1000 barrels per day (bbl/day) and a decline rate (Di) of 50% per year, equivalent to approximately 4.17% per month. The objective is to model production decline over time and estimate cumulative production, improving the accuracy of forecasts and enabling better decision-making in reservoir management. Arps' models are applied to represent different decline behaviours: the Exponential model assumes a constant decline rate and is simple to apply but may be less reliable for long-term predictions. The Hyperbolic model allows for a variable decline rate that adjusts according to reservoir performance, offering more flexible and realistic forecasts. The Harmonic model, a special case of the Hyperbolic model (where the hyperbolic exponent b equals 1), provides a smoother, long-term decline trend suitable for reservoirs with cyclic or intermittent production patterns. Excel is used as the primary tool for calculations and visualization, where production rates and cumulative production are computed at regular time intervals using Arps' equations. Cumulative production is calculated with the formula, enabling systematic analysis of time, production rates, and cumulative output. Sensitivity analysis is performed by varying key parameters such as Qi, Di, and b to evaluate the robustness of the forecasts. Historical production data, where available, is used for model validation. The results demonstrate that while the Exponential model is simple, the Hyperbolic and Harmonic models provide more accurate, adaptable forecasts, highlighting the importance of selecting an appropriate decline model for effective reservoir management.

Keywords: Decline Curve Analysis (DCA), Arps Models, Exponential Decline, Hyperbolic Decline, Harmonic Decline

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ICMSTS – E072

NATURE INSPIRED BASED NEURAL NETWORK WITH ENHANCED SECURITY FOR DATA TRANSMISSION IN MARINE MONITORING SYSTEM

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Abstract:

The maritime industry's transition from traditional mechanical systems to interconnected digital infrastructures has introduced significant cybersecurity vulnerabilities. This shift towards automated systems, reliant on software, networks, and digital communication, has expanded the attack surface, creating opportunities for both simple and sophisticated cyberattacks. The potential consequences of these attacks are far-reaching, including disruptions to operations, financial losses, and compromises to vessel safety and security. Furthermore, the current state of preparedness within the maritime sector is often inadequate, particularly among smaller organizations lacking the resources and expertise to implement robust security measures. The evolving complexity of cyber threats, coupled with the increasing reliance on interconnected technologies, necessitates a proactive and comprehensive approach to cybersecurity within the maritime industry. This includes investing in advanced threat detection and mitigation strategies, enhancing security training and awareness, and fostering collaboration between stakeholders to strengthen the overall resilience of maritime operations. Extensive Threat Review is the study conducts a thorough review of security threats impacting the IoT-enabled maritime industry and Comprehensive Background provides a detailed overview of the maritime security threat landscape, encompassing various threats, threat actors, and their motivations. The infrastructure-Specific Analysis is a Cybersecurity threats are analyzed concerning specific elements of maritime infrastructure and onboard devices (navigation systems, data recorders, logistics systems). The Risk Assessment & Mitigation examines various risk analysis methods, discussing their strengths and weaknesses, and explores different threat mitigation techniques.

Keywords: YOLO, Attack and detection classification algorithm. Pretrained Neural network, Adversarial Attack, Adaptive Encoder.

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ICMSTS – E073

REAL-TIME ROAD ACCIDENT DETECTION AND NOTIFICATION SYSTEM USING OPTIMIZED DEEP LEARNING MODELS

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Abstract:

Road accidents are a grave concern worldwide, claiming numerous lives and causing significant economic losses annually. Traditional methods of accident detection are often sluggish and ineffective, especially in identifying incidents in real time. This inefficiency leads to delays in emergency response and hinders efforts to save lives and minimize damages. This project addresses these challenges by employing advanced deep learning techniques with an optimized You Only Look Once (YOLO V8) model. YOLO V8, being one of the most efficient object detection algorithms, is utilized to analyze live CCTV footage and precisely detect road accidents as they happen. The integration of this technology ensures rapid and accurate identification, reducing the likelihood of missed incidents or false alarms.The system's functionality is powered by a Flask-based web application, which processes video frames from live surveillance feeds. Through this application, real-time detection of accidents is achieved. In case of an identified accident, the system instantly triggers automated notifications to alert emergency responders. This seamless communication drastically shortens response times, enabling immediate intervention and potentially saving lives.By combining these innovative technologies, the system offers several key benefits. Enhanced detection accuracy ensures precise identification of accidents, while real-time processing reduces delays in emergency response. Quick and automated alerts streamline coordination among response teams, improving overall emergency management. Moreover, the system strengthens public safety by enabling effective monitoring of accident-prone areas and fostering a secure road environment.

Keywords: YOLOv8, Accident detection classification algorithm. Convolutional Neural network, Alert system, Flask-based web application.

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ICMSTS – E074

VIRTUAL MOUSE WEBSITE

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Abstract:

In the modern digital era, human-computer interaction has evolved significantly, leading to the development of innovative, touchless control systems. This project presents a Virtual Mouse Website, enabling users to interact with a computer's cursor using hand gestures via a webcam. The system leverages Python, Flask, OpenCV, MediaPipe, and PyAutoGUI to achieve real-time hand tracking, gesture recognition, and cursor control without requiring physical peripherals.The proposed solution enhances accessibility and convenience, particularly for individuals with disabilities or users seeking a more intuitive and hygienic way to interact with computers. By employing MediaPipe's hand-tracking framework, the system detects and interprets various gestures, such as moving the cursor, left-click, right-click, and scrolling, which are then translated into corresponding mouse actions using PyAutoGUI. Flask serves as the backend to host the application, ensuring seamless operation directly within a web browser.This project demonstrates the potential of AI-driven computer vision applications in human-computer interaction, reducing reliance on traditional input devices while maintaining efficiency and accuracy

Keywords: Virtual Mouse, Hand Tracking, Gesture Recognition, OpenCV, MediaPipe, Flask, Human-Computer Interaction (HCI)

ISBN 978-819840061-1

ICMSTS – E075

WAVELET-BASED ANALYSIS OF KNOCKING INTENSITY IN DIESEL-TERNARY FUEL BLENDS FOR EMISSION AND PERFORMANCE OPTIMIZATION

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Abstract:

With the growing global need for cleaner and more efficient internal combustion engines, alternative fuel blends have been one of the major research priorities. Diesel-ternary blends of regular diesel, biodiesel, and oxygenated additives have been investigated in this study to consider their viability for knocking intensity reduction, combustion stability improvement, and emissions reduction. To accomplish these goals, one-cylinder testing of the diesel engine was performed under different loads. Engine performance factors like brake thermal efficiency, fuel consumption, and emission patterns—nitrogen oxides (NO_x), carbon monoxide (CO), unburned hydrocarbons, and particulate matter—were extensively explored. This work is new because wavelet transform analysis of cylinder pressures was applied. Wavelet transform analysis allows for the determination of transient combustion events with accuracy and offers greater insight into knocking behavior and the effect of fuel properties. To supplement experimental outcomes, predictive models based on machine learning such as regression analysis and artificial neural networks (ANN) were utilized to analyze correlations of combustion behavior with engine performance and fuel composition. With the combination of the models, it was possible to optimize the fuel composition for efficiency, emissions, and knocking intensity. The study finds that the ternary blends of diesel substantially inhibit knocking with performance levels being as good as regular diesel. It establishes the role of advanced signal processing approaches and AI-based modeling in optimizing combustion analysis for paving the way for cleaner and more sustainable diesel engine technology. It provides insightful information on alternative fuels and aids global efforts towards adhering to strict emission standards without sacrificing reliability in engines.

Keywords: Water-Emulsified Diesel Fuel, Multi-Objective Optimisation, Artificial Neural Networks, Combustion Analysis, IC Engine Emission Control, Signal Processing

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ICMSTS – E076

MULTI-OBJECTIVE OPTIMIZATION OF CI ENGINE PERFORMANCE AND EMISSIONS USING WATER-EMULSIFIED DIESEL FUELS AND AI-BASED MODELING

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Abstract:

The quest for cleaner and more efficient diesels has given rise to increasing interest in water-emulsified diesel fuels. These new, high-technology blends of tiny water droplets suspended in diesel contain within them the potential for emissions savings and combustion efficiency improvement. Research into the impact of water-emulsified diesel blends on engine performance and emissions combines experimental methodologies with AI-based optimization. Control experiments were conducted on one-cylinder compression ignition engine to analyze key performance parameters, i.e., brake thermal efficiency, specific fuel consumption, and in-cylinder pressure oscillations. At the same time, the emissions of nitrogen oxides (NO_x) emissions, carbon monoxide (CO), unburned hydrocarbon emissions, and particulate matter emissions were also quantified to analyze the environmental benefits of such fuel blends. Wavelet transform and fast Fourier transform (FFT) analysis were conducted for better understanding of combustion behavior, allowing detailed analysis of combustion stability and transient pressure oscillations. Along with experimental validation, regression models and artificial neural networks (ANN) were also developed to predict engine performance as a function of the fuel composition and the running conditions. Genetic algorithms were also used to optimize the optimum water-to-diesel ratio that would provide minimum emissions and maximum performance. This multi-objective optimization method provided a holistic framework for the optimization of the composition of the fuel. The study proves that highly optimized emulsified water blends for diesel can substantially reduce harmful emissions with no sacrifice in operational performance. With advanced signal processing using AI-based predictive modeling, the study offers a new paradigm for achieving cleaner combustion modes in diesel powertrains.

