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MANIPAL ACADEMY *of* HIGHER EDUCATION DUBAI CAMPUS
(Institution of Eminence Deemed to be University)

125th BIRTH ANNIVERSARY
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RAiSE 2023

International Conference

Recent Advances in Science and Engineering

RAiSE - 2023

SOUVENIR

4th & 5th October 2023

Venue: MAHE, Dubai

Organized by:

Department of Mechanical and Industrial Engineering
Manipal Institute of Technology, MAHE, Manipal, India

Department of Mechanical Engineering, School of Engineering and IT
MAHE, Dubai

MESSAGE

I am elated to learn that MIT-Manipal in collaboration with the School of Engineering and IT, MAHE, Dubai is organizing an International Conference on Recent Advancements in Science and Engineering (RAiSE) – 2023 in Dubai.

Today, we live in an era where technology advancements are fast paced and therefore it is even more important for academic Institutions to explore opportunities for interaction with the experts and see how our academic programs can bring "Research Informed Learning" to the classrooms. This conference is going to provide us just that kind of opportunity.

I am also delighted to see a wide range of engineering and science topics being covered in the conference. From design engineering topics, engineering material, energy engineering, industrial and manufacturing engineering to many multi-disciplinary topics will see students researchers, experts and academicians come together to share information, knowledge and experience.

I wish International Conference RAiSE – 2023 a grand success and on behalf of MIT, Manipal, would like to thank all the participants for their whole-hearted participation.

Dr (Cdr) Anil Rana
Director
Manipal Institute of Technology
Manipal

MESSAGE

I extend a very warm welcome to the participants of the International Conference on Recent Advances in Science and Engineering (RAiSE – 2023). This year's theme underscores the fact that the core engineering sciences are currently going through astounding levels of transformation. This conference is intended to provide a platform for researchers and scholars to showcase their work and collaborate with others to extend the current boundaries in science and engineering.

I congratulate the organizing team from Manipal Institute of Technology Manipal and School of Engineering and IT for putting together a fine event. I wish all the participants a very productive and rich conference experience and in their research endeavours in future.

Dr S. Sudhindra
Academic President
Manipal Academy of Higher Education
Dubai Campus

MESSAGE

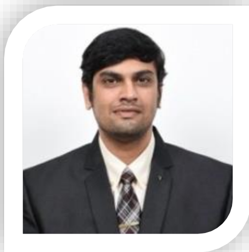
RAiSE-2023 marks a significant milestone in our department's journey, reflecting our commitment to fostering innovation, collaboration, and excellence in science and engineering. This conference serves as a platform for the exchange of cutting-edge ideas and the advancement of knowledge, bringing together esteemed researchers, scholars, and experts from around the world. Your presence underscores the importance and relevance of your work in your respective fields, and I extend heartfelt congratulations to all authors whose papers have been accepted. Your dedication and intellectual prowess have earned you a well-deserved place at this prestigious event, and we eagerly anticipate your ground-breaking presentations.

Our department is firmly committed to collaboration as the key to progress. In a world of intricate challenges, interdisciplinary approaches and partnerships are essential. We welcome opportunities for joint research and academic activities. As we embark on this journey of exploration and knowledge-sharing over the next two days, I encourage active engagement, networking, and the forging of lasting connections. RAiSE-2023 is more than presentations; it's about conversations, debates, and shared perspectives that lead to innovation and transformation.

I extend my best wishes for a fruitful experience at RAiSE-2023. May discussions inspire, collaborations bear fruit, and impact endure. Together, let us elevate excellence in science and engineering.

Dr Sathyashankara Sharma
Head,
Department of Mechanical & Industrial Engineering
Manipal Institute of Technology
Manipal

MESSAGE



Prof Nithesh Naik
Convenor

Dr Pavan Hiremath
Convenor

Prof Suhas Kowshik
Co-Convenor

Dr Ritesh Bhat
Co-Convenor

As the excitement builds, it is our honor to extend a heartfelt welcome to the upcoming International Conference on Recent Advances in Science and Engineering, RAiSE-2023, organized by the Department of Mechanical & Industrial Engineering at Manipal Institute of Technology, MAHE, Manipal, India, in collaboration with the School of Engineering and IT, MAHE Dubai, UAE.

Scheduled for 4 – 5 October 2023, in Hybrid Mode, this conference promises to be a dynamic convergence of global scholars, researchers, and practitioners, both offline and online, sharing groundbreaking ideas and exploring the latest advancements in science and engineering.

The conference program boasts enlightening keynote addresses, thought-provoking panel discussions, and a diverse array of research presentations, providing a platform for the exchange of innovative ideas and the exploration of current trends in the field. The Hybrid Mode ensures that participants from around the world can actively engage, fostering collaboration and knowledge sharing regardless of geographical boundaries.

We extend our sincere appreciation to all participants, speakers, sponsors, and partners for their enthusiastic support and commitment. Your collective efforts will undoubtedly contribute to the success of RAiSE-2023. Our gratitude also goes to the conference committee for their dedicated efforts in organizing the program, and we express special thanks to all the authors, reviewers, and contributors who play a vital role in shaping the success of RAiSE-2023. We eagerly anticipate your participation and look forward to the dynamic discussions, collaborations, and insights that will unfold during this exciting event. Together, let us explore new horizons and shape the future of science and engineering.

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5G Technology Is the Future of Healthcare: Opening Up A New Horizon For Digital Transformation In Healthcare Landscape

Oruganti S S Sumanth Chowdary, Nithesh Naik*, Vathsala Patil, Kinju Adhikari, BM Zeeshan Hameed, Bhavan Prasad Rai, and Bhaskar K Somani

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There is a new cause for concern regarding healthcare's skyrocketing costs in the recent times. To overcome these obstacles, 4G and various communication standards are applied in health-care for smart health-care services and applications. However, cutting-edge technologies are being developed, like I O T (Internet of things), Big Data, Artificial intelligence (AI) and through the utilization of 5G wireless transmission technology, we can enhance the patient care and improvise healthcare services whilst decreasing the overall healthcare delivery cost. There is a gradual but clear transformation taking place in healthcare as a result of these new technologies. Future healthcare applications are highly dynamic and time-sensitive, making it challenging for current communication systems to meet their requirements. Consequently, 5G networks are conceived and built to meet the varied communication requirements of healthcare applications. In this review, we look at an overview of 5G wireless transmission technology applications in healthcare which opens up a new horizon for digital healthcare transformation.

Keywords: 5G technology; Healthcare; Digital transformation, Wireless technology; Artificial intelligence.

RAiSE23 - 102

Simulation and Experimental Analysis of L-Section in Reinforced Cement Concrete: Uncertainties in Performance and Strength

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The design and construction of reinforced cement concrete (RCC) flooring play a crucial role in the overall stability of a structure, particularly in regions prone to tectonic activity. RCC floors comprise various beams, including intermediate T-sections and specific L-sections at critical points such as corners and around staircases or lift openings. This paper identifies a key challenge in building frameworks to resist tectonic loads. It further explores the components of the structure that provide potential for interruption, capability, and the safe transfer of tectonic loading to the array connection, all while maintaining sufficient strength. The L-sections were experimented on using various grades of concrete and sizes to reinforce connections under diverse loading conditions. L-sections contribute to reducing floor height, solving economic and technical problems, and creating advanced composite connections that integrate the proposed structural system. The analysis was conducted both analytically and experimentally to assess methods to resist earthquake forces based on stiffness, building strength, and elasticity capacity. These approaches have been identified to safeguard buildings during substantial seismic events. The development of the L-section is detailed, highlighting the loading process and the capacity to overcome various structural challenges.

Keywords: Reinforced Cement Concrete, L-Section, Cyclic Load, Ductility, Energy Absorption, Stiffness, Earthquake Resilience, GFRP Mesh

RAiSE23 - 103

Unlocking the Potential of Artificial Intelligence Powered Non-Invasive Urine Analysis for Disease Diagnosis and Treatment

Vinod Kumar Shukla, Jayaraj Mymbilly Balakrishnan, Dasharathraj K Shetty*, Suvidhi Banthia, Priyamvadha Chandrasekar, Nithesh Naik, BM Zeeshan Hameed

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Urinalysis is a significant diagnostic tool for the detection of various diseases. The recent surge in the applications of artificial intelligence (AI) has revolutionized the medical industry, including urine analysis. AI has become an indispensable tool in clinical decision making, enabling the identification of illnesses, accurate diagnosis, and personalized therapy and management of various diseases. The analysis of urine encompasses the assessment of several components, including proteins, electrolytes, and creatinine, which may undergo modifications contingent upon the physiological and pathological condition. The advancement of urine detection methodologies, including urine proteomics, metabolomics, and RNomics, has facilitated the retrieval of diverse data from this readily accessible and abundant source. However, the utilization of this resource has been a challenge due to the sheer amount of data that needs to be processed and analyzed. AI optimization of urine data processing has solved the utilization challenge. AI algorithms can analyze large amounts of urine data quickly and accurately, enabling non-invasive and precise illness detection and therapy using urine. AI-based urine detection has been used for various diseases, including kidney disease, urinary tract infections, and prostate cancer. Despite the promising prospects of AI-based urine detection, there are still challenges to be addressed. The challenges encompass several key aspects, especially the requirement for larger and more comprehensive data sets, the advancement of AI algorithms with enhanced precision, and the establishment of standardized protocols for urine sample collection and processing. By effectively tackling these problems, the complete potential of AI-driven urine detection can be actualized. This review examines the utilization of artificial intelligence (AI) in urine detection for the purpose of disease diagnosis and treatment. It emphasizes the potential benefits, problems, and prospects associated with this approach. This paper investigates different technologies utilized for urine detection, the integration of artificial intelligence (AI) in the processing of urine data, and the clinical applications associated with AI-based urine detection. The article finishes by providing an analysis of the obstacles and potential opportunities associated with AI-driven urine detection, emphasizing the necessity for additional research in this domain.

Keywords: Artificial Intelligence; Urine detection; machine learning; diagnosis; Non-invasive methods.

RAiSE23 - 104

Revolutionizing Bladder Cancer Care in Clinical Urology: How AI Is Changing the Game

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Artificial intelligence (AI) and machine learning (ML) have emerged as powerful tools in the diagnosis and treatment of bladder cancer, offering significant advancements in accuracy and speed. This review presents key findings and contributions of AI and ML in bladder cancer diagnosis. AI algorithms have enabled precise segmentation of the bladder wall and accurate detection of bladder tumors using non-invasive 3D image-based features from CT and MRI scans. Decision support systems based on AI have improved the assessment of treatment efficacy for muscle-invasive bladder cancer. AI-assisted cystoscopy has demonstrated higher sensitivity and specificity in identifying and categorizing bladder lesions, potentially outperforming human urologists. ML algorithms, including artificial neural networks, have shown superior predictive capabilities in prognosis and outcome prediction compared to conventional models. Radiomics and ML techniques have enhanced bladder cancer staging and treatment response assessment through accurate analysis of imaging data. AI-driven biomarker discovery, including metabolomics, has the potential to revolutionize non-invasive bladder cancer diagnosis and monitoring. Automated histologic grading and molecular typing facilitated by AI have led to faster and more precise diagnoses, enabling personalized treatment plans. The integration of AI and ML in bladder cancer diagnosis has the potential to improve patient outcomes significantly. By providing faster and more precise diagnoses, AI-driven approaches can enhance treatment planning and response evaluation. Additionally, AI-assisted cystoscopy and improved biomarkers can lead to less invasive and more effective diagnostic techniques. Furthermore, AI-driven prognostic models offer a more accurate prediction of patient outcomes, enabling personalized treatment strategies. These contributions collectively indicate a promising future for AI and ML in bladder cancer management, enhancing diagnostic accuracy, treatment efficacy, and patient care.

Keywords: Artificial Intelligence, Machine Learning, Bladder Cancer, Deep Learning, Neural Networks, Medical imaging.

RAiSE23 - 105

Artificial Intelligence in Electronic Warfare: Comprehensive Review of Intelligent Asymmetric Warfare Systems

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Advancements in the technological landscape led by the advent of disruptive technologies have transformed conventional Warfare worldwide. Lopsided technological progressions across developed and developing countries broadened the technical gaps, leading to the employment of unconventional weapons and tactics – referred to as Asymmetric Warfare (ASW). Transformative potential and prominent yields accrued by employing Artificial Intelligence (AI) in Modern Warfare have unleashed the possibility of using AI in ASW. Non-contact conflicts are led by Electronic Warfare (EW) - one of the most imperative verticals of ASW in modern conflicts that revolve around effectively exploiting the electromagnetic (EM) spectrum and denying it to the adversary by strategic resources employment in the face of the conflicts. Underlying intelligence needs to be derived by observing and analyzing Electronic Support Measures (ESM), Electronic Counter Measures (ECM), and Electronic Counter Counter Measures (ECCM) activities during the EW operations that impact the decision-making process and strategy formulation before and during conflicts. AI-powered processing and analysis of active and passive radars and sensors' data can help in scanning the radiating devices, scrutinizing data to recognize the emitters, classifying the emitters, and location fixing of the emitter/jammer with their characteristics more effectively. AI techniques can not only aid in developing efficient anti-jamming algorithms but also enable an EW system to operate autonomously. The paper incorporates a literature study of pragmatic advancements of AI and EW with technical analysis of Machine Learning (ML) techniques and covers the entire canvas of AI and ASW to map possibilities of using ML algorithms and envisage the influence of AI in transforming the EW. The paper also presents a conclusive study of the recent advancements in EW, followed by research gaps and futuristic research possibilities.

Keywords: AI in Electronic Warfare; Asymmetric Warfare; Machine Learning in Electronic Warfare; Future of Modern Warfare; Cognitive Electronic Warfare.

RAiSE23 - 106

The VGG16 Method Is A Powerful Tool For Detecting Brain Tumors Using Deep Learning Techniques

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A Brain tumor diagnosis is a complex and difficult task that requires accurate and efficient data analysis. In past years, deep learning has emerged as a promising tool for improving the accuracy of mental health diagnoses. In this research article, we present a review of various in-depth studies and models for mental health diagnosis. We examine the performance of convolutional neural networks (CNNs), VGG16, and other deep learning models on multistate data in the brain. Our results show that deep learning models can provide high accuracy and efficiency in brain tumor detection beyond imaging techniques. We also discuss the clinical applications of these models, including assisting radiologists in brain diagnosis and improving patient outcomes. Overall, this work raises awareness of the use of deep learning in medicine and provides insight into future directions in brain tumor.

Keywords: Brain tumor; CNNs; VGG16; Deep Learning; MRI Images.

RAiSE23 - 107

A NLP Model for Predicting Five Star Ratings of Video Games on Short-Text Reviews

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Gaming industry is one of the most important and innovative subfields in the field of technology which boasts a staggering $200 billion in annual revenue and stands as a behemoth. It has an immense effect on popular culture, social networking, and the entertainment industry. Continuous advances in technology are the primary factor fueling the industry's expansion and these innovations are also revolutionizing the design of games and improving the overall gaming experience for players. The growing number of people who have access to the internet, the wide-spread use of smartphones, and the introduction of high-bandwidth networks such as 5G have all contributed to an increase in the demand for gaming around the world. It is essential to do consumer feedback analysis if one wants to appreciate market requirements, evaluate game performance, and realize the effect that games have on players. On the other hand, short-text reviews frequently lack grammatical syntax, which makes it difficult for standard natural language processing (NLP) models to effectively capture underlying values and, as a result, com-promises the accuracy of these models. The major purpose of this study is to determine which NLP model is the most accurate at forecasting 5-star ratings of video games based on brief reviews. We make use of natural language processing (NLP) to avoid the constraints that are imposed on us by the linguistic structure of short-text reviews. The findings of our research have led to several important contributions, one of which is the creation of an innovative models for reviewing and grading short writings. The accuracy is improved by employing different machine learning models which enables game creators and other industry stakeholders to obtain vital in-sights into the attitudes and preferences of users.

Keywords: Natural Language Processing, Game Reviews, Video Games, Recommendation System, Text Classification.

RAiSE23 - 108

Advanced Deep Learning Models for Corn Leaf Disease Classification: A Field Study in Bangladesh

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Agriculture is pivotal in Bangladesh, with maize being a central crop. However, leaf diseases significantly threaten its productivity. This study introduces deep learning models for enhanced disease detection in maize. We developed an unique datasets of 4800 maize leaf images, categorized into four health conditions: Healthy, Common Rust, Gray Leaf Spot, and Blight. These images underwent extensive Pre-processing and data augmentation to improve robustness. We explored various deep learning models, including ResNet50GAP, DenseNet121, VGG19, and a custom Sequential model. DenseNet121 and VGG19 showed exceptional performance, achieving accuracies of 99.22% and 99.44% respectively. Our research is novel due to the integration of transfer learning and image augmentation, enhancing the models' generalization capabilities. A hybrid model combining ResNet50 and VGG16 features achieved a remarkable 99.65% accuracy, validating our approach. Our results indicate that deep learning can significantly impact agricultural diagnostics, offering new research directions and applications. This study highlights the potential artificial intelligence in advancing agricultural practices and food security in Bangladesh, emphasizing the need for model interpretability to build trust in machine learning solutions.

Keywords: ResNet50; DenseNet121; VGG19; agricultural diagnostics; socioeconomic development

RAiSE23 - 109

Fabrication of Antimicrobial Fabrics Embodied With Boosted Antimicrobial Activity of Vegetable Oil

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Industrial and academic research is increasingly focusing on the serious implications of replacing petroleum based products with renewable alternatives. Plant/vegetable extracts are the most effective natural agents for making efficient biocompatible and eco-friendly polymers. Vegetable oils/natural extracts has ignited a lot of interest as a potential feedstock. It is one of numerous biodegradable materials that could be employed including starch, natural oils, cellulose, proteins, and sugar. The naturally existing bioactive substance (vegetable oil) was successfully grafted onto maleic anhydride copolymer via ring opening reaction, in which anhydride combines with hydroxyl groups of vegetable oil via esterification. Structure investigations (FTIR 13 and 1H & 13C NMR) have demonstrated grafting of vegetable oil to maleic acid. The dip coating process was employed to coat sterile cotton cloth with synthesized polymer. With a minimum inhibitory concentration (MIC) of 250 g/mL, coated textiles were effective against S. aureus but not against E. coli, M. smegmatis, or Candida albicans. Adding vegetable oil to a maleic anhydride polymer made it more effective against bacteria due to an increase in long alkyl chains.

Keywords: Vegetable oil; Activity boosted polymer; Antimicrobial fabrics; Invitro studies

RAiSE23 - 110

Functionalized Water Soluble Epichlorohydrin Based Antimicrobial Polymers

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Infections and diseases brought on by pathogenic microbes in people, plants, and animals have served as a warning for human health and social development. One of the difficulties in stabilizing societal health is the prevention and control of the spread of harmful bacteria. The significance is to promote the development of novel formulations to fight pathogens, in addition to prevention. We aim to report a simple water soluble functional epichlorohydrin based antimicrobial polymers. By adding epichlorohydrin and bioactive compounds to the polymer backbone, water soluble polymers were developed. Structural investigation includes FTIR and NMR. Thermal properties were investigated by DSC and TGA. The water-soluble polymer exhibited activity against gram-negative bacteria Escherichia coli and gram positive bacteria Staphylococcus aureus.

Keywords: Post polymerization; Water soluble polymer; Invitro studies

RAiSE23 - 111

Optimization of Turning Parameters and Cooling Techniques for Enhanced Machining Performance of EN8 Steel Using L9 Orthogonal Array

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This study presents a detailed analysis of the effects of machining parameters, including cutting speed (v), feed (f), depth of cut (d) and type of coolant flow (CF), on two primary performance characteristics in a machining process, namely surface roughness (Ra) and material removal rate (MRR). A series of experiments were conducted, and the resulting data were analyzed using regression models, analysis of variance (ANOVA), Taguchi's L9 orthogonal array analysis and grey relational analysis. The initial findings from the raw experimental data revealed that while Ra appeared to be influenced by a combination of parameters, an increasing trend in MRR was observed with higher values of feed rate and depth of cut. The regression models suggested the significant influence of the machining parameters on Ra and MRR, with the type of coolant flow playing a critical baseline role. The ANOVA results statistically validated these models and ranked the significance of each parameter in affecting Ra and MRR. Furthermore, Taguchi's analysis supported the findings and highlighted the potential for process optimization. The grey relational analysis revealed that the combination with the speed of 130 m/min, feed of 0.1 mm/rev, depth of cut 0.15 mm and minimum quantity lubrication type of coolant flow provided the optimal result, with a GRG of 0.704, ranking first among all other parameter combinations, providing valuable insights for improving machining processes. The results thus indicated that the best results were generally obtained with higher speeds, lower feed rates, and moderate depths of cut under minimal quantity lubrication conditions. These findings could greatly benefit industry professionals in optimizing their processes for efficiency and quality, though it is noted that results may vary with different materials and machining conditions, presenting potential areas for future research.

Keywords: EN8 Steel; Machining Parameters; Orthogonal Array; Surface Roughness; Material Removal Rate

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Nanotechnology Based Approach for Tuberculosis: Antimycobacterial Compounds From Marine and Terrestrial Sources

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Natural products are widely available, there have been numerous attempts and discoveries made in the search for novel pharmaceuticals, and herbal medicines constitute an integral part of conventional medical research. In particular, communicable diseases like Tuberculosis (TB) are affected differently by microbial and terrestrial sources. The most common infectious killer in the world, tuberculosis, has been extensively studied. Therefore, the need for novel antitubercular medications is essential, and, natural products derived marine and medicinal plants sources have played a significant role in TB drugs to overcome the challenge of side effects. In the present study, Single emulsion solvent evaporation method is used to formulate and optimize compounds with biodegradable and biocompatible polymer PLGA. Characterization in terms of size distribution and zeta potential and determination of encapsulation efficiency were analysed to study the effect of formulation variables. In-vitro drug release phosphate buffered saline (PBS) at different pH ranges using developed RP-HPLC method showed initial burst followed by slow and sustained release over a period of several days, thereby In order to target therapeutic molecules, the biodegradable nano particulate carriers shall have effective applications. The preliminary study with available current drugs encapsulated within the nanoparticles has showed uniform dispersion good stability with an increased drug loading followed by a slow and a steady drug release pattern.

Keywords: Antimycobacterial-activity, Drug loading, Poly(lactic-co-glycolic acid), Natural product.

RAiSE23 - 115

Toward Secure Door Lock System: Development IoT Smart Door Lock Device

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Conventional doors have gotten little attention for a number of reasons, including the need for a unique key for each door, the requirement of specialized equipment to duplicate keys, the difficulty to determine who opened the door, and the absence of alternatives to utilizing the traditional key. Apart from that, standard locks are subject to lock picking tools, tools that reach under/over the door frame to reach the door handle, and bump keys, which utilize force to set the lock pins and open the door. This paper develops a secure Internet of Things Smart Door Lock System (IoT-SDL) that can unlock door without keys or other physical tools. Installing and initializing the IoT-SDL system requires inserting the home's WIFI SSID and password into the Raspberry Pi's WIFI access point and providing internet connectivity. After installation, users may be configured and enabled IoT-SDL capabilities using a web interface. The IoT-SDL system includes a touchscreen keypad and an RFID scanner that are used to unlock the door if the user chooses to activate the two-factor authentication function. The results showed the ability of the IoT-SDL system to remember who pushed the door unlock button, so it is possible to exactly know who has been in the space. Additionally, the user had the ability to generate temporary PIN codes that are valid for a predetermined amount of time and are intended for reliable guests to enter on the touchscreen keypad of the IoT-SDL in order to open the door. The IoT-SDL system includes a number of additional options that can be used to personalize the way the door functions due to the essential property that the door should be used to serve its users rather than the other way around. The user had the ability to remotely open the door with the push of a button after they have used the interfaces that are provided to them. The access was possible to any and all of the data that the IoT-SDL has collected by making use of the different application program interfaces.

Keywords: component; formatting; style; styling; insert

RAiSE23 – 118

The Study of the Value of π Probability Sampling by Testing Hypothesis and Experimentally

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In the present paper is to study the value of the π obtained by Monte Carlo Simulation Method and compared the results with experimental value. To find experimental value π of we considered the unit circle i.e., |z|=1 with center at origin and square drawn with vertices (0.0), (1,0), (1,1) & (0,1) infinite numbers or points lie inside the circle and the square. If |z|≤1 the lies inside or on the arc the circle but if |z|≥1the point will lie outside arc but with the square. In this manner, hundreds or thousands of pairs of random numbers are selected, and it is ascertained whether the points representing them lie in/on the or beyond the arc but inside the square. If N is the total number of points considered, out of which n lie in /on the arc then we get a relation π=4n/N this gives the experimental value of π. From this we observe that the larger the sample size N closer will be the obtained value to the true value of π. Then the Monte Carlo Simulation distribution considering 20 triplet of random numbers lies on a semicircle or not is tested by applying non-parametric testing of hypothesis like Friedman's Test we have assigned the ranks for selected 20 random numbers row wise for each Triplet – 1, Triplet – 2 and Triplet – 3. Then setting the null hypothesis as all triplets have identical effects, but we found that the triplets have different effects at 5% level of significance. Then the same distribution of 20 samples is tested for goodness of fit by setting the null hypothesis triplets of random number will follow the goodness of fit by using a nonparametric Chi – Square Test. Setting the critical value of 5% level of significance. From this study the following points are observed. Triplets of random numbers will follow the goodness of fit.

Keywords: Random Number; Triplets; Non-Parametric Test; Friedman's Test; Chi-Square Test

RAiSE23 - 119

Green Hydrogen as a Clean Energy Resource and Its Applications as an Engine Fuel

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World's economy heavily depends on the energy resources used by the various countries. India is one of the promising developing nations having very low crude reserves and is actively looking for new renewable energy resources to power its economy. Higher energy consumption and environ mental pollution are two big global challenges for our sustainable development. The world is facing this dual problem of energy crisis as well as environmental degradation. So, there is a strong need of reducing our dependency on fossil fuels and greenhouse gas emissions. This can be achieved to a great extent by universally adopting clean fuels for all daily life uses like Ethanol or Liquified Natural gas (LNG) as this burn very clean and don't emit many pollutants. Nowadays, Green Hydrogen has come up as a new clean energy source, which is abundantly available and does not pollute much. This article explores the various benefits of green hydrogen with respect to fossil fuels, various techniques of producing it and its possible use in different sectors such as industry, transport, aviation as well as day-to-day life. Finally, it explores the use of green hydrogen as fuel in automobile engines, its blending with CNG gas and its benefits in reducing emissions compared to fossil fuels. Green hydrogen on combustion just produces water vapours thus is a highly clean fuel. Thus, it can potentially help mankind in preserving environment due to its ultra ultra-low emissions and shall be a consistent and reliable source of energy for generations to come thereby ending the Clean Energy Security debate forever.

Keywords: Green Hydrogen; Renewable energy: clean fuel Engine fuel: Energy Security

RAiSE23 - 120

A New Gate Control Unit-Recurrent Neural Network Structure for Audio-Based Sentiment Analysis

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Sentiment analysis, a crucial task in audio processing, involves the classification of emotions expressed in spoken language. Traditionally machine learning algorithms have proven effective in various classification tasks. In this study, we propose a novel XGBoost-based structure for audio-based sentiment analysis. We extract relevant acoustic features from the audio signals, such as Mel-frequency cepstral coefficients (MFCC) coefficients and pitch, and utilize them as input to train an XGBoost classifier. The XGBoost algorithm is an ensemble of decision trees with gradient boosting to learn the sentiment patterns in the audio data. The results demonstrate the effectiveness of the XGBoost model in accurately classifying sentiment in audio data. The findings highlight the potential of XGBoost for sentiment analysis in audio and contribute to advancing the field of emotion recognition in speech processing. After optimizing the features, the classification of three types of sentiment: positive, negative, and neutral is done by using a novel Recurrent neural network (RNN) structure that incorporates a new Gate Control Unit (GCU) specifically designed for audio-based sentiment analysis, because it has gating mechanisms that regulate the information flow within the RNN, enabling the model to selectively focus on relevant acoustic features and effectively capture sentiment-related patterns in the audio data. The results highlight the effectiveness of the GCU in capturing sentiment information from audio signals and its potential for advancing sentiment analysis research in the audio domain. Our findings contribute to the development of more accurate and powerful models for audio-based sentiment analysis, opening avenues for improved sentiment understanding in applications such as voice assistants, call Centre analytics, and emotional speech recognition. The proposed methodology for audio-based sentiment analysis is tested with different samples and the results are markable compared to previous and existing techniques

Keywords: GCU, MFCC, NGCU, RNN, XGBOOST.

RAiSE23 - 121

Millennials' Intention to Visit Green Hotels in India – A Prelim-Inary Analysis Using the Theory of Planned Behavior

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The purpose of this study is to investigate the factors that impact millennials' intentions to visit green hotels in India and their willingness to participate in the sustainable practices offered by hoteliers. The main objective is to find antecedents of intentions that drive people to visit green hotels using the theory of planned behavior (TPB). This study will focus on millennials as they represent a major part of the consumption economy having higher disposable income. A preliminary study was conducted using a questionnaire survey, and 35 responses were received. Structural equation modeling was performed to analyze the relationships. Measurement model analysis was performed to validate the instrument and structural model analysis was done for hypothesis testing. Collected data were analyzed using SmartPLS V4.0. Findings revealed that subjective norm have a significant impact on customers' attitude (β=0.374, $p<0.001$) but not much influence on perceived behavioral control (β=0.218, $p>0.1$). Customers' attitude (β=0.609, $p<0.001$) was found to significantly influence their green purchase intention, however, PBC (β=0.242, $p>0.1$) did not influence customer's green purchase intention. Findings also confirmed that attitude is a crucial variable impacting customers' green purchase intention to visit green hotels. Having a favorable attitude toward saving the environment will have a positive influence on customers' intention to select a green hotel. This study highlights the factors impacting millennials' intention to visit green hotels i.e. attitude, subjective norm, and perceived behavioral control. The study's findings can be put to use by hoteliers to design sustainable strategies to build environmentally viable hotels and create awareness among the millennial generation to contribute towards sustainable tourism. This can also be utilized to gain a competitive advantage for hotels to market them as a differentiating factor in the highly competitive tourism industry. The government can utilize the findings to develop sustainable infrastructure for protecting the environment.

Keywords: Green hotel; intentions; sustainable development, green purchase behavior; green consumerism; sustainable tourism

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Thermographic Evaluation of Dental Implants Insertion with Different Diameters and Bone Quality on the Primary Stability: A 3D Finite Element Study

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Caries and periodontal disease are the primary causes of tooth loss and extraction. Inadequate oral hygiene continues to pose a major obstacle to oral health, impeding individuals' ability to consume a balanced diet and maintain proper nutritional levels, ultimately affecting their overall well-being. Tooth loss leads to resorption of the alveolar ridge, which can complicate the placement of dental implants. Hybrid prostheses are emerging as effective treatment options for individuals with complete tooth loss, offering a means to restore proper chewing function. Implant dentistry has improved edentulous patients' recovery, with a 10-year success rate of more than 97%. However, the insertion torque, the surface properties of the implants, and the heat created during implant site preparation may all play a role in early implant failure. As a result, monitoring the temperature during the insertion might be critical in predicting the prosthesis success rate. Although various research has investigated the thermal consequences of drilling and fixture placement, a comparative analysis of the thermal result of implant insertion of Different Diameters and bone quality on the primary stability is lacking. The primary objective of the study was to evaluate the thermal changes generated by the insertion of narrow and using a three-dimensional (3D) finite element analysis. Both narrow and standard implants caused a rise in bone temperature. Furthermore, the narrow had a greater thermal effect than standard implants, although it was always lower than the temperature limits of bone necrosis. The findings demonstrated that narrow implants are both thermally and clinically safe.

Keywords: Biomechanics, finite element analysis, implant, bone quality; thermal.

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Risk Prediction and Simulation of Cardiovascular Treatments: Use of Big Data

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There is an enormous need for cardiovascular experts, who frequently supervise the provision of medical services for various medical situations. The modern cardiovascular surgeons therefore has to be adept at managing a variety of cardiovascular issues. It was established in the past that substantial personnel shortages that make it difficult to provide cardiovascular surgical attention. Additionally, because to the ageing at-risk populace, this is still a high priority at the national scale to enhance rapid assessments, specialist advice, and the proper patient transfer to institutes of excellence that can offer a full range of immediate vascular care. Strategies to reduce these service gaps include expanding non-elective vascular issues, using clinical decision aids, and using training via simulation. Comparatively, the use of enormous amounts of data as a tool that can offer algorithms to solve more challenging medical issues has only lately come to light. In order to effectively manage cardiovascular emergencies, big data, risk forecasting, and modeling and simulation have been applied. The goal of this paper is to provide a thorough overview of the lessons learned from these applications.

Keywords: Big Data, Risk Prediction, Vascular surgery

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Influence of Implant-Abutment Contact Surfaces and Prosthetic Screw Tightening Torque on the Stress Concentration and Micro Gap: A 3D Finite Element Analysis

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The utilization of implant-supported restorations to replace missing teeth has become a standard practice for patients with partial or complete tooth loss, boasting high success rates. The internal conical design with screw-retained restorations has been widely endorsed due to its ability to distribute stress more favorably, provide greater rigidity, and reduce the risk of leakage compared to external and internal hexagonal connections. In dental implantology, an implant abutment gap could compromise the implant's long-term success of the implant. This study uses finite element static structural analysis to investigate how preloaded torque and occlusal loading affect the growth of the implant-abutment gap. A preloaded torque of 200Nmm to 300Nmm and progressive loads ranging from 10N to 250N was applied to the abutment after mating a dental implant with an M1.2*0.25 thread pitch. Results showed that the size of the applied load and the amount of preloaded torque had an impact on how the implant abutment gap developed. The research also revealed the rise in the von Mises stress concentration as the amount of preloaded torque increased. Based on the findings of the finite element analysis, the study assessed the maximum von Mises stress in the abutment screw, the occurrence of micro gaps, and the critical load required to bridge the internal implant space. In order to reduce the occurrence of abutment gap creation and increase the long-term success of dental implants, the findings offer crucial insights for dental implantology practitioners in creating suitable implant-abutment connections.