Keywords: Combustion Stability and Emissions Minimization Study using Wavelet Analysis and Machine Learning

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ICMSTS – E077

SMART MARINE SECURITY ECOSYSTEM: INTEGRATING IoT, AI, GIS, AND BLOCKCHAIN FOR REAL-TIME THREAT DETECTION AND SECURE MARITIME OPERATIONS

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Abstract:

Marine security is vital for global trade and safety, yet it faces numerous challenges like piracy, smuggling, environmental hazards, and cyber threats. Traditional surveillance systems often suffer from delayed responses, limited real-time monitoring, and data vulnerability. This paper explores how the integration of advanced technologies — Internet of Things (IoT), Artificial Intelligence (AI), Geographic Information Systems (GIS), and Blockchain — can create a Smart Marine Security Ecosystem to address these issues. IoT enables real-time monitoring through interconnected sensors on ships, buoys, and ports, providing continuous data on environmental conditions and vessel movements. AI enhances this by analyzing IoT data for anomaly detection, predictive modeling, and automated decision-making, helping identify threats like unauthorized access and route deviations. GIS ensures accurate location tracking and geofencing, while also supporting environmental monitoring and maritime navigation. Blockchain secures critical data by creating an immutable, decentralized digital ledger, preventing manipulation and enhancing supply chain transparency. Real-world implementations like the smart port of Rotterdam and the Maersk-IBM TradeLens platform demonstrate the effectiveness of these technologies. Singapore's smart port, which integrates IoT, AI, GIS, and Blockchain, has achieved a 30% reduction in security incidents and faster response times. Despite the advantages, challenges such as high implementation costs, cybersecurity risks, and technical expertise requirements remain. Future innovations like 5G, satellite connectivity, and AI-powered autonomous vessels promise to further strengthen this ecosystem.

Keywords: *Marine security, Internet of Things (IoT), Artificial Intelligence (AI), Geographic Information Systems (GIS), Blockchain technology, Smart Marine Security Ecosystem, maritime safety, real-time monitoring, predictive analysis, data integrity, threat detection, autonomous vessels, supply chain transparency, cybersecurity in maritime, smart port systems.*

ICMSTS – E078

MACHINE LEARNING-BASED NUMERICAL AND EXPERIMENTAL STUDY OF INLET FLOW RATES, TEMPERATURE, AND EMISSION CORRELATIONS IN PURE HYDROGEN COMBUSTION

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Abstract:

This study employs a combined numerical and experimental approach, integrated with Machine Learning (ML) techniques, to investigate these correlations and enhance predictive capabilities. Traditional combustion studies rely heavily on computational fluid dynamics (CFD) simulations and experimental methods, both of which are resource-intensive and time-consuming. To address these challenges, ML algorithms, including artificial neural networks (ANNs), support vector machines (SVMs), and regression models, are trained on experimental and simulated data to establish predictive relationships between combustion parameters. This approach enables rapid and accurate estimation of key performance indicators such as flame temperature, NOx emissions, and combustion efficiency. The experimental setup involves controlled hydrogen combustion under varying inlet flow rates and temperature conditions, capturing real-time emission data. Numerical simulations using CFD provide additional insights into flame dynamics and reaction kinetics. The ML models are trained using these datasets, allowing for the prediction of combustion behavior across a wide range of operational conditions. Sensitivity analysis is conducted to determine the most influential factors affecting emissions and combustion stability, aiding in the optimization of hydrogen fuel usage for improved efficiency and reduced pollutant formation.

The results indicate that ML-driven models can effectively capture complex nonlinear relationships between flow rates, temperature, and emissions, providing an efficient alternative to conventional simulation-based approaches. The trained models demonstrate high accuracy in predicting combustion characteristics, reducing the reliance on exhaustive experimental trials. Additionally, this study highlights the role of AI-driven optimization techniques in refining hydrogen combustion systems for sustainable energy applications.

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ICMSTS – E079

OPTIMIZATION OF MULTI-FRACTURING IN HORIZONTAL WELL

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Abstract:

Hydraulic fracturing is a process through which a large number of fractures are created mechanically on the rock, thus allowing the natural gas or crude oil trapped in subsurface formations to move through those fractures to the wellbore from where it can then flow to the surface. The multi-cluster fracturing in horizontal well is more complex in shale gas reservoirs. Stimulated Reservoir Volume (SRV) technology for fracturing is used for exploiting shale gas reservoirs. The multiple fractures in horizontal wells are used to increase the recovery and the productivity in tight and shale reservoirs. The productivity of fractured well is affected by factors such as reservoir permeability, hydraulic fracturing angle and distribution of fractures. Optimization of the influence of reservoir properties and fracture parameters are studied. The design and modelling of the multi-fractured horizontal wells are carried out. The results show how the volume fracturing technology improves the gas well productivity in horizontal well for the complicated flow characteristics in shale gas reservoirs.

Keywords: Horizontal well, Multiple fracturing, Shale gas, Tight gas, SRV

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ICMSTS – E082

IDENTIFICATION OF WELL PROBLEMS USING WELL TESTING

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Abstract:

The identification of problems in oil and gas reservoirs is crucial for optimizing production and maintaining long-term reservoir health. Well testing, a key diagnostic tool, provides valuable insights into reservoir behavior and well performance by analyzing parameters such as pressure, flow rate, and fluid properties during short-term tests. This case study focuses on the application of well testing techniques—such as pressure buildup, drawdown, and transient tests—to identify issues like reservoir heterogeneity, production decline, wellbore damage, and flow restrictions. The methodology involves collecting and interpreting pressure and production data from the literature papers and comparing it using the Excel, followed by the estimation of key reservoir parameters like permeability, skin factor, and productivity index. Through the analysis of real or simulated well data, the case study aims to diagnose common production issues such as formation damage, scaling, and pressure anomalies. The findings highlight the importance of well testing in detecting flow inefficiencies and reservoir depletion early, enabling informed decision-making and targeted interventions like acidizing or hydraulic fracturing. In conclusion, the case study underscores the role of well testing in effective reservoir management, ensuring sustained well productivity and long-term operational efficiency.

Keywords: Well testing, reservoir management, production problems, pressure transient analysis, permeability, wellbore damage, reservoir heterogeneity, flow restrictions.

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ICMSTS – E083

REMOVAL OF SULPHUR FOR FCCU CRACKED GASOLINE WITHOUT AFFECTING OCTANE NUMBER

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Abstract:

This project deals with removal of Sulfur from FCCU cracked gasoline without affecting the octane number of the gasoline. As per the BS VI standard Sulfur in the gasoline should maintain less the 10ppm. While removing Sulfur from gasoline by using hydrogenation may loss octane number by saturating olefins in gasoline. Selective hydrogenation reactor introduced in hydrogenation process. In this report the material and energy balance calculations are shown in detail involved in this process have been done in detail by considering the technical aspects of the equipment. Environmental regulations and enhancing the performance of the fuel. A key aspect of the project involves performing material and energy balances to ensure that the process is efficient and sustainable. By analyzing the inputs and outputs of the system, the balance calculations help optimize the process flow and resource usage. Additionally, safety considerations were carefully addressed. An economic analysis was carried out to evaluate the financial feasibility of the sulfur removal process. The results of this analysis indicated that the process is economically viable, offering a good return on investment. Overall, the project demonstrates that sulfur removal from gasoline can be achieved effectively with minimal octane loss, while maintaining safety and economic efficiency.

Keywords: FCC Gasoline, S, Selective Hydrogenation, Material Balance, Energy Balance.

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ICMSTS – E084

NUMERICAL MODELING AND PREDICTION OF RESILIENT MODULUS IN LIGNOSULPHONATE-STABILIZED SOIL USING MATLAB

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Abstract:

Soil stabilization is important process in geotechnical engineering for problematic soil which could not sustain high bearing capacity mainly aimed at improving the mechanical characteristics of subgrade materials for infrastructure advancement. Lignosulphonate, a byproduct of the paper industry, has grown as a notable eco-friendly and economical choice among different stabilizers used in soil stabilization. Various literatures and researches were studies and concentrated on the study of Lignosulphonate, a stabilizer which enhances the strength of soil. This research work mainly concentrate to assess and forecast the resilient modulus of Lignosulphonate-stabilized soil by numerical modeling and machine learning in MATLAB. The resilient modulus is an important parameter which plays a vital role in pavement design, indicating the soil ability to rebound under repeated pressure. Experimental data from laboratory experiments, including cyclic load test and unconfined compressive strength (UCC) tests, will be gathered for various soil-Lignosulphonate mixes. MATLAB employed to handle and analyze the data using statistical regression, and machine learning methodologies. Using ANN, correlations between resilient modulus and factors such as moisture content, compaction properties, and Lignosulphonate dosage. Furthermore, numerical simulations was conducted utilizing MATLAB's finite element capabilities to model stress-strain behavior under cyclic loading circumstances, giving the best results. This findings in the study will enhance the sustainable development of stabilized soil for transportation infrastructure, providing a novel method for predicting soil performance through computational tools like MATLAB.

Keywords: Resilient Modulus, Soil Stabilization, Lignosulphonate, MATLAB, Numerical Modeling, Machine Learning

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ICMSTS – E085

EMERGING PHOTOVOLTAIC MATERIALS AND TECHNOLOGIES

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Abstract:

Solar energy in particular stands out as a potential solution for dealing with the increasing demand for renewable energy on an international level in recent years. Over the past few years, there have been notable developments in materials and design for Photovoltaic (PV) technology, which directly transforms sunshine into electricity. Solar energy has emerged as a key solution to meet the growing global demand for renewable energy in recent years. Significant advancements in materials and design for Photovoltaic (PV) technology, which directly converts sunlight into electricity, have been made over the past few years. In this paper provides an overview of these new photovoltaic materials and technologies, which aim to enhance the sustainability, cost-effectiveness and efficiency of solar power generation. These materials offer the potential for high efficiency low production costs and greater flexibility. Perovskite solar cells, for example, have demonstrated power conversion efficiency comparable to traditional silicon-based cells. Similarly, OPVs, which use organic materials, offer a flexible and cost-effective solution with applications in various settings, such as Building-Integrated Photovoltaics (BIPV) and wearable electronics. The future of photovoltaics lies not only in the development of advanced materials but also in integrating these technologies with energy storage systems, smart grids and energy-efficient buildings.

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ICMSTS – E086

INVESTIGATION OF TILES CHARACTERISTIC MANUFACTURING BY USING SILICON-BASED COMPOUNDS REINFORCED WITH TIRE ASH

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Abstract:

This research investigation examines the synergistic amalgamation of tire ash and silica fume cement (SFC) into silicon-based compounds aimed at the development of sustainable construction materials, specifically tiles exhibiting superior mechanical and durability characteristics. Employing a powder metallurgy methodology, three distinct compound formulations were meticulously engineered by maintaining the tungsten carbide content at 15%, while systematically varying the silicon-based cement proportions (85%, 80%, 70%) and tire ash content (0%, 5%, 15%). Electron microscopy analyses validated the uniform distribution of reinforcement particles across all formulated compounds. The empirical results reveal significant enhancements in performance attributable to tire ash integration: hardness augmented by 7.89% with the inclusion of 5% tire ash and by 21.27% with 15% tire ash. Remarkably, the corrosion resistance exhibited a substantial improvement, with the average mass loss diminished by 52.36% at 5% tire ash content and by 84.81% at 15% tire ash content. Furthermore, both compressive strength and wear resistance demonstrated considerable enhancement. This pioneering methodology addresses dual environmental challenges by repurposing waste tire byproducts while concurrently advancing the development of high-quality construction materials, thereby aligning with the principles of green construction and the objectives of a circular economy.

Key words: Tire ash reinforcement, Silicon-based compounds, Silica fume cement, Sustainable construction materials, Corrosion resistance

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ICMSTS – E087

EXPERIMENTAL INVESTIGATION OF STATIC BEARING FAULT DETECTION USING IMPULSE EXCITATION TECHNIQUE

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Abstract:

This research presents an innovative methodology for the detection of bearing faults through the analysis of vibrations under static conditions, thereby addressing a significant requirement in the maintenance of industrial machinery, wherein mechanical imbalances and bearing malfunctions account for the majority of failures in rotating electric machines. The design articulated herein employs the Impulse Excitation Technique (IET) to assess bearing conditions without necessitating dynamic operation, utilizing a domestically developed mechanical platform that is interfaced with a PSoC embedded design and LabVIEW virtual instrumentation. The system incorporates a solenoid-operated hammer mechanism that strikes the inner race of stationary bearings, while an ADXL 335 tri-axial accelerometer captures the resulting vibration signals; testing conducted on HCF model 6201-2RS bearings has evidenced that defective bearings yield discernible increases in power spectrum amplitude peaks subsequent to FFT analysis. Notable advantages encompass expedited testing (less than one minute per bearing), adaptable mounting for various bearing dimensions, the capability to verify bearing authenticity through power spectrum analysis, and non-destructive evaluation without the necessity of disassembling existing machinery, thereby presenting substantial potential for preventive maintenance and quality verification within industrial applications.

Keywords: Bearing-Fault-Detection, Impulse-Excitation-Technique, Static-Condition-Testing, Vibration-Analysis, Non-Destructive-Testing

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ICMSTS – E088

PREVENTING ACCIDENTS IN MATERIAL HANDLING OPERATIONS ON HCI SITES BY HAZARD IDENTIFICATION AND MITIGATION

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Abstract:

Construction is statistically among the world's most hazardous industries, accounting for approximately 30% of all fatal workplace accidents. These occurrences not only inflict profound human suffering but also impede project timelines, escalate costs, and tarnish the reputation of the industry. The determinants of accidents frequently arise from inadequacies associated with personnel, machinery, materials, methodologies, and situational contexts—all of which highlight deficiencies in safety management protocols. Material handling constitutes a particularly vital operation within infrastructure development, entailing the transportation of substantial materials through cranes, hoists, and various other apparatus. The prevalence of unsafe operating practices, negligence in maintenance, and human error substantially exacerbates the incidence of accidents during such activities. This investigation merges meticulous examinations conducted at a construction firm with extensive literature reviews to scrutinize incidents related to material handling. The research methodologies employed encompassed site evaluations, interviews with personnel and safety managers, accident analyses, and job safety assessments concentrated on failures in material handling. Risk assessment, which incorporated severity and frequency metrics, identified material handling as one of the most high-risk endeavors within construction operations. The results indicate a robust correlation between the data derived from the literature review and actual accident trends. The study concludes that the adoption of strategically focused novel techniques and improved safety protocols has the potential to significantly reduce material handling accidents within the construction sector, thereby enhancing overall workplace safety.

Key words: Safety, Construction accidents, Material handling, Minimizing accidents, cranes, hoists

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ICMSTS – E089

BLOCKCHAIN FOR SECURE AND DECENTRALIZED ARTIFICIAL INTELLIGENCE IN CYBERSECURITY

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Abstract:

The integration of blockchain technology and decentralized artificial intelligence (AI) is emerging as a robust solution to enhance cybersecurity. Blockchain ensures immutable, decentralized data storage, enabling secure transactions and privacy, while decentralized AI facilitates distributed threat detection and autonomous responses. This review explores the convergence of these technologies, presenting a taxonomy of their applications in cybersecurity. It highlights existing solutions, real-world use cases, and their potential to address modern cybersecurity challenges, such as data breaches and cyberattacks. However, challenges like scalability, interoperability, and regulatory concerns hinder widespread adoption. The paper also proposes future research directions to overcome these obstacles, aiming to advance these technologies and improve cybersecurity practices. Together, blockchain and decentralized AI offer a promising framework for building resilient and adaptive cybersecurity systems in an increasingly digital landscape.

Keywords: Blockchain, Decentralization, AI, Cybersecurity, Privacy, Security, Scalability, Interoperability

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ICMSTS – E090

DEVELOPMENT OF SKINCARE SHEETMASKS WITH COMBINED EXTRACTS OF *Citrus reticulata* AND *Persea americana* AND ITS BIOLOGICAL ACTIVITIES

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Abstract:

The increasing demand for natural and effective skincare products has led to the exploration of plant-based ingredients. *Citrus reticulata* is known for its rich content of flavonoids and vitamin C, which exhibit strong antioxidant and anti-inflammatory activities. *Persea americana*, commonly known as avocado, is rich in fatty acids and vitamins, providing excellent moisturizing and skin barrier repair properties. The individual and combined extracts of Persea americana and Citrus reticulata were prepared through maceration method. Qualitative phytochemical analysis was performed to evaluate the phytochemical components present in the extracts. The biological activities of the combined extracts were evaluated through in vitro assays, including DPPH radical scavenging activity for antioxidant activity where the combined extracts of . Through the antioxidant assay among the five extracts the mandarin orange extract *Citrus reticulata* peel and *Persea americana* peel exhibited the highest inhibition of 89.04%. Antibacterial and Antifungal assays where carried out and the results shows that the extracts of *Citrus reticulata* and *Persea americana* has exhibited antibacterial and antifungal properties that will be beneficial for the skin and the iodine starch test confirmed the presence of vitamin c and the carr price method confirmed the presence of vitamin A. Further studies will be involved by conducting anti-inflammatory test, preparing sheet masks , antiaging test, antiwrinkle test and so on is expected to exhibit a promising natural solution for enhancing skin health and provide potent effects making them suitable for daily skincare routines. This research highlights the potential of combining botanical extracts in skincare formulations to achieve enhanced biological activities and meet consumer demands for natural and effective skincare products.

Keywords: *Citrus reticulata*, *Persea americana*, skincare, sheet masks, antioxidant,

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ICMSTS – E091

THE IMPACT OF QUERCETIN ON CUMULUS CELL FUNCTION AND IN VITRO MATURATION OF BUFFALO OOCYTES USING CUMULUS CELL CO-CULTURE

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Abstract:

Quercetin, a bioactive flavonoid with potent antioxidant and anti-inflammatory properties, has shown promise in enhancing reproductive outcomes across various species. This study explores the impact of quercetin on cumulus cell function and its subsequent effect on the in vitro maturation (IVM) of buffalo oocytes. Cumulus-oocyte complexes (COCs) were cultured in IVM media supplemented with different concentrations of quercetin (0, 1, 5, and 10 µM) to assess its influence on oocyte maturation. Key parameters such as cumulus cell expansion, viability, and gene expression related to oocyte maturation were evaluated. Additionally, the nuclear maturation of oocytes was determined through the assessment of meiotic progression. This improvement in cumulus cell function correlates with a higher rate of oocyte maturation, suggesting that quercetin can positively influence the IVM of buffalo oocytes. These findings highlight the potential of quercetin as an effective supplement in IVM protocols, offering new opportunities for improving reproductive efficiency in buffalo and other livestock species.

Keywords: Quercetin, cumulus cells, buffalo oocytes, in vitro maturation, reproductive biotechnology.

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ICMSTS – E092

STRUCTURAL BRAIN NETWORK ANALYSIS IN SCHIZOPHRENIA USING FMRI WITH DEEP LEARNING ALGORITHM

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Abstract:

Schizophrenia is a mental disorder in which functional and structural brain networks are disrupted. Classical network analysis has been used by many researchers to quantify brain networks and to study the network changes in schizophrenia, but unfortunately metrics used in this classical method highly depend on the networks' density and weight; the comparisons made by this method are biased. Early diagnosis and treatment can reduce family burdens and reduce social costs. There is no objective evaluation index for schizophrenia. In order to improve the classification effect of traditional classification methods on magnetic resonance data, a method of classification of functional magnetic resonance imaging data is proposed in conjunction with the convolutional neural network algorithm. We take functional magnetic resonance imaging (fMRI) data for schizophrenia as an example, to extract effective time series from preprocessed fMRI data, and perform correlation analysis on regions of interest, using transfer learning and VGG16 net, and the functional connection between schizophrenia and healthy controls is classified. Experimental results show that the classification accuracy of fMRI based on VGG16 is up to 84.3%. On the one hand, it can improve the early diagnosis of schizophrenia, and on the other hand, it can solve the classification problem of small samples and high-dimensional data and effectively improve the generalization ability of deep learning models.