Keywords: Dental Implant, Abutment, Dental Material, Finite Element Analysis

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A Comprehensive Review on Unsupervised Domain Adaptation for 3D Segmentation and Reconstruction in CT Urography Imaging

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The Computed tomography urography (CTU) is a specialized radiological procedure that pro-duces finely detailed pictures of the urinary system, comprising the kidneys, ureters, and bladder, using computed tomography (CT) scans. This diagnostic procedure's main goal is to assess dis-orders that impact these vital organs, such as stones in the kidneys, tumors, UTIs, and morpho-logical anomalies. CTU has benefits like the capacity to deliver a personalized therapeutic strategy via radiomics and artificial intelligence technologies, as well as extra knowledge about abdominal anatomy. This comprehensive article looks at how computed tomography urography (CTU) is used and how it can be changed to evaluate the urinary system, especially the kidneys, bladder, and ureters. The most important part of this review is the discussion on 3D kidney segmentation and reconstruction from urographic images, which has helped doctors a lot with accurate diagnosis and planning of treatment for kidney diseases. Even though 3D convolution networks have been used a lot in medical picture segmentation, it can be hard to adapt them to clinical data from different modalities that hasn't been seen before. The review gives an in-depth look at the current research on how an unsupervised domain adaptation or translation method can be used with 2D networks, especially for accurate kidney segmentation in urographic images. Through this thorough study, we want to show how these techniques can be used in medical imaging and how they might change in the future.

Keywords: Computed Tomography Urography; CTU; Kidney Segmentation; 3D Convolution Networks; Unsupervised Domain Adaptation; Medical Imaging.

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Scanning Electron Microcopy Analysis after Electrical Discharge Machining of Advanced Ni-based Alloy

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Electrical Discharge Machining (EDM) and its variant methods are used to fabricate 3 dimensional and complex geometrical features from micro level to Nano dimensions. Researchers have successfully experimented for high strength alloys and composite materials finding wide applications in defense, automobile, and medical industries to shape precision micro-grooves (straight, tapered, and angular based). Motion type EDM methods (tool electrode is moving) utilized capabilities to rotate tool-electrode or work-material to manufacture groove (applications include in micro-electronics sector, air flight engines and diffraction gratings). In the present investigation, experimental studies were performed to fabricate the grooves on high-strength NI-based alloy using EDM electrode (cylindrical in shape) using Taguchi's L-18 Orthogonal array. SEM studies were done at different magnifications also to check and analyzed the recast layer formation on the surface of the surface of the groove at different parametric settings. The analysis of the effect of input parameters was tested on machining performances responses viz. MRR, EWR and Surface Roughness. This was revealed and analyzed those optimum levels of process parameters shown the best surface finish with maximum metal removal rate after analyzed using SEM. The MRR was found to increase with an increase of thickness of disk electrode (0.1-0.6) at all parametric settings. Also, Roughness increased with an increased in current settings from 6 to 12 A. SEM analysis depicts that groove thickness at the bottom (565μm) and top of groove (1.1.4 mm).

Keywords: Electrical Discharge Machining (EDM); Ni-based Alloy; Scanning Electron Microscopy (SEM); Surface Roughness; Process Parameters Optimization

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A Comprehensive Review on the Application of 3D Convolutional Neural Networks in Medical Imaging

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Convolutional Neural Networks (CNNs) are a kind of deep learning models that were created primarily for processing and evaluating visual input, which makes them extremely applicable in the field of medical imaging. CNNs are particularly adept in automatically identifying complex patterns and features in pictures like X-rays, CT scans, and MRIs. They accomplish this by capturing hierarchical information utilizing layers of convolutional and pooling processes. By enabling precise disease diagnosis, anatomical structure segmentation, and even patient outcomes prediction, CNNs have transformed medical imaging. In this review paper, we examine how crucial CNNs are for improving diagnostic effectiveness and efficiency across a range of medical imaging applications. This review details how Convolutional Neural Networks (CNNs) are used, focusing on the development and use of 3D CNNs for processing and categorizing multidimensional and moving images. The paper discusses how critical 3D CNNs are in areas like analyzing surveillance videos and, especially, in medical imaging to find pathological tissues. With this method, pathologists can segment the layers of the bladder with a lot more accuracy, which cuts down on the time they have to spend looking over them by hand. CNNs use specific filters to find spatial and temporal relationships in images, making understanding and interpreting them easier. CNNs are better at fitting image datasets because they have fewer parameters and weights that can be used more than once. This makes the network better able to understand complex images. This thorough review shows how 3D CNNs could improve the speed and accuracy of processing and analyzing medical images and how far they have already come.

Keywords: Convolutional Neural Networks (CNNs); 3D CNN; Medical imaging; Pathological tissues; Image processing.

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Performance Enhancement of Aged Mineral Oil by Blending Synthetic Ester for Transformer Insulation Applications

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Mineral oil derived from petroleum is mostly preferred as liquid insulation and coolant in power and distribution transformers because of its stability at high temperatures and excellent electrical insulating properties. Since it is non-biodegradable and inflammable, an alternative insulating liquid should be developed or a possible approach should be established to further utilize the aged mineral oil in the existing transformers to avoid the problem of discarding the oil. Though natural esters look like a promising alternative, they suffer from excessive oxidation which makes them unsuitable for transformer insulation applications. This work presents the feasibility of blending aged mineral oil with synthetic ester to extend its life. Both fresh and aged mineral oil are blended with synthetic ester separately using ultrasonication after the removal of moisture content. The electrical, thermal and physiochemical characteristics of the blended oil are studied by measuring breakdown voltage, flash and fire points and viscosity respectively. These characteristics varied depending upon the ratios of mineral oil and synthetic ester. The optimum ratio of synthetic ester and mineral oil for enhanced performance is found as 1:4 for both fresh and aged mineral oils. This adds an advantage of reduced synthetic ester requirement and thus reduced cost. A comparison of results also reveals that the optimum ratio of mineral oil and synthetic ester depends on the ageing condition of the oil, electrical, physiochemical and thermal properties of the blended oil. The results also proved that the aged mineral oil can be reused after blending it with synthetic ester that avoids discarding the oil.

Keywords: Mineral oil; synthetic ester; transformer liquid insulation; breakdown voltage; viscosity

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Influence of Ionizing Radiation on Bio-synthesis of Noble Metal SF-AgNPs: Their Applications

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Recently, biosynthesis of silver nanoparticles using aqueous silk solution has emerged as a simple and viable alternative to more physical and chemical methods. The present investigation explains rapid and extracellular synthesis of silver nanoparticles using Bombyx mori silk and exposed to Gamma irradiation. The synthesized silver nanoparticles are confirmed by UV-vis, SEM, E-DAX, XRD, TEM, FTIR, TGA and DSC. UV-vis spectra show the presence of silver nanoparticles, as the irradiation time increases spectra also increases. XRD study confirms that resultant particles are face cantered cubic structure of metallic silver nanoparticles. SEM analysis shows the formation of AgNPs (Silver Nanoparticles) in the aqueous solution. E-DAX results confirms the formation of silver nanoparticles. Silver nanoparticles are spherical or nearly spherical in shape confirmed by TEM. The FTIR studies showed major peaks of proteins involved in the synthesis of silver nanoparticles. The TGA and DSC studies of SF/AgNPs (Silk fibroin Silver Nanoparticles) revealed that the nanocomposites having more stability.

Keywords: Bombyx mori silk, silver nanoparticles, UV-vis, TEM, TGA, DSC.

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A Comprehensive Analysis of the User Experience in Digital Platforms Concerning the Practice of Nudging User Behavior

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This research paper unveils an all-encompassing literature exploration into "nudging" in digital platforms and its profound impact on the user experience. The study delved into various sources spanning academic research papers, corporate reports, books, and online publications, acquired through a thorough four-step approach. The methodology entailed unearthing pertinent sources via diverse academic databases and industry networks and a diligent review process to estimate their relevance and caliber. Data extraction from each selected source focused on the employed nudge techniques, underlying behavioral principles, and their repercussions on the user experience. The findings were subsequently synthesized to unearth the existing literature's prevalent themes, disparities, and prospective gaps. The paper underscores the importance of nudging as a potent driver of user actions while safeguarding their autonomy. We employed a comprehensive approach to explore nudging's application and influences on digital platforms, including academic database searches, corporate reports, and web blogs. We thoroughly extracted data on platform types, nudging strategies, behavioral theories, and user experience influences and impacts. It deliberates on potential future research trajectories, encompassing ethical considerations and personalized nudging methodologies. Ultimately, the study underscores how applying nudge techniques in the architecture of digital platforms can elevate user experiences and confer value upon both users and providers. However, the findings acknowledge the inherent limitations that accompany any literature review and may not encapsulate every facet of the subject matter.

Keywords: Nudging, Digital Platforms, User Experience, Behavioral economics, Recommender Systems

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Cultural Influences on User Experience: A Review

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The world is rapidly becoming more digital, and as a result, it is becoming increasingly important to investigate the enormous impact that cultural dimensions have on the user experience in digital worlds. This is a phenomenon that is incredibly complicated and has many facets. This in-depth study aims to shed light on the complex ways in which the user experience in digital settings is influenced and shaped by a wide range of cultural contexts. The research was conducted with a methodologically sound approach, and it involved a broad search for publications from the most recent ten years in crucial fields such as e-learning, e-commerce, and digital public services. As a result of this search, the study provides important insights into pressing issues such as linguistic challenges and the significance of cultural adaptation in user interfaces. In addition to this, it stresses the necessity of cross-cultural interaction design and focuses on the varied viewpoints that people of different cultures have regarding technology. The story draws on a diverse variety of perspectives to paint an accurate picture of the cultural forces that are most influential in the most important digital domains. The study paves the way for businesses to develop user-focused digital solutions that not only promote inclusivity but also enhance user satisfaction and participation across a wide variety of cultural backgrounds, ultimately contributing towards a more unified and in tune digital future. This is accomplished by highlighting the urgent need for cultural testing of usability and adapted branding strategies. It orients businesses and digital creators to support culturally rich user experiences that are nonetheless unified via the use of smart and inclusive digital design methods. This is done because it advocates for the harmonized integration of cultural features into the digital narrative.

Keywords: Cultural influences; User experience; E-learning; E-commerce; Digital services

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Review of Development and Characterization of Shape Memory Polymer Composites Fabricated by Additive Manufacturing Technology

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The structures as well as components are generated by depositing the filaments on one another via the technique of additive manufacturing. Among the various processes of printing, 4D printing combines the technology of 3D printing with the passage of time, resulting in additively generated parts that are responsive to stimuli from the outside by modifying their form, volume, size, or mechanical qualities. Thus, the materials of shape memory are used in 4D printing and respond to environmental factors including temperature, pH, and humidity. Shape memory polymers (SMPs) are the materials with a shape memory effect that are best suited for additive manufacturing. Contrarily, the method named Fused Filament Fabrication (FFF) is employed most frequently among all additive manufacturing methods. In this regard, the objective of the present study is to evaluate all investigations that have been done on the 4D-FFF materials' mechanical properties. The study offers an unparalleled overview that highlights the possibilities of 4D-FFF printing across multiple applications in engineering while keeping the end structure's or component's structural integrity in consideration.

Keywords: Shape memory polymers; 3D printing; 4D printing; Fused Filament Fabrication, polymer composites, mechanical properties, additive manufacturing.

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Digital Delights: Empowering Canteens with an Intuitive Firebase-Powered Online Catering System

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An online catering system is a mobile application created on the android platform that enables businesses and vendors to manage orders and accept payments in a streamlined manner. This program can be accessed using a mobile device and is referred to as an online catering system. The key goal of the project that we are working on right now is to create an interface for the users that will allow them to place food orders based on their preferences rather than on the availability of those alternatives. This will be accomplished through the provision of an interface. Additionally, the program is centered on the development of a platform for smaller vendors, with the goal of helping them to digitalize their food companies and boost their revenue through the utilization of analytics. This is one of the primary focuses of the program. Users also have the opportunity to pre-schedule their orders, which enables them to save time and prevents them from having to wait in line for extended periods of time. There will be no need to worry about collecting cash or making change because an integrated payment system will allow for payments to be received in real time. This will eliminate the necessity for such activities. The application takes use of Firebase as a back-end service for real-time database management, authentication, and accelerated application deployment. Firebase has been utilized as the backend service to ensure that databases are updated in real time, that authentication is conducted rapidly, and that deployment is carried out successfully. These three goals have been achieved through the usage of Firebase. This application for catering is not just a tool for placing orders; rather, it is an all-encompassing solution to the challenge of altering and improving the environment of the food industry.

Keywords: Firebase; Canteen Management; Android development; Food Ordering

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Hand Gesture Recognition in Indian Sign Language Using Deep Learning

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Sign languages are important for the deaf and hard of hearing community, as they provide a means of communication and expression. However, many people outside of the deaf community are not familiar with sign languages, which can lead to communication barriers and exclusion. These are also not universal; each country and culture have its own sign language, and some countries have multiple sign languages. For example, American Sign Language (ASL) is used in the United States and Canada, British Sign Language (BSL) is used in the United Kingdom, and French Sign Language (LSF) is used in France. There are over 300 sign languages in the world today. Indian Sign Language (ISL) is a visual language used by the deaf and hard of hearing community in India. It is a complete language, with its own grammar and syntax, and is used to convey information through hand gestures, facial expressions, and body language. ISL has its roots in the British Sign Language (BSL), which was introduced to India in the 19th century by the British colonial government. Over time, ISL has evolved into its own distinct language, with regional variations and dialects. Recognizing hand gestures in sign languages is a challenging task due to the high variability in hand shapes, movements, and orientations. Indian Sign Language uses a combination of one-handed and two-handed gestures, which makes it fundamentally different from other common sign languages like ASL. This paper aims to address the communication gap between especially abled (deaf) people who can only express themselves through the Indian sign language and those who don't understand it, thereby improving accessibility and communication for sign language users. This is achieved by using and implementing Convolutional Neural Networks on our self-made dataset. This is a necessary step as none of the existing dataset fulfills the need for real world images. We have achieved 0.0178 loss and 99% accuracy on our dataset.

Keywords: CNN; AI; ISL; Static Hand Gestures; Deep Learning.

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Stock Market Predictions and Risk Analysis with LSTM-VaR Machine Learning Hybrid Approach

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To achieve the goal of producing projections regarding the value of stocks based on the risks that are associated with them, a choice to use a hybrid deep learning approach that goes by the name LSTM-VaR has been made available as an option. This choice was made available in order to meet the objective of achieving the goal. This strategy explores whether or not there is a relationship between the data on stock values and the chronological sequence in which the events occurred over the course of time. Specifically, this method looks into the question of whether or not there is a connection between these two factors. To provide a greater level of clarity, the methodology lays an emphasis on the chronological order in which the events transpired. Because it takes into account the passage of time when making its projections, the model is able to improve the accuracy of the stock price projections it generates while simultaneously reducing the amount of volatility that is associated with those projections. This is possible because the model takes into account time. Constructing a method that accurately predicts future costs and that accurately predicts shifts in stock market indices while simultaneously calculating the natural variations that occur in the indices is something that is conceivably doable. Future costs can be accurately predicted using this method. This is an endeavour that is not impossible to carry out. This is undoubtedly something that can be completed successfully. This is an endeavour that if sufficient time and effort, might be able to be completed successfully. This is a potential that needs to be handled and taken into consideration, so keep that in mind.

Keywords: LSTM (Long ShortTerm Memory); Stock Market Prediction; Moving Average; Risk Analysis; Time Series Forecasting; Neural Networks.

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Sustainable Power Prediction and Demand for Hyperscale Datacenters in India

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Data localization, data explosion, data security, data protection, and data acceleration are important driving forces in India's datacenter revolution, which has raised a demand for datacentre expansion in the country. In addition, the pandemic has pushed the need for technology adoption, digitization across industries, and migration to cloud-based services across the globe. The launch of 5G services, Digital Payments, Big data analytics, smartphone usage, digital data access, IoT services, and other technologies like AI (Artificial Intelligence), AR (Augmented Reality), ML (Machine Learning), 5G, VR (Virtual Reality) and Blockchain have been a strong driving force for datacenter investments in India. However, the rapid expansion of these data centers presents unique challenges, particularly in predicting and managing their power requirements. This abstract focuses on understanding the power prediction and demand aspects specific to hyperscale data centers in India. The study aims to analyze historical power consumption data from existing hyperscale data centers in India and develop predictive models to estimate future power requirements. Factors such as server density, workload patterns, cooling systems, and energy-efficient technologies will be considered in the analysis. Datacenter negatively impacts the environment because of the large consumption of power sources and 2% of the global contribution of greenhouse gas emissions. Given the increasing cost of power, datacenter players are naturally encouraged to save energy, as power is a high datacenter operational expenditure cost. Additionally, the research will explore the impact of renewable energy integration, backup power solutions, and demand response mechanisms to optimize energy usage and reduce reliance on conventional power sources. Many datacenter providers globally have started using power from renewable energy like solar and wind energy through Power Purchase Agreements (PPA) to reduce these carbon footprints and work towards a sustainable environment. In addition, today's datacenter industry constantly looks for ways to become more energy-efficient through real innovation to reduce its carbon footprint.

Keywords: Cloud Datacenter, Carbon Emissions , HypervScale Datacenter , Edge Datacenter, Digital India, Sustainability, Greenhouse Gas Emissions

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Preparation Object Detection and Classification Using Quantum Transforms

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In the past two decades, the exploration of quantum technologies within the field of remote sensing and imaging has been a subject of substantial research and interest. Quantum principles, with their potential to harness the unique properties of quantum mechanics, offer a promising avenue for transforming remote sensing technologies. Spatial quantum remote sensing, an innovative approach, integrates active imaging and information transmission technologies based on quantum mechanics principles. This paradigm shift holds the promise of significantly enhancing the precision and efficiency of imaging and data transmission in remote sensing applications. Quantum methodologies have also found their place in interferometry synthetic aperture radars (InSAR). By leveraging quantum techniques, researchers aim to elevate the precision and resolution of radar systems, potentially revolutionizing the quality of remote sensing data. Addressing the challenge of optimizing phase evolution, often encountered as an unrestrained quadratic binary optimization problem in remote sensing, quantum computing solutions like D-Wave Quantum Glow offer promising ways to tackle complex connectivity problems. Quantum luminescence is another intriguing facet, showing potential for feature selection and grouping within hyperspectral images. This could substantially improve the identification of specific features or patterns within complex hyperspectral data, enhancing the accuracy of remote sensing applications. Furthermore, the proposal of a quantum discrete transform for real-time object discovery across diverse domains hints at the expanding role of quantum techniques in object detection and recognition, core processes in remote sensing and imaging. In summary, the integration of quantum technologies into remote sensing and imaging is a dynamic and promising field. As quantum technologies advance, they hold the potential to revolutionize remote sensing, offering greater precision, efficiency, and novel approaches for understanding our world remotely.

Keywords: Quantum Circuit; Quantum Transform; Object Detection

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Longevity Recommendation for Root Canal Treatment

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Root canal therapy is a vital dental procedure for salvaging severely decayed or infected teeth, preserving them instead of extracting, thus averting the risk of reinfection. Nonetheless, the prevalence of root canal treatment (RCT) failure is surprisingly high, potentially leading to painful abscesses and severe infections. This study delves into the multifaceted reasons behind RCT failures and employs Support Vector Machine (SVM) technology to predict treatment longevity. The research dataset comprises 332 manual instances, subjected to a rigorous 10-fold cross-validation for testing and accuracy assessment. SVM is employed to categorize failed RCT cases into distinct classes, such as broken instruments, periapical radiolucency, root fractures, vertical root fractures, pulp stones, adequate periodontal support, periapical abscesses, overfilled cavities, and perforated or underfilled cavities. By scrutinizing the interplay between these treatment-failure-causing factors, the system discerns their impact on treatment duration. Comparisons are made with other machine learning models, including Logistic Regression (LR) and Naïve Bayes Classifier (NB), to pinpoint the root causes of RCT failure in terms of accuracy, sensitivity, and specificity. Interestingly, Logistic Regression emerges as the top-performing model with an impressive 92.47% accuracy rate. This research investigates the causes of RCT failure and employs SVM to predict treatment longevity, offering crucial insights into addressing this common dental issue. The study's findings highlight the efficacy of Logistic Regression in identifying RCT failure causes, providing valuable guidance for improving dental procedures and patient outcomes.

Keywords: Root canal treatment failure (RCT); Logistic Regression; Support Vector Machine (SVM); Dental treatment longevity; Dental complications.

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Crowd Monitoring and Suspicious Behavior Detection Using Deep Learning

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In contemporary society, the task of ensuring security in public events, family gatherings, and crowded locations has grown increasingly challenging due to the constantly rising popula-tion. The conventional method of relying solely on human security personnel has proven to be insufficient, and as a result, many regions have implemented CCTV cameras to monitor such crowds through live video feeds. However, manual surveillance is labor-intensive, prone to human error, and can overlook potentially suspicious or harmful activities. In light of these challenges, researchers have turned to intelligent crowd monitoring techniques that incorporate deep learning to automatically detect suspicious behavior. Despite several previous attempts, ensuring accurate detection without false positives or negatives remains a major challenge. Our proposal aims to address these limitations by developing a highly accurate model that can promptly identify suspicious crowd activities. Our research motivation was further intensified during the COVID-19 pandemic, where maintaining social distance became crucial in curbing the spread of the virus. Crowded areas were identified as high-risk areas, necessitating a reliable surveillance system. To this end, we introduced a deep learning model that combines the strengths of Fully Convolutional Network (FCN) and Long Short-Term Memory (LSTM) to monitor social distancing protocols using digital images and security footage. Our proposed methodology comprises two phases: a comprehensive crowd analysis followed by the detection of suspicious behaviors in varying crowd densities. To ensure Crowd monitoring and suspicious behavior detection using Deep Learning in term of the reliability and effectiveness of our FCN + LSTM model, we employed various evaluation metrics on crowd-sourced data.

Keywords: Internet of Things , Visual Geometry Group , Crowd Monitoring, Long Short-Term Memory , Fully Convolutional Network.

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Identification of Molecules against LasR of Pseudomonas Aeruginosa Using In Silico Approach

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Quorum sensing (QS), commonly known as inter-and intracellular communication in bacteria, is accomplished by small, diffusible signalling molecules termed as autoinducers. Numerous virulence factors that are involved in pathogenesis are regulated by QS. The QS has come into attention as a result of the growing resistance of bacteria to conventional antibiotics, as it applies less selective pressure to limit the development of resistance among bacteria. For inhibitors, LasR, a transcription factor that regulates QS in Pseudomonas aeruginosa, is a promising therapeutic target. The objective of this study was to identify possible LasR inhibitors from natural substances. Virtually 2068 ZINC database compounds were tested against the LasR structure. Following the filtering of suitable compounds using Lipinski's rule and ADME criteria. Depending on binding energy, eight novel potential QS inhibitory agents were identified. In order to determine how inhibitors and targets bind, structures of LasR-ligand complexes were examined. It is important to note that all of the compounds are structurally distinct from 3-oxo-C12HSL, a native autoinducer of LasR, which is essential for the activation of LasR dimer that regulates QS system in Pseudomonas aeruginosa.

Keywords: Internet of Things , Visual Geometry Group , Crowd Monitoring, Long Short-Term Memory , Fully Convolutional Network.

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Track-me Down Emergency Location Service Provider

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Object tracking and detection are fundamental and challenging tasks in various computer vision applications, spanning surveillance, vehicle navigation, and autonomous robot control. These tasks are particularly critical in the context of video monitoring within dynamic environments, where the detection and tracking of objects, such as people and automobiles, play a pivotal role. In today's world, as we combat crime, terrorism, ensure public safety, and manage traffic effectively, advanced computer vision technology becomes indispensable. Video monitoring in dynamic environments is at the forefront of this battle, providing crucial insights and real time information for decision making. Object tracking based techniques emerge as a strong choice, especially for detecting stationary foreground objects. These methods exhibit robust performance when the camera remains stationary, even in scenarios where ambient lighting conditions gradually change. This stability makes them well suited for applications requiring consistent and reliable object detection. In the contemporary landscape, one of the most pressing concerns revolves around the recognition of objects and the real time tracking of their locations. Achieving these objectives is paramount for enhancing security, safety, and efficiency across various domains. However, it's essential to acknowledge that in some scenarios, such as remote or isolated locations with limited internet connectivity, access to advanced object tracking and detection technologies may be constrained. Therefore, addressing these challenges and developing robust, offline capable solutions remains a critical area of research and development in computer vision. In conclusion, object tracking and detection are pivotal technologies in computer vision, with applications spanning from surveillance to traffic management. In dynamic environments, they play a crucial role in enhancing security and safety. However, addressing challenges related to real time tracking and detection in resource constrained settings is an ongoing research endeavor.

Keywords: GSM Module, GPS Tracking, ESP32, Arduino, SMS, Object Tracking.

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CheatFit: 360° Fitness Application

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The global rise in overweight and obesity has become a significant concern, posing serious health threats such as noncommunicable diseases and musculoskeletal problems in both developed and developing nations. Addressing this escalating health crisis necessitates a precise assessment of body fatness, given the limitations of relying solely on Body Mass Index (BMI) as an indicator. This study delves into the intricate relationship between Body Fat Percentage (BFP) and BMI among adult individuals. To measure body fat percentage accurately, skinfold measurements were employed as a reliable method. The overarching objective of this research is to devise an innovative dietary recommendation system aimed at mitigating the burgeoning overweight and obesity issue. This system endeavors to offer individuals personalized meal plans that align with their preferences while ensuring optimal nutritional balance. The methodology adopted for this purpose encompasses two distinct stages, each playing a crucial role in promoting healthier dietary habits. In the initial stage, the system formulates dietary suggestions based on the nutritional content of foods. By incorporating individual food preferences and restrictions, it tailors meal plans to the unique tastes and dietary needs of each individual. This customization helps individuals embark on a healthier eating journey without feeling deprived or burdened by rigid dietary restrictions. The second stage of the system shifts its focus to a comprehensive analysis of dietary nutrients. It evaluates the nutritional composition of recommended meals to ensure they meet essential dietary requirements. This step guarantees that the proposed dietary choices not only cater to personal preferences but also deliver the necessary nutrients for overall health and well-being. By adopting this two stage approach, the research aspires to provide a holistic solution to the growing obesity epidemic. It empowers individuals to make informed dietary choices that not only support their personal tastes but also prioritize their health by delivering well balanced nutrition. In doing so, this research contributes to the ongoing efforts to combat the adverse health effects associated with excess body fat and encourages healthier eating habits in both developed and developing regions worldwide.

Keywords: Body Fat Percentage (BFP),Body Mass Index (BMI),Overweight and Obesity Dietary Recommendation System,Percent Body Fat (PBF).

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Identification of Turmeric Rhizome using Image Processing and Machine Learning

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India is the world's leading producer and exporter of turmeric. Indian turmeric is known as the best in the world because of its natural medicinal properties. Different turmeric varieties are having different amount of nutritional values, which results in variations in their cost and quality. A quality assessment of turmeric aids in evaluating and determining its quality also it helps to promote its marketing. Hence identification of turmeric cultivars is having great importance. But it requires manual inspection by human experts and generates subjective, time-consuming results. Machine vision will provide a more accurate and faster way to identify different agricultural products and their varieties. This study presents an automated system to identify a turmeric rhizome variety by extracting morphological, color and texture features. The classification of different rhizome types is carried out by using image processing techniques followed by the KNN, SVM, Naïve Bayes, Random Forest and LDA classifiers. The proposed work showed promising results for the identification of turmeric rhizome varieties.

Keywords: Turmeric rhizome, Segmentation, Feature extraction, GLCM, K-Nearest Neighbor.

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Review and Analysis of the Literature AI-based Digital Transformation of Automated Customer Onboarding

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Digital transformation in customer onboarding represents a paradigm shift in the way businesses engage with their clients. This process harnesses the power of digital technologies to create a seamless and highly efficient onboarding experience. The key objectives of digital client onboarding include saving time and effort, achieving cost savings and operational optimization, enhancing the overall customer experience, and ultimately increasing revenue. In the context of digital transformation customer onboarding, a wide array of digital tools and platforms are employed to facilitate the collection and processing of customer information. This enables the automation of previously manual procedures and allows businesses to offer personalized support throughout the onboarding journey. Compared to traditional customer onboarding methods, digital client onboarding offers several distinct advantages. Firstly, it saves valuable time and effort for both businesses and clients. The automation of various tasks, such as data entry and document verification, streamlines the onboarding process, allowing clients to quickly access the products or services they seek. This efficiency also translates into significant cost savings as businesses reduce overheads associated with manual processes, such as paperwork and administrative tasks. Furthermore, digital transformation in customer onboarding leads to a substantial improvement in the overall customer experience. Clients benefit from a faster and more convenient onboarding process, reducing the likelihood of frustration or abandonment. This enhanced experience fosters customer satisfaction and loyalty, ultimately contributing to increased revenue through repeat business and referrals.

Keywords: Digital Transformation, Customer Onboarding, Efficiency, Cost Savings, Customer Experience, Revenue Increase.

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Blockchain-Based Network Optimization for Workstation Nodes

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Computer networks are used for internet access, cloud computing, and telecommunication. Network optimization is the process of increasing the speed and efficiency of the communication process between nodes on a network. The concept utilizes the Blockchain as a tool. Network optimization is an important and challenging problem in network design and routing. The goals of network optimization are to decrease the number of hops while maintaining the quality of service guarantees and to minimize the amount of energy used in communications. Traditional network architectures rely on centralized servers or data centers, introducing potential bottlenecks and single points of failure. In contrast, Blockchain offers a decentralized approach, enabling nodes to communicate directly without dependence on a central authority. Its unique features include its ability to provide transaction transparency and immutable record-keeping. In this paper, we will study an efficient system to demonstrate real-time traffic and understand the fundamentals of networking.

Keywords: Blockchain in java, peer-to-peer networking, consensus algorithm, encoding algorithm, hash functions.

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A New Approach for Sentiment Analysis of Social Media Comments Using Natural Language Processing

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Business and science are using sentiment analysis to extract and assess subjective information from the web, social media, and other sources using NLP, computational linguistics, text analysis, image processing, Audio Processing and video processing. It models polarity, attitudes and urgency from positive, negative or neutral input. Unstructured data makes emotion assessment difficult. Unstructured consumer data lets businesses market, engage, and connect with consumers on social media. Text data is instantly assessed for user sentiment. Opinion mining identifies a text's positive, negative, or neutral opinions, attitudes, views, emotions, and sentiments. Text analytics uses machine learning to evaluate "unstructured" natural language text data. These data can help firms make money and decisions. Sentiment analysis shows how individuals feels about things, services, organisations, people, events, themes, and qualities. Reviews, forums, blogs, social media, and other articles use it. DD(Data Driven) methods find complicated semantic representations of texts without feature engineering. Data-driven sentiment analysis is three-tiered: Document-level Sentiment Analysis determine polarity and sentiment. Aspect Based Sentiment Analysis assesses document segments for emotion and polarity. Data Driven (DD) Sentiment Analysis recognises word polarity and writes positive, negative neutral sentiment. Our innovative method captures sentiment from text comments. Syntactic Layer: Sentence-level normalisation, ambiguity detection at paragraph boundaries, POS tagging, text chunking, and lemmatization; Pragmatics include personality recognition, sarcasm detection, metaphor comprehension, aspect extraction, and polarity detection; semantics include word sense disambiguation, concept extraction, named entity recognition, anaphora resolution, and subjectivity detection.

Keywords: Sentiment Analysis, Natural Language Processing, social media, Syntactic Layer, Semantic Layer, Pragmatic Layer.

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Seasonal Variation in Model Coefficient for Multi-crystalline Silicon Photovoltaic Technology Module Using Regression Method

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The installed capacity of photovoltaic (PV) systems has been rising quickly lately. Deploying PV systems to generate power, however, is a substantial problem given their reliance on weather and environmental circumstances. The following environmental factors must be taken into account: temperature, wind direction, speed as well as irradiation. The solar system's standard test condition (STC) is never precisely attained outside. Because of this, it is necessary to take into ac-count the seasonal influences in order to increase the solar system's performance in a real-time context. In the context of the Indian subcontinent, this research is especially important due to seasonal fluctuations in spectrum related characteristics. The findings demonstrate that the multi-crystalline (mc-Si) technology efficiency and output power evaluated for site conform to the efficiency and output power anticipated using module temperature. Under normal testing conditions, the solar PV module's parameters are taken from the manufacturer's datasheet. Accurate modeling of solar systems is necessary to address a variety of PV system problems. We may characterize a solar module's electrical properties using this precise modeling technique to pro-vide an accurate analysis of cell behavior under any operating situation. Three main stages must be taken into account while modeling a PV cell: the right selection of analogous models, the mathematical formulation of the model, and the precise identification of parameter values in the models. Therefore, in order to mimic the characteristics of solar modules, it is crucial to analyze, design relevant models, and use the right modeling technique. The Root Mean Square Error (RMSE) parameter is considered for linear regression method.

Keywords: Standard test condition; Multi-crystalline; Photovoltaic; Parameter extraction; Root mean square error.

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Federated Learning for Healthcare: A Comprehensive Review

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Recent advancements in deep learning for healthcare and computer-aided laboratory services have sparked a renewed interest in making medical data more accessible. Elevating the quality of healthcare services and delivering improved patient care necessitates a knowledge base rooted in data-driven insights. Deep learning models have proven to excel in this regard, as they are specifically designed to embrace a data-driven approach. These models thrive on exposure to larger datasets, which enables them to continuously improve their performance. However, as healthcare organizations strive to aggregate clinical records onto central servers to construct robust deep learning models, concerns surrounding privacy, data ownership, and legal restrictions have emerged. Safeguarding sensitive medical data while harnessing the collective knowledge from multiple healthcare centers is a challenging balancing act. One promising approach to address these concerns is the use of privacy-preserving techniques that allow for the utilization of data from multiple centers without compromising security. Federated learning (FL) is a technique that has emerged to enable the deployment of large machine learning models trained across multiple data centers without the necessity of sharing sensitive information. In this article, we present the most recent findings derived from a systematic literature review focusing on the application of federated learning in healthcare settings. This review offers insights into the current state of research and practical implementations of FL within the healthcare domain. By leveraging federated learning, healthcare institutions can harness the collective power of their data while upholding privacy and data security standards, ultimately leading to more effective and data-driven healthcare solutions.