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ICMSTS – E093

EXPERIMENTAL INVESTIGATION ON SUSTAINABLE PAVER BLOCKS USING RECYCLED MATERIALS

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Abstract:

The rapid increase in plastic waste, particularly single-use plastics, poses a significant environmental threat. Conventional methods of plastic waste disposal, such as landfilling and incineration, contribute to pollution and resource depletion. This study investigates the feasibility of incorporating single-use plastic waste into paver block production as an eco-friendly alternative to conventional concrete pavers. Shredded plastic waste is used as a partial replacement for fine aggregates, reducing dependency on natural resources while enhancing the durability and flexibility of the blocks.A series of laboratory tests were conducted to evaluate the mechanical properties, including compressive strength, water absorption, and abrasion resistance, of plastic-based paver blocks. The results indicate that incorporating plastic waste improves resistance to cracking and enhances durability, making these pavers suitable for pedestrian walkways, parking lots, and low-traffic roads. Furthermore, the use of plastic waste significantly reduces raw material costs and promotes a circular economy by repurposing non-biodegradable waste into valuable construction materials. This research highlights the potential of sustainable paver blocks as a viable solution for waste management and infrastructure development. The findings contribute to green construction practices by offering an innovative method to mitigate plastic pollution while maintaining the structural integrity of paving materials.

Keywords: Sustainable paver blocks, recycled materials, plastic waste, circular economy, eco-friendly construction.

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ICMSTS – E094

COST AND TIME EFFICIENCY IN CONSTRUCTION: EVALUATING INTERLOCKING BRICKS AS A SOLUTION

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Abstract:

The construction industry faces constant challenges in balancing cost control and time management while maintaining structural quality. Interlocking bricks have emerged as an innovative solution that addresses these concerns through their unique design and installation process. Unlike conventional bricklaying methods, interlocking bricks eliminate the need for extensive mortar usage, thereby reducing material costs. This dry-stacking system accelerates the construction process by simplifying alignment and minimizing the need for skilled labor, leading to significant reductions in project timelines. This study investigates the economic and temporal efficiencies achieved by utilizing interlocking bricks in various construction settings. Through comparative analysis of traditional brick systems versus interlocking brick techniques, the research highlights key advantages such as faster installation speeds, reduced labor costs, and minimized construction waste. Additionally, the improved thermal insulation and structural stability provided by interlocking bricks contribute to enhanced energy efficiency and long-term savings. The findings underscore that interlocking bricks offer a practical solution for low-cost housing, community infrastructure projects, and eco-friendly construction initiatives. By integrating this system, stakeholders can achieve substantial cost reductions, enhanced project timelines, and improved sustainability outcomes. As a result, interlocking bricks emerge as a transformative approach to meeting modern construction demands while promoting economic and environmental benefits.

Keywords: Interlocking bricks, construction efficiency, cost-effective building, sustainable construction, time-saving methods, labor reduction, construction innovation, dry-stacking system, thermal insulation, eco-friendly building.

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ICMSTS – E095

MODELING AND OPTIMIZATION OF LASER CUTTING PARAMETERS FOR STAINLESS STEEL SHEET

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Abstract:

In Laser cutting of stainless steel 304 having wide application in of home and commercial applications, this is one of the most familiar and most frequently used alloys in the stainless steel family.Is important from the quality of cut point of keeping this view an approach of Responds Surface Methodology (RSM) of co2 laser cutting in austenitic stainless steel 304 to achieve better cut qualities within existing resource. The quality characteristics bottom kerf, top kerf, kerf width ratio and kerf taper should be considered. The input parameter considered as assist gas pressure, cutting speed and laser power. And responds should be analysing and optimize in Design-Expert 7.00 software.

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ICMSTS – E096

AN IN-DEPTH REVIEW OF HEAT PIPES: CLASSIFICATIONS, INTEGRATION METHODS, ANALYTICAL APPROACHES, AND UTILIZATION

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Abstract:

Thermocapillary pipelines are the most advanced thermal management devices that make use of capillary action as well as a phase change to transfer heat. They come into a different category according to the configuration in which they are made, including axillary groove, flat, cryogenic, micro, flexible, diode, and magnetically driven heat pipes. The article discusses the complexity of the design of a heat pipe with respect to material compatibility with the thermal conductivity, and temperature range. It also presents ideas on combining a variety of materials-nano-fluids, phase changes, metal foams, and others-to enhance the performance of heat pipes. Heat pipes have applications in many industries-healthcare and consumer electronics, renewable energy, vehicles, LED illumination, electronics refrigeration, and manufacturing machinery, among others. They have been demonstrated to maximize the efficiency, reliability, and performance of systems and equipment and are versatile enough to be applied in thermal management problems in many different industries.

Keywords: Heat pipes, Thermal management, Heat transfer, Phase change, Thermal conductivity, Nanofluid

ISBN 978-819840061-1

ICMSTS – E097

EXPLORING THE FRONTIERS OF NANOFLUID TECHNOLOGY FOR THERMAL SYSTEMS: A COMPREHENSIVE REVIEW

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Abstract:

Heat pipes facilitate the passive transfer of heat, resulting in excellent thermal performance. The efficiency of the working fluid diminishes as the temperature increases. Nanofluids, which consist of nanoparticles suspended in base fluids, could conduct heat. This article provides an overview of the latest advancements in nanofluid heat pipe research. the project will investigate the impact of size, shape, and concentration on heat transfer after researching nanoparticles and base fluids. The settling and clumping together of nanoparticles in heat pipes might hinder the transfer of heat. An analysis will be conducted to assess the compatibility and stability of nanofluids. This research evaluates the theoretical and practical enhancements in the thermal efficiency of heat pipes using nanofluids. The thermal resistance, effective thermal conductivity, and heat transfer coefficient will be quantified across different operating conditions and compositions of nanofluids. This research aims to assess the impact of nanofluids on the initiation and functioning of heat pipes. Nanofluid-based heat pipes can potentially improve the cooling systems in electronics, renewable energy technologies, and aeronautical engineering. The economic and environmental impacts of nanofluids will be promptly evaluated. If the final examination identifies any deficiencies in knowledge, it is advisable to research nanofluid heat pipes. To investigate the physics of heat transfer enhancement, examine novel base fluids, and refine characterization.

Keywords: Nanofluids, Heat pipes, Thermal performance, Nanoparticles, Heat transfer

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ICMSTS – E004

ASSESSMENT OF WASTE PLASTIC AND REFUSE COOKING OIL AS PROSPECTIVE RENEWABLE FUELS FOR DIESEL ENGINES

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Abstract:

The generation of plastic waste and waste cooking oil is a serious environmental concern because of worldwide waste disposal issues. At the same time, increasing demand and contemporary geopolitics make fossil fuels a significant worldwide problem. As a result, there has been an increase in demand for alternate fuel for CI engines. To overcome these twin problems can be addressed by converting waste into liquid fuels. This research explores an intriguing area by mixing waste cooking oil biodiesel and waste plastic oil to create a mixture that remarkably seems like the physico-chemical properties of diesel fuel in a society that is looking for sustainable alternatives. So, in this investigation, a ternary fuel blend of Petro-diesel, waste cooking oil biodiesel (WCOB), and waste plastic oil (WPO) was used in the diesel engine. To enhance the properties of fuel, combustion, emission, and performance parameters of diesel engines, a ternary blend of B30P30D40 was employed in the CI engine as an alternative fuel. In the ternary fuel blends, WCOB, WPO, and diesel content were 30%, 30%, and 40%, respectively. The results were compared with conventional diesel fuel, showing that the ternary fuel blend B30P30D40 has an improved brake thermal efficiency of up to 1.54% at 70% loading and reduced emissions (HC, CO, NO_x) compared to conventional diesel. Because of this, the ternary blends have significant potential for use in diesel engines.

Keywords: *Plastic, fuel, carbon, emission, blends.*

1. Introduction

Biodiesel, a sustainable energy source, plays a crucial role in reducing nitrogen oxides (NOx) emissions and carbon content in the atmosphere. Its carbon

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content originates from plant feedstock, resulting in a diminished contribution to global warming [1]. Additionally, compared to fossil fuel-derived diesel, biodiesel reduces emissions of air pollutants like nitrogen oxides, carbon monoxide, and carbon dioxide. According to a 1998 study by the United States Department of Energy and the United States Department of Agriculture, the use of pure biodiesel in urban buses results in a substantial reduction in life cycle emissions of total particulate matter by approximately 32 percent, carbon monoxide by around 35 percent, and sulphur oxides by about 8 percent compared to petroleum diesel [2]. In recent years, there has been a substantial increase in research focused on the production, characterization, and application of biodiesel. The objective of this literature review is to present a comprehensive analysis of the existing information on biodiesel, condensing the key discoveries from research articles in the topic .A study was done to assess the emissions and performance of diesel engines using various combinations. Energy is an essential factor for the development of every place in the world. The market has issued a cautionary notice to transition towards sustainable fuel in response to the rising prices of crude oil and the associated global emissions. The need for energy is increasing due to the expanding worldwide population, the imperative need for energy in industrial applications, the use of transportation, and power generating equipment [3]. the properties of tall oil methyl ester-diesel fuel blends as prospective substitutes for traditional fuels. The researchers investigated the potential of using blends of tall oil methyl ester and diesel fuel as a viable alternative for diesel engines. Tall oil methyl ester was synthesized by meticulously blending methyl alcohol with tall oil fatty acids.[4] The addition of long oil methyl ester to the diesel fuel blends resulted in a significant enhancement in engine power and torque output, with gains of up to 6.1% and 5.9% respectively [5].

2. Experimental Setup

The study employed biodiesel extracted from waste cooking oil. A single-cylinder, four-stroke diesel engine was utilized for the investigation. At the commencement of the engine, conventional diesel fuel was employed, considering all pertinent parameters as outlined in Table 1. The dynamometer employed eddy current for engine loading. Essential instrumentation for measuring crank angle and combustion pressure was included in the equipment to facilitate prompt utilization. The engine was equipped with a piezoelectric pressure sensor and a crank angle indicator device to monitor the combustion process. In order to ensure precise measurements of cylinder pressure, heat release rate, and ignition delay, it is imperative to calculate the average output signal from a pressure transducer across a span of fifty cycles. This procedure is essential for maintaining adherence to system standards and ensuring the

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accuracy of measurements. Figure 1 depicts the experimental configuration, encompassing a schematic portrayal of the system. It is imperative to initiate the engine without any external load and increase its rotational speed to 1,500 revolutions per minute (rpm) using a warm-up operation prior to conducting steady-state measurements. Steady- state measurements can only be carried out after this step. The study aims to monitor and analyze brake thermal efficiency and emission parameters during steady conditions, particularly focusing on engine performance and emission levels when the engine reaches 1500 RPM. These parameters include nitrogen oxides, ethane gas temperature and composition, carbon monoxide concentration and composition, smoke opacity, and smoke vapor pressure.

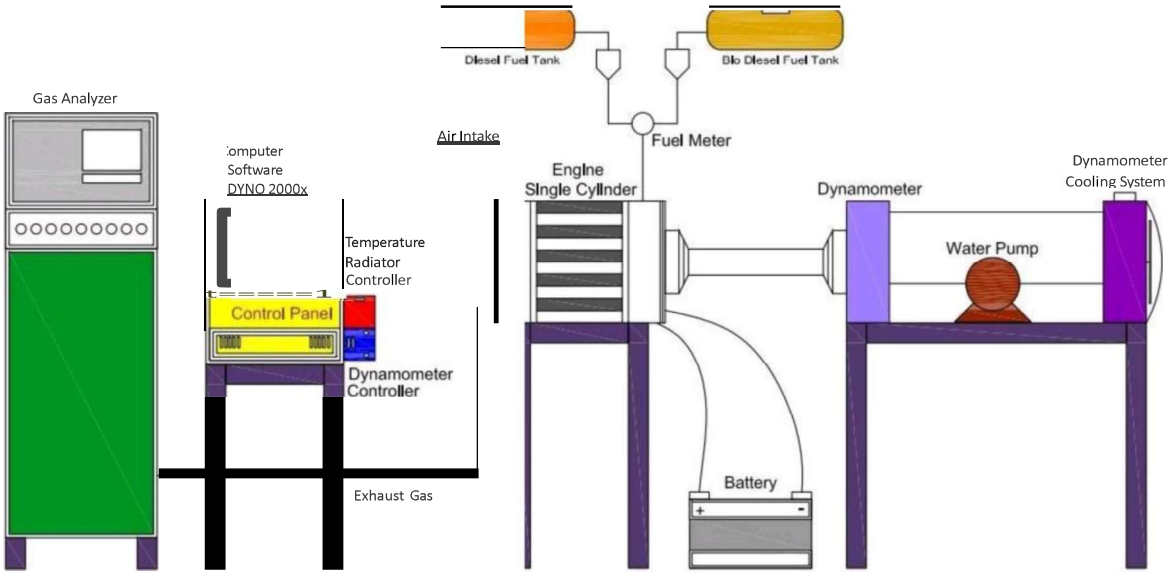

Figure.1: *Schematic diagram of the experimental setup*

3. Error Analysis

In the experimental trend, the mentioned algorithm was selective in order to compute the overall uncertainty associated with the system. According to Equation (3), the overall uncertainty (in percentage terms) of the findings is denoted by the symbol \(W_R \), where \(w \) stands for the dimensional shape variable and \(R \) is the uncertainty variable. Additionally, the term "w_n" is used to refer to the uncertainties that are related with the variables that are independent [12].

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$$W_R = \left[\left(\frac{\partial R}{\partial x_1} w_1\right) + \left(\frac{\partial R}{\partial x_1} w_2\right) + \cdots \left(\frac{\partial R}{\partial x_n} w_n\right)\right]^{\frac{1}{2}} \quad \text{_____ (1)}$$

4. Result and discussion

This experiment focused on ternary combinations of waste cooking oil biodiesel (WCOB), diesel fuel, and waste palm oil (WPO), aiming to assess engine performance, combustion traits, and emissions. Research was performed at engine acceleration of 20%, 40%, 60%, 80%, and 100%, with BMEP values ranging from 1 to 6 bar. The findings of these investigations were examined. To assess the impact of various combinations, we measured emissions of deleterious pollutants, including fine particulate matter, carbon monoxide, and nitrogen oxides, alongside critical engine parameters such as power output, efficiency, and combustion characteristics. The research aimed to evaluate the performance of WPO-Diesel-WCOB mixtures under diverse operating situations.

5. Performance Characteristics

5.1. Brake thermal efficiency (BTE)

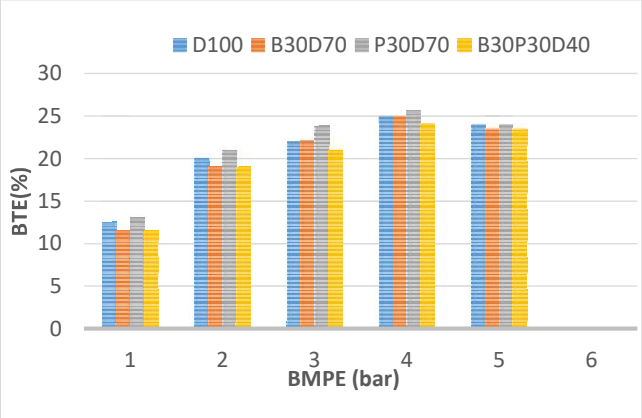

Figure. 2: Brake thermal efficiency as a function of BMEP varies between blended materials

BTE is a key parameter that evaluates the ability of a diesel the brake thermal efficiency (BTE) statistic facilitates a quantitative assessment of an engine's ability to convert fuel energy into usable work. This apparatus is very beneficial to both academics and engineers as it provides a systematic way for assessing the performance of various fuel samples in diesel engines. A higher BTE signifies greater engine efficiency, resulting in enhanced sustainability and less environmental impact. The need of optimizing BTE to assess the economic viability of the engine exacerbates the dilemma. The rationale behind this is that BTE directly influences both fuel prices and overall operational expenditures.

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The thermal efficiency of the engine is directly correlated with power production per unit of fuel consumption. Consequently, owners and operators should expect significant reductions in costs and enhancements in fuel efficiency. Figure 2 provides a visual picture of the importance of doing empirical research to optimize fuel blends, illustrating the potential performance improvements associated with various mixing percentages. This research's findings align with the primary goals of sustainability and economic efficiency in fuel use, while also improving engine performance.

5.2. Brake-specific fuel consumption (BSFC)

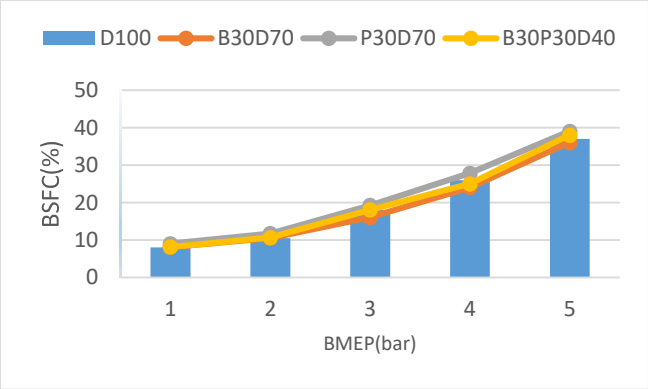

Figure. 3: Brake-specific fuel consumption as a function of BMEP varies across different blends

Brake Specific Fuel Consumption, often referred to as BSFC, is a critical metric for assessing and improving the fuel economy of diesel engines. By comparing the BSFC values of various test fuels, we can determine which fuels provide the best performance levels. A lower BSFC indicates greater engine efficiency, since it implies the engine can provide the same power output while using less fuel on average. The operational efficiency and cost-effectiveness of diesel engine applications are strongly linked to this property, making it a crucial component. We will examine the BSFC values for various test fuels throughout a spectrum of Brake Mean Effective Pressures (BMEP) to elucidate the relationships between BSFC and engine performance. The following BSFC values were recorded at 1 bar BMEP (30% loading): diesel at 0.432 kg/kWh, B30D70 at 0.485 kg/kWh, P30D70 at 0.454 kg/kWh, and the B30P30D40 blend at a much lower 0.320 kg/kWh. All these values were evaluated under identical loading conditions. These results illuminate the potential advantages of using the B30P30D40 blend, consisting of forty percent waste cooking oil biodiesel, forty percent oil obtained from plastic pyrolysis, and sixty percent diesel. Diesel registered 0.271 kg/kWh, B30D70 recorded 0.67 kg/kWh, P30D70 measured 0.65 kg/kWh, and B30P30D40 further fell to 0.123 kg/kWh when the loading increased to 4.8 bar

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BMEP (70% loading). The BSFC readings exhibited significant variation as the loads escalated to 70% capacity. According to this trend, the Brake Specific Fuel Consumption (BSFC) seems to decrease for all test fuels as the Brake Mean Effective Pressure (BMEP) increases, suggesting that fuel efficiency improves with elevated load conditions.