Keywords: Deep Learning; Federated learning; Privacy Preservation; healthcare.

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Comparison of Different Machine Learning Algorithms to Classify Epilepsy Seizure from EEG Signals

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Recurrent seizures are a symptom of the central nervous system which are called epilepsy, the duration of these seizures last less than few seconds or sometimes minutes. There are very few ways to record the seizures and one of them is EEG. EEG systems mainly consist of scalp electrodes that record electrical activity. These EEG data are often complex signals containing noise and artifacts. Accurate classification of epileptic seizure is the major challenge as manual seizure identification is a laborious and challenging endeavour for neurologists. An automated method for seizure detection and categorization was required to address this issue. In this paper, we have used machine learning and proposed a model that predicts the behaviour of these signals and classifies seizures. The Epileptic Seizure Recognition Data Set from the UCI Machine Learning Repository was the dataset used in this work. The model is evaluated on various models such as XGboost, Extra Tree Classifier, Random Forest etc. Using measures like f1-score, recall, precision the proposed approaches have been assessed. The results indicate that the Random Forest had produced the superior result of 0.943 f1-score and XGB has achieved a slightly lower f1-score of 0.933. Moreover, Random Forest has the highest accuracy of 0.977.

Keywords: EEG Signals; Epilepsy Seizure Classification; Machine Learning Algorithms; Signal Processing; Feature Extraction; Algorithm Performance.

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A Systematic Literature Review on Cloud Containers Security

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In recent years, container security has emerged as a critical component of modern software application security and overall integrity. Containers have gained widespread popularity due to their lightweight and portable nature, facilitating rapid and flexible deployment across diverse environments. However, this surge in container adoption has also brought forth unique security challenges, including vulnerabilities within container images, misconfigured containers, and insecure runtime environments. To address these evolving security risks, various protective measures have been introduced. These include container image scanning, which identifies and mitigates vulnerabilities in container images, container orchestration security to safeguard the container management process, and runtime security monitoring to detect and respond to threats during application execution. Establishing a robust security policy and regularly updating containers with the latest patches are also fundamental practices to enhance container security significantly. Given the increasing prevalence of containers in modern software development, organizations must prioritize container security to safeguard their applications and data effectively. Our research endeavors to contribute to this imperative by presenting automated dynamic security approaches tailored for integration into a Continuous Integration/Continuous Deployment (CI/CD) pipeline. We have empirically analyzed the additional overhead incurred by these security measures to provide a practical perspective. Furthermore, we have identified specific research and technological challenges that the DevSecOps community is likely to encounter in the context of enterprise security and Cloud-native applications. Our study aims to provide initial solutions and insights that will enable informed decision making when implementing DevSecOps techniques in these contexts. Ultimately, our research seeks to strengthen the security posture of organizations utilizing DevSecOps practices in the dynamic landscape of modern software development and cloud-native applications.

Keywords: Container Security, DevSecOps, DevOps, Automation, Containerization

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A Review on Machine Learning based Routing Protocols for WSN Lifetime

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Wireless sensor networks grapple with a challenging and pivotal issue: how to maximize the network's lifespan. Numerous studies preceding our research have proposed a myriad of strategies to enhance network longevity. These strategies encompass reducing energy consumption, minimizing latency, load balancing, clustering, efficient data aggregation, and curtailing data transmission delays. In our study, we present an innovative approach called "Optimal Hierarchical Routing Protocols for WSN Lifetime" grounded in machine learning techniques, building upon the foundation of previous research in the field. Our research zeroes in on energy management techniques within wireless sensor networks (WSNs), employing an optimal routing methodology infused with Machine Learning adaptability. We delve into the nuances of energy optimization, recognizing that this plays a pivotal role in extending the lifespan of WSNs. By harnessing the power of machine learning, we aim to develop a dynamic and responsive routing protocol that can adapt to changing network conditions in real-time. Furthermore, our study goes beyond a mere theoretical exploration; it provides practical recommendations for the implementation of Optimal Clustering Methods to further enhance the longevity of WSNs. Clustering is a crucial aspect of network organization, and our research aims to optimize this process, thereby contributing to the overall efficiency and durability of wireless sensor networks. In conclusion, our research represents a comprehensive and innovative approach to addressing the critical challenge of maximizing the lifespan of wireless sensor networks. By leveraging machine learning and focusing on energy management and clustering techniques, we aim to provide practical solutions that can enhance the operational longevity of WSNs. Our study not only builds upon previous work but also paves the way for future advancements in this crucial field of research.

Keywords: machine learning; wireless sensor network; routing; neural network; fuzzy logic; reinforcement learning.

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Epilepsy Seizure Detection Using Machine Learning Algorithm

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Our research is dedicated to the development of a machine learning algorithm aimed at predicting epilepsy using EEG data. This study incorporates five distinct machine learning algorithms, namely Support Vector Machine (SVM), Linear SVM, Logistic Regression, K-Nearest Neighbor (KNN), and recurrent neural networks (RNN) including LSTM/BiLSTM. The objective is to assess and compare their accuracy and precision to determine the most effective algorithms for this purpose. To prepare the data for these algorithms, our research undertook feature label extraction and feature engineering processes. These steps were crucial in enhancing and preserving the accuracy of the data, ensuring that the algorithms could perform optimally. The findings of our research and statistical analysis revealed that SVM and LSTM algorithms outperformed the others. SVM achieved a remarkable accuracy rate of 98.14% for training data and 97.01% for test data. On the other hand, LSTM exhibited even higher accuracy rates, with 99.96% for training data and 97.3% for test data. These results highlight the potential of these algorithms in accurately diagnosing epilepsy. The ultimate goal of our model is to provide an online-based platform for diagnosing epilepsy swiftly and cost-effectively. By offering a faster and more budget-friendly means of disease detection, we aim to improve the accessibility of epilepsy diagnosis and, consequently, patient outcomes. However, it is crucial to emphasize the need for further validation of the model in real-world clinical settings. Ensuring its robustness and reliability in practical scenarios is essential before widespread implementation. Our research serves as a promising step towards advancing the field of epilepsy diagnosis through machine learning but underscores the importance of rigorous real-world testing and validation.

Keywords: Epilepsy; seizure; Electroencephalography (EEG) signals; Machine learning; Feature Extraction.

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A Survey on Forecasting IOT Time Series Data

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The proliferation of cutting-edge technologies like sensors and the Internet of Things (IoT) has led to an increase in the amount of data that is continuously accumulated over the course of time, which has led to the development of a number of different time series. Analysis of time series and making projections about future values have been primary focuses of research for a good number of years. There are many applications for time series analysis and forecasting in time series data. Some of these ap-plications include business, the stock market and exchange, the weather, the demand for electricity, the cost and usage of items such as fuels, electricity, and so on, as well as any location that experiences distinct seasonal or fashionable variations over time. The company is provided with key information that is required in order to make important decisions thanks to the forecasting of time series data. This paper presents a comprehensive analysis of the several methods that are now in use for forecasting the many different kinds of time series information. This review covers forecasting models in general, as well as the algorithms that are applied inside the models, as well as the many optimization tactics that are used to boost performance and accuracy. This paper also takes a look at the several performance evaluation elements that are utilised in the process of evaluating forecasting models. This study provides the reader with information regarding the numerous studies that have been conducted regarding the utilisation of time series data in predictive modelling.

Keywords: Time Series Analysis, IoT Devices, Predictive Modeling, Deep Learning, Anomaly Detection, Scalability.

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Traffic Management System using YOLO Algorithm

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The escalating issue of traffic congestion poses a growing challenge in today's urban landscapes. Conventional traffic signal systems, designed for a simpler era, are struggling to effectively regulate the surging number of vehicles on our roads. In response to this pressing problem, a cutting-edge solution has emerged, merging computer vision and machine learning to emulate the intricate dynamics of traffic at signalized intersections. At the heart of this innovative approach lies the real-time object detection system known as "You Only Look Once" (YOLO). YOLO leverages the power of deep convolutional neural networks to identify and track objects in real time. By implementing YOLO, we aim to revolutionize the way traffic signals operate, with a focus on enhancing safety, minimizing waiting times, and maximizing the efficient flow of vehicles. This research paper introduces a novel method that harnesses the capabilities of YOLO to optimize traffic signal phases. Instead of relying on fixed, predetermined schedules, our approach utilizes real-time data, primarily focusing on two critical parameters: queue density and waiting time per vehicle. By dynamically adjusting traffic signal phases based on these factors, we aim to create a responsive and adaptive traffic control system that caters to the ever-changing demands of urban traffic. To implement YOLO effectively, we employ embedded controllers that adopt the Transfer Learning methodology. This approach allows us to fine-tune YOLO's object detection capabilities specifically for traffic management, ensuring that it can accurately interpret complex traffic scenarios and make informed decisions in real time. In summary, this research endeavors to address the worsening traffic congestion crisis by embracing the synergy of computer vision, machine learning, and YOLO-based algorithms. Our work represents a significant step forward in the ongoing efforts to revolutionize traffic management and mitigate the adverse impacts of congestion on our cities and daily lives.

Keywords: computer vision; machine learning; neural network; traffic density; waiting time.

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Enhancing User Profile Authenticity Through Automatic Image Caption Generation Using Bootstrapping Language-Image Pre-training Model

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Generating captions automatically for images has been a challenging task, requiring the integration of image processing and natural language processing techniques. In this study, we propose a system that focuses on generating captions for online social network users' profile images using a Bootstrapping Language-Image Pre-training Model. Our approach leverages pre-training techniques, enabling the model to learn visual and textual representations from large datasets, which are then fine-tuned on a task-specific dataset. By utilizing this methodology, our proposed system demonstrates promising performance in generating captions for online social network users' profile images. The model effectively combines visual and textual information to generate informative and contextually relevant captions. This can greatly enhance user engagement and personalization on social media platforms, as users' profile images are accompanied by meaningful captions that accurately describe the content and context of the images. The proposed system shows the performance on the task of caption generation for online social network users' profile images. Furthermore, we show that our model can be used to identify scam (fake) profiles on online social network by generating more accurate and informative captions for real profiles than for fake ones. By leveraging the power of pre-training and bootstrapping techniques, our model showcases its potential in enhancing user experiences, improving platform security, and promoting a more trustworthy online social environment. The proposed system has the potential to improve the authenticity and trustworthiness of user profiles on online social network.

Keywords: Automatic Image Caption Generation, Online Social Network user, Bootstrapping Language-Image Pre-training Model (BLIP), fake profiles, pre-training techniques, profile verification.

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Text Summarization Using Deep Learning Techniques: A Survey

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The process of text summarization is one of the applications of natural language pro-cessing that presents one of the most challenging obstacles. This is one of the most chal-lenging duties since it demands an in-depth understanding of the information that is being retrieved from the text; as a result, it is one of the most time-consuming as well. Traditional methods of paraphrasing a text each come with their own individual set of restrictions; this is why it is vital to develop new methods in order to get better results in paraphrasing a text. Deep learning has been used, which has resulted in a paradigm shift in the way natural language processing is carried out. This shift was brought about by the paradigm shift. The tremen-dous progress that has been made in the fields of sentiment analysis, text translation, and text summarization can be attributed to the application of methodologies that are based on deep learning. The utilisation of these various approaches, which resulted in the produc-tion of these advancements, is a primary cause of these breakthroughs. We have gone over a variety of deep learning procedures with the goals of summarising text and analysing details in order to get these methods ready for possible application in future research. This will allow us to get these methods ready for possible application in future research.

Keywords: Text Summarization, Deep Learning, Techniques, Neural Networks, Natural Language Processing

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Identification and Prevention of Pests on Crops

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When it comes to the detection of pests, agriculture presents a considerable challenge; as a result, productive tactics need to be developed in order to detect and combat the infestation while minimising the usage of pesticides. Image analysis methods are utilised in the field of agricultural research with the goals of improving crop management and output while also maximising crop protection. In order to monitor pest infestations in an effective manner, it is vital to have staff members present. However, recent advances in automatic monitoring have made it possible to reduce the amount of human labour and mistake that is involved in the process. This study enhances the deployment of many image processing algorithms to detect pests using an automated detection and extraction method to prevent pests in agricultural fields. The algorithms are used to detect pests using picture data. Image processing software can be used in conjunction with these methods to locate unwanted critters. These algorithms have the capability of recognising a wide range of undesirable creatures, such as weeds, insects, rodents, and a great deal more. The results and discoveries made through the experiment. Show that the method that was described offers an easy method that is both productive and fast for determining whether or not agricultural pests are preva-lent in the area.

Keywords: Pest Detection, Image Retrieval, Image Identification, Image Classification, Machine Learning.

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Internet of Things and Diversity of Device's Frameworks and Architectures: Survey

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The Internet of Things (IoT) ushers in a revolutionary era in our current digital world, ushering in a plethora of benefits that are unrivalled in their applicability to all aspects of human life and the operations of businesses. Its potential appears to have no limits, and it has the potential to radically transform our everyday routines while also streamlining operations and increasing temporal and financial efficiencies. The Internet of Things does more than just improve upon already established procedures; it also paves the way for brand new growth opportunities, ignites inventive ways, and makes it easier to accumulate new knowledge. Entities in both the public and private sectors are in an excellent position to take advantage of the Internet of Things' capabilities, which will enable them to introspectively analyse and improve their operations and even conceive of game changing business models. In this review paper, we delve into the vast body of previously published research on the Internet of Things (IoT), with a particular emphasis on the foundational methods that enable improved communication among a variety of ecosystems and architectures for smart devices. The investigation provides a comprehensive grasp of how sophisticated integrative frameworks can be built and put into action. This broadens the boundaries of the transformative potential of the Internet of Things.

Keywords: Internet of Things; wireless sensor networks; smart space; cloud computing; configuration management.

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Face Anti-Spoofing and Criminal Identification Using Deep Neural Network

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In the past, real-world photos have been used to train classifiers for face liveness identification since the related face presentation attacks (PA) and real-world images have a high degree of overlap. The use of deep convolutional neural networks (CNN) and real-world face photos together to identify the liveness of a face, however, has received very little study. Biometrics using face recognition is increasingly often employed. A face recognition system should be able to identify real faces as well as efforts at faking utilizing printed or digital presentations. A true spoofing avoidance method involves observing facial liveness, such as eye blinking and lip movement. However, this strategy is rendered useless when defending against replay assaults that use video. The anti-spoofing technique consists of two modules: the ConvNet classifier module and the blinking eye module, which measure lip and eye movement. Several publicly accessible sources can be used to create our CNN classification dataset. Using Python, we gradually merged these two modules to produce a straightforward facial recognition program. The results of the testing demonstrate that the developed module is capable of identifying various face spoof assaults, including those made with the use of posters, masks, or smartphones. To assess the convolutional features in this study adaptively fused from deep CNN produced face pictures and convolutional layers learned from real-world identification. Extensive tests using intra-database and cross-database scenarios on cutting-edge face anti-spoofing databases including CASIA, OULU, NUAA and Replay-Attack dataset demonstrate that the proposed solution outperforms state-of-the-art methods for face liveness detection.

Keywords: Face Anti-Spoofing, convolutional neural networks (CNN) , ConvNet ,Deep Learning , face liveness detection.

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Calculation of Neural Network Weights and Biases Using Particle Swarm Optimization

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Various machine learning techniques and algorithms have been used to address and are still being used to tackle several real-world issues. One technique that has been extensively employed to address a variety of issues is the usage of neural networks. Neural networks can be used to classify data and to calculate regression coefficients. Back-propagation is the cornerstone of neural network training. The process of iteration involves changing a neural network's weights in response to the error rate observed in the preceding epoch. The error rates can be reduced and the applicability of the model increased, both of which will increase the model's dependability. The technique of back-propagation, sometimes referred to as backward propagation of errors, is frequently used to train artificial neural networks. This method helps determine the gradient of a loss function for each weight in the network. The dataset is separated into training and testing sets for the backpropagation method. The neural network is assisted in performing exploration and exploitation by a variety of techniques. Among them are algorithms with biological inspiration. By using a different approach, bio-inspired computing can be distinguished from other traditional algorithms. Simple rules and individual life forms or swarms of individuals that adhere to those rules make up the ideology of bio-inspired computing. These living things, also referred to as agents, develop over time and advance within fundamental imperatives. This approach can be categorized as bottom-up or decentralized. In this paper, a neural network is created using weights and biases determined by the swarm's individual particles. To compare a few parameters between the Particle Swarm Optimization and backpropagation in neural networks, the Pima Indian diabetes dataset is employed.

Keywords: neural networks; weights; biases, particle swarm optimization

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Transport Vehicle Demand Prediction Using Context Aware Neural Networks

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Transportation plays a pivotal role in the facilitation of trade and economic activities. The correlation between an efficient transport system and thriving trade is well-established. However, challenges arise when there is a shortage of available transport vehicles to meet the demands of cargo movement. To address this issue and optimize trade processes, a systematic approach is required to monitor and fulfill the demand for transport vehicles effectively. This Study aims to develop a comprehensive system that monitors and addresses the demand for transport vehicles, ultimately enhancing trade efficiency. To achieve this, the Study leverages machine learning techniques, specifically Multilayer Perceptron (MLP) and Long Short-Term Memory (LSTM) models. These models are instrumental in analyzing historical data and predicting future demand patterns for transport vehicles. One of the key contributions of this Study is the comparative analysis of MLP and LSTM models. It explores how these models handle gradual changes and improvements over time and evaluates their performance concerning different types of data. This comparative assessment provides valuable insights into the strengths and weaknesses of each model, helping to refine and optimize their applications. By utilizing advanced machine learning models and comprehensive data analysis, this study successfully predicts transport vehicle demand accurately within a specific geographical area. This predictive capability is a significant advancement in optimizing the allocation of transport resources, leading to improved trade operations. This Study addresses the critical issue of transport vehicle demand prediction, a vital aspect of trade facilitation. Through the utilization of MLP and LSTM models, it not only predicts demand accurately but also offers insights into model performance and data types. This research contributes to the enhancement of trade efficiency and the development of intelligent transport management systems.

Keywords: Transportation, Demand Prediction, Multilayer Perceptron (MLP), Long Short-Term Memory (LSTM), Trade Optimization.

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Investigation of Elastic Properties of Sc Doped AlN: A First Principles and Experimental Approach

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Aluminum Nitride (AlN) is a promising piezoelectric material for microelectromechanical systems owing to its attractive physical and chemical properties and CMOS compatibility. It has a moderate piezo response compared to its rival material bound to its wide application. This obstacle can be overcome by doping or alloying. Sc alloying increases the piezo response of AlN up to fourfold; it also increases the electromechanical coupling coefficient, which is a prominent figure of merit for any MEMS device application. Sc doping induces elastic softening in wurtzite AlN, enhances polarization, and increases piezoelectric constants. However, the possibility of phase separation at higher Sc concentrations, and the wurtzite phase of AlN, which is responsible for piezoelectricity, becomes negligible. Therefore, knowing the optimum concentration of Sc for device applications is necessary. In this work, using density functional theory, we calculated the lattice parameter, band and density of states along with the physical properties such as Young's modulus, the bulk modulus, Poisson's ratio, and elastic constants of pristine AlN and Sc doped AlN. The DFT calculations show that the geometrical optimized lattice parameters agree with the literature. As a function of increased Sc concentration, the calculated Young's modulus and elastic constants decrease, indicating a decrease in hardness and elastic softening, respectively. Meanwhile, the bulk modulus and Poisson's ratio increase with an increase in Sc concentration, representing an increase in the crystal cell parameters and elastic deformation. AlN and AlScN thin films were grown on Si (111) substrate using magnetron sputtering to study the structural properties experimentally. The deposited films show the required c-axis (002) preferential crystallographic orientation. The XRD peaks of Sc doped AlN thin films have shifted to a lower angle than pristine AlN, indicating elastic softening/tensile stress in grown thin films. So, from our observation, we can conclude that Sc doping induces elastic softening in AlN and deposited films have a preferential crystallographic orientation that can be applied in MEMS devices.

Keywords: aluminum scandium nitride; piezoelectricity; density functional theory; DFT; magnetron sputtering; elastic softening

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Comparative Performance and Energy Analysis of the Various Configuration Organic Packings Used In Evaporative Cooling

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Present work focus on the design and fabrication of the counterflow evaporative cooler test rig. Coconut coir with the wettability of 300, 400 and 500 m2/m3 are used as the packing and the tests are conducted by changing air velocity. Performance parameters such as evaporation rate, cooler efficiency, COP and the details of energy consumption were studied and related with that of the standard Celdek 7090 packing. Results indicated that system with a coconut coir of maximum wettability yielded a cooling efficiency and coefficient of performance equal to 53.57% and 1.25 which is marginally lesser compared to standard Celdek 7090 packing. Being a biomass-based material and due to its various advantages, coconut coir can be considered to be a substitute filling materials for evaporative cooling techniques.

Keywords: Humidification; evaporative cooling; Celdek and Coconut coir; evaporation rate; coefficient of performance.

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On the Thermal Energy Storage of Paraffin Wax – Impact of Alumina Nanoparticles

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Thermal energy storage system plays a major role in the present renewable energy technologies like solar, biomass, etc. Phase change material (PCM) has gained significant research interest across the globe as an energy storage material. Different PCMs have been investigated in the literature like organic, inorganic salts, eutectics, etc. The heat transfer rates are limited subjected to the low thermal conductivity resulting in low rates of melting or freezing of PCMs. Different approaches have been demonstrated in the literature to improve the thermal conductivity of PCMs by means of introducing fins in the storage system and augmenting PCM with highly conducting materials. Among them, the addition of nanoparticles has been shown to have enhanced heat transfer rates owing to the increase in thermal conductivity of PCM. In this study, $Al2O3$ nanoparticles have been augmented with paraffin wax at three different concentrations of 0.5%, 1.0%, and 1.5% (by vol.). Performance of the PCM is assessed in a heat exchanger (shell and tube) by charging with hot water at 75 °C. Maximum temperature achieved for 200 minutes duration is studied. It is shown that $Al2O3$ nanoparticles with a concentration of 1.5% increases the total heat absorbed during charging cycle by 16.7%. The overall savings in time for charging and discharging 3000 kJ of heat have found to be 21.9% and 25% respectively. Further studies to improve the heat transfer rates in PCM system by optimizing the concentration of nanoparticles can be carried out.

Keywords: **E**nergy storage; Nanoparticle; paraffin; Phase change material.

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Advancements and Implications of Product Service Systems in the Automobile Industry: A Comprehensive Review

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This research paper is explaining the last twenty years, the study & research of Product Service System (PSS) in Automobile Sphere experienced high growth due to its unique approach in enriching customer value & experience, strengthening product competence for both customers and as well as providers and facilitating improved control and management over the product lifecycle. The review of literature for automobile sphere is classified into four categories- i) Numbers of publications per year, ii) Journal Specific publications, iii) Year wise publications and iv) growth of research based on applied techniques. The integration of additional services proves instrumental in improving product design, optimizing operations, and offering innovative new services. Additionally, this paper explains how the product service system (PSS) plays an important role for enriching outcomes from customers, efficiency of the product and managing lifecycle management. Its future scope lies in integration & fostering innovation ideas, improved customer services and its performance-based contracts because PSS can drive long-term relationships, trust and growth in the industry. The paper emphasizes the importance of user-centered design and innovative business models. The primary objective of this review paper is to provide a comprehensive analysis of product service systems (PSS) in the automobile industry, focusing on progress, challenges and opportunities, with the aim of responding to the evolution of consumer behavior through innovative innovations such as digitalization and sustainability integration.

Keywords: Automobile industry; Product Service System; Product Oriented; Use Oriented; Result Oriented.

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Study of the Mechanical Properties of the Fly Ash Composite Bricks

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Fly ash brick is an eco-friendly construction material comprised of fly ash, bottom ash, cement and rice husk. Fly ash, a by-product of coal-fired power plants, is utilized in place of typical clay or lime in the manufacturing process. One of the key benefits of fly ash brick is its long-term viability. Utilizing fly ash in the manufacturing process lowers waste generated by power stations and the requirement for virgin resources. Fly ash brick also has a reduced carbon impact than typical clay bricks. In terms of performance, fly ash brick offers various benefits. The bricks are more robust and resistant to weathering because they have a higher compressive strength and lower water absorption rate than ordinary clay bricks. They are also well insulated and have a low thermal conductivity. Fly ash brick is also cost-effective since it takes less energy to produce and is less expensive than typical clay bricks. Fly ash bricks are better for the environment since they have a reduced carbon footprint than ordinary clay bricks. They also offer numerous additional advantages, such as being sturdy, long-lasting and weather-resistant. They also have strong insulation characteristics, which means they can keep a structure cool in the summer and warm in the winter. Fly ash bricks are also a suitable alternative for construction since they are less ex-pensive than regular clay bricks. They also take less energy to manufacture, making them more cost-effective. In this study, the Taguchi technique of parameter design is used to describe the findings of an experimental investigation into the mix proportions of fly ash bricks. With four factors and three levels per factor, the experiments were created using a L9 orthogonal array. Analysis of fly ash bricks on various dimension like compressive strength and water absorption test.

Keywords: Fly ash; cement; Taguchi method; compressive strength; water absorption.

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Reducing Equipment Failure Risks by Redesigning of Products and Processes

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Low-voltage (LV) network assets, although they do not play a significant role in reliability indices compared to medium-voltage (MV) assets like the transformer and switchgears, are required to be designed in a way that would mitigate the risk of sporadic failures, hence incurring an R&M cost. LV assets like LV cables, distribution panels, molded-case circuit breakers (MCCBs), and miniature circuit breakers (MCBs) generally do not have a planned maintenance (PM) schedule and are procured based on the run-to-failure concept in view of the huge volume. These assets are exposed to the harshest of environmental and operation conditions. Hence, it is imperative that we take the necessary measures during the design stage such that they are able to cater to their stringent duties, which include frequent short circuits, exposure to the environment, and thermal overloads. It is also important to periodically review the product design based on site feedback and product performance to re-calibrate the product and its associated processes. Through this technical paper, several case studies are presented wherein special terminal connectors with shear bolts were designed to mitigate the thermal hotspot issues causing frequent fire and failures—i.e., vertical fuse switch disconnectors (VFSDs) and miniature circuit breaker (MCBs). A case study on condition monitoring through a substation inspection schedule is also presented, through which potential failures were averted in time. The observations and measurements are mapped in an SAP system for trend analysis. With the adoption of effective product and process design, AEML has reduced asset failures.

Keywords: product design; VFSD; terminal connectors; shear bolt; MCB; condition monitoring; trend analysis

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Determination of the Fracture Point for the Inconel -718 Using The Luder's Band Method

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The current scenario demands the need for the usage of alternate materials with lower stress and stress-strain energy deformation for applications in gas turbines, chassis of automobiles, and biomedical instruments. The work on the Inconel-718 can be carried out as it is a new material; it can be used for many applications in addition to its usage in automobiles. The Inconel-718 is a superalloy of nickel (Ni) and chromium (Cr). The Inconel-718 is corrosion-resistant and oxidation-resistant when subjected to extreme temperature conditions. But when applying tensile and compressive load, it bends, causing the formation of Luder's band. The work analyses the formation of Luder's band in Inconel-718. The methodology for detecting Luder's band is based on the material structure. It also depends on the material's rigidity modulus and the shear stress ratio to shear strain. The stress, harmonic, and thermal analysis was carried out using ANSYS to find the red-hot zone for the formation of Luder's band. The results depict that Luder's band is mainly formed at the middle point of the frame. The stress for the Inconel-718 is in the range of 0.064454 MPa to 81.514 MPa, whereas the frequency varies from 0.71157 to 475.87 Hz under vibration load. Conversely, while heating the Inconel-718, the temperature varies from 1.6009e5 to 112.83°C. The analysis shows that Inconel-718 is a better material for designing automobile parts.

Keywords: Luder's band; Inconel-718; low-strain energy; specimen; deformation

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Biodegradability of Musa acuminata (Banana) Fiber-Reinforced Bio-Based Epoxy Composites: The Influence of MMT Clay

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The increasing environmental concerns associated with conventional composites, made using glass fiber reinforced polymers (GFRP) and carbon fiber reinforced polymers (CFRP), have shifted attention to bio-based composites. These environmentally responsible alternatives offer performance without sacrificing biodegradability. The present study examines the biodegradability of novel Musa acuminata (banana) fibers reinforced with bio-based epoxy composite. Two composite variants were compared: one with 2.5% Montmorillonite (MMT) nanoclay and one without. While previous research has demonstrated an enhancement in mechanical and physical properties of polymer matrix composites with the addition of MMT nanoclay, it was hypothesized in this study that nanoclay addition would not significantly impact the composites' biodegradability. To confirm this, we conducted standard biodegradability tests and an SEM analysis. The SEM results revealed a uniform distribution of MMT nanoclay within the bio-based polymer matrix, in addition to strong interfacial adhesion and decreased void crater sizes. The inclusion of nanoclay did not significantly impact the composites' biodegradability, according to the statistical analysis provided in the present study. The present study also developed regression models to predict biodegradability over time to facilitate the determination of the timespan required for 100 percent biodegradability of the tested bio-based composite. Thus, this study is a significant benchmark for advancing eco-friendly composite materials.

Keywords: Musa acuminata; Bio-based epoxy composites; Nano clay filler; Biodegradability; Renewable composites.

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Comparative Evaluation of Lubricant Properties of Jatropha and Jojoba Methyl Ester

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Mechanical parts move relative to one another and come into contact; friction is produced. Wear in industrial equipment is mostly brought on by friction, which also causes energy and material waste. Wear reduces mechanical performance, hence any improvement in wear can result in significant financial savings. It is well known that lubricant oils can reduce the coefficient of friction between two contacting surfaces. Due to their poor biodegradability and toxicity, petroleum lubricants are typically deemed to be unacceptably bad for the environment. These oils have a significant negative impact on both human and plant life and contaminate the air, soil, and drinking water. As a result, the public's concerns about a pollution-free environment are growing along with the demand for ecologically friendly lubricants. Given their intrinsic technical characteristics and capacity for biodegradation, vegetable oils are viewed as potential substitutes for mineral oils for lubricant base oils. Because of their superior lubricity, biodegradability, viscosity-temperature properties, and low volatility, plant oils hold promise as the basis fluid for bio-lubricants. In the current work, jatropha and jojoba oil are converted into bio-lubricants by chemical modification processes like transesterification and epoxidation through H2SO4 and HCl catalysts. When the catalysts concentrations are increased from 0.3 to 0.9 ml, kinematic viscosity of jatropha ester is increased by 12.93% and 123.22% and jojoba ester is increased by 16.10% and 123.22% at 32°C and 90°C respectively for H2SO4 catalyst. Similarly, for HCl catalyst kinematic viscosity values of jatropha are increased by 5.43% and 30.25% and for jojoba - 20.84% and 50.96% at 32°C and 90°C respectively. Epoxidized jatropha had greater experimental flash and fire point values than epoxidized jojoba.

Keywords: Lubricants, Transesterification, Epoxidation, Kinematic viscosity, Flash & Fire points

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Heuristic Exploration of Vital Parameters for Cash Transactions through Mobile in the Coastal Hinterland of India

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People of India sought digital mode of payments during the demonetization period in India (2016); with the increasing growth of the internet, electronic commerce (e-commerce) websites it is imperative for secured accessible to payment gateways, which has given a spurt growth in the digital payments process and payment app development. During the pandemic, there has been an exponential increment in mobile payment using smartphones. The usage of mobile and its market penetration with government schemes such as 'Digital India' accelerated mobile payment by a large percentage of customers in the coastal hinterland (Manipal) of India. This study aims to analyze the critical factors influencing digital payments in the educational town of Manipal. From the literature, 13 regressors were shortlisted, and their effect was measured with a behavioral intention to use mobile payments. A structured and validated questionnaire is used as a research tool for data collection that is analyzed using structural equation modelling. The structure equation modeling included using smart partial least squares (SPLS), in which path coefficients, t-statistics, and consistency tests were conducted. The investigation found that ease of use, social influence, perceived behavioral control, rewards and offers, credibility, compatibility, perceived cost, impact on the environment, and government schemes have a positive influence on m-payments. Social influence has a strong influence on m-payment and is a direct enabler of technology acceptance. The critical factors were identified by using smart PLS, ease of use, and social influence were identified as the critical factors for m-payments.

Keywords: Heuristic exploration; coastal hinterland; mobile transactions; social impact; digital payments; structure equation modeling;

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Dynamic Analysis of 650 W Vertical Axis Wind Turbine Rotor System Supported by Radial Permanent Magnet Bearings

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This paper presents a dynamic analysis of a 650 W vertical axis wind turbine (VAWT) rotor system supported by radial permanent magnet bearings (PMBs). PMB capacity and stiffness were optimized by using multi ring radially magnetized stack structures in the design process. A dynamic examination is carried out to determine the influence of bearing stiffness on the modal frequency, vibration amplitude, and stability of a VAWT rotor. In the first step of this process, an analysis was carried out for the rotor system supported by the deep groove ball bearings (DGBs) already in place. This research took into consideration the influence of bearing span length. The dynamic response of the rotor system supported by a hybrid bearing set (HBS) was investigated by exchanging DGB for PMB in the second step of the process. At the very end of the process, radial PMBs entirely replace DGBs. A finite element analysis (FEA) was carried out to investigate the feasibility of successfully using HBS and radial PMBs in a VAWT rotor operating at critical speeds that are higher than average. The analysis results provide valuable insights into the performance of the VAWT rotor system supported by HBS. It is observed that the bearing stiffness parameter significantly affects the dynamic and stability aspects of the system. Critical speeds for the HBS-backed VAWT are 5.75–9.81 percent greater than operational speeds. In addition, the HBS rotor's initial dynamic frequency is lower, and the remaining frequencies are much closer than they are with a standard DGB arrangement. The findings contribute to the understanding of VAWT rotor bearings and provide insights for designing and optimizing rotor systems supported by PMBs, facilitating the development of more efficient and reliable wind energy conversion systems.

Keywords: Rotor dynamic; Wind turbine; PMB; Hybrid bearing set; Modal analysis

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Mathematical Models to Compare the Pharmacokinetics of Methadone, Buprenorphine, Tramadol, and Tapentadol

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Pharmacokinetics (PK) is the study of how a drug is absorbed, distributed, metabolized, and eliminated by the body. In pharmacokinetics, the two-compartment model is used to understand the distribution and elimination of drugs. The two-compartment model represents the body as two distinct compartments: the central compartment (such as the blood) and the peripheral compartment (such as tissues). This work aims to enhance the understanding of drug kinetics inside the human body by comparing different mathematical models. The main focus of the present study is to compare the distribution patterns of the drugs, methadone, buprenorphine, tramadol, and tapentadol when administered intravenously using a two-compartment model. To mathematically describe the distribution of drugs in the body, a system of non-linear ordinary differential equations is employed. These equations capture the dynamics of drug concentration in the different compartments over time. The roots are obtained by solving this system of equations using numeric analysis techniques. The study determines the time required for the drugs to reach the minimum effective concentration in the blood by analyzing the obtained results. Furthermore, the study also determines the time it takes for these drugs to be eliminated from the body. This data is significant for understanding the drug's clearance rate and its potential duration of action. By comparing the distribution patterns and elimination rate of, methadone, buprenorphine, tramadol, and tapentadol, the study provides insights into the differences between these drugs in terms of their pharmacokinetic properties. Healthcare professionals can utilize this information to optimize drug therapy, ensuring that the drugs are administered in accurate amounts and at precise intervals to achieve the desired therapeutic effect while minimizing potential side effects. Overall, this study provides a comprehensive analysis of drug kinetics, aiding in a better understanding of drug behavior within the human body and facilitating informed decision-making in clinical settings.

Keywords: Pharmacokinetics; drug; mathematical model; methadone; buprenorphine; tramadol; tapentadol.

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Blockchain Enabled Detection of Neurological Disorder Using A Deep Learning Approach

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Neurological disorders are a significant health challenge globally, affecting millions of individuals and imposing a considerable economic burden on healthcare systems. Early and accurate diagnosis plays a crucial role in improving patient outcomes and managing these disorders effectively. This abstract presents a novel approach that combines blockchain technology with deep learning algorithms to enhance the detection of neurological disorders. The proposed system leverages the decentralized and transparent nature of blockchain to securely store and share medical data, enabling seamless collaboration among healthcare providers, researchers, and patients. This infrastructure ensures data integrity, privacy, and accessibility, addressing critical concerns in medical data management. Furthermore, the deep learning approach employs advanced neural network architectures, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), to analyze large-scale neurological data, including medical images, electroencephalograms (EEGs), and clinical records. By leveraging the power of deep learning, the system can automatically extract relevant features and patterns from complex neurological data, enabling accurate diagnosis and early detection of various disorders. The integration of blockchain and deep learning offers several advantages. Firstly, it facilitates secure and decentralized storage of medical data, ensuring patient privacy and data integrity. Secondly, it enables seamless data sharing and collaboration among multiple stakeholders, promoting knowledge exchange and enhancing research capabilities. Lastly, deep learning algorithms improve the accuracy and efficiency of neurological disorder detection, enabling timely interventions and personalized treatment plans. The proposed system holds great potential in revolutionizing the field of neurological disorder diagnosis and management. By leveraging the combined power of blockchain and deep learning, healthcare providers can enhance their diagnostic capabilities, leading to improved patient outcomes, reduced healthcare costs, and accelerated research advancements. However, further research and development are necessary to address technical challenges, scalability issues, and regulatory considerations to realize the full potential of this innovative approach.

Keywords: RNN, CNN, EEG, Neurological disorder, Blockchain.

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The Waning Intellect Theory: A Theory on Ensuring Artificial Intelligence Security for the Future

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As technology continues to advance at an unprecedented pace, it is crucial to understand and ad-dress the challenges associated with AI systems. ‘Superintelligence’ is a term that has been used to describe the possibility of AI systems acquiring an intellectual capability that is much greater than any of the most ‘gifted Human-minds’. This is possible due to already better-than-human computational capabilities possessed by AI systems, which may get compounded by the ever-rising intelligence of AI models. Once achieved, Superintelligence in AI systems will result in Technological Singularity in the development of such systems – a condition in which their ev-lution and regulation become irreversible and uncontrollable, causing unforeseeable consequences. Such a situation may endanger the very existence of Humanity. As a solution, Fading Intelligence or Waning Intellect theory has been proposed that seeks to impose a lifetime on the continuous evolution of individual AI models based on various variables and parameters, and routinely eliminate the models that have “learned too much”. Fading Intelligence thus refers to the potential degradation or decline in the intelligence of AI systems over time. As AI becomes more advanced, there is a risk that its performance and capabilities may deteriorate, due to the increase in complexity of neural networks, leading to unexpected consequences and risks. Fading Intelligence poses significant risks to the reliability, safe-ty, and ethical implications of AI systems. It can result in incorrect decisions, compromised ac-curacy, and the inability to adapt to new scenarios. Addressing these risks is essential to maintain the trust and effectiveness of AI in various domains. Ethics play a vital role in safeguarding the path ahead in AI development. It is crucial to establish ethical guidelines and frameworks that prioritize human values, fairness, transparency, and accountability. By incorporating ethical considerations, we can ensure that AI systems serve the best interests of humanity. The collaboration between humans and AI is key to harnessing the full potential of AI while mitigating risks. Humans provide context, empathy, and critical thinking skills, while AI systems offer computational power and data analysis capabilities. By combining human expertise with AI capabilities, we can achieve more robust and reliable outcomes. Regulatory frameworks and governance mechanisms are essential in ensuring the responsible and safe deployment of AI technologies. These frameworks should address issues such as privacy, data protection, bias mitigation, and accountability. By establishing clear guidelines and standards, we can create an environment conducive to the secure advancement of AI.

Keywords: Artificial Intelligence; Superintelligence; Fading Intelligence; Waning Intellect; Ethics of AI; Future of AI.

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Key Generation in Cryptography using ECC and Genetic Algorithm

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Elliptic Curve Cryptography (ECC) has become a robust cryptographic technique that ensures secure data transmission with comparatively smaller key sizes. In this context, this research introduces a novel approach to ECC key pair generation by utilizing Genetic Algorithms (GAs). GAs have proven effective in solving optimization problems by mimicking the principles of natural selection and genetics. The proposed Genetic Algorithm-based ECC key generation process involves several stages: chromosome initialization, fitness evaluation, selection, uniform crossover, and mutation. Chromosomes representing points on an elliptic curve are initialized randomly, evaluated for their proximity to a predefined target point using a fitness function, and subjected to tournament selection to determine parents for the next generation. Uniform crossover and mutation operators then create offspring, inheriting traits from their parents while introducing diversity. The generated ECC key pair comprises private and public keys derived from the GA-driven process. The private key is chosen randomly within the constraints of the elliptic curve's parameters, while the public key is generated through the GA procedure. The study evaluates the efficiency and effectiveness of the proposed ECC-GA approach through empirical analysis of execution time, key size, and the size of the search space. The outcomes of this research highlight the potential of Genetic Algorithms in ECC key generation, offering a promising alternative for enhancing the security and efficiency of cryptographic systems, especially in resource-limited environments. The exploration of key size and search space aids in understanding the security implications and computational complexity associated with the proposed method. Overall, the ECC-GA approach opens avenues for further research in innovative key generation techniques for modern cryptographic applications.

Keywords: Key Generation, Elliptic Curve Cryptography, Genetic Algorithm, Key Size

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Enhancing Biodiesel Production from Waste Cooking Oil Using Calcium Hy-Droxide as Catalyst

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Over the past few decades, energy consumption in developing nations has grown exponentially, and it is certain to continue to do so in the future. As such, it is important to consider alternative energy sources that are both sustainable and efficient. Biodiesel is one such alternative that is gaining traction in the energy industry. Biodiesel is made from natural sources like animal fats and vegetable oils. It is biodegradable, nontoxic, and acts as an alternative to conventional fuel. The objective of this work is to produce biodiesel using waste vegetable oil and homogenous & heterogenous catalysts such as Potassium propoxide and Calcium hydroxide. Isopropyl alcohol was used as the alcohol required for transesterification. Biodiesel yield obtained at various changing parameters was studied. It was observed that the yield obtained using Calcium hy-droxide as a catalyst was only 71.44% whereas Potassium propoxide gave a yield of 84.55%. However, the viscosity of the esters obtained using calcium hydroxide did not change much from the viscosity of the WVO and this could be due to heterogenous catalysts requiring supercritical conditions to work efficiently.

Keywords: Waste cooking oil; Transesterification; calcium hydroxide; yield; fatty acid isopropyl esters

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Prediction of the Reaming Torque Using ANN and Random Forest Algorithm: Comparative Performance Analysis

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In any manufacturing setup, reaming operation is always prominent and present because of ever increasing demand for improved quality of the manufactured products. At the same time, new engineering materials make the process challenging. Further, reaming is the highly sought-after operation to achieve specified tolerance for specified applications to satisfy the rising demand for high-quality and precision-engineered products. Hence, accurate prediction of reaming torque is of utmost necessity, as it gives rise to uneven cutting forces, thereby affecting the sur-face finish of the reamed hole. High torque produces high cutting forces, resulting in uneven surface finish and oversized holes. In this regard, the ability of traditional statistical tools to identify intricate correlations and patterns in reaming operation data is limited. To overcome these issues, machine learning methods such as the Artificial Neural Network (ANN) provide reliable options. The present study compares the use of ANN and random forest to analyze the data from reaming operations to predict the torque and compares it with those of the random forest method and the polynomial regression model. The model is trained and tested using a well-structured dataset that includes multiple input parameters (e.g., material, tool radius, and rotation angle) and the related reaming outputs (e.g., torque) in the suggested supervised learning method. An interconnected single layer of artificial neurons is used to create the ANN mod-el. A comparison is made between the ANN and the Random Forest algorithm, a well-liked ensemble learning technique based on decision trees, to assess the performance of the ANN. The same dataset is used to train both ANN and Random Forest algorithms. The result showed that ANN gave better performance when compared to the other models, with testing accuracy of 94.4% and 61% for ANN and Random Forest, respectively.

Keywords: Reaming; prediction; regression; ANN; Random Forest, torque

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A Comprehensive Analysis of Contaminants, Consequences, Advanced Recycling Technologies, and Regulatory Compliance for Sustainable E-Waste Management in India

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The rapid progression of technology has precipitated a substantial surge in the proliferation of electronic waste, commonly referred to as e-waste. E-waste encompasses discarded electronic devices, which frequently harbor hazardous constituents like lead, mercury, cadmium, and chromium. The improper disposition of e-waste engenders grave repercussions for both human well-being and the ecosystem. Consequently, the apt management of e-waste has emerged as an exigent global concern. This scholarly exposition delves into the domain of e-waste, with a keen emphasis on its contaminants, repercussions, modalities of recycling, and the regulatory framework governing e-waste management in India. This comprehensive investigation discerns that e-waste harbors noxious substances that have the potential to induce various health maladies, encompassing but not limited to cancer, neurological disorders, and congenital anomalies. Furthermore, the inappropriate elimination of e-waste can engender the pollution of soil, water bodies, and the atmosphere, precipitating a pernicious course of environmental degradation. To address the intricacies of e-waste management, a spectrum of recycling methodologies has been conceived, encompassing mechanical, pyrolytic, and hydro metallurgical recycling. This investigation ascertains that recycling can facilitate the retrieval of valuable metals and mitigate the ecological footprint of e-waste. Moreover, the Indian government has instituted a suite of regulations and policies, most notably the E-waste (Management) Rules of 2016, ensures judicious handling, storage, and disposal of e-waste.

Keywords: E-waste; hazardous substances; recycling methods; environmental impact; Management rules in India; contaminants

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Driving the Energy Transition: Large Scale Electric Vehicles and Renewable Power Integration

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The global energy landscape is undergoing a profound transformation as the need for sustainable and renewable sources of power becomes increasingly urgent. One of the key drivers of this energy transition is the integration of large-scale electric vehicles (EVs) with renewable power systems. This article explores the crucial role that EVs play in accelerating the adoption of renewable energy sources and driving the transition towards a cleaner and greener future. Electric vehicles are instrumental in reducing carbon emissions and combating climate change. By re-placing traditional internal combustion engine vehicles with EVs, we can significantly decrease greenhouse gas emissions. When these EVs are powered by renewable energy sources such as solar or wind, their carbon footprint becomes nearly zero, making them an essential component of a sustainable transportation and power ecosystem. Large scale electric vehicles can also contribute to enhancing grid flexibility. With their advanced battery systems, EVs can serve as mobile energy storage units, allowing excess renewable energy generated during peak production periods to be stored and then discharged back to the grid during high-demand periods. This capability helps stabilize the power grid and ensures a reliable and consistent supply of electricity, even when renewable energy generation fluctuates. Integrating electric vehicles into renewable power systems opens up opportunities for de-mand response programs. These programs allow EV owners to participate in grid-balancing initiatives by adjusting their charging and discharging patterns based on the grid's needs. By incentivizing EV owners to charge their vehicles during off-peak hours or supply excess energy back to the grid, demand response programs optimize energy usage and reduce strain on the power infrastructure. One of the significant challenges in the integration of large-scale electric vehicles and renewable power systems is the need for extensive infrastructure development. This includes the installation of a robust charging network capable of accommodating the growing number of EVs. Governments, utility companies, and private stakeholders must collaborate to invest in charging infrastructure to ensure widespread adoption and a seamless transition to electric mobility.

Keywords: Electric Vehicles; Vehicle-to-Grid Technology; V2G; Renewable Energy; Carbon foot-print; Greenhouse Gases; Grid Energy; Power System Infrastructure; Smart Grid; Energy Storage; Bat-tery; Accumulators.

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Characterization of Aluminium Alloy LM6 with B4C and Graphite Reinforced Hybrid Metal Matrix Composites

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Hybrid metal matrix composites (MMC's) are increasingly important in aviation, marine, automotive, and industrial manufacturing due to their ability to enhance the mechanical and chemical properties of composites. The study aimed to understand the fabrication, mechanical properties and microstructural properties of LM6/B4C/Gr composites. Aluminium alloy (LM6) is the base metal having properties of less weight, medium strength and excellent castability. The addition of B4C and Gr enhanced the tensile strength, hardness, and wear resistance of the composites, while maintaining good ductility. Boron carbide is a lightweight and extremely hard material with excellent wear resistance and high thermal stability. It has a specific modulus that is almost two times higher than that of aluminium, meaning it can provide superior stiffness and strength while maintaining a low weight such as drive shafts, housings and structural sup-ports. Addition of graphite improves the lubrication properties of the composites. Composites were successfully fabricated through stir casting process, with uniform dispersion of Boron car-bide and Graphite particles in the Aluminium LM6 matrix. The hybrid metal matrix composites fabricated by five different combinations of B4C (1,2,3,4,5 Wt%) with constant Wt% of Graphite (1Wt%). The fabricated samples of hybrid composites used to find the mechanical properties and microstructure analysis. The test results reveal that the tensile strength and hardness of the composites increased with an increase in the weight percentage of reinforcements and percent-age of elongation decreases with increasing reinforcement particles. The Boron Carbide (B4C) and Graphite (Gr)particles in a matrix material are analyzed by Scanning Electron Microscope (SEM). Energy Dispersive X-Ray analysis (EDX) is used to evaluate the microstructure and chemical composition of the composites, providing valuable insights for their design and optimization.

Keywords: Metal-matrix composites (MMCs), Aluminium alloy LM6, Stir Casting, Scanning electron microscopy (SEM), Energy Dispersive X-Ray analysis (EDX).

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A Comparative Analysis of Various Deep Learning Methods in Lung Cancer Detection

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Lung cancer is a leading cause of cancer-related deaths worldwide, highlighting the critical need for accurate and efficient detection methods. Deep learning techniques have demonstrated remarkable potential in medical imaging analysis, particularly in the field of lung cancer detection. This study presents a comprehensive comparative analysis of various deep learning methods for lung cancer detection, aiming to identify the most effective approach. The research focuses on three main deep learning architectures: convolutional neural networks (CNNs), recurrent neural networks (RNNs), and generative adversarial networks (GANs). Each architecture is evaluated using a diverse dataset of lung cancer images, including computed tomography (CT) scans and histopathological images. The evaluation metrics employed in this study include accuracy, sensitivity, specificity, precision, and area under the receiver operating characteristic curve (AUC-ROC). Additionally, the computational efficiency of each method is assessed to gauge their real-world applicability. The comparative analysis highlights the strengths and weaknesses of each deep learning architecture in lung cancer detection. CNNs excel in analyzing CT scans, leveraging their ability to extract relevant features and spatial relationships. RNNs showcase their potential in analyzing sequential data, such as the temporal progression of lung cancer. GANs prove valuable in generating synthetic data for augmentation and addressing imbalanced datasets. Furthermore, the study investigates the impact of transfer learning and data augmentation techniques on the performance of deep learning models. Transfer learning enables the models to leverage pre-trained networks and limited annotated data to enhance their accuracy. Data augmentation techniques, such as rotation, scaling, and flipping, enhance the model's generalization capability and reduce overfitting. The results of this comparative analysis provide insights into the strengths and limitations of different deep learning methods for lung cancer detection. These findings can guide researchers and medical professionals in selecting appropriate approaches for developing accurate and efficient lung cancer detection systems. Ultimately, the study contributes to advancing the field of medical imaging analysis and improving lung cancer diagnosis, treatment, and patient outcomes.

Keywords: CNN, RNN, GAN, AUC-ROC, CT scan, Data augmentation, deep learning.

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New Portable Virtual Simulator of Retrograde Intrarenal Surgery: Development and First Validation

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Retrograde intrarenal surgery (RIRS) is the gold standard among surgical treatments for kidney stones up to 2 cm in size, according to current guidelines. Young specialists must perform at least 60 self-performed procedures in order to master all necessary skills. Due to the precipitous learning curve and the need to maintain patient safety, training outside of the operating room is essential. Among various types of simulators, those based on virtual reality (VR) have the advantage of presenting a greater number of anatomical variants for educational purposes, thereby boosting the learners' confidence in a stress-free environment prior to their first patient encounter. Unfortunately, the VR-simulators currently available on the market are prohibitively expensive and require the use of cumbersome and complex hardware, limiting their use in routine education and clinical practice. In light of the preceding, we present a concise description and validation results of the first portable VR-simulator capable of simulating main steps of RIRS. The simulator consists of two parts: a printed controller in the shape of the most popular flexible ureteroscopes and special software for personal computers on the Windows operating system (OS), allowing it to imitate endoscopy, kidney stone laser fragmentation and extraction. A control module is installed in the housing and contains a microcontroller electrically connected to an accelerometer configured to measure the angle of rotation of the tool around the longitudinal axis and a magnetic encoder, opposite which is mounted on the inside of the lever, a neodymium magnet that changes its position by bringing the inside of the base of the lever into a rotational movement when moving the rotary part in the distal or proximal direction. The device is connected to a personal computer with preinstalled software via a USB type B cable. The above software was developed on the Unity game engine via the C-sharp programming language. After the simulator's manufacture and calibration, four experienced urologists were asked to estimate its face, content, and construct validity via a Likert scale (1-low, 5-high). The measured range of rotation of the manipulator around the axis is -180... 180°, which corresponds to the rotation of the virtual flexible ureteroscope in the range -180... 180°. The measured range of manipulator lever deviation is 90... -90°, which corresponds to the virtual flexible ureteroscope deviation in the range -270... 270°. In both cases, measurement accuracy was 0.3°. All urologists applauded the proposed VR simulator and highly estimated its face (5/5), content (4.5/5), and construct (4.5/5) validity. The described VR simulator does not require the use of large-sized equipment and is highly realistic, which makes it accessible and useful in training young urologists.

Keywords: 3D, Virtual reality, simulator

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Feasibility Analysis of Tamura Features In the Identification of Machined Surface Images Using Machine Learning and Image Processing Techniques

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In modern manufacturing industries with industry 4.0 capabilities, automated identification and classification of machined surfaces based on their texture will play a crucial role. Texture analysis through computer vision, image processing, classification using artificial neural networks (ANN), and various machine learning techniques have been prominent research areas in the recent decade. Tamura features are very popular in selecting optimum textural features from an image, especially in the medical domain. These textural features correspond to human visual perception and play a significant role in identifying and shortlisting the best features from the photographs. Despite the popularity of Tamura features in the medical domain, their usage in extracting the features from machined surfaces' photographs is seldom reported. Hence, the present study investigates the feasibility of using Tamura features to classify machined-surface-images produced using turning, milling, grinding, and shaping operations in manufacturing. Photographs of the surfaces produced are obtained using smartphone cameras. Further, the photographs are preprocessed and divided into sixteen different portions. Then, Tamura features are extracted and are given as input to the ANN, Support vector machines (SVM), K-Nearest Neighbor (KNN), Decision Tree (DT), and Random Forest (RF). The result shows that each machine learning (ML) algorithm performed differently while classifying the same set of machined surface images. Amongst the ML algorithms considered in the study, RF classified the photographs of surfaces machined using different machining operations with the highest accuracy. On the other hand, SVM performed poorly.

Keywords: Tamura features; machined surfaces; images; classification; ANN; machine learning algorithms.

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Comparative Study of Random Forest and Gradient Boosting Algorithms to Predict Airfoil Self-Noise

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The airfoil self-noise emerges due to the pressure fluctuations influenced by the reciprocity involving turbulent flow in the boundary layer and the trailing edge of an airfoil. Its impact on efficiency and the environment has created significant concern in the aerospace industry. Many successful attempts have been made to study this airfoil noise for much quieter and more efficient designs. Airfoil noise prediction involves several parameters, such as frequency, angle of attack, etc., with complex non-linear relationships. Researchers have explored applying various supervised machine-learning models on large aerodynamic datasets. Due to its ability to draw results from multiple decision trees, Random Forest has shown promising results in capturing complex noise predictions. This paper uses the airfoil dataset published by NASA (NACA 0012 airfoils) to predict the scaled sound pressure using five different input features. Diverse Random Forest and Gradient Boost Models are tested with five-fold cross-validation. Their performance is assessed based on mean-squared error, coefficient of determination, training time, and standard deviation. The results show that the Extremely Randomized Trees Algorithm exhibits the most superior performance with the highest Coefficient of Determination. In contrast, the Gradient Boosting Regressor offers an advantage in terms of the least training time for the given dataset. Also, the relative importance of the five features is evaluated using both Random Forest and Gradient Boosting models, where both yielded similar results, with frequency and boundary layer thickness being the topmost influential. Random Forest and Gradient Boosting models are robust approaches for predicting airfoil self-noise. Their choice depends on the available computational resources and the balance between training time and predictive performance.

Keywords: Airfoil Self-Noise, Random Forest; Extra Trees; Gradient Boosting; XGBoost; Feature Importance.

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Total Harmonic Distortion Analysis of Seven-Level Inverter for Fuel Cell Applications

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This paper focuses on the total harmonic distortion (THD) analysis of a multi-level Inverter (MLI) for fuel cell applications. Furthermore, a 50 kW 625 V proton exchange membrane fuel cell (PEMFC) stack is employed to study this analysis. The various modes of operation of the suggested inverter are presented accordingly along with its switching combinations. Also, a sinusoidal pulse-width modulation (SPWM) controller is employed to drive the power electronic switches in the suggested topology. The suggested inverter can produce the sinusoidal voltage with only fundamental frequency switching. Moreover, the number of components and voltage stress of the suggested topology are compared with the conventional topologies are presented. Besides, the THD is analyzed with and without the LC filter is discussed. Finally, the validity of the system is verified through MATLAB/Simulink software.

Keywords: Total harmonic distortion (THD); multi-level inverter (MLI); PEMFC stack; LC filter; topology.

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Enhanced Cervical Cancer Detection from Pap Smear Images Using Deep Learning-Based Classification with Convolutional Neural Networks

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Cervical cancer is one of the most common and deadliest cancers among women and ranks as the fourth most prevalent cancer. The conventional Papanicolaou (Pap) smear analysis effectively diagnoses cervical pre-malignant and malignant conditions by analyzing swab images. However, manual calculation is a tedious and time-consuming process that relies on expert cytologists. Hence, developing a computer-aided diagnosis system is beneficial to make the Pap smear test more accurate and reliable. Feature extraction from medical images plays a vital role in the early detection and diagnosis of cervical cancer. This paper proposes a deep learning approach using Convolutional Neural Networks to extract features from cervical cancer images and provide the extracted features as inputs for a support vector machine (SVM) classifier and a VGG19 deep learning classifier. This methodology involves training a CNN model on a comprehensive dataset of Pap smear images consisting of both normal and abnormal cervical cells. The convolutional layers of the CNN act as local feature detectors, capturing intricate patterns and textures specific to cervical cancer. Key evaluation metrics, including accuracy, precision, recall, and F1 score, are employed to assess the method's efficacy. Results show that the CNN-based feature extraction method consistently outperforms traditional handcrafted features. Furthermore, transfer learning techniques like fine-tuning are explored to leverage pre-trained CNN models on the image dataset, enabling the extraction of generic attributes that can be fine-tuned for image analysis. The SVM classifier achieved an accuracy of 96.9% on the balanced dataset with SMOTE applied in the 2-class taxonomy, and the VGG19 classifier achieved an accuracy of 97.1% on the balanced dataset post-SMOTE. The deep learning framework allows the model to adapt and generalize to unseen cases, contributing to the robustness of the feature extraction method. In conclusion, this paper contributes to medical image analysis and disease diagnosis. The proposed CNN model's exceptional performance opens new opportunities for enhancing disease detection and patient care.

Keywords: Cervical cancer, Pap-smear, Deep Learning, Convolutional Neural Network, Feature Extraction, Classification.

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Comparative Evaluation of the Antifungal Efficacy of Sodium Hypochlorite, Silver Nanoparticles and Zinc Nanoparticles against Candida Biofilm: An In-Vitro Study

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Comparative evaluation of the antifungal efficacy of sodium hypochlorite (NaOCl), Silver nanoparticles (Ag-NP), and Zinc nanoparticles (ZnO-NP) against candida biofilms. Single rooted premolars were decoronated to a root length of 12 mm. Canals were shaped to Protaper size F2 and were then subject to sterilization in an autoclave. The specimens were placed in vials containing 2ml of the sabouraud's broth and then incubated for 14 days. From n=22, one sample was subject to scanning electron microscopy evaluation, dentinal shavings was taken from one more sample on a Sabourad Dextrose agar plate to confirm the presence of candida biofilms. The remaining 20 samples were divided (n=5), and irrigated as follows: Group 1:Saline, Group 2:5.25% NaOCl, Group 3:0.02% Ag-NP's & Group 4:0.02% Zn-NP's. Dentinal shavings were collected in a sterile sabouraud dextrose agar plate and the colony forming units were determined for each group. SEM imaging of one sample from each group was done to correlate the microbiological results. Statistical analysis was done using Kruskal wallis. $P<0.05$ kept as significant level. NaOCl reduced candida colony counts to a maximum, which was of statistical significance followed by Ag-NP & Zn-NP. Saline showed least antifungal efficacy. NaOCl was the most effective irrigant against candida biofilms. Ag-NP's and ZnO-NP's reduced the fungal load but failed to eradicate the biofilm completely.

Keywords: Silver nanoparticles, Zinc nanoparticles, Candida biofilms, Endodontic disinfection.

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Effect of Lanthanum Doping on the Structural, Morphological, and Optical Properties of Spray-Coated ZnO Thin Films

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In recent years, transparent conducting oxide semiconductor materials have found applications in both science and technology, especially in the areas of semiconductors, optoelectronics, and a wide range of energy efficiency devices. These TCO materials are the building blocks of various optoelectronic devices, such as transparent thin-film transistors, solar cells, and light-emitting diodes. This work concentrates on the structure, morphology, and optical properties of ZnO and Zn0.95La0.05O thin films at 673 K using a chemical spray technique. The polycrystalline nature and wurtzite structure of ZnO were confirmed by using XRD analysis with preferred growth along the (1 0 1) plane. The Zn0.95La0.05O deposits showed maximum crystallinity of 15.4 nm and a strain value of 2.4 × 10−3. The lattice constants increased for lanthanum-doped ZnO thin films due to the ionic radii mismatch of the doping material, which causes lattice expansion. Fibrous morphology was observed for ZnO, and a mixed structure of grains and fibers was observed for Zn0.95La0.05O films, which confirms the insertion of La3+ into the Zn2+ position. The Zn0.95La0.05O deposits showed transmittance above 80% due to the increased crystalline quality and a bandgap of 3.32 eV. The photoluminescence spectra showed peaks corresponding to e-h recombination, zinc defects (Zni and Ozn), and oxygen vacancy (Oi and Vo). The lanthanum-doped ZnO films showed increased band-edge emission and decreased defect-related peaks due to the increased crystalline quality. Hence, the doping of La3+ ions into a ZnO lattice enhances the crystalline quality and increases the transparency of the host ZnO matrix, which is suitable for optoelectric device applications.

Keywords: lanthanum-doped ZnO; spray pyrolysis; photoluminescence; optical properties

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Unveiling the Neural Mirage in the Pursuit of Transcendent Intelligence

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This paper presents a pioneering approach that emulates the intricacies of brain computation to attain new knowledge based on sensory inputs derived from the system's environment. Through recursive engagement in this process, the AI system's knowledge undergoes evolution, fostering what can be aptly referred to as knowledge expansion. The proposed approach aims to develop intelligent agents capable of thinking and acting in a rational manner, closely mirroring human cognition. This cognitive modeling approach culminates in the creation of a comprehensive model of human information processing and introduces a technique for optimizing the performance of cognitive agents, known as A3S (Arwin-Adang-Aciek-Sembiring). The resulting framework, termed as Knowledge-Expanding System (KES), heralds a new paradigm in the field of AI, namely Cognitive Artificial Intelligence (CAI). This paper explores the transformative potential of the proposed model in enabling AI systems to achieve Transcendent Intelligence. By emulating the intricacies of brain computation, the model facilitates the acquisition of profound knowledge, surpassing the intellectual capacities of even the most gifted human minds. The recursive process of knowledge expansion allows the AI system to continually evolve, further enhancing its computational capabilities and intellectual acuity. The synergy between brain-inspired computation and the A3S optimization technique empowers the cognitive agent to maximize its cognitive abilities and attain unprecedented levels of performance. The realization of Transcendent Intelligence in AI systems has profound implications for humanity and necessitates thoughtful consideration of ethical aspects. As AI surpasses human cognitive capacities, ensuring the alignment of AI systems with human values, fairness, transparency, and accountability becomes paramount. Ethical guidelines and frameworks must be established to govern the development and deployment of Transcendent AI, safeguarding the well-being and interests of humanity. The paradigm of Cognitive Artificial Intelligence, enabled by brain-inspired computation and the proposed Knowledge-Expanding System, offers a pathway towards achieving Transcendent Intelligence in AI systems. By harnessing the astounding potential of the human brain and leveraging the recursive process of knowledge expansion, AI can transcend the limitations of hu-man cognition and unlock extraordinary realms of intelligence. However, as we embark on this transformative journey, it is crucial to proceed with caution, upholding ethical considerations and ensuring the responsible development and deployment of Transcendent AI for the benefit of humanity.

Keywords: Transcendent Intelligence; Knowledge Expanding System; Cognitive Artificial Intelligence; Ethical Considerations; Brain-Inspired Computation; Recursive Engagement; Machine Learning; Deep Learning; Neural Networks.

Nonlinear Behavior of Cold-Formed Steel Columns: Investigating the Influence of Stiffener on Strength and Buckling Resistance

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Steel structures are widely employed in the construction industry because of its simplicity, speed of construction, and ease of handling. Cold formed steel is getting more popular in construction industry as the sections are created using thin gauge sheets as a result of which the weight of the structure is reduced. This would save a lot of steel as compared to the normal steel structures proving cost benefits and material saving. Finding a cross section that is both cost-effective and able to carry more weight without buckling presents a challenge. The objective of this investigation is analyzing the effects of a stiffener on the behavior of cold-formed steel columns. Experimental study on two long columns made of cold-formed steel with back-to-back lipped channel sections were tested – one with the stiffener and the other without stiffener. Finite element model was developed and validated through the experimental and theoretical results. Theoretical investigation was based on effective width method and direct strength method by using IS codes IS 801, IS811 and BS 5950. From the results it is observed that the intermediate V-shaped web stiffeners improved the distortional and local buckling strength. A non-linear behavior of stress strain curve is observed. The applied stiffener did not increase the dimension or material of the section, but the results predicted an increase in strength by 32%. This model can be further utilized for various parametric studies and more effective sections can be arrived.

Keywords: Cold-formed steel column; experimental investigation, Finite element analysis, back-to-back channel, stiffener.

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Role of Computational Material Science in Improving the Properties of Piezoelectric Smart Materials: A Review

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Piezoelectric smart materials have gained significant attention in various technological applications due to their ability to convert mechanical energy into electrical energy and vice versa. These materials have diverse energy harvesting, sensing, actuation, and biomedical engineering applications. Research investigations on piezoelectric smart materials encompass many areas, including material development, characterization, modeling, device design, and manufacturing techniques. Computational materials science is crucial in advancing these materials' under-standing, design, and optimization. This research paper aims to provide an overview of the computational approaches employed in piezoelectric smart materials. The state-of-the-art computational techniques used for modeling piezoelectric materials are reviewed, and their applications in device design are explored along with performance optimization. The comprehensive review highlights the potential of computational materials science in shaping the future of piezoelectric smart materials. It is observed that density functional theory and molecular dynamics are commonly used techniques. At the same time, finite element and phase field methods are employed for specific applications requiring continuum modeling or phase evolution simulations. Further exploration reveals that computational materials science optimizes existing smart materials' structural and compositional parameters through modeling and simulation. This improves properties such as enhanced performance, increased durability, and greater functionality. In addition, computational materials science is employed to design and predict the properties of new piezoelectric materials by utilizing advanced modelling techniques, enabling the discovery and development of materials with tailored piezoelectric properties for specific applications. Recent research advancements in piezoelectric smart materials have contributed to developing materials with improved properties, advanced fabrication techniques, and expanded application possibilities. These advancements have paved the way for the realization of innovative devices and systems that harness the unique capabilities of piezoelectric materials.