6. Emission Parameters

6.1. Unburned hydrocarbon (HC) emissions

A significant association exists between inefficient fuel combustion in engines and the occurrence of unburned hydrocarbons (HC) in exhaust emissions. This inefficiency diminishes fuel economy, significantly contributes to air pollution, and poses serious threats to public health, including respiratory issues, cardiovascular diseases, and other related ailments. It is essential to take measures to mitigate these emissions to protect human health and the environment.

Hydrocarbon emissions may be effectively reduced by several strategies. The design of engines that allow enhanced air-fuel mixing may result in higher combustion efficiency. One of the most critical strategies is the enhancement of engine architecture. Optimizing the combustion chamber's geometry may provide a more uniform temperature distribution and enhance flame propagation, both critical for complete combustion. The provision of enough air supply is equally important, since insufficient air may lead to incomplete combustion and an increase in unburned hydrocarbons. Recent studies on hydrocarbon emissions from various gasoline blends provide data that is both enlightening and useful. For instance, diesel produced 60.7 parts per million (ppm) of hydrocarbons when operated at a loading rate of thirty percent and used one bar of brake mean effective pressure (BMEP).

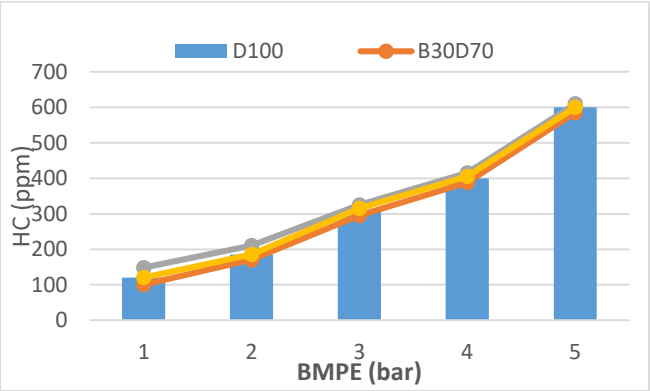

Figure.4: HC emission VS BMEP

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6.2. Carbon dioxide (CO_2) emissions

Carbon dioxide (CO2) is a naturally occurring byproduct of combustion, produced from the interaction between carbon in fuel and oxygen in the atmosphere. In diesel engines, this process is essential for fuel combustion, although it also exacerbates greenhouse gas emissions, which have considerable environmental consequences. Figure 5 depicts the carbon dioxide emissions linked to diverse fuel mixtures under varying operational situations. At a brake mean effective pressure (BMEP) of 1 bar and a loading percentage of 30%, the emissions for various fuel mixes were as follows: diesel yielded 2.45% CO2, B30D70 created 2.46%, P30D70 released 2.28%, and B30P30D40 resulted in 2.55%. These results indicate minor discrepancies in CO2 emissions among the various mixes. Upon testing the same blends at an elevated BMEP of 4.8 bar (80% loading), emissions exhibited a slight rise across all samples. B30D70 reported 4.83%, P30D70 displayed 4.61%, B30P30D40 noted 4.75%, and diesel likewise shown an emission level of 4.75%.

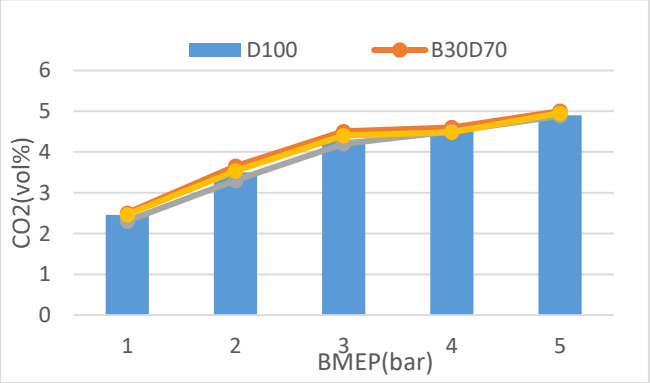

Figure.5: CO_2 emissions VS BMEP

7. Conclusion

The B30P30D40 blend outperformed other gasoline combinations as the brake mean nominal pressure (BMEP) increased. Specifically, this was the case. Brake thermal efficiency (BTE) was consistently higher under all load conditions when this combination of 30% waste cooking oil biodiesel (WCOB), 30% waste plastic oil (WPO), and 40% diesel was used. At a BMEP of 3.9 bar, the BTE for diesel was 26.23%, while for the B30P30D40 mix, it was slightly higher at 26.234%. Given these conditions, it's reasonable to assume that the mixed fuel improved energy conversion efficiency. However, both fuels' BTE values dropped when the BMEP was lowered to 1 bar. Diesel had a BTE rating of 12.73 percent and the B30P30D40 mixture 12.66%.These results suggest that the B30P30D40 blend

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may increase efficiency even under reduced load conditions, in addition to improving performance under higher load conditions. This proves that the mixture can be a viable alternative fuel source in many different types of applications. Nevertheless, the existing corpus of information, which is mostly based on experiments conducted in laboratories, does not sufficiently address the potential long-term effects that the prolonged use of certain fuel mixtures may have on the efficiency of engines, their lifetime, and the environmental impacts that are associated with their usage.

References

[1] Swaminathan, C. (2023). Effect of aluminum oxide nanoparticles in algae biodiesel blend as a fuel in CRID engine and its performance, emission and combustion aspects. International Journal of Environmental Science and Technology, 20(11), 12427-12436.

[2] Ali, H. E. A., El-fayoumy, E. A., Soliman, R. M., Elkhatat, A., Al-Meer, S., Elsaid, K., & Abdullah, M. A. (2024). Nanoparticle applications in Algal-biorefinery for biofuel production. Renewable and Sustainable Energy Reviews, 192, 114267.

[3] Pugazhendhi, A., Kamarudin, S. K., Chinnathambi, A., Alharbi, S. A., & Ramya, G. (2024). Investigation of bionano additives in red algae CyanidioschyzonmerolaeultrasonifiedMgO/MWCNT catalyzed biodiesel in optimized engine performance. Environmental Research, 258, 119352.

[4] Rajpoot, A. S., Choudhary, T., Chelladurai, H., Rajak, U., & Sahu, M. K. (2023). Comparison of the effect of CeO2 and CuO2 nanoparticles on performance and emission of a diesel engine fueled with Neochlorisoleoabundans algae biodiesel. Materials Today: Proceedings.

[5] Tripathi, G., Jamal, A., Jamal, T., Faiyaz, M., & Farooqui, A. (2022). Phyco-nanotechnology: an emerging nanomaterial synthesis method and its applicability in biofuel production. In Green nano solution for bioenergy production enhancement (pp. 169-200). Singapore: Springer Nature Singapore.

[6] Bin Rashid, A. (2023). Utilization of nanotechnology and nanomaterials in biodiesel production and property enhancement. Journal of Nanomaterials, 2023(1), 7054045.

[7] Karthikeyan, S., Periyasamy, M., Prathima, A., & Balaji, M. R. (2020). Performance and exhaust emissions of a CI engine using Bi2O3 nano blends as an alternate Caulerpa racemosa algae oil biofuel. Materials Today: Proceedings, 33, 3265-3270.

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ICMSTS – M001

A STUDY ON THE LEGAL PERSPECTIVES OF E-BANKING FRAUD IN INDIA

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Abstract:

The financial sector plays a crucial role in the economic development of a country, with banking serving as the lifeblood of an economy. A strong and well-regulated financial sector is essential for sustained economic progress. India's banking industry is currently dwelling with IT revolution, significantly transforming the way financial services are delivered. Customers and financial institutions alike have benefited from the industry's transformation brought about by the incorporation of the internet into banking operations. The adoption of e-banking has gained immense popularity, driven by technological advancements and innovation. Several key developments have shaped this transformation, including the introduction of debit and credit cards, Immediate Payment Service (IMPS), online banking, mobile banking, and seamless fund transfers. E-banking encompasses a wide range of services, such as online shopping, fund transfers and digital payments, making transactions more convenient for consumers. With the increasing use of the internet across India, electronic banking continues to expand due to its numerous benefits. However, this rapid digital transformation has also led to challenges, particularly in cyber security. Challenges like data theft, phishing, and credit card fraud present major risks to the banking sector. This paper seeks to give a general review of electronic banking in India, emphasizing its advantages, effects, and the difficulties the financial industry faces in maintaining security and confidence in online transactions.

Keywords: Banking, Consumers, Fraud, Fraud Payment.

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1. Introduction

Indians today are increasingly engaging in digital activities such as online searches, social networking, and more complex tasks like e-commerce and banking. The country is undergoing a digital revolution, with technology transforming various aspects of daily life. 70% of urban consumers currently conduct financial transactions through digital platforms, which means they use at least one online channel when making a financial product purchase. According to a Facebook and Boston Consulting Group study, India's online banking user base will double from 45 million to 150 million by 2020 [1-4].

Every nation's economy depends heavily on the banking industry, which is essential to providing credit to all facets of society. For India to reach its full economic potential, a robust financial system is necessary. The banking industry's operations have changed as a result of IT integration, and banks must embrace digitalization to prosper in the modern, globalized world. Modern banking is more convenient than ever you can manage transactions while enjoying a cup of coffee or making an important phone call. ATMs are easily accessible, and digital payments have led to a shift where plastic cards often outnumber cash in our wallets.

Internet banking, commonly known as e-banking, represents a broad spectrum of innovations in the financial sector. It describes how banking services and goods are delivered via electronic means, including computers, smartphones, and the internet. According to *Barron*, e-banking is "a form of banking where financial transactions occur through electronic exchanges rather than physical cash, checks, or other traditional intermediaries."