Keywords: Piezoelectric; smart material; computational material science, properties, density functional theory, molecular dynamics

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Sustainability in Supply Chain Management: A Case Study of the Indian Retailing Industry

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The world is currently living through unparalleled times in many ways. The outburst of a global pandemic has warned the public to change their attitude towards sustainability. It is a must situation for every individual on the planet to identify various sustainable crises and act following the corrective measures to enhance the present concern related to the environment, economy, and society at large, primarily in developing and underdeveloped countries. It's even more crucial for businesses to take up sustainability programs because they impact more than individuals. In the process of the supply chain, i.e., turning raw materials into a final product, the business world must keep in mind the minimization of environmental harm through carefully managing all kinds of utilities, be conscious of the waste and pollution reduction measures with a positive influence on the environment and local communities. Against this backdrop, the researchers have initiated the present study to identify the sustainability programs introduced in their supply chains by the Indian re-tailing (FMCG and Pharma) sector and various problems encountered in managing their supply chains. After a pertinent and extensive literature review related to the sustainability supply chain activities and the Indian retailing sector, the researchers collected the opinions of 200 companies from the FMCG and pharma sectors by introducing a self-administered five-part questionnaire after checking the internal consistency and validity using Cronbach's α and Kaiser-Meyer-Olkin (KMO) tests. After the data collection, the data was summarized, coded, and controlled using R Studio and Microsoft Excel. The selected hypotheses were analyzed using the Kruskal-Wallis (K-W) hypotheses technique. The significant findings are that manufacturers emphasized that their supply chains significantly impact toxic waste and pollution. In contrast, wholesalers and retailers are highly influenced by poor cost control and management, difficulty in forecasting demand, and supply-related problems.

Keywords: Sustainability; Supply chain management; Environment; Economy; Society; Indian Retailing Sector

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Tracking Daily COVID-19 Infection Count in European Countries using Hadoop MapReduce

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This research project introduces a novel approach to track and analyze the daily COVID-19 infection count in European countries using Hadoop MapReduce and Python. The exponential growth of COVID-19 data poses challenges for traditional data processing techniques in efficiently handling large volumes of information. To overcome these challenges, the project utilizes Hadoop's distributed processing capabilities to extract meaningful insights from the extensive COVID-19 dataset. The project follows a structured approach, beginning with the collection of reliable COVID-19 data for European countries from reputable sources such as the World Health Organization (WHO). The collected data is then prepared and formatted to ensure compatibility with the Hadoop MapReduce framework. Subsequently, a Hadoop cluster is established in standalone mode, enabling distributed processing. This setup includes the Hadoop Distributed File System (HDFS) and the MapReduce framework, providing the necessary infrastructure for efficient data processing. The Map function extracts pertinent information such as the date, country, and infection count, while the Reduce function aggregates the data by country and calculates the average infection count. The results offer a comprehensive overview of the pandemic's progression and allow for comparisons between countries. The research findings highlight the power of Hadoop MapReduce and Python in processing and analyzing large-scale COVID-19 datasets. By harnessing Hadoop's distributed processing capabilities, this project demonstrates an efficient approach to handle the data deluge associated with the pandemic. In conclusion, this research contributes to the field of COVID-19 analysis by presenting a novel method to track and analyze daily infection counts in European countries. Additionally, the methodology employed in this project can be scaled to other continents, enabling the tracking and analysis of COVID-19 infections worldwide. This scalability underscores the potential impact of the project's approach in addressing the global challenges posed by the pandemic. We make our code available at: https://github.com/mixed-farming/COVID-19_Tracker-_European_Infection_Analysis.

Keywords: MapReduce; Covid-19; Hadoop; Python; Big-Data

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Influence of MWCNT in Sulfur/ CNT Composites Synthesized Using Solution Casting Method

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In this manuscript we are reporting the influence of MWNTs (Multiwalled carbon nanotube) on structural, bonding and surface morphological response on sulfur nanoparticles. The sulfur and Multiwalled carbon nanotubes (MWCNT) composites have been formed using solution casting method. The concentration of MWCNTs (0.01 & 0.05) and Sulfur (0.99 & 0.95) respectively was taken in weight ratios during fabrication of the composites. These fabricated composites have been characterized by using XRD (X-ray Diffraction), FESEM (Field Emission Scanning Electron Microscope) and FTIR (Fourier Transform Infrared Spectroscopy) techniques. XRD spectra reveals the crystallite size distribution in the range ca. 55 nm to 78 nm as well as enhanced crystallinity on increasing concentration of MWCNTs in sulfur composites. Dislocation density and strain have been found to be increased in the composites showing more augmentation of MWCNT (i.e., S95% MWCNT5%) while FESEM images confirms uniform distribution of MWCNTs in sulfur composites along with round structure at nanoscale range. FTIR spectra depicted bending and stretching of C-H bands. The composites which have more concentration of MWCNTs show slightly more stretching vibrations. This indicates more delocalization of electrons, which reveals that as MWCNTs concentration is increased, electrical conductivity gets enhanced, showing that MWCNTs could perform better in electrical industries. More delocalization of electrons also expresses that free electron hole pair formation is better in the composite having more concentration of MWCNTs, accounting that photocatalytic response may increase in the composite which has more concentration of MWCNTs. Overall, it can be said that as the MWCNT concentration is ameliorated, the composites show a more crystallized structure with more vibrations. This characteristic of MWCNTs/sulfur composites are useful in photocatalytic response as well as in cathode materials in sulfur batteries.

Keywords: Multiwalled carbon nanotube; sulfur; solution casting method; delocalization; tensile strain

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Sustainable Manufacturing Scenario – A Review

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Engineers must create environmentally and socially just systems that operate within society's and nature's carrying capacities without endangering the well-being of future generations in order to address the world's environmental and development issues. Design for sustainable behavior has arisen in sustainable design to encourage behavior modification via design innovation to decrease environmental and social consequences from the demand side or consumer side and slow the rate of environmental deterioration. To study how sustainability can be developed in engineering, it is essential first to define what sustainability science is. In some instances, the connection between the philosophy of sustainability and scientific concepts has been recognized in the broader literature. Furthermore, contemporary international sustainability science has focused on giving policy definitions and techniques. Still, there is a need to clarify how the scientific and technical communities can integrate sustainability science into reality from a sustainability perspective. The term "sustainability" is broad and encompasses a variety of social, technical, economic, and environmental concerns. It has been expanded to cover sustainability challenges and difficulties in rich nations in an interdisciplinary course on sustainable engineering in developing societies. This paper describes how a multidisciplinary approach to teaching sustainability was incorporated into engineering learning programs and activities. This study aims to look at sustainable engineering publications over the last two decades.

Keywords: Sustainable development, Sustainable Engineering, Sustainability science, sustainability literacy, sustainable innovation, and environmental product design.

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The Factor Analytic Study of the Perceived Influence of Social Media on the Food Consumption Behavior of Young Adults

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Social media has revolutionized the lives of young adults, including their food consumption patterns and behavior. It is an emerging concern, and a significant gap exists in understanding how social media influences eating behavior and the potential moderating factors involved. This survey-based study paper examines the link between young adults' social media usage patterns and the influence of social media on food choices. The primary objective is to develop a scale to measure the impact of social media usage on adolescent eating behavior, including dietary choices, health, and well-being effects. The study participants are students pursuing undergraduate and postgraduate education in various constituent institutions of Manipal Academy of Higher Education, Manipal. The study design included both qualitative and quantitative approaches. In the first phase, focus group interviews (20 participants) were conducted to identify the relevant statements for the survey questionnaire. In the 2nd phase, a survey instrument with 36 statements was distributed among the Health Sciences, Technology, Management, and Hotel Management students. Two hundred and fifty seven completed responses have been received. Exploratory and Confirmatory factor analyses were performed to identify the factors. The five factors were labeled as; 1. consumption desire stimulus, 2. Health-focused Diet Orientation, 3. Impulsive and binge eating, 4. Superfluous food consumption, 5. Recipe exploration and information Source. Future researchers may utilize the scale to validate the influencing factors and find their association with factors such as life satisfaction, mood, health, etc. The study results may encourage young adults to develop strategies for healthy eating habits and mitigate the potential negative impact of social media on an individual's relationship with food. It may help other stakeholders, including decision-makers, to create awareness among young adults toward the potential benefits of healthy eating behavior. It can be concluded that while social media can have positive and negative effects on young adults' eating habits, they must cultivate a critical mindset, engage in self-care, and seek reliable sources of information to make informed choices about their health, nutrition, and overall well-being.

Keywords: Social Media; Eating Behavior; Young Adults; Influencers

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Unfolding Conversational AI: A systematic Review of Datasets, Techniques and Challenges in Developments

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Over the last decade, countless developments in Artificial Intelligence (AI) have been most prominent in the fields of Natural Language Processing (NLP) and Conversational AI. With the creation of state-of-the-art language models, response generation has become less challenging than it was earlier. This advancement along with an increase in the availability of conversational data has been tremendously valuable for the evolution of conversational bots, both in terms of scope and effectiveness. Several researchers have published works related to conversational AI, mainly exploring a task-oriented system. However, a consolidated review of literature that focuses more on conversational bots, datasets, latest SOTA methods and their analysis, evaluation metrics is lacking. There is a need to systematically cover all these aspects in the form of a comprehensive and consolidated study for Conversational AI. In this regard, this paper attempts to provide an extensive coverage of conversational AI systems, discussing all technical aspects in the literature. This paper reviews the datasets used by researchers, multiple approaches/techniques employed to create conversational bots, and the metrics used to evaluate them along with discussion of various challenges in dialogue systems. It also presents plausible solutions to tackle challenges while talking about the future of conversational bots. Conversational bots have been grouped into two categories: 1. Retrieval-based and 2. Generative. The paper also surveys state-of-the-art strategies for each of these, drawing a comparison between them highlighting the future research directions in this field. The future scope lies in data pre-processing techniques, evaluation measures, and optimization using GANs or transfer learning. Self-supervised and unsupervised techniques hold immense potential in the future of technological evolution. These approaches provide solutions leveraging the latest advancements in the field of conversational AI, supporting a strong base for future research in this field. In summary, the advent of conversational AI bots represents a noteworthy milestone within the field of NLP, garnering attention from both industry experts and researchers.

Keywords: natural language processing; conversational AI; deep learning; recurrent neural networks; transformers; chatbot

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Biocompatibility of Performance of Dental Composite Restorations: A Narrative Review on Free Monomer Release, Concerns and Solutions

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The use of resin based dental composites is multiplying by the years due to the increased demand of tooth-coloured restorations. The choice of monomers employed strongly determines the viscosity, reactivity, mechanical property, water sorption and polymerization shrinkage of the composite material. It is desirable for all monomers to be converted to polymers (Degree of Conversion), but this does not occur clinically resulting in poor prognosis of the restoration as well as increase in systemic health risks. The release of monomers occurs due to erosion and degradation as well as release of leachable species from the restoration. The potential toxicity of free monomers on the dental pulp cells (DPC) is concerning. Free monomers are not only allergens but also have reported cytotoxic and genotoxic effects. Various methods and practices have thus been employed to counter the ill effects of free monomer release from dental composite restorations for better safety and healthy oral cavity.

Keywords: Free Monomers; Composite Resins; Conversion of Monomers; Monomer Elution; HPLC

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Optimization of Drilling Parameters on Delamination and Burr Formation in Drilling of Neat CFRP and Hybrid CFRP Nano-Composites

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Carbon fibre-reinforced polymer (CFRP) composites have exceptional mechanical advantages such as high specific strength and stiffness, lightweight, and high damping capacity, making them very attractive for aircraft, aerospace, automotive, marine, and sporting applications. However, various defects such as delamination, burr formation, and surface roughness are observed during the drilling of CFRP composites, which are influenced by various drilling process parameters. In this work, the drilling quality of uni-directional CFRP composites and the hybrid CFRP nano-composites are investigated experimentally using different types of drill geometry step drill, core drill, and twist drill. The design of the experiment table was developed using response surface methodology (RSM) for input process parameters of spindle speed, feed, drill diameter, and drill geometry. The main effect plots of RSM were used to examine the effect of spindle speed, feed, drill diameter, and drill geometry on exit delamination and burr formation. The analysis of main effect plots showcased the optimum process parameters, such as a high spindle speed of 5500 rpm, low feed of 0.01 mm/rev, and drill diameter of 4 mm. The step drill demonstrated the least damage mechanism among drill geometries, followed by the twist and core drills. The minimum drilling damage was observed for Al2O3 hybrid nano-composite compared to the neat CFRP composites.

Keywords: CFRP; drilling; delamination; burr formation and response surface methodology.

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Preparation & Characterization of Activated Carbon Using Pinecone (Conifer Cone) To Remove Phenol from Wastewater

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Chemical industries are generating unprecedented effluent, including toxic aromatic compounds like Phenol, which poses severe environmental risks. This study explores the acute and pro-longed effects of Phenol, which range from the death of animals, birds, and fish to reduced plant growth, reproductive problems, and changes in appearance and behavior. Additionally, oral exposure to Phenol can be toxic to humans. Meanwhile, the agricultural sector faces challenges in finding salvage value for increasing amounts of waste. To address this issue, our research analyses organic materials with no market value and investigates the feasibility of achieving efficient adsorption using their char. We specifically examine pine nuts, an abundantly available waste material. Our objective is to synthesize an organic adsorbent material that meets specific criteria: organic, readily available at zero cost, derived from waste with no other utility, native to the area, abundantly accessible, possessing a large surface area, and demonstrating superior adsorption capabilities. This research employs chemical activation using four acids (Nitric acid, Sulfuric acid, Hydrochloric acid, and Orthophosphoric acid) and involves drying and heating the samples at different elevated temperatures. The selection of the optimal adsorbent is based on an analysis of the BET surface area and pore volume ensuring its efficacy. The adsorbents efficiency was also tested with the help of a UV spectrophotometer to assess its efficiency using beer Lamberts law. The study also goes through an ultimate analysis to measure the amount of carbon content in our adsorbent. Through this study, we aim to develop sustainable waste management practices by utilizing pine nut waste as a valuable resource for effective Phenol removal.

Keywords: Adsorption; Wastewater; Pinecone; Phenol; Activated Carbon

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Effect of Metal Filler on Mechanical Performance of Epoxy Resin Composites

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It is a common practice in the plastics industry to compound polymers with fillers to dilute the manufacturing cost and/or attain desired properties. By combining different fillers with various polymer matrices, polymer composites can be tailored to achieve property combinations which cannot easily be obtained from either the polymer matrices or the reinforcements alone. In the past decades different metallic (Cu, Al, Steel, etc.) and ceramic fillers (SiC, Al2O3, CuO, TiC, TiO2, TiN, ZrO2, ZnO, ZnF2, SiO2, etc.) have been used as reinforcements in composite preparation be-cause of their effectiveness in reinforcing polymers. In the light of the above, this research work aims at fabrication and study of the basic mechanical properties of epoxy resin composites filled with different weight percentages of metal filler. It includes the study of mechanical properties of cast iron filler reinforced epoxy-based polymer matrix composites. Epoxy composites filled with cast iron in different weight percentages are prepared using casting technique. Data on neat epoxy is also included for comparison. All the tests are conducted at room temperature and as per ASTM standards. Density, hardness (Rockwell), tensile, flexural and impact tests are con-ducted and the data are analyzed with the help of statistical charts to draw useful inferences. It is observed that inclusion of cast iron filler affected most of the mechanical properties of neat epoxy. Density, hardness, impact strength, tensile and flexural properties of the developed composites exhibited a varying trend with respect to cast iron content. The increase in cast iron content showed significant improvement in tensile, hardness, impact strength and the density of the composites. The flexural strength was found to decrease at higher cast iron content. This re-search work also highlights the possible reasons for variation in the mechanical properties of developed polymer composites.

Keywords: density; hardness; tensile strength; impact strength; flexural strength; neat epoxy

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Study on the Suitability of Constant Boundary Elements for the Simulation of Biological Organs

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In the process of designing of surgical simulators, it may be a requirement to simulate biological organs real-time. About thirty computations per second are required for achieving real-time graphics. Hence, computational techniques employed to simulate biological organs in real-time should be able to perform about thirty computations per second. The computational techniques employed should be fast enough, but at the same time should be accurate enough to realistically simulate the biological organs which are inherently nonlinear. A numerical technique called the Boundary Element Method (BEM) is generally thought of being faster when one compares the technique with some well-established numerical techniques like the Finite Element Method (FEM). This technique (BEM) is even faster if constant boundary elements are employed. How-ever, BEM is mostly used to simulate linear behavior whereas FEM is more established for simulating nonlinear behavior. Present work investigates whether biological organs may be simulated by using linear BEM. The reason non-linear BEM has not been used is that non-linear BEM is quite slow and difficult to implement. A human kidney is the biological organ considered in this work. A nonlinear analysis and a linear analysis are carried out on the kidney. Non-linear analysis is carried out by using the FEM, whereas the linear analysis is carried out by using the BEM. Results from the nonlinear analysis are compared with the results from the linear analysis. The results indicate that there is good agreement between the results from linear-BEM and nonlinear-FEM many times but there is considerable difference between the results a few other times. Although the results reinforce the idea that the BEM could be a useful tool while simulating biological organs, further research is needed to definitively say whether the results given by linear-BEM that uses constant boundary elements are always good enough for simulating biological organs.

Keywords: nonlinear; linear; simulation; kidney; BEM

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Short Cycled Repeated Weil Sequences With Low Correlation Values

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The Global Navigation Satellite Systems (GNSS) use Code Division Multiple Access (CDMA) techniques to perform ranging to Navigation satellites. In satellite navigation, a Pseudo-Random Noise (PRN) Code is assigned to each navigation satellite to distinguish the desired satellite from another. These PRN codes used should have certain properties like balance, family size, period, auto & cross-correlation properties to meet the specific application requirements. Existing GNSS uses Linear Feedback Shift Register (LFSR) based methods for the design of PRN sequences due to simplicity in their hardware implementation. The LFSR-based methods usually generate PRN sequences of length 2n-1, where 'n' is the shift register length. The GNSS uses PRN sequences of lengths that are multiples of 1023, other than 1023-bit length, none of the sequence lengths used in GNSS have 2n-1 lengths and cannot be directly generated using LFSR-based methods. Hence, the generation of PRN codes with non 2n-1 periods with desired correlation properties remains a challenge. This research introduces a novel technique called Short-cycled Repeated Weil Sequences (ScRWS) for generating PRN codes even for non 2n-1 periods. The generated sequences exhibit significant enhancements, including a 2-3 dB improvement in auto-correlation and a 1-2 dB enhancement in cross-correlation compared to existing cutting-edge sequences used in satellite navigation systems. Detailed analysis of the generated sequences confirms the suitability of the proposed method for integration into GNSS systems.

Keywords: GNSS; CDMA, Correlation, PRN sequences; Weil sequences.

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Prediction of Machining Characteristics & Machining Performance for Titanium Grade 2 Material in WEDM Using GMDH & ANN

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The present research focuses on the machining of grade 2 titanium material using the Wire Electric Discharge Machining (WEDM) process by means of L16 Orthogonal Array (OA). This study investigates numerous process parameters, including pulse on time, current, pulse off time, voltage, bed speed and flush rate. The voltage and flush rate were kept constant throughout the experiment, while the other four parameters were varied for the machining process. In this study, a 0.18 mm molybdenum wire was utilized as the electrode material. Initially, this research aimed to optimize the process parameters to discern their impact on machining characteristics (Surface Roughness and Electrode Wear) as well as on machining performance (Acoustic Emission Signals). Subsequently, simpler functional relationship plots were generated between these parameters to recognize the potential information about the machining characteristics and machining performance. The straightforward approach lacks the capability to furnish information regarding the condition of the material (Surface Roughness), the tool (Electrode Wear) and the signals (Acoustic Emission). Hence, to estimate the experimental values the numerical tools viz., Group Method of Data Handling (GMDH) and Artificial Neural Network (ANN) were used. Upon comparing the predictive performance of ANN and GMDH, it became evident that the ANN's predictions using 70% of the data for training displayed a higher correlation with the experimental values compared to the GMDH.

Keywords: group method of data handling; artificial neural network; surface roughness; electrode wear; acoustic emission

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Fault Detection and Classification in Electrical Power Transmission System Using Wavelet Transform

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A balanced operating power system with all elements carrying the normal currents and bus voltages within the prescribed limits can be disrupted due to faults within the system. Overhead transmission networks are vulnerable to the vagaries of the atmosphere and, therefore, statistically have the highest probability of fault occurrence. Quick and accurate fault detections assist in timely remedial action offering significant economic and operational benefits. Maintaining continuous and uninterrupted supply functionality is one of the critical objectives of electric utilities for a reliable system operation. Also, identifying and locating faults is crucial to address them in time to avert the risk of cascaded failures. During faults, fast electromagnetic transients associated with the current and voltage waveforms can provide valuable insights into identifying abnormal operating conditions. To analyze these non-stationary signals in both the time and frequency domains, wavelet transform (WT) has become an indispensable tool. Thanks to its ability to adapt to variable window sizes, WT provides a more accurate and detailed resolution, making it a highly useful technique for signal analysis. In this context, this paper presents the application of WT based intelligent technique to detect and classify power system faults accurately. The transient disturbances caused by various faults are subjected to wavelet transform analysis to analyze the detail coefficients of phase currents. The maximum detail coefficients of phase currents, which differ significantly when the system experiences a fault, served as the distinguishing feature to identify different power system faults. The phase current signals are analyzed with one of the wavelets from the Daubechies 4 (db4) family to obtain detail coefficients, thus enabling the categorization of the faults. Extensive simulation tests for fault types have been conducted on the standard IEEE 5-Bus system to demonstrate the technique's effectiveness and fault detection capability, allowing utilities to take timely protective actions.

Keywords: Detail Coefficients; Fault Detection; Power System; Transient Analysis; Transmission Line; Wavelet Transform

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Novel Class of Benzimidazoles; Synthesis, Characterization and Pharmaceutical Evaluation

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Benzimidazole moieties are of great interest in synthetic compounds due to their wide range of applications in biological activities. In the present study, novel class of benzimidazole heterocycles scaffold has been successfully designed and synthesized by using the starting material O-phenylenediamine derivatives (1a-c). The 1-methyl-2-(methylthio)-1H-benzo[d]imidazole derivatives (3a-c) have been synthesized as intermediate compounds by treating the precursors (1a-c) with carbon disulfide followed by N- and S-methylation with iodomethane in the presence of anhydrous potassium carbonate. In the latter step, the intermediate compounds have been converted into methyl-piperazine holding benzimidazoles (4a-c), piperazinol tethered benzimidazoles (5a-c) and phenylpiperazin holding benzimidazoles (6a-c). The structures assigned to target compounds have been analyzed, and confirmed by IR, NMR, and MS analysis. The target compounds were studied for their antimicrobial, anthelmintic and anticancer activity. The biological study envisioned that the compounds 6b, 4c, and 5a have emerged as excellent antibacterial, antifungal, and anthelmintic agents respectively whereas heterocycle 6a showed excellent anticancer activity against hepatocyte-derived cell line HUH7 and breast adenocarcinoma cell line MCF7 with IC50 value 6.41 and 9.70 μg/mL respectively. These data are also highlighted, concerning the development of new class of hetero compounds having more than one hetero moiety that could help in drug design.

Keywords: Benzimidazole; (piperazin-1-yl) ethanol; phenylpiperazine, pharmaceutical evaluation, antimicrobial, anticancer

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Synthesis of Fused Isoxazole: A Comprehensive Review

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Pharmaceutically important isoxazoles are one among the wide range of heterocycles. Isoxazole ring, being five-membered, is also found in many bioactive natural products apart from synthetic drugs. Many significant properties are exhibited by synthetically modified isoxazoles. Fused isoxazoles have widely expressed their therapeutic potential such as anticancer, insecticidal, antibacterial, antituberculosis, antifungal, antibiotic, antitumor and ulcerogenic. A variety of strategies are employed for the synthesis of these compounds which are known for their pharmacological importance and the same is reviewed. Synthesized isoxazoles have shown up as good forerunners for raising many divergent molecules. This review summarizes the various approaches that are put forth in, for a detailed study of the synthesis process. The substituted isoxazoles are well-developed in literature for significant biological activities. This review is mainly focused on the synthesis of fused isoxazoles.

Keywords: Isoxazoles; Fused isoxazole; Hydroxylamine hydrochloride

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Acetone Vapour Sensing Performance of Ni Doped Zno Nano-Fibers

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Metal oxides have been widely investigated as sensing materials for detecting toxic gases and volatile organic compounds (VOCs). Particularly, MOs Nanofibers becomes an attractive material due to their physical properties such as high specific surface area and compact size. Ageing populations and an increase in chronic diseases all over the world necessitate efficient healthcare solutions to ensure people's well-being. One research strategy that has gotten a lot of attention is the development of simple, less time-consuming, and more accurate health monitoring systems. Gas sensors are used in health care to identify the content of gas in the breath. From various literature studies, it is found that metal oxide and ceramic nanofibers are used for gas sensor applications. The electrospinning method is the best one to suit for the preparation of ZnO nanofibers with the required properties. From the literature survey it is evident that the processing parameters and solution parameters play a significant role in the dispersion of the polymer solution from the syringe needle. Pure and Ni-doped ZnO nanofibers were synthesized using the electrospinning method followed by pyrolysis. The morphology, crystal structure, and optical properties of the nanofibers were characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD), and photoluminescence (PL) spectroscopy, respectively. It is found that Ni doping does not change the morphology and crystal structures of the nanofibers, and the ultraviolet emissions of ZnO nanofibers present red shift with increasing Ni doping concentration. The acetone vapour sensing performance of the sensors of the pure and Ni doped nanofibers were investigated. The results show that the acetone sensing properties of ZnO nanofibers improves by Ni doping, and 4% Ni-doped ZnO nanofibers exhibit a maximum sensitivity to acetone vapour.

Keywords: Nanofiber; Gas sensor; sensor response, response time, recovery time.

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Automated Email Classification using Machine Learning Approaches

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Information consumers rely heavily on the email system which is considered as one of the main sources of communication. Its importance and usage are increasing despite the development of mobile applications and social networks. Email data extraction and analysis can be performed for various purposes such as spam detection and classification, spam filtering, email subject classification, to classify emails based on their message body, filtering email messages by priority and many more. Automated email classification aids in organizing data into groups which reduces the search execution time and plays a vital role in data tracking and management. In this study, a large amount of personal email is used to classify folders and subjects. Supervised and unsupervised machine learning approaches were used to perform the grouping and classification of this large collection of text. Here the classification is based on emails with publication details such as research, login, submission, review, decision, revision, acceptance, and others. Under supervised approach, classifiers such as Naive Bayes, Decision tree, Random Forest and SVM were used for classification. Under unsupervised approach, K –Means and hierarchical clustering techniques were used for classification. Result analysis were performed on the outputs obtained on supervised and unsupervised approaches and identified the best classifiers for automated email classification.

Keywords: Email system; Data extraction; Classification; Machine learning; Supervised; Unsupervised

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Treating pharmaceuticals and personal care products in the wastewater using gamma irradiation

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Pharmaceuticals and personal care products (PPCPs) are entering into the rivers, groundwater, and oceans in trace quantities. The primary reason is because of inappropriate wastewater treatment and direct disposal of wastewater into these water bodies. As a result, aquatic biota consumes these compounds in low doses, which biomagnifies in the food chain causing genetic damages. Studies were made in a small west flowing river near Mangalore, in southwestern India to identify the extent of such pollutants.. Their presence was detected in the river at low concentrations in nanograms per liter. Nevertheless, previous literature has indicated that it can potentially harm the riverine biota even at low concentrations. There is an urgent need to arrest the entry of these pollutants to the water bodies by adopting suitable treatment technologies. This is attempted in this study by exposing the treated wastewater to low doses of gamma irradiation. Seven most commonly used PPCPs were chosen for this study, namely, sulfamethoxazole (SMX; an antibiotic), ethyl paraben (ETP; food preservative), propylparaben (PRP; cosmetic), benzophenone (BP1; UV filter), oxybenzone (OXB; UV filter), bisphenol A (BPA; plasticizer), and triclocarban (TCC; detergent). Grab samples were collected from the wastewater treatment plants and the river. They were subjected to filtration, solid phase extraction, and pre-concentrated. Target analytes were measured using Liquid Chromatography Mass Spectrometry (LC-MS) with good QA/QC. In parallel, a known amount of target analytes dissolved in deionized water was subjected to low doses of gamma irradiation at Bhabha Atomic Research Centre, Mumbai. Radiation doses were administered sequentially from low to higher doses at 1, 5, 10, 20, 30 & 40 kilograys (kGy). When compared with the initial concentration of the individual compounds, ≥97% were removed for the compounds SMX, ETP, PRP, BP1 and TCC at 5kGy dose, whereas the removal was 95% for the BPA and 96% for the OXB for the same dose. In conclusion, PPCPs are polluting the water bodies of southwestern India, which are adversely affecting the biota. The source of this pollution is the wastewater which has to be treated at the tertiary level to completely remove the pollutants. Low dose of gamma irradiation has proved effective in near complete removal of the PPCPs. This needs to be scaled up to the level of a wastewater treatment plant and further investigated for its effectiveness.

Keywords: wastewater; tertiary treatment; water pollution; gamma irradiation; LC-MS

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Protracted Sintering Effect on Microstructure, Hardness And Strength of Al-Fly Ash Compo-Cast

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In the present investigation, an attempt is made to prepare and characterize the compo-cast composite having pure aluminium as matrix and fly ash as the reinforcement. The powders of the matrix and reinforcement (5, 10, 15 wt.%) are mixed and are compacted by applying a uniaxial compressive load of 400 MPa. All green composites produced are sintered at 500°C for 1 h. SEM images showed the uniform distribution of reinforcement particles and EDAX images are taken on the sectioned surface of specimens to confirm the elemental distribution of fly ash in the aluminium matrix. The XRD plots confirmed the existence of quartz and mullite as the key segments in the composite. The sintered compo - casts at 500°C are further pr°Cessed isothermally at 550 to 650°C, in steps of 50°C to study the hardness variation with the pr°Cessing time. The hardness and UTS are found to be increasing with the increase in quantity of fly ash and sintering temperatures showing a maximum for composite with 15 wt.% of fly ash.

Keywords: Fly ash, SEM-EDAX, XRD, sintering, compact, tensile strength.

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Optimization of Performance and Emission Responses of CRDI Engine by Taguchi-Grey Relational Analysis Technique

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India imports fossil fuels to meet its energy needs, and the need is expected to increase over the coming years. The constant usage of fossil fuels will cause their depletion in due course, necessitating the hunt for substitute fuels. One of the most promising alternatives to fossil fuels is determined to be biofuels. Fuels made from second-generation feedstocks, particularly non-edible oils, may change the game in this situation. The use of simarouba non-edible oil as a substitute for diesel in common rail direct injection (CRDI) engines is the subject of current research. Running a CRDI engine with simarouba biodiesel blends may not be suitable under the same operating conditions as running a diesel engine. In order to optimize performance, it is needed to determine the ideal conditions for operating a CRDI engine with simarouba biodiesel mixes. In this study, the control parameters that influence the performance of the CRDI engine viz., fuel preheating temperature (FPT), injection pressure (IP) and injection time (IT) are designed using the Taguchi technique. Experiments using the Taguchi L9 orthogonal array (OA) for the bio-diesel blends SB5, SB10, and SB20 are conducted at full load conditions of 12 kg. Through experimentation, performance and emission responses are obtained. For analysis, six engine responses are taken into account. The investigation reveals that the engine control parameters affect each response in a distinct way. As a result, it might be challenging to pinpoint the ideal circum-stances that will improve engine performance and lower emissions. This is an example of a multi-response optimization problem. As a result, Taguchi-Grey Relational Analysis (TGRA) is used in multiple response optimization. According to TGRA, the optimal parameters for using simarouba biodiesel blends as an engine fuel to boost performance are IP of 600 bar, IT of 21˚ bTDC, and FPT of 40˚ C.

Keywords: Taguchi, Simarouba Biodiesel, CRDI Engine. Control Factors, TGRA

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Heat Transfer Enhancement in a Tube Heat Exchanger Using Discrete Triangular Prism Roughness Elements

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Heat exchangers of high effectiveness are generally sought by the thermal industry for the efficient utilization of heat energy. Present study focuses on the enhancement of effectiveness of a single tube heat exchanger by attaching roughness elements on the peripheral heat transfer sur-face. The numerical methodology is adapted to study the forced-convection in a circular tube in-stalled with equilateral triangular prism roughness elements. Analysis is performed by using ANSYS-fluent considering air as the working-fluid for the Reynolds number (Re) range 10000 to 18000. The geometric parameters; the cross-section and the roughness element height are fixed. The effect of longitudinal pitch, angular pitch and the orientation of triangular prism roughness elements on the heat transfer and energy loss due to friction are studied. The longitudinal pitch is varied as 20 mm, 30mm, and 40 mm. The angular pitch is varied as 45°, 60°, and 90°. The tri-angular prism orientation is changed based on the line bisecting the corner angle. The angle between the streamwise-flow-direction and the bisection line is varied as 0°, 30°, and 60°. The numerical model based on SST   is validated using the well-known Dittus-Boelter and Blasius correlations. The presence of roughness elements on the heat transfer surface found to increase turbulence and fluid mixing. Up to 23% increase in heat transfer performance is seen in Nusselt number values of roughened tube over the smooth tube. The presence of roughness elements on the tube surface, also increases the frictional losses, however, this increase is found to be gradual with the reduction of both longitudinal and angular pitch.

Keywords: Tube heat exchanger; Nusselt number; Turbulator; Triangular-prism roughness; Friction-coefficient

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A Holistic Approach on Smart Garment for Patients with Juvenile Idiopathic Arthritis

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Juvenile Idiopathic Arthritis (JIA) is a widespread and chronic condition that affects children and adolescents worldwide. The person suffering from JIA is characterized by chronic joint inflammation leading to pain, swelling, stiffness, and limited body movements. Individuals suffering from JIA require ongoing treatment for their lifetime. Beyond inflammation, JIA patients have expressed concerns about various factors and the lack of responsive services addressing their challenges. The implementation of smart garments offers a promising solution to assist individuals with Juvenile Idiopathic Arthritis in performing their daily activities. These garments are designed to seamlessly integrate technology and clothing, providing not only physical support but also addressing the psychological and emotional aspects of living with a chronic condition. By incorporating sensors, these smart garments can monitor joint movement, detect inflammation, and provide real-time feedback to both patients and healthcare providers. To tackle these comprehensive challenges, the research aims to offer a solution through the design of a smart garment, created with a holistic approach. This smart garment is intended to improve the overall well-being of JIA patients by enhancing their mobility, comfort, and overall quality of life. The integration of technology into clothing can potentially revolutionize the way JIA is managed, allowing patients to better manage their condition and minimize its impact on their daily lives. The synergy between healthcare and technology holds great potential in addressing the multifaceted challenges posed by Juvenile Idiopathic Arthritis patients. Through innovation and empathy, this research aims to pave the way for a brighter future for individuals living with Juvenile Idiopathic Arthritis.

Keywords: Juvenile idiopathic arthritis, patients, health care, holistic, smart garments

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Optical Investigation of h-BNNS/Graphene Reinforced Polyurethane Nanocomposites

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Polyurethane (PU) has excellent mechanical qualities such as abrasion resistance, impact resistance, toughness, low viscosity, high elongation, good flexibility, strong rip strength, low shrinkage, hydrolytic stability, and resilience, allowing it to be used in a variety of applications. Polyurethane has a wide range of applications due to its hard or flexible nature depending on the need. Moreover, polyurethane is utilized in a variety of sectors, including coatings, adhesives, sealants, and elastomers (CASE), automotive, medical, textile, and apparel, marine, and polyurethane wood composites. PU is available in a variety of forms, including: PU foam, PU leather, PU coating, PU adhesive, PU sealant, PU film, PU membrane, and PU insulation. In the pure form PU is very weak in terms of mechanical and physical properties. The mechanical and physical properties of PU may be enhanced by adding materials which have superior mechanical and physical properties. Materials such as metal nanoparticles, nanoropes, nanofibers, 1D and 2D structures such as nanotubes, nanosheets respectively have excellent mechanical, physical, thermal and chemical properties. When these materials would be reinforced in the PU matrix, the load carrying capacity may increase which may result in enhanced mechanical properties. Due to superior thermal properties, the resulting composites after reinforcement has hood thermomechanical properties as well. In the present research, 2D nanostructures such as graphene (Gr) nanosheet and hexagonal boron nitride nanosheet (h-BNNS) has been selected as the reinforcement candidate to study the improvement in the mechanical properties of PU nanocomposites. Gr and h-BNNS reinforced PU nanocomposites were prepared at different weight percentage of the Gr and h-BNNS. In order to study the optical properties of Gr, h-BNNS and Gr+h-BNNS (hybrid) reinforced PU nanocomposite, the experimental samples are prepared using the three wt.% (0.3, 0.5 and 0.8 wt.%) of each reinforcement i.e., Gr, h-BNNS, and Gr+h-BNNS (hybrid). The schematic of sample preparation is shown in Fig. 1. FTIR examination of Graphene/h-BNNS reinforced Polyurethane nanocomposites was performed in this study, and it was discovered that the bond stretches of pure PU alter with the addition of Gr/h-BNNS. The peak of Gr displays a considerable change, indicating the establishment of a link between Gr and PU. The Gr/PU exhibits bond formation, which results in good dispersion and an increase in load capacity at higher wt.% smaller peak bond stretch, which may result in brittleness in nanocomposites. The same results are obtained in h-BNNS, but the hybrid exhibits odd behaviour due to repulsion and insufficient dispersion of reinforcing chemicals. However, a strong interfacial property is detected, which could result in improved mechanical and thermal properties. There is interfacial interaction in all of the nanocomposites, which may improve their properties.

Keywords: FTIR; h-BNNS; Graphene; Nanocomposite; Optical properties; Polyurethane

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Helical Milling and Drilling for Hole-Making in CARALL: Experimental Evaluation

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Carbon fiber-reinforced aluminum laminates, known as CARALL, have wide applications in aircraft structures. However, numerous holes must be processed to assemble these structures, which is conventionally practiced through drilling. However, the drilling process exhibits certain limitations when utilized for hole-making in heterogeneous materials. In the recent past, helical milling has positioned itself as an alternative to the drilling process. However, helical milling performance examination during hole-making in CARALL is scant and needs further evaluation. The present study compares the milling process to the drilling process considering important performance indices, including cutting forces, surface roughness, chip morphology, machining temperature, and burr size. Additionally, microscopic characterization of the boreholes is performed to verify the presence of surface damage and delamination defects. Helical milling successfully lowered the thrust and radial forces and restrained the machining temperature below the levels attained via drilling. The diametrical deviation is higher at entry and lower at exit for both processes; however, helical milling produced holes with much higher accuracy. Helical milling developed smaller sized holes in comparison to drilling. Moreover, rougher surfaces due to the abrasion of continuous chips were observed in drilling, while a smoother finish was noted in helically milled holes. Based on the comprehensive comparative analysis, helical milling positions itself as an acceptable alternative to conventional drilling for machining fiber metal laminates.

Keywords: fiber metal laminates (FMLs); helical milling; CARALL; sustainable machining

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The Thiadiazole Ring (THD) Is a Building Block for Potential Inhibitors of the SARS-Cov-2 Main Protease (Mpro): Theoreti-Cal Look into the Structure, Reactivity, and Binding Profile of Three 1, 3, 4-THD Derivatives towards Mpro

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Thiadiazole (THD) derivatives are famous for their exceptional chemical properties and versatile biological activities. In this work, we report computational investigations on the structure, reactivity, and binding affinity of three 1,3,4-THD derivatives (THDs) towards SARS-CoV-2 main protease (Mpro). Hirshfeld surface (HS) analyses are carried out in conjunction with topological calculations in the context of the quantum theory of atoms in molecules (QTAIM) and reduced density gradient (RDG) to unravel the nature and magnitude of non-covalent interactions that contribute to maintaining these THDs. The three approaches consistently indicate that the titled THDs are mainly stabilized by weak intramolecular H…H, C-H…π, C-H…N, and N-H..H interactions in their monomeric forms, while their dimers also exhibit intermolecular π…π stacking and T-shaped contacts. In addition, Hirshfeld atomic charges, frontier molecular orbitals (FMOs), Fukui functions, and Molecular electrostatic potential (MEP) reveal that the pyrrolic H atom (ring F) and the imidazole N atom (ring E) are the preferred binding sites for nucleophilic and electrophilic attacks respectively. Finally, docking, and molecular dynamics simulations demonstrate the remarkable binding profile of TDHs towards Mpro, which can be related to potential inhibitory activity.

Keywords: Thiadiazole derivatives, Hirshfeld surface, QTAIM, MEP, Molecular docking, Molecular dynamics

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Effect of Fabrication Methods on Structural Properties of Alkaline Treated Coir Fiber Reinforced Epoxy Composites

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Alkaline treatment has a significant impact on behavioral changes of reinforcing fiber material. Coir fiber is considered as a reinforcing material for epoxy resin in this experimentation as it is abundantly available, and the fiber is light in weight. Epoxy composites with 40 wt% alkaline treated short fibers are fabricated using two different methods i.e., solution casting and compression molding. Solution casting is one of a kind of open molding technique where the resin is mixed with reinforcement material as a solution. The solution is then poured into a prepared mold of desired dimensions and allowed to cure at room temperature. Compression molding is a closed molding technique where resin and fiber are spread in the mold with desired dimensions, then a compressive force is applied to the mold so that the resin is spread all over the mold and is allowed to cure under compressive force. This article meticulously accounts for the impact of the two fabrication methods on the structural properties such as tensile and flexural strengths of the composite. The specimens are tested for tensile and flexural properties as per ASTM standards D638 and D790 respectively on Universal Testing Machine. The results reveal that composite prepared using compression molding displayed better structural properties than composite prepared using solution casting. Optical microscopic images of fabricated specimens using respective methods are analyzed to understand the surface morphology of the composites.

Keywords: Coir fiber; Natural fiber composite; Alkaline treatment; Structural properties; Optical microscopy

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A Hybrid MCDM-Grey Wolf Optimizer Approach for Multi-Objective Parametric Optimization of Micro-EDM Process

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Micro-electrical discharge machining (micro-EDM) process has come up as an effective material removal process for manufacturing of miniaturized components in modern industries. The performance and quality of micro-EDM process mainly depends on the combination of process parameters selected. This paper makes an attempt to demonstrate the applicability of three well-known multi-criteria decision making (MCDM) techniques, such as technique for order of preference by similarity to ideal solution (TOPSIS), multi-attributive border approximation area comparison (MABAC), and complex proportional assessment (COPRAS) methods separately hybridized with grey wolf optimization (GWO) algorithm. The proposed hybrid optimization approaches are applied to find the optimal parametric setting of a micro-EDM process during machining on stainless steel shim as work material. Feed rate, capacitance and voltage were selected as the machining control parameters, while material removal rate, surface roughness and tool wear ratio were selected as the responses. The polynomial regression (PR) meta-models are observed as the inputs to these hybrid optimizers. The results obtained are further compared to traditional weighted sum multi-objective optimization (WSMO) approach which suggests that all considered MCDM-PR-GWO approaches outperforms traditional PR-WSMO-GWO approach in obtaining better machining performance measures.

Keywords: Micro-EDM process; MCDM; GWO; Meta-model; Optimization

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Exploring Flexural Strength in High Performance Concrete with Iron Slag and Copper Slag as Sand Substitutes

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The purpose of this research is to investigate the feasibility of utilizing iron slag and copper slag as substitute for conventional sand in concrete, considering flexural strength as the criterion variable. Flexural strength, a crucial parameter influencing the bending behavior of structural elements, serves as a key indicator of a material's ability to withstand applied loads. The study focused on evaluating the mechanical behavior and structural performance of concrete specimens containing iron slag and copper slag, aiming to establish their effectiveness in enhancing flexural strength. Three combinations have been tried: Cement with Iron Slag and Copper Slag, Cement with Sand and Iron Slag, and Cement with Sand and Copper Slag. The independent variables were the combination proportions and the number of days of curing, namely 7 days, 28 days, 56 days and 90 days. The results indicated that the best combination was iron slag – copper slag mixture in 40 – 60 % proportion along with cement as there was an increase of the flexural strength up to 92% for the curing period of 90 days from 7 days. Both the combinations with iron slag and copper slag mixed with sand separately had about an average of 85% increase in the flexural strength for the aforementioned period of curing. The two-way analysis of variance (ANOVA) indicated that the increase in flexural strength was significant for all the combinations mentioned before. The outcome of this research could be of interest to both academicians as well as practitioners in this field as the use of these substitute elements for sand are addressing environmental as well as solid waste management issues.

Keywords: Iron slag; copper slag; sustainable construction; workability; flexural strength.

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The Effect of Process Parameters on Quality Characteristics in the Drilling of Al-MMCs

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Alumnium metal matrix composites (Al-MMCs) became most promising materials in defense, automotive and aerospace applications because of their enhanced properties of requirement over the conventional engineering materials. Silicon nitride (Si3N4) found to be a promising reinforcement with Aluminium (Al) with improved creep property and compressive strength. Drilling is the operation to be performed on the components to fasten each other firmly in assembly operation. Poor quality of drilling leads to failure of the assembly which impairs the performance of the component in service. Deterioration of drilling in Al-MMCs is observed in terms of out of roundness, delamination, high surface roughness which must be reduced to ensure the quality of a hole. Improper selection of cutting parameters leads to poor quality of hole in drilling of Al-MMC. To address this issue, Present work focusses on investigating the effect of process parameters such as feed rate and spindle speed on quality characteristics of hole i.e., sur-face roughness (Ra) and circularity at entry and exit in drilling of Al6061 reinforced with different volume proportion of Si3N4 (0%, 5% & 10%) fabricated by stir casting. Feed rate (0.125, 0.575 and 1.25 mm/rev) and spindle speed at three levels (300, 580, 1160 rpm) respectively along with drill bit of different diameter (6mm, 8mm, 10mm) are considered as the control factors. Drilling is performed using automatic radial drilling machine based on the taguchi's L27 orthogonal array. Optimum parameters for Ra and circularity of hole at entry and exit are obtained as feed rate at level 1(0.125 mm/rev), spindle speed at level 1 (300rpm), diameter of drill at level 2 (8mm), % Vol. of Si3N4 at level 2 (5%). Analysis of Variance (ANNOVA) results witnessed that spindle speed is the most influential parameter on Ra and circularity of hole at entry and exit followed by feed rate.

Keywords: Al-MMCs; Drilling; Surface roughness; Circularity; ANNOVA.

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Strength and Durability Properties of Geopolymer Mortar Made With Concrete Waste Powder

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With the each passing season, the need for sustainability is growing exponentially. This target of sustainability can only be achieved by innovation in new materials and technologies. Geopolymer binders are those innovative materials that can replace cement and can play a vital role in attaining the sustainability in infrastructure. This paper discusses the effective utilization of Concrete Waste Powder (CWP) as a binder to access the strength and durability properties of geopolymer mortar. Herein a CWP was partially replaced with Ground Granulated Blast Furnace Slag (GGBS) at different replacement levels of 0%, 10%, and 20%. The alkaline solution for geopolymer mortar was made from sodium hydroxide and sodium silicate solutions. For all geopolymer mortar mixes, 0.45 alkali/binder ratio,12 molarity (M) of sodium hydroxide, 2 of sodium silicate/sodium hydroxide ratio, and 0.35 of water/solid were kept constant. The strength property in terms of compressive strength and durability was accessed in terms of water absorption and porosity of all geopolymer mortar mixes at both ambient and heat curing conditions at 7 and 28 days. The presence of silica, alumina and calcium in CWP make it as a potential binder for geopolymer mortar. The results suggest that increasing the substitution of GGBS with CWP improves the strength and durability of geopolymer mortar mixes by providing appropriate calcium content along with geopolymer reaction. The compressive strength increases and water absorption and porosity decrease significantly with 20% content of GGBS. The utilization of CWP in production of geopolymer mortar source from concrete waste can help to achieve sustainable environment.

Keywords: Geopolymer mortar, Concrete waste powder, GGBS, Compressive strength, Water absorption

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Modelling of AR88 Dye for Residence Time Distribution Studies and Adsorption onto Ocimum Sanctum in Packed Bed Reactor

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One of the most critical environmental issues confronting humanity today is the worldwide pollution of freshwater by industrial chemical compounds such as dyes. Adsorption is an excellent way to remove toxins from water. The studies can be carried out in batch as well as in continuous mode. In this research initiative, analysis of flow characteristics, system ideality along with mixing inside the column was carried out in the form of residence time distribution (RTD) experiments. This paper discusses studies of RTD for which the packed bed column was filled with green synthesized CuNps (adsorbent). The experiment was performed for varying flow rates of AR88 dye by utilizing potassium chloride for tracing purposes. The dispersion coefficient found from the RTD studies was then utilized for estimation of the mass transfer coefficient.

Keywords: Residence time; Packed bed reactor; Adsorption; Nanoparticles; Tracer testing; Dispersion coefficient

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Synthesis and Electrochemical Characterization of Activated Porous Carbon Derived From Walnut Shells as an Electrode Material for Symmetric Supercapacitor Application

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One of the greatest options to address the growing need for hybrid energy storage systems is a supercapacitor with high specific capacitance, high power density, and more charge and dis-charge cycles. The valorization of Walnut shells, a bio waste, into an activated biocarbon electrode material for the symmetric electric double-layer supercapacitor (EDLC), has been done. The valorization method comprises of two-steps for the synthesis of activated biocarbon which are thermal carbonization and $ZnCl_2$ chemical activation of walnut shells at 700°C. The sample has good long-term stability and a specific capacitance of 50 Fg^{-1} @1 Ag^{-1}, making it an excellent supercapacitor electrode material. So, the symmetric electric double-layer capacitor's (EDLC) promising electrode material was found to be porous AC samples made from walnut shells.

Keywords: Biowaste, porous carbon, electrode material, energy storage, supercapacitor

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Electrochemical-Oxidation of a β-blocker Drug Propranolol in Biomimetic Media of Surface-Active Ionic Liquid and A Conventional Cationic Surfactant at Glassy Carbon Electrode

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The electrochemical studies of drug and micellar aggregates of surfactants have become mode of interest nowadays. This aggregation of micelles resembles to mimic structure of biological membrane. It also helps to regulate the pharmacokinetic properties of medicines as they offer a path for formulations with controlled release. Propranolol (PPL) is a beta-blocker drug which is used as medication for treatment of hypertension, cardiac arrhythmias, atrial fibrillation and also prevents migraines. The electro oxidation of Propranolol was observed using a glassy car-bon electrode in Cationic surfactants and ionic liquid surfactants having same chain length using Cyclic voltametric Technique. The well-defined single irreversible peak was found in the potential range of 0.6 to 1.6V at room temperature. Propranolol in absence and presence of both the surfactants have been discussed in pre and post micellar concentration. The Scan rate and effect of concentration were evaluated in presence and absence of surfactants in biphasic condition of surfactants. The diffusion -controlled and irreversible process were observed in both the surfactants involving the adsorption effect. These interaction of PPL in presence of different cationic micelles provides the effective approach in estimation of stability of radicals in biological mimetic system.

Keywords: Surfactants, Micelles, Propranolol, Binding, Cyclic-voltammetry

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Investigation on the Acoustic Performance of Micro-Perforated Panel Integrated Coiled-Up Space Acoustic Absorber

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Recently, increased attention is given to minimize the effects of noise pollution on living beings. The attenuation and manipulation of sound waves with low frequency components are quite difficult with traditional absorbers due to inherent properties induced by large wavelengths and yet particularly critical to modern designs. In this study, a parallel arrangement of coiled-up space cavity and micro-perforated panel (MPP) is considered as the absorber configuration. The coiled-up space consists of a front panel with an orifice and a rigid backing panel enclosing an arch-shaped concentric channel. The entire coiled-up space length is provided with two varying cross-sections. By this arrangement, the sound path is squeezed into a reasonably small volume enabling sound absorption at low frequencies. A thin panel with numerous perforations is the main constituent of MPP. It is backed by an air cavity and terminated by a rigid backing. Here in this configuration, micro perforations are provided on the front panel of the coiled-up space, which ensures simultaneous entry of acoustic waves into the micro-perforations and coiled-up space structure. The absorption characteristics of the present configuration is studied numerically and analytically. The combined structure with parallel combination of coiled-up space and MPP resulted in the abatement of more than 70% of sound in the frequency range of 321 Hz to 853 Hz. The present absorber has only 5.5 cm thickness, which is subwavelength also.

Keywords: Micro Perforated Panel, Acoustic absorption, Coiled-up space, Low-frequency, Broad bandwidth

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Comparative Analysis of Crystalline Silicon Solar Cell Characteristics in an Individual, Series, and Parallel Configuration and Assessing the Effect of Temperature on Efficiency

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Solar energy is gaining immense significance as a renewable energy source owing to its environmentally friendly nature and sustainable attributes. Crystalline silicon solar cells are the prevailing choice for harnessing solar power. However, the efficiency of these cells is greatly influenced by their configuration and temperature. This research aims to explore the current-voltage (I-V) characteristics of individual, series, and parallel configurations of crystalline silicon solar cells under varying temperatures. Additionally, the impact of different temperature conditions on the overall efficiency and fill factor of the solar cell was analyzed. With the aid of a solar simulator and required conditions, the I-V characteristics of each configuration- individual, series, and parallel were obtained. The solar panel was subjected to various temperature settings and I-V characteristics were obtained for each configuration to calculate the maximum power and fill factor for each case. In addition to this, The results showed that the parallel configuration has a larger power output, followed by the individual and series configurations. Additionally, the temperature of the solar panel had a significant effect on the output power of the solar cells. The maximum output power is also affected by temperature variation. The fill factor on the other hand was observed to be dependent on the configuration but had no significant variation with respect to the temperature. The effect of solar irradiance was also observed with respect to the configuration at a definite temperature. This research offers valuable insights into the ideal configuration and optimal temperature for achieving maximum efficiency in crystalline silicon solar cells. Hence, a definite configuration with optimum temperature yields maximum power output and helps in attaining maximum efficiency. Furthermore, the highest efficiency was observed under the condition of peak solar irradiance. These findings hold significant implications for the design of more efficient and economically viable solar cells to enhance renewable energy generation.

Keywords: Crystalline silicon solar cells, configurations, temperature, current-voltage characteristics, solar irradiance.

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Insights and Implications: Unraveling Critical Factors in Resistance Spot Welding of Dissimilar Metals through SS 347 and DSS 2205 Welds

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The examination of microstructural and mechanical properties in resistance spot welding (RSW) of dissimilar metals holds significant industrial importance. The dissimilar welding is inevitable in any fabrication as several material will be involved in the fabrication of a product. There is only a meagre literature available on the weld characteristics of the austenitic and duplex dissimilar welding. Hence there is a scope for research in this area and there is no research data available on the dissimilar welding of AISI SS 347 and DSS 2205. This research focuses on analyzing the microstructure and mechanical characteristics of austenitic SS 347 and duplex DSS 2205 stainless steel dissimilar welds. This is achieved by varying the weld parameters welding current and heating cycle at three levels each. The Taguchi's L9 orthogonal array experimental design was used for experimentation and 9 experimental runs were conducted. All the welded specimens were subjected to macrograph studies for analyzing the nugget quality. In order to investigate the mechanical strength of the welds, the specimens were fractured through tensile shear test. The welded specimens were studied under scanning electron microscope (SEM) to observe the microstructure of the weldments. The specimen 9 was subjected to microhardness test. The macrograph study reveals that the nugget size increases with the increase in welding current and heating cycle. When the welding current exceeds 7.5 kA, the nugget size exceeds the threshold value of $4\sqrt{t}$, where 't' is the thickness of the parent metal. A similar behavior is also noticed with the increase in the heating time. The tensile shear test results clearly indicates that as the nugget size increases, the tensile force also increases. The sample 9 absorbed a maximum tensile force of 18 kN. Moreover, the failure mode observed during the tensile shear test of the specimens is influenced by welding current and heating cycles. All the samples except sample 9 had failed through interfacial failure. The sample 9 failed through pull our failure mode. The microhardness test results indicate that the hardness is maximum at the fusion zone. The maximum hardness value recorded was 320 HV. These findings shed light on the critical factors affecting the RSW process for dissimilar metals, providing valuable insights for industrial applications and advancements in this field.

Keywords: SS 347; DSS 2205; Tensile shear test; Dissimilar resistance spot welding, Microhardness.

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Advances in Inorganic Nano-Filler Enabled Rubber Nanocomposites

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Conventional fillers such as carbon black and silica that are used in rubber products are often unable to meet today's demanding requirements. Several strategies have been employed in this regard to enhance the performance of the rubber products. Among these strategies, use of inorganic nano-fillers have been found to have promising potential owing to the outstanding and unique features of nanomaterials including enhanced surface area, high mechanical performance and possibility to obtain synergistic effect when used in combination with conventional fillers. Both carbon and non-carbon-based nano-fillers have been investigated towards enhancement of mechanical, electrical and physico-chemical properties of rubber products. Among the carbon-based inorganic nano-fillers, carbon nanotubes (single walled and multi walled), graphene, graphene oxides have been incorporated within natural and synthetic rubber matrices. Additionally, non carbon-based inorganic nano-fillers such as nano-clays, halloysite nanotube, etc. have also been investigated for developing high performance rubber nanocomposites. Against this background, this article provides a brief overview of the emerging trends in the field of inorganic nano-fillers based rubber nanocomposites.

Keywords: Rubber nanocomposite; carbon nanotubes; graphene oxide; graphene; high performance composites; mechanical properties.

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Blockchain for Secure Sharing of Neonatal Data

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Neonate is an infant less than four weeks old. According to WHO Report 2021, out of 5 million deaths of under-five children worldwide, 2.3 million are neonates. In India, over half of the under five deaths occurs during the first four weeks. Reducing newborn mortality to 12 per 1,000 live births by 2030 is a Sustainable Development Goals (SDG) target 3.2. Neonatal Intensive Care Unit (NICU) is a specialized unit which takes care of sick or premature neonates. Medical practitioners working at NICUs have been saving the lives of many thousands of children born sick or premature. According to the literature, various studies have been conducted to build predictive models for early detection of diseases in neonates but very few are trained in the Indian context. Early detection of a disease is vital to provide timely treatment and prevent morbidity or mortality. One of the major challenges faced by researchers to build a good predictive model for early detection of neonatal disease is the amount of data available for training, hence there is a need for collaborative research among NICU's. However, existing data-sharing systems face challenges such as protecting the privacy of the neonates, ensuring informed consent from appropriate owner, achieving interoperability, complying with legal and regulatory frameworks, maintaining data quality and integrity, establishing trust, and fostering collaborations among NICU's. In this paper, we propose a blockchain based data sharing approach which addresses the challenges of sharing neonatal data. The study focuses on Ethereum as the underlying blockchain platform and utilizes Ethereum Remix as the integrated development environment (IDE) for smart contract development and testing. The results of this study suggest that blockchain technology improves data exchange among NICU's by offering a decentralized, transparent, immutable and secure infrastructure. The proposed solution increases interoperability, facilitates trusted data interchange, improves data integrity, and gives parents/guardians more control over their neonate's data. Researchers can get access to retrospective neonatal data with proper consent from data owners to build better predictive models which can aid the medical practitioners at NICU to make informed decisions leading to improved care outcomes for critically ill or premature neonates.

Keywords: Neonate; NICU, Data Sharing; Blockchain; Ethereum; SDG 3.2

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Comparative Evaluation of the Microleakage of Two Bonding Systems Pretreated With Chitosan Nanoparticles and Restored With Composite Resin: An In Vitro Study

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Prime and bond and Scotchbond universal are two newly introduced universal dental adhesive systems. The purpose of this study was to evaluate and compare the microleakage of class II cavities restored with Bulk fill composite using Prime and bond universal adhesive well as Scotchbond universal adhesives that were pretreated with chitosan nanoparticles. The fluid filtration model was used to check the microleakage. 84 caries free freshly extracted maxillary premolars were used in this study. Mesio-Occlusal Class II cavity preparation was done with no.245 carbide bur at high-speed with air/water spray. The specimens were randomly divided into 3 groups. Group I: Teeth restored with composite without adhesive, negative control (n=12). Group II: Teeth restored with composite using Prime and bond universal adhesive (n=36). Group III: Teeth restored with composites with Scotchbond universal adhesive (n=36). Group II and III (n=18 each) were further subdivided into Chitosan pretreated and non pretreated groups and named as II a ,II b , III a, III b respectively. The groups were restored with the above materials as per manufacturer's instruction. The teeth were immediately subjected to microleakage test using fluid filtration model. The results were analysed at the end of 24 hours and 1 month respectively. Statistical analysis was done using ANOVA and Kolmogorov-Smirnov test. The significance level was set at $P \leq 0.05$. The mean microleakage was least for Prime and bond Universal group pretreated with Chitosan (0.00145 and 0.00205) at both time periods. This was followed by Scotchbond universal group pretreated with Chitosan (0.00149 and 0.00203). This was followed by Prime and Bond without pretreatment with Chitosan (0.00229 and 0.00225) and Scotchbond universal group without pretreatment with Chitosan (0.00213 and 0.00214). Chitosan pretreatment has significantly reduced the microleakage of teeth restored with composite using the universal adhesive system.

Keywords: Chitosan Nanoparticles; Adhesive dentistry; Scothcbond universal; Prime and bond universal

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Experimental and Numerical Investigation on Damage Resistance Characteristics of Woven E-Glass/Epoxy Composite Laminates Subjected to Drop-Weight Impact

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The utilization of composite materials in structural components has been on the rise in the aerospace, automotive, and marine industries. Although these materials offer numerous benefits, they can be damaged by various sources, such as low-velocity drop-weight impacts. Debris on a runway or tools falling onto composites can cause this type of impact, which has led to extensive research on crashworthiness and impact damage assessment. This study aimed to assess the response of woven E-Glass/Epoxy composite laminates under low-velocity Drop-weight impact. Tests were conducted using experimental methods and numerical simulations with a Drop-weight impact testing machine and Explicit Finite Element software LS-DYNA. The experimental tests were performed according to ASTM standards, with varied magnitudes of initial impact energy ranging from 7.85 J to 23.54 J and specimen thickness of 4 mm. Force-Time, Energy-Time and Force-Displacement histories obtained through the experiments and numerical analyses along with images of damaged specimens were examined. The effective stress contours are also illustrated to gain a deeper comprehension of the stress distribution in the laminates. The findings demonstrated that the impact energy significantly influences the impact response of the specimens, and both the experimental and numerical analyses yielded similar results, validating the modeling approach for the impact problem in composite material. The study provides insight into the damage mechanism of woven E-Glass/Epoxy composite laminates under Drop-weight impact and is expected to contribute to a better understanding of their response in low-velocity drop-weight impact events.

Keywords: Drop-weight impact; LS-DYNA; Damage resistance; E-Glass/Epoxy.

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A Computational Fluid Dynamics Study on Characteristics of Flow Separation in Flow Rate Measurement Using Multi-Hole Plates

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Flow rate measurement is a challenging task in the industry as there is no general-purpose measuring instrument for all appliances. However, orifice plates with multiple holes can be employed to measure the flow rate accurately. A computational fluid dynamics (CFD) based numerical study has been conducted to investigate the flow separation characteristics caused by the flow of water in multiple-hole orifice plates using ANSYS FLUENT software. The study includes single and multiple-hole orifice plates, with orifices of 36% area ratio, equivalent diameter ratio (β-ratio) of 0.6, and hole number configurations of 1H, 4H, 9H, 16H, and 25H. The discharge coefficient for flow through multiple-hole orifices has been obtained and compared for holes distributed in circular and square configurations. The significant parameters considered for the analysis are the hole number, distribution of holes, pressure drop, and reattachment points. k-ε turbulence model was employed to study velocity fields, reattachment length, and discharge coefficient. The study discusses the effects of hole number and its allocation on the reattachment length and discharge coefficient. Results are presented in the form of pressure variation comparisons, Downstream Recovery distance plots, recirculation zone plots and percentage change in Coefficient of discharge. The study revealed that the number of holes on the plate significantly affects the pressure drop across the plate, recirculation zone, and the orifice's discharge coefficient.

Keywords: CFD; Multi-hole plates; Turbulence Model; Flow separation.

Development of an Eco-Friendly Crop Protection System

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About 58 percent of India's population relies primarily on agriculture as a source of income, making India one of the key players in the global agricultural industry. The invasion of wild animals in agricultural farm is one of the main issues Indian farmers confront. From the real time questionnaire survey conducted on farmers, it was concluded that, farmers experience heavy crop loss due to uncontrolled attack of wild animals, leading to reduced yields and food insecurity. In addition to crop loss, wild animal attack poses threat to human safety. At the same time, animal deaths are reported due to erratic use of ordinary electric fence. This paper tries to develop a socially beneficial solution that will assist the farmers to deter the attack of the wild animals. In order to prevent animals from entering in to the field, a solar-powered fence, an ultrasonic wave emitter and an instant alert messaging system is included. This idea uses a night vision camera and a machine learning model to detect the animal presence around the agriculture region. If the detected animal poses a threat, the programmed control device activates the electric fence in pulsating voltage. When an animal touches the fence, it receive a mild shock that is intended to be unpleasant but not harmful that helps to keep animals away from the fence. Thus animals are not severely harmed in the project. An ultrasonic wave emitter is activated as an animal repulsion technique. Also, farmer gets notified by a mobile phone message whenever animal entry to the field is detected. This smart system stands advantageous over ordinary electric fence as it turns ON only when animal detection takes place and thus saves energy. It is to be noted that the entire system is powered by solar energy. The advantages of using solar energy does not need a preface. Overall, this eco-friendly crop protection system shows great potential for improving food security and reducing conflicts between farmers and wild animals in rural areas. . Thus eco-friendly crop protection system is a necessary measure to protect lives and livelihood of farmers without harming the wild animal. This helps to ensure the integrity and productivity of the agricultural fields, making this system an essential tool for crop protection.

Keywords: Agriculture; Wild animal attack; Machine learning model; Smart fence; Ultrasonic wave emitter

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Investigation of Structural and Electrochemical Properties of Hetero Atom Doped Reduced Graphene Oxide for Supercapacitors

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Graphene is one of the attractive carbon materials for the application in supercapacitor owing to its fascination properties. Heteroatom doping significantly enhance the electrochemical properties of graphene. However, the simple technique and bulk production are extremely important to realize their application. Hydrothermal reduction of graphene oxide (GO) is one of the finest ways to synthesize graphene with noticeable hetero atom doping into graphene lattice. Herein, we presented the properties of hetero atom doped reduced graphene oxides namely, Nitrogen doped reduced graphene oxide (N-rGO) and Sulfur doped reduced graphene oxide (S-rGO). Presence of N, S atoms in graphene lattice using XPS studies. Structural and morphology characterization is performed by XRD, FTIR, Raman and SEM analysis. Supercapacitor performance is evaluated on two electrode symmetric cell. The electrochemical properties are significantly improved upon doping. A high specific capacitance of 142 F/g and 132.5 F/g at current density of 1 A/g is attained for N-rGO and SrGO, respectively. Both the samples have shown good rate capability. Doping induced additional pseudocapacitive property to the graphene material which enhanced the overall performance of the materials. This study revealed that the N-doping more effective in enhancing the properties of rGO in comparison with S-doping.