In the past, opening a bank account required visiting multiple branches in person, reinforcing a strong connection with traditional banking. However, conventional banking systems come with limitations, such as fixed working hours, inefficient branch layouts, and a restricted range of financial products. The evolution of digital banking has addressed many of these challenges, offering greater flexibility and accessibility to consumers. The easiest way to open a savings account through online banking is by linking it to an existing current account. Completing a transaction requires just a simple click, eliminating the need for long queues or loud exchanges at the bank counter. Customers can easily handle their accounts from the convenience of their homes. Compared to traditional banking, internet banking offers greater flexibility and improved banking services. E-commerce has expanded to a global level due to the quick development of the world's information infrastructure in recent decades, especially in the areas of artificial

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intelligence, machine learning, telecommunications, and the internet. These technological developments have significantly enhanced communication among business professionals, making transactions smoother and more efficient. E-commerce serves as an integrated platform that brings together data management, marketing, and sales, revolutionizing the way businesses operate in the digital age.

Connectivity and security services must satisfy customer expectations and give business partners a competitive edge in order to guarantee the smooth exchange of information. In the banking sector, as in many other industries, information and communication technology (ICT) is used to enhance customer support and service maintenance. E-banking technology facilitates easy communication between banks and their customers while guaranteeing that transactions are completed quickly and effectively. This allows financial institutions to offer a diverse range of customer-centric services. Electronic banking, internet banking, and e-banking also referred to as virtual banking are different terms that all describe the same concept: banking transactions facilitated through ICT-based systems. "E-banking" is the distribution of banking services through the internet, which enables clients to obtain financial services from any location outside of the bank's physical location. But as might be expected, there are a number of difficulties with e-banking that extend beyond technical issues [5-9].

The regulation of e-banking involves oversight by both national and international supervisory and regulatory authorities. E-banking's rising popularity, which has resulted in more cross-border transactions and a significant reliance on information and communication technology (ICT) for banking services, is one of its main problems. Various challenges arise, including regulatory compliance, legal complexities, operational efficiency, reputational risks, security concerns, and user inconvenience. Since cyber security has a direct impact on the security of digital payments, building a safe and secure ICT infrastructure is the most important challenge facing financial institutions. Banks must constantly adjust to changing cyber threats as the number of global online financial transactions rises. Skilled hackers and fraudsters are constantly finding new ways to exploit financial systems, gaining unauthorized access to personal and corporate accounts. Such threats can have severe consequences, often originating both externally and internally within an organization. To address these risks, bank managers must implement robust security measures to protect consumer data and ensure the safety of online banking systems. Strengthening cyber security frameworks is essential to maintaining trust and reliability in digital banking services.

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1.1Accents of E – banking

- Banking transactions are conducted over the Internet.
- Since customers can access services from different locations, e-banking eliminates traditional geographical limitations.
- E-banking enables transactions to be processed 24/7, including on holidays and weekends.
- Built on advanced technology, it allows banks, businesses, and customers to save valuable time by using digital platforms.

1.2 The Economic Benefits of E-Banking

1.2.1 Convenience

The biggest benefit of e-banking is convenience, which greatly exceeds any disadvantages. Nobody would want to give up the convenience of being able to make payments and conduct transactions with a single click while remaining in the comfort of their home or place of employment. Online account management is far quicker and more effective than going to a bank in person for the same services. Internet banking has made it much easier to access even non-transactional services like checking account renewals, check book requests, and interest rate inquiries on different financial products.

1.3Higher Rates

Because internet banking eliminates the need for physical resources, banks will continue to benefit from it. With fewer requirements for large office spaces and additional staff to manage customer interactions, banks can significantly cut operational costs. This financial advantage allows a portion of the savings to be passed on to customers in the form of higher returns on deposits and lower interest rates on loans. To promote internet banking, many banks offer online services with minimal or no physical branches, along with reduced penalties for early withdrawals on fixed deposits (FDs).

2. Administrations

Technology has greatly enhanced convenience for both banks and customers, allowing easy access to a wide range of essential services with just a login. Financial planning tools and other useful services are readily available as basic applications on a bank's website. Additionally, most banks offer online access to tax documents and resources for tax preparation [10-13].

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2.1 Versality

With the development of mobile technology, e-banking has changed dramatically in recent years, allowing users to easily conduct financial transactions even when they are on the go.

2.2 In Good Working Order

Another significant advantage of e-banking is its positive impact on the environment. It reduces paper usage, minimizes pollution by eliminating the need for physical travel, and does not produce harmful emissions. However, the growing reliance on the internet for a wide range of transactions comes with potential challenges that could become costly over time if not addressed proactively.

3. Online Banking: A Boon or a Challenge for the Economy

3.1 Customer Relationship

Online transactions have weakened the personal connections between customers and bank representatives, which were traditionally built through in-person visits to branch offices. Establishing a relationship with bank staff can be beneficial, especially when seeking expedited loan approvals or special assistance not typically available to all customers. Branch managers often have discretionary authority, such as waiving penalty interest or administrative fees, which were frequently granted to trusted clients. Additionally, a strong rapport with bank representatives allowed customers to receive personalized financial advice and insights, a service that is often lacking in digital banking interactions.

3.1.1 Transactions that are complicated

Some complex banking interactions require direct, in-person discussions with a supervisor, which cannot be effectively managed through e-banking. Specific concerns and disputes often necessitate a physical visit to the bank, as they cannot be fully resolved online. Additionally, digital banking is not always clear or interactive enough to assist with unexpected challenges that may arise. Certain services, such as authorization processes and bank signature verification, cannot be entirely facilitated through the internet.

3.1.2 Security

One of the biggest risks of internet banking that every customer should be aware of is cyber security threats. Despite the availability of advanced

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encryption software designed to protect user data, the risk of hacking remains due to the presence of sophisticated cybercriminals. Online threats such as hacker attacks, phishing scams, malware, and other malicious activities are widespread. Additionally, fraud is a significant concern for individuals who rely exclusively on online banking, making security a crucial aspect of digital financial transactions [13-16].

4. The legal framework governing internet banking

Online banking is essentially traditional banking conducted through digital channels rather than a separate industry. In India, the Reserve Bank of India (RBI) regulates the banking industry under the RBI Act. The legal framework for online transactions is outlined in the Information Technology Act of 2000, later amended by the Information Technology Act of 2008, which includes provisions for electronic reporting. E-banking is subject to several statutory regulations that also apply to conventional financial transactions. However, existing laws do not fully address all emerging challenges, highlighting the need for stricter regulations and guidelines, especially concerning e-banking security and operations. The Banking Regulation Act of 1949, the RBI Act of 1934, the Financial Emergency Management Act of 1999, as well as provisions from evidence laws and contract laws, are among the laws that regulate the Indian financial system. The historical development of banking in India is illustrated in Figure 1.

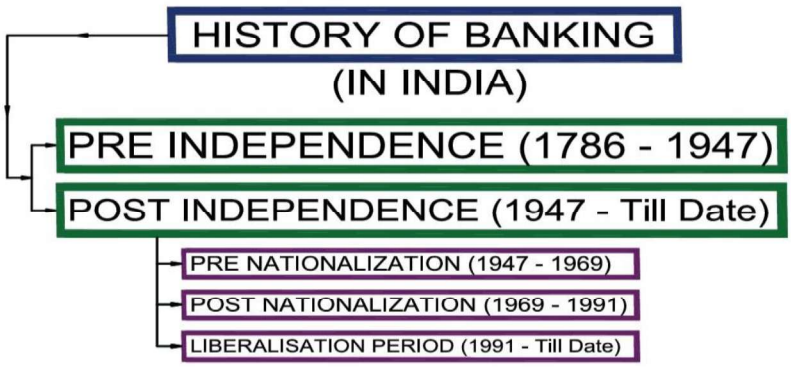

Figure.1: Illustrated India's Banking Industry

5. Discussion

The Information Technology Act of 2000 aimed to address various challenges related to managing online businesses. However, some ambiguities remain, as the law does not clearly outline all aspects, nor have constitutional authorities proposed concrete implementation strategies. ICICI Bank pioneered online banking in India in 1996, paving the way for several other financial

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institutions to follow suit. Between 1996 and 1998, internet banking remained in the early adoption phase, but usage saw a significant rise in 1999 due to declining ISP costs, increased PC penetration, and a technology-friendly environment. However, public sector banks (PSUs) have been slower in adopting internet banking, with the State Bank of India (SBI) leading the way among them. The Reserve Bank of India (RBI) formed the "S.R. Mittal Working Group" to create regulations for internet banking after the IT Act was passed on October 17, 2000. As a result, on June 14, 2001, the "Internet Banking Guidelines 2001" were published. Licenses are given on a case-by-case basis to banks that plan to offer e-banking services. The guidelines mainly address the following topics:

- Legal concerns
- Problems with implementing and overseeing

In 2005, the Reserve Bank of India (RBI) released a new circular addressing the previously mentioned recommendations. The matter was further reviewed, and businesses were encouraged to take necessary steps to resolve existing legal challenges within the Indian regulatory framework. According to the provisions of this circular, banks do not require explicit approval from the RBI to offer internet banking services. Additionally, the circular included the following recommendations:

The Internet Banking Policy was put into effect by the Institution's Board of Directors, who made sure that privacy and technological security were maintained while coordinating it with the bank's overall IT standards.

- An essential component of the strategy is operational risk.
- The policy provides a detailed explanation of the "Know Your Customer" (KYC) requirements.
- Established approaches are consistently applied to comply with the circular's guidelines. Figure 2 illustrates the various functions of banks in India [17-20].