Keywords: reduced graphene oxide; hydrothermal; hetero atom doping; energy storage; supercapacitor

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Multi-Modal Deep Learning in Early Autism Detection – Recent Advances and Challenges

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Autism Spectrum Disorder (ASD) is a global concern, with a prevalence rate of approximately one in 36 children according to estimates from the CDC (Centers for Disease Control and Prevention). Diagnosing ASD poses challenges due to the absence of a definitive medical test. Instead, doctors rely on a comprehensive evaluation of a child's developmental background and behaviour to reach a diagnosis. Although ASD can occasionally be identified in children aged 18 months or younger, a reliable diagnosis by an experienced professional is typically made by the age of 2. Early detection of ASD is crucial for timely interventions and improved outcomes. In recent years, the field of early diagnosis of ASD has been greatly impacted by the emergence of Deep Learning models, which have brought about a revolution by greatly improving the accuracy and efficiency of ASD detection. The objective of this review paper is to examine the recent progress in early ASD detection through the utilization of multimodal deep learning techniques. This study utilized a systematic literature review using the PRISMA and a qualitative synthesis methodology. A thorough search was conducted in scientific databases, including PubMed, Scopus, and IEEE Xplore, using relevant search terms related to the early detection of ASD and deep learning techniques. The search encompassed papers published between 2019 and 2023. Ultimately, 35 papers were selected for data synthesis and analysis in this review. The analysis revealed that integrating multiple modalities, including neuroimaging, genetics, and behavioral data, is key to achieving higher accuracy in early ASD detection. It is also evident that while neuroimaging data holds promise and has the potential to contribute to higher accuracy in ASD detection, it is most effective when combined with other modalities. Deep learning models, with their ability to analyse complex patterns and extract meaningful features from large datasets, offer great promise in addressing the challenge of early ASD detection. Among various models used, CNN, DNN, GCN, and hybrid models have exhibited encouraging outcomes in the early detection of ASD. This study had also identified potential research gaps and challenges in the current literature and proposed future research directions to address them. The systematic review highlights the significance of developing accurate and easily accessible tools that utilize artificial intelligence (AI) to aid healthcare professionals, parents, and caregivers in early ASD symptom recognition. These tools would enable timely interventions, ensuring that necessary actions are taken during the initial stages.

Keywords: Autism Spectrum Disorder (ASD); Neuroimaging; Deep Learning (DL); Artificial intelligence (AI); Multimodal

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Dimensionality Reduction Algorithms in Machine Learning: A Theoretical and Experimental Comparison

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The goal of Feature Extraction Algorithms (FEAs) is to combat the dimensionality curse, which renders machine learning algorithms ineffective. The most representative FEAs are investigated conceptually and experimentally in our work. First, we discuss the theoretical foundation of a variety of FEAs from various categories like supervised vs. unsupervised, linear vs. nonlinear and random projection-based vs. manifold-based, show their algorithms and compare these methods conceptually. Second, determine the finest sets of new features for various datasets, as well as in terms of statistical significance, evaluate the eminence of the different types of transformed feature spaces and power analysis, also determine the FEA efficacy in terms of speed and classification accuracy.

Keywords: Feature Extraction; Dimensionality Reduction(DR); Manifold, Multi-class datasets.

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Internet of Things Enabled Machine Learning Based Smart Systems: A Bird's Eye View

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Machine learning (ML) helps the Internet of Things (IoT) become widely used by automatically identifying data patterns and extracting important insights from the vast pool of observed data. To efficiently serve corporations, governments, and individual consumers, the Internet of Things IoT needs machine learning (ML). IoT gathers environmental data and automates decision-making using sophisticated methods based on human judgement. Data, application, and industry perspectives are used to organize and assess machine learning-IoT literature. We discuss how machine learning, and the Internet of Things can make our surroundings smarter by reviewing relevant research. Our analysis includes many cutting-edge methods. We also discuss the pandemic control, networked enabled cars, distributed computing, trivial deep learning, and the Internet of Things. Technological, personal, commercial, and societal concerns face the Internet of Things. Learn how to use the IoT to improve society's well-being and longevity. We also take a case study to find comparative results among various machine learning methods integrated with IOT.

Keywords: IOT; Machine Learning; Smart Systems; cloud computing; deep learning.

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Mild Adulteration Using Spectroscopy and Machine Learning: A Review

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Milk adulteration is the process of adding various substances to milk with the intent of increasing the volume or improving the appearance of the product. Common adulterants include water, urea, starch, detergent, and even animal fats. This practice is harmful to consumers as it lowers the nutritional value of milk and exposes them to potential health risks such as bacterial infections, kidney damage, and gastrointestinal disorders. Milk adulteration is a widespread problem in many countries, particularly in developing nations where regulations are often lax or poorly enforced. To combat this issue, various measures have been taken such as implementing stricter regulations and penalties for violators, increasing public awareness about the dangers of adulterated milk, and encouraging farmers to use proper milking and storage practices. Overall, milk adulteration poses a serious threat to public health and safety, and it is essential that consumers remain vigilant and informed about the type of product being consumed. In the current study, it is observed, the diaries and milk-farms are using the adulterants to such an extensive amount that, it is leading to various health issues, as milk as a product is used by every age of human race. The NIR spectroscopy which is used for the study, has helped to highlight the difference between and un-adulterer and adulterer milk sample. The adulterant used in the current study is urea with a concentration of 10%.

Keywords: Milk; Adulterants; FTIR; NIR; Machine Learning Models.

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A Futuristic Approach for Security in Cloud Datacenters Using Hybrid Algorithm

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All associations used on-premises data focuses. An on-premises data focus suggests that the association keeps up all the IT system expected by the trade nearby. An on-premises data focus consolidates everything from the servers that support web and email to the getting sorted out gear communicating them to back establishment equipment like uninterruptible control supplies. Contingent upon the association, this could reach out from a server storage room to a monstrous, dedicated classified data place like those worked by huge tech associations. Data focus organization is not confined to ensuring that the establishment and program game plans are helpful. Data focus chiefs are in addition trustworthy for the security of their circumstances. Getting into a data community office is sensibly compelled. Most don't have outside windows and by and large couple of entries center. Security watches the inside of the structure screen for dubious activity using film from observation cameras presented along the outside line. This integrates using strong check measures, like two-factor confirmation, for all clients. It also suggests completing encryption for all data in movement, both inside the data place and between the data community and any external structures. The components of data centers must be safeguarded against physical threats. A data center's physical security controls include a secure location, physical access controls for the building, and monitoring systems. As organizations relocate on-premises IT frameworks to cloud specialist co-ops, cloud information capacity, cloud foundations, and cloud applications, it's vital to comprehend the safety efforts and the service Level Arrangements they have set up.

Keywords: Cloud Datacenter; Cloud Parameters; Security System; Cloud Component; Security Parameters; Cloud Datastores.

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Cloud Service Broker Using Ontology Based System

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Cloud computing offers more advantages to clients and associations regarding capital uses and working costs investment funds. This study gives an ontological model of the cloud fabricating space to help data trade between the cloud-producing assets. The ideas of the proposed cosmology depend on a writing survey of models of cloud and models of assembling. In the research article the problem addressed is how cloud brokers are providing cloud services in an efficient way to cloud users. The main prologue to an ontology-based, process-situated, and specialist framework that is autonomous of society that permits most associations to utilize it. This is by characterizing, as well as bringing in the metaphysics of the public and some cycle designs, which might be started up from the cosmology of the cycle into the framework. The course arrange is associated with the Infrastructural Space and organizes the resources of sort figure, stockpiling, and organization in dealer resources and cynic resources. The rising number of Cloud providers, the nonappearance of interoperability, and the heterogeneity in current open Cloud stages lead to the requirement for creative frameworks to track down the foremost fitting Cloud resource plan as successfully and mechanized as may be anticipated. In this paper, we depicted the building arrangement of a Cloud organization made of two agreeable modules. The Cloud Agency, whose objective is to naturally secure assets from suppliers on the premise of SLA evaluation rules and find the foremost reasonable Cloud supplier that fulfills users' prerequisites, and the Semantic Motor, whose objective is to make a rationalist depiction of assets based on users' benefit pre-requisites and a brokering framework.

Keywords: Computing parameters; Cloud Services; Cloud Brokers; Cloud Resources; Scheduling; Cloud Ontology; Cloud Simulation.

Discounts Based Cloud Resource Management Using Cloud Broker

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Associations require a technique for checking asset use to try not to disregard SLAs and guarantee that assets are proficiently dispensed to specific cycles. A method for allocating, managing, and monitoring cloud resources is provided by cloud resource management systems. They permit you to make and oversee pools of assets, allocate those assets to explicit clients or applications, and track how they are being utilized. Users will be able to request and provision resources as needed through a self-service interface provided by a good cloud resource management system. Cloud asset the board is significant because it empowers the proficient and successful utilization of cloud assets. At the point when you have a deficient comprehension of how your assets are being utilized, it can prompt wasteful spending and an absence of versatility. Additionally, cloud resource management aids in cost savings for businesses. When compared to using a cloud provider, businesses that manage their own resources frequently achieve greater efficiency. A portion of the manners in which that IT robotization is helping organizations in dealing with their assets incorporate setting boundaries for the greatest and least number of virtual machines (VMs), setting look-ahead times for VMs to turn up, and halting VMs when they are inactive and at this point not needed for occupations. Moreover, IT organizations might profit from laying out a structure of cautions and warnings to further develop perceivability and command over asset utilization. Cloud computing is a model for empowering omnipresent, helpful, on-request network admittance to a common pool of configurable processing assets (for example networks, servers, capacity, applications, and administrations) that can be quickly provisioned and delivered with negligible administrative exertion or specialist organizations association. Distributed computing is a financial model for huge corporates as it kills the requirement for beginning interest in capital or framework cost.

Keywords: Discount parameters; Cloud Resources; Resource Management; Resource Methodology; Resource Types; Discount Types.

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Multi-Level Cloud Datacenter Security Using Efficient Hybrid Algorithm

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Security is presently the main boundary for cloud-based administrations. It isn't adequate to just consolidate the cloud by adding a couple of additional controls or component answers for your current organization security programming. Businesses must utilize both virtual and physical information center security frameworks to keep it secure. As well as shielding the association's computational assets, express organization security endeavors ought to be executed to hinder malware ambushes and distinctive perils from entering the server cultivate. Server cultivate security is the act of applying security controls to the server cultivate. The objective is to defend it from dangers that may jeopardize the secrecy, judgment, or openness of mental property or commerce data resources. These are the fundamental central focuses of all assigned attacks, and in this way require a hoisted degree of security. Hundreds to thousands of physical and virtual servers are partitioned up into information centers agreeing to application sort, information classification zone, and other criteria. To protect applications, framework, information, and clients, information center security takes after the workload over physical information centers and multi-cloud situations. It too applies to open cloud data centers. All server ranches ought to protect their applications and data from a rising number of refined threats and around the world ambushes. Each organization is at chance of assault, and numerous have been compromised without being mindful of it. An evaluation of your resources and business necessities is important to improve a spotless way to deal with your way of life and cloud security technique. To deal with a strong mixture, multi-cloud wellbeing program, you should lay out perceivability and control. You can consolidate incredible controls, organize responsibility dispersion, and lay out fantastic gamble the board with the assistance of safety items and experts.

Keywords: Cloud Security; Security Parameters; Cloud Resources; Security Techniques, Security Types.

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Progressive Reservation of Cloud Services Using Multi Cloud Broker System

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Cloud brokers play a crucial role in providing an effective service by utilizing cloud computing. The middleware known as cloud brokers aids in the provision of effective cloud services to cloud users. There are a lot of cloud brokers who offer cloud services to cloud users on a reservation-in-advance basis so that they don't have to rush to use the cloud. Cloud organizations agent is an IT work and arrange of activity in which an organization or other component improves at slightest one cloud organizations for the good thing about at slightest one buyer of that help by implies of three basic employments counting combination, joining and customization trade. Cloud services are presently more than ever an awfully vital portion of the ICT frameworks abused by companies from numerous distinctive businesses. Since cloud innovation gives a Cloud Benefit Brokerage stage for them to run their delicate and basic operations, it has gotten to be exponentially acknowledged by businesses all over the world. As worldwide workplaces, providers, and other accomplices within the generation chain can share data in genuine time, Cloud Benefit Brokerage has significantly diminished handling costs, expanded adaptability, and decreased downtime. A Cloud Organization Dealer arrange got to provide a profitable strategy for restricting induction to distinctive components of the cloud the board organize. Clients' ought to be able to safely construct, create, and spare their claim reports, and there ought to be a centralized database detailing information from different live nourishes of clients. Utilizing the proposed methodology system, users are provided with the reserved services that best suit their needs. Effective services were the subject of this research paper. The proposed system performs best due to its complexity.

Keywords: Cloud Computing; Cloud Parameters; Cloud Brokers; Mathematic Methodology; Cloud Resources; Cloud Reservation System.

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Accessing the Morphology and Shoreline Changes of Kallai River Mouth by using Remote Sensing and GIS, Kozhikode District, Kerala

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The present study investigates coastal changes due to erosion and accretion processes and also the shoreline changes across the river mouth of Kallai. The parameters analyzed for the study include Geology, Geomorphology, and Shoreline changes. Coastal erosion removes the sediments from the nearshore at a significant distance thereby seawater intrude beneath the freshwater by reducing fresh groundwater head at transition zone. The geomorphological landform units identified in Kozhikode are alluvial plain, flood plain, valley fill, linear ridge, hillcrest, sloping terrain, rocky slope (scarp face) and hilly terrain. The Geology of the area plays a key role in the shoreline change and it equally plays a role in the coastal zone management plan. This study deals with analysis of shoreline changes using satellite images like Landsat 7 and Landsat 8. The zone of erosion and accretion has been demarcated using Landsat ETM and OLI images during the year of 2005, 2010, 2015, 2019. The DSAS extension tool have been used as the software using Arc GIS software and then the End Point Rate and Linear Progression Rate is calculated from which we will get the erosion accretion rates. The EPR rate in Payyanakkal North region was 6.1 m/yr, near Payyanakkal was 1.4 m/yr ,near Chakkumkadav was 8.62 m/yr and near Thekkepuram it came like -1.6 m/ yr.The LRR near Payyanakkal North was 5.1 m/yr , near Payyanakkal was 1.68 m/yr , near Chakkumkadav was 7.88 m/yr , near Thekkepuram was -1.24 m/ yr and near Thekkepuram South was like -1.06 m/yr. In the river mouth of Kallai, we can see that there is lower erosion level near to Thekkepuram and near Chakkumkadav, there is higher erosion level. In between Chakkumkadavu and Payyanakkal, there exists higher accretion level. There is lower accretion level near to Payyanakkal. The spatial distribution of the geology map created reveals that the major portions of the study area are occupied by deposits of Quaternary and proterozoic type. Clay paleotidal flats comes under the early Holocene age. Holocene ferri sand is also visible here. Hence we can finalize that the study incorporates a detailed methodology for the morphology changes which help us to know the Erosion and accretion zones.

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Finite Element Analysis of Stress Distribution in Mandibular Fracture.

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Treatment of mandibular fractures is based on the restoration of form and function with the aim of suitable bone repair. With this intention, open reduction with stable internal fixation has been the treatment of choice. There are several possibilities for isolated fracture fixation, for example, a lag screw or straight mini plates for symphyseal fixation and trapezoidal, delta, lambda, and straight mini plates for condylar fixation. The focus of this study is on improving and facilitating the surgical approach because these fractures usually involve areas of restricted surgical access and some complications can occur, including hemorrhagic and infection events, facial nerve paralysis, and Frey syndrome (for condylar fracture treatment), as well as altered transversal dimensions (in symphyseal fractures) and wound scars in the esthetic area. The mentioned factors should be considered in the clinical decision-making process. When novel approaches are being tested, several points should be addressed; among these, stress distributions and the use of biomechanical tests or finite element model (FEM) analysis are important possibilities. FEM analysis is considered a technique that creates a precise mathematical model using computer-generated models, and has been widely used in the maxillofacial surgery literature; it has been used to investigate craniomaxillofacial fracture fixation. This study aims to use a finite element model to analyze the stress distribution that occurs in the various site of mandibular fracture when treated using 1 miniplate, 2 miniplate, 2 parallel plates, 2 or more mini plates arranged in lambda, delta or trapezoidal manner.

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Comparison of Transfer Learning Techniques to Classify Brain Tumours Using MRI Images

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Brain tumour detection and classification is one of the life-saving steps for humanity. There are many medical imaging modalities available to detect abnormal disorders in the brain. These include light, electrons, lasers, X-rays, radionuclides, ultrasound and nuclear magnetic resonance. Due to the outstanding image quality and lack of ionising radiation, Magnetic Resonance Imaging (MRI) is widely employed in medical imaging. Artificial Intelligence provides an easier way to interpret these MRIs which is otherwise a tedious and time-consuming task. Deep Learning Networks and Convolutional Neural Networks have been very good in the detection of brain tumors. In this work, the authors employ deep learning transfer techniques for the classification of brain tumours. The VGG-16, ResNet-50, and Inception v3 models with CNN pre-training have been utilised by the authors to predict and categorise brain tumours automatically. Using a dataset of 7023 MRI brain tumour images divided into 4 different classifications, pre-trained models are shown to be effective. The performance of VGG-16, ResNet-50, and Inception v3 models is compared and it is established from the experimental evaluation that ResNet-50 outperforms VGG-16 and Inception v3. Thus, the employment of ResNet-50 in tumour classification is validated and advocated.

Keywords: Brain tumour; MRI; CNN; Deep learning; Inception v3; ResNet-50;VGG-16.

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Market-Inspired Framework for Securing IoT Computing Environment

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The IoT security, also known as "Internet of things security," is the innovation component that focuses on protecting connected devices and systems on the Internet of Things (IoT). IoT includes adding a web network to a framework of connected computers, mechanical and computerized machines, objects, creatures, and people. Each thing has a unique identifier and the ability to transfer data across an organization. In any case, enabling devices to partner to the web frees them up to authentic weaknesses if they aren't properly gotten. The term IoT is enormously wide, and as this development continues to propel, the term so to speak will be more extensive. From sees to indoor controllers to video entertainment upholds, each imaginative contraption can relate with the web, or different devices, in a couple of limits. The Internet of Things organizations help to get a practical advantage by taking care of the hardships of consolidating wearables, sensors, associations, cloud, and applications without choosing security. Development is stressed over partner contraptions with each other to work with correspondence between them. The devices that are related will really need to share the information that can be used as commitment by any contraption that is dependent upon various contraptions for input. It is known as the Trap of things like the Internet; this development certifications to sort out among contraptions. With different industry-unequivocal data and IoT development expertise covering Firmware Improvement, Transportability, conveyed registering, and Data Assessment, for making the market space an impressive range for end clients. The end clients get soft assembled decisions concerning solid data assessment in IoT organizations. Now a days a lot of IoT applications , computations and organizations are utilizing the services over the Internet. These are the most important applications which need security from the cyber web. If cyber-attacks are going on in IoT devices, security is a must for the end users.

Keywords: IoT Parameters; Resource Issues; IoT Service Logic; IoT Security Process; IoT Simulation.

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Recent Developments in Machine Learning Predictive Analytics for Disaster Resource Allocation

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To be effective, evidence-driven disaster risk management (DRM) relies on a wide variety of data types, information sources, and models. Weather modeling, the rupture of earthquake fault lines, and the creation of dynamic urban exposure measures all require extensive data collection from a variety of sources in addition to complex science. The fast acknowledgment of necessities and resources amid a adversity can spare lives. Twitter may be a strong information source amid catastrophes and has been studied up on utilizing AI for situational mindfulness. There are various methodologies to utilize AI to recognize necessities and asset accessibility by implies of Twitter, however the foremost broadly recognized and exact strategies remain cloudy. Within the occasion of a catastrophe, machine learning apparatuses for designating assets are required to instantly help those in require. This overview appears a necessity for additional examination in respect to an assertion on endorsed methods for calculation demonstrate assurance, benchmarking datasets, crisis word references, word embedding techniques, and evaluation methods. As fiascos of all sorts ended up more visit, these devices have the potential to improve realtime crisis administration over all stages of a catastrophe. This study aims to provide readers, including data scientists, with a clear and uncomplicated reference on how disaster risk management systems can benefit from machine learning. On this set of technologies, which are both complicated and constantly changing, there are numerous sources of information. The volume of sensor data that can be analyzed has increased exponentially because of an enormous increase in computational speed and capacity over the past few decades.

Keywords: Machine learning (ML); pandemic management; crowd evacuation; social distance.

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Efficient Execution of Cloud Resource Management in Cloud and IoT Applications

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The Internet of Things is essential for business. It makes it possible to gather and analyze huge amounts of data in real time. IoT devices also encourage computerization. They enable individuals to gain greater control over their circumstances, well-being, and safety. As a rule, there are two principal sorts of asset the executives move toward that are worried about framework and applications. Foundation based asset the board connects with computational, systems administration, stockpiling and energy asset. All improvement groups that work with cloud situations will be influenced by the modern approaches for cloud administration. Google Cloud Resource Chief could be an offer assistance that grants clients to bunch, continuously sort out, and direct resources by affiliation, envelope, and undertaking from a singular point for control. Utilization checking, asset assignment to applications and administrations based on their prerequisites, and capacity administration guarantee that assets are utilized successfully are all components of asset administration. It might, for occasion, make utilize of robotized apparatuses to screen how its servers are being utilized, donate more assets to administrations that are in tall request, and cut back on administrations that aren't in tall request. The Internet of Things makes it conceivable to computerize regular undertakings that commonly consume a ton of assets and labor supply. Thusly trading settings considering brief environment or use is one model. This opens a great deal of assets, permitting the organization to focus on development and the bigger vision of the business. It gives information bits of knowledge to better choices, and tracks down holes in tasks and cycles, and business arrangements. It likewise makes an extraordinary association between the production line floor and the business. This implies expanded efficiency, even while reducing expenses and energy use.

Keywords: IoT System; IoT Applications; IoT Resource; Resource Management System; Resource Techniques.

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Ubiquitous Intelligent Machine Learning Resource Allocation System in IoT

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IoT Cleverly Applications are prebuilt software-as-a-service (SaaS) perform various applications that can use dashboards to analyze and display data from IoT sensors. IoT applications analyze enormous amounts of cloud-based associated sensor data using machine learning calculations. There are several security issues related to the rising request for connected gadgets and app advancement. The complete security of an IoT organizer relies upon a singular contraption within the chain. Each other gadget in this chain's security is jeopardized if one of the devices is compromised. Manufactured insights-based resource assignment can moreover help affiliations with progressing their staffing needs. By dismembering irrefutable undertaking data, recreated insights calculations can help affiliations with recognizing designs within the number of resources anticipated for a given venture type. Asset parcel may well be chosen by utilizing PC programs connected to a specific space to circulate resources thus and capably to candidates. Usually especially typical in electronic contraptions committed to coordinating and correspondence. Capable resource dispersion got to ensure work is isolated similarly among all resources to thwart staff burnout. By guaranteeing that assets have the abilities, information, and preparation required to total allotted work, successful asset assignment ought to enable groups. The security of the whole arrangement may well be effectively compromised by this. You can obtain perceivability into key execution indicators, measurements for harsh time between data by utilizing IoT dashboards and alarms. Calculations based on machine learning can identify peculiarities in equipment, send alerts to customers, and even initiate robotized repairs or proactive countermeasures. By combining several technologies that enable real-time labeling, Machine Learning and Deep Learning provide an analogy for dealing with a real-world workplace issue like labeling.

Keywords: IoT Application; Machine Learning; IoT Parameters; Resource Allocation; Optimization.

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Advancements in Plant Pests Detection: Leveraging Convolutional Neural Networks for Smart Agriculture

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Insects and illnesses that affect plants can have a major negative effect on both their quality and their yield. Digital image processing may be applied to diagnose plant illnesses and detect plant pests. In the field of digital image processing, recent developments have shown that more conventional methods have been eclipsed by deep learning by a wide margin. Now, researchers are concentrating their efforts on the question of how the technique of deep learning may be applied to the issue of identifying plant diseases and pests. In this paper, the difficulties that arise when diagnosing plant pathogens and pests are outlined, and the various diagnostic approaches that are currently in use are evaluated and contrasted. This article presents a summary of three perspectives, each of which is based on a different network design, on recent research on deep learning applied to the detection of plant diseases and pests.We developed a Convolutional Neural Network (CNN) based framework for identifying pest-borne diseases in tomato leaves using the Plant Village Dataset and the MobileNetV2 architecture. We compared the performance of our proposed MobileNetV2 model with other existing methods and demonstrated its effectiveness in pest detection. Our MobileNetV2 model achieved an impressive accuracy of 93%, outperforming some other models like GoogleNet and VGG16, which were fully trained on the pest dataset in terms of speed.

Keywords: CNN (Convolution Neural Networks); MobileNetV3; Pests Control; Smart Agriculture; Digital Image Processing.

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Predicting Employee Turnover: A Systematic Machine Learning Approach for Resource Conservation and Workforce Stability

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A company's most valuable resource is its workforce, which includes each worker. Because of the crucial role that employees play in the success of an organization, measuring employee turnover rate has become one of the most important metrics that businesses are concentrating on in the modern era. Attrition may occasionally arise owing to unavoidable circumstances such as move to a distant place, retirement etc. But, when attrition begins to cause a hole in the pockets of an organization, it is necessary to monitor the situation closely. When hiring new staff, a company must use a significant amount of its available resources. The process of rehiring employees needs to be eliminated, and a strong workforce needs to be maintained, so it is necessary to adapt the analysis of systematic machine learning models. From these models, a suitable model that gauges the risk of attrition may then be selected. This not only helps an organization save money by preserving its resources, but it also assists in preserving the status quo of its staff.

Keywords: Employee attrition; Machine learning; Descriptive analysis; Deep Learning; Random Forest.

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Design and Implementation of a Hardware-Implemented Dual-Axis Solar Tracking System for Enhanced Energy Efficiency

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This paper concentrates on the development of a closed-loop tracking of the sun (STS) that precisely follows the sun's trajectory, allowing photovoltaic panels to capture the maximum amount of solar energy. Azimuthal and elevation tracking mechanisms are included in the proposed system, and a feedback controller based on sensors monitors brightness of the sun continuously as a reference signal. The controller generates a signal to operate the tracking motor with two axes, orienting the PV panel towards the sun, when the intensity exceeds a set threshold. In both east-west (E-W) and north-south (N-S) directions, the STS tracks the sun's position independently. Dual axis solar tracking system has been made in three 335-watt panels (each generating 1 kilowatt of power) in a PV system. Three 335-watt panels were used to successfully execute the dual-axis solar tracking system, with each panel contributing to the PV system's overall power generation of 1 kilowatt. Overall, the PV system integration of a dual-axis solar tracking system with three 335-watt panels shows the potential for higher power output and energy efficiency. This configuration offers a viable means of maximizing the advantages of renewable energy sources and efficiently harnessing solar energy.

Keywords: Solar Tracking System (STS); Fixed Flat-Plate System; Dual Axis System; Azimuthal Tracking; LDR.

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Breast Cancer Diagnosis using Bagging Decision Trees with Improved Feature Selection

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Machine Learning is the science of computer algorithms that enable systems to automatically learn, adjust actions without explicit programming, and improve from experience using pattern recognition. This work offers a practical introduction to the core concepts and principles of bagging decision trees for breast cancer diagnosis. In this article three main algorithms viz. linear regression (LR), Decision Tree (DT) and Random Forest were used. Random forest used bagging techniques for selecting data points and feature optimization was also done. Through experiments it has been found that the results obtained with the bagging trees algorithm outperform the result obtained with the best decision trees parameters. A feature optimization scheme is also introduced in the selection of data points during the training phase which effectively increased the accuracy.

Keywords: Machine Learning Deep Learning (DL); Convolution Neural Network (CNN); XceptionNet; Le-Net; DenseNet; MobileNet.

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Identifying Antibiotic Resistant Mutants in β-lactamases for Class A and Class B Using Unsupervised Machine Learning

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Antimicrobial Resistance (AMR) is a significant global concern that endangers human health. Gaining insights into the factors contributing to the emergence of AMR is crucial for the preservation of existing antibiotics. Among the commonly utilized antibiotics, β -lactams hold a prominent position. It was discovered long ago that resistance to these drugs is primarily through the enzymes β-lactamases. To overcome this resistance, β -lactames are used in combination with β -lactamase inhibitors to bypass the enzymatic action. Nevertheless, there have been discoveries indicating that the enzyme has developed resistance to these inhibitors. It is crucial to comprehend the underlying mechanisms that confer this resistance and determine the specific characteristics responsible for the ability of β -lactamase enzymes to resist inhibition. The purpose of the research study is to classify and cluster the behavioural aspect of the protein structures which may be resistant to the antibiotics consumed. There is a possibility of mutation of these protein structures which may generate and create new structures which needs to be addressed. The current study incorporates the techniques of machine learning to cluster the patterns of the proteins which may be antibiotic resistant. K-Mean Clustering algorithm is applied along with PCA analysis, to verify and validate the model's accuracy. Mean Clustering Analysis is done to validate the number of clusters that were formed. It was seen that 3 clusters in Class A and 4 clusters in Class B that represent various characteristics of these mutants. The study of these characteristics is useful for understanding the inception of inhibitor resistance.

Keywords: Antibiotic; β -lactames; Machine Learning; Clustering; K-Mean Cluster; PCA; MCA.

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Deep Learning Models for Classification of Cotton Crop Disease Detection

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Plants play a vital role in the survival of all organisms. A country like India where a vast population heavily depends on its agriculture sector; crop yield should be increased to a sustainable level. Cotton being one of the most important cash crops for farmers and raw material for ever expanding Indian textile industry, a significant effort should be made to combat its plant diseases and prevent a significant loss of yield. This paper discusses the deep learning models that can be used for cotton plant disease detection such as Convolution Neural Networks, XceptionNet, LeNet, DenseNet and MobileNet using the images of the diseased and healthy cotton leaves. The training on the model is done using the dataset consisting of a total of 1711 images classified into three diseased and one healthy leaves class. The training was done keeping the input and output size constant for all the models. The DenseNet shows the best promising result with best accuracy of 98.25%. It also requires a smaller number of parameters compared to the other models. The results of the experiments are shown to compare the performance of all the models.

Keywords: Plant Disease; Bacterial Blight; Curl Virus; Fusarium Wilt; Deep Learning (DL); Convolution Neural Network (CNN); XceptionNet; LeNet; DenseNet; MobileNet.

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Ontology Based Resource Allocation in Sustainable Cloud Computing System

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Ontologies are used to see the information. Data in the executive's systems can be used to see, coordinate, picture, and even initiate modern data at any point where data is illustrated. Ontologies use semantic assessment to portray data inside an environment with interconnection relationships between heterogeneous sets. In cloud computing, asset management includes checking, apportioning, and provisioning. Servers, memory, limit, arrange, central processor, application servers, and modernized systems, in addition, known as virtual machines, are representations of cloud resources. These machines are the handling units of the cloud. a framework that uses ontologies to present the result of extracting particular types of data from unstructured or semi-structured characteristic dialect content using a component guided by ontologies. Asset assignment is the process of delegating and managing resources to support an organization's primary planning goals. Asset assignment entails overseeing large assets like hardware to make the best use of lighter resources like human capital. Resource task, otherwise called resource arranging, is the strategy for perceiving and giving out resources for a specific period to various activities. These exercises, such as administration, back, operation, and so on, can be extended or non-project work. Quality, Kindness, Protest, and Modality are the four categories. Two capabilities shape the foundation of the fourfold design. The essential refinement is between non-significant substances like modes and characteristics and impressive substances like items and sorts. Ineffective asset management has a coordinated negative impact on execution and fetched as well as a sporadic effect on framework functionality. It can also become too expensive or ineffective due to ineffective execution. Asset administration may be a crucial task for any cloud framework.

Keywords: Cloud ontologies; functions; relations; cloud resources; Ontology Parameters.

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Resource Management Techniques on the Internet of Things, Edge and Fog Computing Environments

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A speculative exhibit for distributed computing organizations is implied as the haze of mists joining different parceled mists into a solitary fluid mass for on-request tasks fundamentally put, the between cloud would ensure that a cloud might use resources outside of its run using current understandings with other cloud benefit providers. Edge processing is a rising registering perspective that insinuates a degree of frameworks and devices at or near the client. The edge is around taking care of data closer to where it's being made, engaging in dealing with additional important rates and volumes, and heading to more conspicuous activity drove happens in real time. Fog figuring could be a processing plan in which a game plan of centers gets data from IoT devices in a certain time. These centers perform continuous planning of the data that they get, with millisecond response time. The center points discontinuously send logical summary information to the cloud. An example of an edge computer is a smartphone connected to a cloud system. More like a "gateway" to insights and control over handling, haze computing. A haze computer connects to multiple edge computers simultaneously, resulting in a specialized set of devices for more efficient data handling and capacity. There are cutoff points to the actual resources and the geographic reach of any one cloud. A cloud can't help its customers if all its computational and storage capacity is used up. Inter-Cloud addresses situations in which one cloud would gain access to other clouds frameworks computing, capacity, or other assets.

Keywords: Resource Management; Edge Computing; Fog Computing; Internet of Things; Cloud Simulation.

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Enhanced Pollutant Adsorption and Antibacterial Activity of a Hydrogel Nanocomposite Incorporating Titanium Dioxide Nanoparticles

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This research delineates the synthesis and subsequent application of a hydrogel nanocomposite, enriched with titanium dioxide (TiO2) nanoparticles, as an adsorbent for pollutants and anantibacterial agent. The nanocomposite was prepared using a hydrothermal method, facilitating the efficient incorporation of TiO2 nanoparticles. Physicochemical characterizations revealed the nanocomposite's augmented adsorption capabilities, specifically for pollutants such as Congo red dye (CR), Amoxilline drug (AMX), and Chlorophenol (CPH). Notably, the study demonstrated that the nanocomposite could be completely regenerated and desorbed in water, attesting to its potential for recyclability. The antibacterial potential of the nanocomposite was also investigated, demonstrating significant efficacy against Gram-negative bacteria (E. coli and Klebsiella spp.) compared to Gram-positive strains. The findings of this study emphasize the potential applicability of the hydrogel nanocomposite as an efficient, reusable agent for pollutant removal and antibacterial activity, providing pertinent insights for environmental remediation and biomedical applications.