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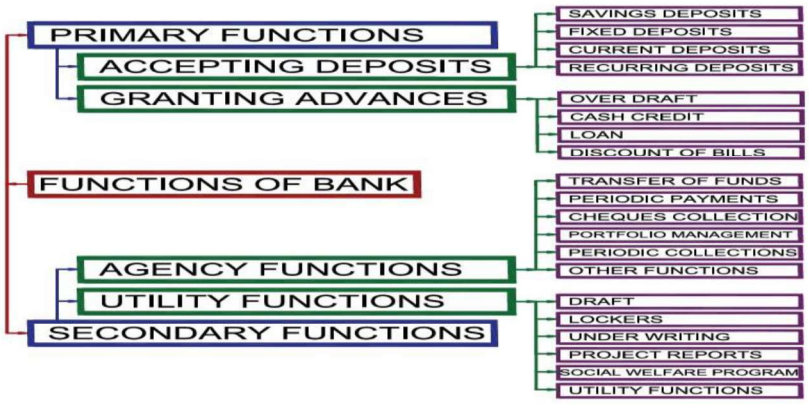

Figure. 2: Depicted the various roles that banks play in India

Section 3(2) of the Information Technology Act, 2000 permits the use of specific technologies to validate electronic documents. This has raised concerns about whether the verification methods currently employed by banks meet the legal standards for authentication. Additionally, the Act states that when the government mandates records or documents to be maintained in physical or printed form, this requirement is deemed fulfilled if the data or information is preserved in hard copy, printed format, or even on circuit boards.

The law further clarifies that such documentation is considered valid if recorded electronically and made accessible for future reference. The Act also includes provisions for penalties in cases of security and privacy breaches under Section 72. Moreover, Section 79 limits the liability of system providers for data transmitted through their networks under certain conditions. In 2008, significant amendments were introduced to the IT Act, 2000, further refining its scope and regulations.

Significant progress was made when the "G Gopala Krishna Working Group on E-Banking Security" published a report on April 29, 2011, which extended the Internet Banking Guidelines (IBG) 2001 by defining updated regulatory standards. The "Capital Markets and Services Act Meeting" in September 2011 and the "Publishing Subcommittee on Client Satisfaction" in August 2011 also offered additional technical recommendations on E-Banking standards. If a payment exceeds ₹20,000, the benefit of Section 40A (3) of the IT Act of 1961, which governs deductible expenses, is only applicable if the transaction is documented.

Online fund transfers between accounts—where checks are not used—are one of the main services that banks provide through internet banking. Customers might therefore be ineligible for the previously mentioned benefit. By

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guaranteeing that payments are made to specified accounts, Section 40A's main goal is to stop tax evasion. Authorized electronic transfers have the same function as a crossed check or bank draft in that they only move money between verified accounts. The different kinds of banks in India are depicted in Figure 3 [21-25].

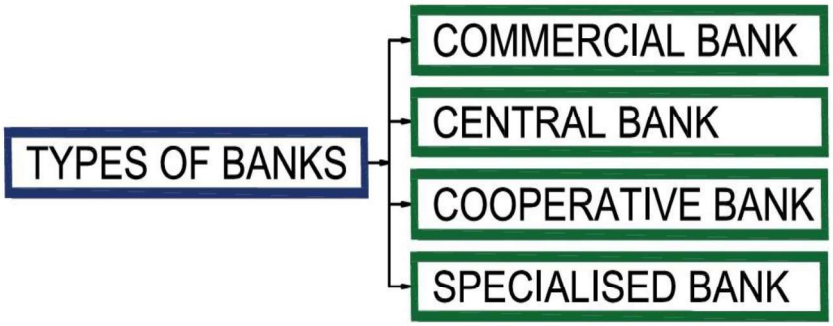

Figure. 3: Depicts the Different kinds of Banks in India

6. Conclusion

Customers of Indian banks are still reluctant to use Internet banking. Knowing the causes of this hesitancy can assist bank executives in creating plans to increase the uptake of online banking. With the rise of cybercrimes, authorities will need to take extra measures to keep fraudsters in check. Technology is a double-edged sword, capable of both positive and negative outcomes. The IT Act of 2000 was introduced to grant legal recognition to electronic transactions and online business practices. Additionally, amendments were made to key laws, including the Indian Penal Code (1860), the Indian Evidence Act (1872) and the Reserve Bank of India Act (1934), to facilitate lawful recognition and regulations for digital economic activities. Although the Act does not intend to hinder business, it defines specific offenses and penalties related to cybercrimes. However, client security remains a significant concern in e-banking, and current legislation does not adequately address these risks. The lack of clarity in legal provisions has made enforcement challenging in courts. Addressing the actual issues with Internet banking must be a top priority for Indian banks and other stakeholders. Significant advancements won't be possible, though, until digital security requirements for Indian banks are imposed.

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References

[1] M. Wang, S. Cho, and T. Denton, "The impact of personalization and compatibility with past experience on e-banking usage," Int. J. Bank Mark., 2017.

[2] A. L. M. Anouze and A. S. Alamro, "Factors affecting intention to use e-banking in Jordan," Int. J. Bank Mark., 2020.

[3] K. S. Al-Omoush, M. K. Al Attar, I. H. Saleh, and A. A. Alsmadi, "The drivers of E-banking entrepreneurship: an empirical study," Int. J. Bank Mark., 2020.

[4] M. A. Nso, "The Role of e-banking as a marketing tool," Innovative Marketing. 2018.

[5] "Adoption of e-banking in Bangladesh: An exploratory study," African J. Bus. Manag., 2010.

[6] N. Priya, P. Nandhini, D. J. Priya, and N. Sharma, "Applying cryptography in e-banking security," Int. J. Innov. Technol. Explor. Eng., 2019.

[7] N. Basias, M. Themistocleous, and V. Morabito, "SOA adoption in e-banking," J. Enterp. Inf. Manag., 2013.

[8] P. Hanafizadeh and A. Zare Ravasan, "An empirical analysis on outsourcing decision: the case of ebanking services," J. Enterp. Inf. Manag., 2018.

[9] S. L. Sobiya and N. Thangavel, "An impact of technology on E-banking dimension in banking sector," Int. J. Recent Technol. Eng., 2019.

[10] B. M. Teka, "Factors affecting bank customers usage of electronic banking in Ethiopia: Application of structural equation modeling (SEM)," Cogent Econ. Financ., 2020.

[11] "E-banking and E-commerce in India and USA," Int. J. Comput. Sci. Issues, 2012.

[12] T. Altobishi, G. Erboz, and S. Podruzsik, "EBanking Effects on Customer Satisfaction: The Survey on Clients in Jordan Banking Sector," Int. J. Mark. Stud., 2018.

[13] I. Koskosas, "E-banking security: A communication perspective," Risk Management. 2011.

[14] D. Mulia, H. Usman, and N. B. Parwanto, "The role of customer intimacy in increasing Islamic bank customer loyalty in using e-banking and m-banking," J. Islam. Mark., 2020.

ISBN 978-819840061-1

[15] R. R. Prasadh, "Examining the roles of perceived quality and customer satisfaction as predictors of customer loyalty in the indian e-banking context," J. Manag. Res., 2018.

[16] R. W. Nduta and J. Wanjira, "E-Banking Strategy and Performance of Commercial Banks in Kenya," Int. J. Curr. Asp., 2019.

[17] P. Spandan, "E-BANKING : CHALLENGES AND ISSUES," Hill Quest, 2019.

[18] C. Thomas and N. Sundaram, "Analysis of factors in e-banking: A review," Man India, 2017.

[19] I. Bojang and L. B. Ceesay, "Consumer Susceptibility to E-banking Services: Evidence from Retail Banking sector of The Gambia," Eur. J. Bus. Manag. Res., 2020.

[20] D. C. Fonchamnyo, "Customers' perception of ebanking adoption in Cameroon: An empirical assessment of an extended TAM," Int. J. Econ. Financ., 2012.

[21] N. J. Al-Khafaji, M. A. Al-Shaher, and A. A. AlSawad, "An empirical study on predicting employees' acceptance of e-banking in Iraq," Int. J. Innov. Creat. Chang., 2019.

[22] S. Prasanth and S. Sudhamathi, "Analysis of Indian Bank Customer's Attitude towards E-Banking," Shanlax Int. J. Manag., 2021.

[23] A. M. Musyaffi, S. Mulyani, and I. Suraida, "Lack of readiness of digital banking channel acceptance: Study on TAM 3 and technology readiness," Acad. Strateg. Manag. J., 2021.

[24] P. Vijay Shankar and S. T. Surulivel, "A study on ebanking awareness among users," Int. J. Pure Appl. Math., 2018.

[25] "Designing a model for analyzing the effect of risks on e-banking adoption by customers: A focus on developing countries," African J. Bus. Manag., 2011.

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ICMSTS 2025 – Presentation Schedule on 23rd March 2025

Theme	Paper IDs	Date & Time
Computer Science & Information Technology	E016, E017, E021, E022, E026, E031, E033, E034 to E041, E053, E054, E055, E057 to E061, E072, E073, E074, E077, E089, E092	**Session I:** **23.03.2025 (Sunday) 10.00 am to 12 Noon**
Bio-Engineering & Pharmacy Technology	E002, E003, E007, E008, E009, E018, E019, E020, E023, E024, E025, E030, E032, E042, E090, E091, S015, S016 E027, S001 to S010, S018	**Session II:** **23.03.2025 (Sunday) 10.00 am to 12 Noon**
Automobile, Mechanical, Civil & Petroleum	E001, E004, E005, E006, E010 to E015, E028, E029, E043 to E052, E056, E062 to E071, E075 to E079, E082 to E088, E093 to E097	**Session III:** **23.03.2025 (Sunday) 2.00 pm to 4.00 pm**
Management & Language	M001 to M014 S011 to S014, S017, S019, S020 to S025	**Session IV:** **23.03.2025 (Sunday) 2.00 pm to 4.00 pm**

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