Keywords: Hydrogel Nanocomposite; Titanium Dioxide Nanoparticles; Pollutant Adsorption; Antibacterial Activity; Regeneration

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Enhanced Drug Delivery and Wound Healing with Novel Hydrogel Nanocomposite

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This study explores the biological activity, drug release properties, and wound healing efficacy of a novel hydrogel nanocomposite, (NaA-g-Poly(ITA-co-NaSS)/ CPL). Firstly, the physicochemical properties of the hydrogel nanocomposite surface were characterized using FE-SEM and TEM imaging, demonstrating a solid, layered morphology with many interconnected pores. Nitrogen isothermal adsorption technique further supported these observations by indicating an enhanced surface area, pore diameter, and total pore volume following hydrogel incorporation. Secondly, the in vitro release of Chlorozepam drug from the hydrogel nanocomposite was investigated, revealing pH-responsive behavior with an increased release rate at a neutral to slightly alkaline pH (7.5). This is hypothesized to be due to the increased swelling of the hydrogel at this pH, facilitating drug dissolution and release. The study also examined the antimicrobial activity of the hydrogel nanocomposite against Gram-positive and Gram-negative bacteria, as well as a type of fungus, Aspergillus flavus. The hydrogel nanocomposite demonstrated superior antimicrobial activity in comparison to CPL and (NaA-g-Poly(ITA-co-NaSS). Lastly, the hydrogel nanocomposite exhibited enhanced wound healing efficiency in mice models, healing injuries faster and more effectively. In conclusion, this study suggests that the (NaA-g-Poly(ITA-co-NaSS)/ CPL) hydrogel nanocomposite holds significant promise for various biomedical applications due to its robust antimicrobial properties, pH-responsive drug release behavior, and wound healing capabilities.

Keywords: hydrogel nanocomposite; antimicrobial activity; drug release properties; wound healing; pH-responsive behavior

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Removal of Brilliant Green Dye using Carbon-Loaded Zinc Oxide Nanoparticles: A Comparative Isotherm Study

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Adsorption is a phase transfer process extensively utilized for removing substances from fluid phases (either gases or liquids) to the solid phase, known as the adsorbent particle. This natural method is observable in various environmental compartments. In water or effluent treatments, a solid interacts with a pollutant, such as a dye. The pollutant is termed the adsorbate, and the solid is the adsorbent. This technique has proven efficient in removing a broad range of contaminants. This study investigates the use of the adsorption technique to eliminate Brilliant green dye from aqueous solutions, employing different adsorbent materials like AC, CNT, ZnO, and ZnO/AC prepared through the hydrothermal method. The compositions of these composites were elucidated using analytical techniques such as FTIR, EDX, and FE-SEM. The study also compares the efficiency of different carbon sources in removing Brilliant green dye, namely Activated Carbon (AC), Carbon Nanotube (CNT), Zinc Oxide (ZnO), and AC/ZnO Nanocomposite as adsorbents. The removal efficiency (E%) for BG dye followed the order: CNT > ZnO/AC > AC > ZnO. Additionally, a comparison was made between sonication and a shaker water bath for different carbon sources in removing Brilliant green dye. The shaker water bath demonstrated an efficiency range of 90.122% to 42.812%, while sonication showed 90.011% to 32.012%. The adsorption data aligned with the Freundlich isotherm model.

Keywords: Adsorption; Isotherms; Removal; Brilliant green dye; Activated carbon; Carbon Nanotube

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Synthesis, Characterization, and Biological Activity of a Novel SA-g-p(AAc-co-AM)/ZnO NP Hydrogel Composite

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This research investigated the preparation and efficacy of a SA-g-p(AAc-co-AM)/ZnO hydrogel composite with enhanced biological activity. The hydrogel was synthesized using the sodium alginate biopolymer through the co-polymerization method. Our findings indicate that introducing zinc oxide nanoparticles to the hydrogel amplified its biological activity. The disc diffusion technique was applied to evaluate the antimicrobial properties against two Gram-positive bacteria isolates (Staphylococcus aureus, Streptococcus epigenetics) and two Gram-negative bacteria (E.coli, Klebsiella spp.). The antimicrobial activities of three surfaces—ZnO, SA-g-p(AAc-co-AM) hydrogel, and SA-g-p(AAc-co-AM)/ZnO hydrogel composite—were assessed. Characterization of these prepared surfaces was executed using FE-SEM and EDX. The results highlighted that the ZnO NPs exhibited minimal antibacterial activity against both types of bacteria. Conversely, the SA-g-p(AAc-co-AM)/ZnO hydrogel composite demonstrated heightened antibacterial effects against Staphylococcus aureus (30 mm) and Streptococcus epigenetics (25 mm). The Gram-negative bacteria, E.coli and Klebsiella spp., recorded inhibition zones of 13 mm and 12 mm, respectively. The SA-g-p(AAc-co-AM) hydrogel showed diminished antibacterial activity relative to the composite, attributed to the absence of zinc oxide. Overall, the isolated effect of zinc oxide nanoparticles indicated a minimal antibacterial influence on all Gram-positive and Gram-negative bacteria strains.

Keywords: Hydrogel, Sodium alginate, Zinc oxide, Antibacterial, Gram-positive, Gram-negative.

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Current Measurement and Fault Detection Based On Non-Invasive Smart Iot Technique

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With the new age data acquisition rally for better understanding of customer consumption and pattern, when it comes to daily necessary consumption units like electricity, water it becomes immensely important to graph the consumption for minimizing the wastage and to estimate the per user usage of resources. Conventional system for the measurement of electricity need manual intervention by expert while other smart variants are expensive with less flexibility. In this paper we present an implementation as a part of Internet of Things (IoT) that measures the current inturn estimates the power and uploads it to cloud with proper statistical data by engaging a non-invasive clamp current transformer around power lines but addressing the cost factor, flexibility and complexity issue. Outputs are fed into filtering and referencing circuit followed by low cost processor (ultra-low power) which incorporates Wifi, ADC as well as Bluetooth functionalities giving values of apparent power with inaccuracy within ±0.37-0.8% in residential and industrial use. Non linearity varies from ±0.2-0.3% as the current value increases, offsets are negligible. The current measuring limit depends upon rating of the CT used and respective filtering, referencing, calibration as well as coding criteria that includes safety if an abrupt huge change in current profile occurs. Our aim is reducing the complexity of the circuit and code from conventional meters on the other hand making the power consumption data available on the go involving minimum expense. Smart with respect to no hard coding for router credential passing and according to algorithm with detect and relay fault signals. Data being hosted on server specific to user serving the purpose of energy saving and monitoring without any expert help or jeopardizing owns safety. On the cloud statistical functions are applied to the fetched data from the power line for more understanding of consumption and failure. Power and current range and error satisfies the use in unit residence, commercial ground..

Keywords: Current; Cloud; Fault detection; Measurement; Non-Invasive; Smart IoT.

An IoT-Enabled Self-Stabilizing Spoon for Parkinson's Patients

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Parkinson's disease is the second most common neurodegenerative disease, generally occurring in older people and often due to severe nerve cell damage which affects the person's movement and daily activity. The patient's first symptoms might be unintended shivering and tremors in the hand, rendering it impossible for them to accomplish everyday tasks like eating food out of a bowl. In this paper, we aim to use the principles of IoT and sensor networks to create a stabilizing spoon for patients suffering from Parkinson's disease. The stabilizing spoon compensates for unintended tremors or shivers received from the user and calibrates its head against these forces, thus keeping the spoon bowl stable at all times. A prototype of the device was built using a gyroscope to measure the angle of the motions, paired with an accelerometer to measure the speed of these motions, to assist patients' eating process.

Keywords: Parkinson's Disease; Gyroscope; Accelerometer; Calibration; Sensor Networks; Internet of Things; Stabilization; Biomedical Instruments.

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An Analysis of Sentiment: Methods, Applications, and Challenges

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Sentiment analysis involves contextually examining text to identify and extract subjective information from source material. It aids businesses in comprehending the public sentiment surrounding their brand, product, or service while monitoring online discussions. Nevertheless, when analyzing social media content, it is often limited to basic sentiment analysis and simple count-based metrics. This is analogous to only superficially exploring the topic and potentially overlooking valuable insights that remain untapped. Thanks to recent advancements in deep learning, algorithms have significantly enhanced their capacity to analyze text. The innovative application of advanced artificial intelligence methods can serve as a valuable resource for conducting comprehensive research. Devices that allow the collection of huge amounts of unstructured, opinionated data are becoming more and more connected with humans. Everyday activity-related comments and evaluations have been obtained as a result of the advances in Internet-based services like social media platforms and blogs. Sentiment analysis (SA) involves obtaining and examining people's opinions, ideas, and first perceptions about a wide range of issues, goods, subjects, and services. In sentiment analysis, NLP (natural language processing) and mining of text are used to identify and acquire emotional details from text. This study supplies a comprehensive assessment of sentiment analysis approaches to provide academics with a global perspective on the analysis of feelings and its associated domain, applications, and challenges. To comprehend the applications of sentiment analysis, this article provides a detailed explanation of the technique for performing this activity. To comprehend the benefits and drawbacks of each method, it is then evaluated, compared, and discussed. To establish future perspectives, the difficulties of sentiment analysis are finally evaluated.

Keywords: Sentiment Analysis; Text Mining, Social Media; Emotion Detection; Classification.

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Development of Modified MEDTOC System to Secure Health-related Data from Changes in the Environmental Parameters

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Patients are generally sent to hospitals during emergencies and life-threatening conditions using ambulances. The health problems of patients become serious when the treatment is delayed. If the vital signs of patients inside an ambulance or in the treatment area are moved to a hospital in real time, the odds of saving lives will improve considerably. The patient's medical needs can be arranged by paramedics with doctor instructions, till their arrival at the hospital. Information from past vital signs can also be archived for medical history. The Internet of Things (IoT) is a paradigm that visualizes practically everything connected to the Internet. This opens a lot of tiny medical needs and emergency relief tools. As a proof of concept, a test model prototype is implemented using an IoT-enabled ambulatory vital sign sensor board and the remote hospital framework. The objective implementation of such a prototype blends IoT technology with healthcare services, to provide a more efficient and patient-centred approach to monitoring and controlling health issues, particularly in instances when continuous remote monitoring is advantageous. The working of the proposed device is validated and results are monitored for the health-related data collected during the testing period. Promotes health monitoring in the emergency with eHealth Signals helps for medical assistance.

Keywords: Temperature; Vital Signs; Health Monitoring; Cryptography; Encryption; Decryption; Diagnosis; Cipher text; Internet of Things; Data Privacy; Patient Monitoring.

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Multi-Objective Ant Colony Optimization (MOACO) Approach for Multi-Document Text Summarization

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The demand for creating automatic text summarization methods has significantly emerged as a result of the web's explosive growth in textual data and the challenge of finding required information within this massive volume of data. Multi-document text summarizing (MDTS) is an effective method for creating summaries by grouping texts that are relevant to a similar subject. With the aid of optimization methods, this strategy can be optimized. The majority of optimization algorithms used in the scientific literature are single-objective ones, but more recently, multi-objective optimization (MOO) techniques have been created, and their findings have outperformed those of single-objective methods. Metaheuristics-based techniques are also increasingly being used effectively in the study of MOO. The MDTS issue is therefore solved by the Multi-Objective Ant Colony Optimization (MOACO) method. This multi-objective metaheuristic algorithm is based on the Pareto optimization. Recall-Oriented Understudy for Gisting Evaluation (ROUGE) metrics have been used to assess the outcomes of experiments using Document Understanding Conferences (DUC) datasets. Additionally, it consistently outperformed other referenced summarizer systems.

Keywords: Multi-Objective Optimization; Multi-Document Text Summarization; Recall-Oriented Understudy for Gisting Evaluation; Document Understanding Conferences; Multi-Objective Ant Colony Optimization; Natural language Processing.

Investigation of Nano-Composite Dampers Using Different Nanomaterials in Civil Engineering Structures- A Review

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Civil engineering structures need to be protected from earthquakes and this relatively represents a new area of research that is growing increasingly rapidly. Design engineers always search for lightweight, stronger, and stiff materials to be applied as vibration-damping materials. Stability in dynamics is required which necessitates an active, robust, and convenient kind mechanism that can absorb the kinetic energy of vibration to prevent the structural system from resonance. Recently, many researchers successfully used nanomaterials to develop energy-absorbing materials which are lightweight and cost-effective. Traditional damping treatments are based on the combinations of viscoelastic, elastomeric, magnetic, and piezoelectric materials. Here in this paper, a review of various damping techniques of composites made of cement modified by various nanomaterials like Nano Al_2O_3 (Aluminum Dioxide), Nano SiO_2 (Silicon Dioxide), Nano TiO_2 (Titanium Dioxide), Graphene, and CNTs (Carbon Nanotubes) is presented. The design of various nano-composite dampers is presented in order to strengthen the information progress in this field. The current study's goal is to discover how nanoparticles impact a cement-based material's damping properties. In the study, several nanomaterials were examined in cement composites at differing concentrations. With the help of the Dynamic Mechanical Analysis (DMA) method and the Logarithmic Decrement approach, the damping properties of these composites were examined. Scanning Electron Microscopy (SEM) was used to examine the effects of nanomaterials on the microstructure and pore size distribution of the composite. Increasing the quantity of nanoparticles in cement paste may improve its capacity to lessen vibration. The experiments also showed that certain nanomaterials may improve load transmission inside the cement matrix and connect neighboring hydration products, which helped to reduce energy loss during the loading process. These nanoparticles will eventually replace the large machinery employed to dampen vibrations in buildings due to their small weight, increased mechanical strength, and effective damping properties.

Keywords: Dampers; vibration; viscoelasticity; kinetic energy; dynamic stability.

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Numerical Simulation of Lid-Driven Cavity Flow Induced By Triangular Obstacles

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This research work presents a study on the flow behaviour in lid-driven cavity flows with triangular blocks using computation fluid dynamics techniques. Lid-driven cavity flow is a widely studied problem that remains a standard for viscous incompressible fluid flows, with a range of parameters, including Reynolds number, being explored. The finite volume method is used to discretize the linear equations, and numerical computations are performed using ANSYS FLUENT 2021 R1. The fluid flow starts when the top wall is moved in the +X direction while the other three walls are kept stationary. A grid independence test has been performed to determine the optimum grid size and to obtain a grid-independent solution. Quantitative elements of the 2D flows in lid-driven cavities are explored for Reynolds numbers ranging from 1000 to 8000, and the results are validated against existing literature. The consequence of different values of the Reynolds number on the flow features is analyzed and examined through streamline patterns, vorticity, and kinetic energy contours. The study finds that the velocity profiles at the centerline get enhanced, and the number and size of vortices increase with the increase in Reynolds number. The behaviour of the isolines of the vortices and the kinetic energy contours are also analyzed. The kinetic energy contours show that the high velocity of the fluid particles close to the upper wall is a significant factor in the maximum kinetic energy values. As the Reynolds number increases, the kinetic energy gradually rises at the moving wall. This suggests that the Reynolds numbers considerably impact the energy values, particularly in the high-speed region surrounding the moving wall. Overall, this study provides valuable insights into the flow behaviour of lid-driven cavities and the effects of obstacles on flow patterns, contributing to the existing literature and being useful for researchers and engineers working in the field of fluid dynamics.

Keywords: Lid driven cavity; Reynolds number; Numerical analysis; Different grid sizes; Triangle obstacle.

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Intraocular Pressure Monitoring System for Glaucoma Patients Using IoT and Machine Learning

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Glaucoma is a condition pigeonholed by unwarranted aqueous humor in the eye, leading to elevated intraocular pressure that can cause damage to the optic nerve. Current treatments for glaucoma are not highly effective and may have significant side effects. Monitoring intraocular pressure in real-time and with accuracy is crucial, particularly for patients with severe glaucoma. Therefore, the development of wearable devices for continuous and precise intraocular pressure monitoring is a promising approach for diagnosing and treating glaucoma. However, existing intraocular pressure measurement and monitoring technologies face challenges in rapports of scope, exactness, power feasting, and astuteness, which limit their suitability for glaucoma patients. To address these needs, this study focuses on the design and fabrication of an implantable flexible intraocular pressure sensor capable of long-term continuous monitoring. The research investigates the working principle, structural design, fabrication process, measurement and control system, characterization, and performance testing of the intraocular pressure sensor. This research holds significant importance for achieving personalized and accurate treatment for glaucoma patients. The prediction is done with Random forest and the result is obtained. Random forest has the highest accuracy when compared with other state of art models.

Keywords: Glaucoma; Intraocular Pressure; Microcontroller; Pressure Sensor; Tanometer.

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Sales Based Models for Resource Management and Scheduling In AI System

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An unmistakable and compelling organization show might help organizations with laying out clear objectives, motivational gadgets to help with arriving at those targets, and a dream for how the organization seem keep on creating past those objectives. Deals the board is the foremost common way of cultivating bargains constrain, organizing bargains errands, and carrying out bargains techniques that allow a commerce to reliably hit and indeed outflank its bargains targets. Within the occasion that your trade gets any salary at all, a deals-the-board method is an by and large verifiable prerequisite. A deals model implies a business' common way of managing with offering. There's no one right bargains demonstrate; each association's technique will vary unexpectedly on its thing, industry, and pay show. Ordinary models consolidate inbound deals, outbound bargains, account-based offerings, or a mix of diverse models. An organization model may be a bunch of choices the activity gather at an organization makes almost long-standing time bearing of a system, cycle, or trade. These choices can shape ways of carrying on and practicing within the organization. The show helps bosses with seeking after educated choices that advantage the organization and its laborers. Cloud-based easy to use Enterprise Software Solution to standardize and professionalize your resource and project management. It delivers a unified and reliable data and information base that facilitates communication and the coordination process. With powerful resource management, you can ensure the best possible deployment of your staff. Moreover, the AI-based risk management function makes your work easier by alerting you to situations where you need to intervene to execute your project in a cost-effective and successful way. AI users are also utilizing this and related technologies to combat issues inherent to the system. Put simply, artificial intelligence technology is being used to optimize its own resources and avoid systems becoming overloaded.

Keywords: AI; Resource; Management; sales; Scheduling; SaaS; Security, Prediction.

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An Efficient and Robust Method for Data Privacy and Security in Public Cloud using a Novel Hybrid Technique

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The end user has a cost-effective and cloud-based method of storing and retrieving their personal information through remote storage using some kind of Internet connection. The user may view the data at any time and from any location they want. However, the data that are stored on the cloud may not always stay in a safe state. Because the data can only be accessed by the end user via the intervention of a third party, the authenticity and integrity of the data are at risk of being compromised. It is possible for many people to utilize different Web access at the same time to access and recover their information stored in the cloud. As a consequence, a user's sensitive data is exposed, leaked, or lost in several locations. Cryptographic methods, such as the Elliptic Curve Cryptography, have been used in the development of a great deal of different algorithms and protocols, all with the intention of preserving the confidentiality and authenticity of the data (ECC). In this research, we present a safe and efficient method for exchanging data via the cloud, while simultaneously preserving both the data's security and its integrity. The suggested system primarily operates by combining the Elliptic Curve Cryptography (ECC) technique with the Advanced Encryption Standard (AES) method to guarantee verification and maintain the solidarity of data. The findings of the experiments demonstrate that the strategy that was presented is effective and produces superior outcomes when compared to other ways that are already in use.

Keywords: Cloud computing; data security; authentication; data integrity; ECC; Data Privacy; AES.

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Intelligent Machine Learning Based IOT Resource Allocation

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The Internet of Things (IoT) and machine learning provide insights that would otherwise be hidden in data for quicker, automated responses and improved decision-making. By ingesting images, videos, and audio, machine learning for the Internet of Things can be used to predict future trends, identify anomalies, and enhance intelligence. The IoT organic framework comprises millions of sharp objects and to form these sharp objects to communicate and work suitably there's a necessity for asset tasks. Diverse reasons for resource task to protect Quality of Advantage (QoS), resource task ought to be done. AI-based resource allocation can offer help to organizations in optimizing their staffing needs. By analyzing unquestionable amplified data, AI calculations can offer help to organizations in recognizing designs inside the number of resources required for a given amplified sort. Asset allotment methodologies move, with many depending on normal decision-making. In differentiate, others utilize orderly approaches such as cost-benefit examination, require setting, or numerical models. These techniques offer help to accomplices in choosing the task that gives the preeminent regard and impact. Prebuilt software-as-a-service (SaaS) applications called IoT Cleverly Applications can use dashboards to analyze and display data from IoT sensors. AI computations are utilized by IoT applications to examine immense measures of cloud-based related sensor information. There are several security concerns raised by the rising demand for apps and connected devices. An IoT coordinator's all out security is subject to a solitary gadget in the chain. If one of the devices is hacked, the security of every other device in this chain is compromised. This can possibly actually think twice about plan's security. You can see key execution indicators and measure the time between data by using IoT dashboards and alarms. Calculations based on machine learning can find peculiarities in equipment, notify customers, and even start robotized repairs or proactive countermeasures. AI and Profound Learning resemble managing a real workplace issue like marking by combining a few innovations that enable constant naming.

Keywords: IoT Application; Machine Learning; IoT Parameters; Resource Allocation; Optimization.

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Safeguarding Against Cyber Threats: Machine Learning-based Approaches for Real-time Fraud Detection and Prevention

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Organizations in a variety of industries, including the financial sector, have increasingly adopted online services as internet usage continues to increase at an exponential rate. However, this widespread adoption of digital technology has also contributed to a significant rise in financial fraud, which has resulted in significant financial losses all over the world. There are more and more cases of fraud, which has led to significant financial losses. As a result, there is a strong financial incentive to look into fraud prevention measures. However, the lack of publicly accessible datasets that include fraudulent activities is a major obstacle in this field of study. Additionally, while machine learning methods have been used to detect fraud, they have frequently failed to take into account the human behavior aspect of the process. Research questions that can be asked are: 1) How can advanced machine learning methods be used to create systems for detecting fraud in real time? 2) How effective are methods based on machine learning for identifying financial frauds? 3) To combat cybercrime, how can datasets be effectively utilized in machine learning? 4) How should large datasets be handled? The development and evaluation of models that are capable of precisely identifying fraudulent activities and transactions in financial datasets is the primary objective of this research. For effective fraud detection, the Random Forest algorithm, renowned for its ensemble learning capabilities, will be utilized to draw on the collective intelligence of numerous decision trees. Additionally, by utilising deep learning techniques and the ANN algorithm, which is based on the neural networks in the human brain, complex fraud patterns will be found. The likelihood of fraudulent events will be modelled using Logistic Regression, a popular classification approach, based on pertinent data. The accuracy of the model is evaluated using publicly accessible data. The accuracy of the different methods, which included Random Forest, Logistic Regression, and Artificial Neural Networks (ANN), was 96.1%, 94.8%, 95.89%, and 97.58%, respectively. The results of this study will be used to improve the performance and comparative evaluation of the Random Forest, ANN, and Logistic Regression algorithms in the context of financial fraud detection. The results will help businesses choose the best algorithmic strategy for their specific fraud prevention requirements. In addition, the study sheds light on the adaptability and efficiency of various algorithms in real-world financial contexts, which contributes to the larger field of machine learning-based fraud detection.

Keywords: Cyber Security; Fraud detection; Random Forest; Artificial Neural Networks; Logistic Regression; Machine learning; Deep learning; Ensemble learning; Feature engineering.

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Electrochemical Sensor for Ultra-Sensitive Detection of Lead (II) Ions in Water Using Na3BiO4 - Bi2O3 Mixed Oxide Nanostructures

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This study is aimed at detecting trace amount of lead using Na_3BiO_4 - Bi_2O_3 mixed oxide nanostructures. Na_3BiO_4 - Bi_2O_3 mixed oxide nanostructures were synthesized on indium tin oxide coated glass electrodes using potentiostatic electrodeposition. Scanning electron microscopy (SEM) showed the presence of Nanoplates with an average thickness of 90 nm. Presence of poly-crystalline Na_3BiO_4 and Bi_2O_3 in the ratio 1:4 was indicated by X-ray diffraction (XRD). Chemical structure of the prepared samples was also studied through x-ray photoelectron spectroscopy. Square wave anodic stripping voltammetry (SWASV) technique confirms that these nanostructured electrodes are highly sensitive for Pb^{2+} ions down to concentrations as low as 68 ppt (0.32 nM).

Keywords: Heavy Metal Ion Sensor; Nanostructured Bismuth Hexagons; Potentiostatic Electrodeposition; Square Wave Anodic Stripping Voltammetry.

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Binder Molecular Weight, Concentration, and Flow Rate Optimization for ZnO Nanofiber Synthesis for Electronic Device Applications

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Optoelectronics, solar cells, and biomedicine all benefit from using zinc oxide nanofibers. Their property matching is critical to getting the desired applicability. This work investigates the influence of binder molecular weight, binder concentration, and solution flow rate on fibre shape, spinning ability, and diameter. Zinc acetate, polyvinylpyrrolidone, and dimethylformamide solutions are electrospun to make zinc oxide nanofibers, and the solution's composition, rheological characteristics, and processing parameters all affect the nanofibers' characteristics. These factors have a significant impact on fiber morphology. Consequently, the optimization of fiber diameters and other properties was achieved through meticulous modification of said parameters, which ranged from 24 to 62 nanometers. The fibers were further analyzed by FESEM, XRD, and EDS to define their improvement for electronic applications.

Keywords: Electrospinning; ZnO; PVP; Nanofiber; Molecular Weight; Flow Rate

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On the Analysis of Swarm Robotics in Sensor-Based Environmental Monitoring for Sustainable Poultry Farming

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This paper presents a novel swarm-based algorithm for the intelligent maneuvering of robots within poultry farms, aiming to enhance livestock well-being monitoring for smart livestock rearing practices. The existing practices in environmental monitoring include the use of ceiling mounted sensors. These sensors are used to purely transfer data from the environment to a centralized system. However, this method has displayed discrepancies in data accuracy due to variances between ceiling and ground-level biomarker readings. Furthermore, these systems do not implement supplementary algorithms for smart monitoring for poultry wellbeing. The proposed algorithm utilizes the principles of the bio-inspired Firefly Algorithm (FA) to establish a viable navigation system for the robot swarm. The fitness function for the algorithm is determined using sensor values received from MQ-135, MQ-137 and DHT-11 sensors for Carbon Dioxide, Ammonia, temperature, and humidity. The sensitivity of these sensors has been suitably calibrated and scaled based on the impact of changes in their values on the wellbeing of the flock. Additionally, the MQ-3 and MQ-7 sensors were used to detect changes in Ethanol and Carbon Monoxide levels. These sensors did not impact the fitness function for the defined FA. Experimental analysis was conducted, using Gazebo simulator, to deduce the optimal parameters for defining the fitness function for the swarm algorithm. This study further delves into potential enhancements for this system. There is also an added discussion on the physical implementation of the robots to understand the cost implications of the swarm. The preliminary tests concluded that the proposed system successfully mapped and monitored the environment within a simulated setting, demonstrating its effectiveness in addressing the challenges of traditional environmental monitoring techniques.

Keywords: Firefly Algorithm, Swarm Robotics; Arduino UNO; Poultry Health Surveillance; Gazebo Simulator.

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Comparison of Foot Rest Vibrations In The Case Of ICE Based and Battery-Based Two-Wheeler

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The current work investigates the two-wheeler rider's comfort and compares the footrest vibration between an internal combustion engine based and electric two-wheeler. Retrofit Hero Honda CD-100 two-wheeler is considered for the study and further it is converted to electric mode in the laboratory. Electric two-wheelers, even though have lesser moving parts than IC engine-based two-wheelers, encounter vibrations emerged from the road excitations. Cracks, potholes and irregular humps on the road are the major influencers of these vibrations. These vibrations transferred to the human body have been reported to cause major injuries to the human body in the long run. Performing several trials on actual road condition, with both rider as well as pillion, the vibration dose value is calculated at the footrest. Different scenarios such as random speed test, 20 kmph speed test and 30 kmph speed test are conducted on the two-wheeler. The vibration dose value (VDV) obtained is later compared with the ISO 2631 standard to analyze the rider's comfort level. A comparison is made between Internal Combustion Engine based and electric based two-wheeler, for its comfort level at the footrest. It is found that VDV as well as RMS acceleration has decreased considerably in the case of electric two-wheeler when compared to Internal Combustion Engine-based vehicle. However, it is found that as the speed is increased the vibrations increased as well. Hence, further scope is found in the improvement and inculcation of vibration damping in the locations where vibrations are pronounced to improve the overall riding experience of a two-wheeler rider.

Keywords: Electric vehicle, Vibration dose value, Rider's comfort, Damping, Actual Road scenario.

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A Review on Recent Developments in 6G Communication Systems

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Currently we exist in the 5G division of the wireless technology cycle, where the standardization is complete and deployment is being carried out. However, 5G networks do not have the capacity deliver an automated and intelligent network that supports connected intelligence. 6G is what enables this and globally countries are aimed at laying the foundation for the communication needs for 2030. This brings out a very key question and discussion on how wireless communications will develop in the future, particularly adapting to the range and set applications and user cases. Industry and academic efforts have started to explore beyond 5G and uncover 6G as 5G becomes more internationally accessible. We forecast that 6G will undergo a transition that is unheard of in the history of wireless cellular systems. 6G exists beyond mobile internet and will be required to support omnipresent AI services from the network's core to its endpoints. Meanwhile, artificial intelligence will be crucial for developing and improving 6G designs, protocols, and operations (AI). URLLC plays a crucial role in next-generation communication systems, particularly in 6G, for applications requiring ultra-low latency and reliability. These services support cutting-edge technologies like driverless vehicles, remote robotic surgery, smart factories, and augmented reality applications. URLLCs ensure robust connectivity and real-time responsiveness, enabling time-sensitive and safety-critical services in 6G communication infrastructures. This article illustrates the importance of URLLCs in 6G and its integration with deep learning, the security challenges and its potential solutions. Further on it establishes its relationship with key aspects of federated learning and security in the 6G domain.

Keywords: 5G; 6G; Blockchain; Federated Learning; Machine Learning; Security.

RAiSE23 - 405

Modeling of Barriers to the Adoption of Autonomous Vehicles: DEMATEL Method

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Autonomous vehicles (AVs) have the potential to increase safety while reducing energy use, pollution, and traffic congestion, to name a few positive effects. Industries, however, are having trouble implementing AVs. The goal of this study was to pinpoint and analyze the obstacles preventing the widespread use of AVs. To do this, a comprehensive review of the literature was conducted to identify the barriers, which were later confirmed by a panel of experts. There were five issues that needed to be addressed: a lack of infrastructure, funding limitations for manufacturing, low customer acceptance, security breach concerns, and potential employment effects. After these barriers were decided upon, the Decision-Making Trial and Evaluation Laboratory method was chosen to model them. The DEMATEL approach makes use of the expertise of groups and experts while relying on matrix tools and graph theory. It develops a visual framework that emphasizes the causal connections between various factors. DEMATEL digraph is also presented which helps to identify which barrier is the most crucial barrier. Priority ranking was given to identify barriers and categorization of barriers was also done in this study. Two categories were formed such as cause and effect barriers categories. Based on the results of DEMMATEL, lack of funds for manufacturing AVs and lack of Infrastructure are the most crucial barriers to AVs adoption. Industries should focus on cause group barriers first as they run the system. By eliminating cause group barriers, the impact of effect barriers can be reduced. Implications and future direction were provided in the current study.

Keywords: Autonomous vehicles; barriers; challenges; DEMATEL; smart vehicles.

RAiSE23 - 406

Multiple Effects on MHD Peristaltic Transport of Non-Newtonian Eyring Powell with an Inclined Non-Uniform Channel

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This technical study analyzes magnetohydrodynamic (MHD) effects on the flow of a viscous, incompressible, non-Newtonian Eyring-Powell fluid via an inclined non-uniform axisymmetric channel. The investigation considers the approximation of long wavelength and low Reynolds number. Slip boundary conditions solve the governing non-linear equations to determine channel velocity, temperature, concentration, and streamlines. In the presence of a magnetic field, the study also investigates the effect of wall characteristics on fluid flow. Using MATLAB R2023a software, a parametric analysis is performed, and the resulting data is represented graphically. The results indicate that the magnetic parameter and variable viscosity significantly affect the fluid properties within the channel. The present study enhances the comprehension of fluid dynamics in inclined channels and offers valuable insights into the influence of variable viscosity and magnetic fields in such setups.

Keywords: Slip effects; hemodynamic application; magnetohydrodynamics; peristaltic transport; Eyring-Powell fluid.

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Plant Disease Prognosis Using Spatial Exploitation Based Deep Learning Models

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There have been several initiatives taken to guarantee higher yields and higher quality crops as the agriculture sector grows. The agriculture industry is severely impacted by plant and agricultural illnesses and deficits. Several techniques and technologies have been developed to aid in the diagnosis, management, and eventual eradication of plant diseases. The efficient and accurate identification of plant diseases could be aided by the development of a quick and accurate model. The use of deep convolutional neural networks for image categorization has greatly improved accuracy. In this paper, we present a framework for automating disease detection by use of a tailored DL architecture. Both the PlantVillage dataset and the real-time field dataset are utilised in the testing process. Our model's results are compared to those of other spatial exploitation models. The results show that the proposed method is superior to the standard deep learning classifier. This proves the network's potential for usage in real-time applications by extracting high-level features that boost efficiency and accuracy while reducing the risk introduced by a manual procedure. In order to enable prompt reaction and maybe targeted pesticide application, the suggested method has the ability to provide early diagnoses of plant vital health.

Keywords: Artificial neural network; Deep Learning; Disease identification; Disease diagnosis; Spatial exploitation; Spatial models.

RAiSE23 - 408

Rational Wiener Index and Rational Schultz Index of Graphs

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In this research paper, we investigate fundamental graph properties within the context of a simple connected graph denoted as G = (V, E). We introduce the concept of rational Schultz, initially rational distance and Wiener index proposed by Raghavendra et al. in their work. In the context of this paper, our main objective is to calculate the rational Wiener index and rational Schultz index for a specific class of graphs. Our focus lies in the analysis and computation of these indices within this particular graph family.

Keywords: Rational distance, Rational Wiener index, Rational Schultz index, Complete bipartite graph, Crown graph.

RAiSE23 - 410

Effect of Artificial Seawater Absorption on Mechanical and Flexural Properties of Pineapple Leaf Fiber Reinforced Epoxy Nanoclay Composites

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Due to the natural fiber's hygroscopic nature, pineapple leaf fiber (PALF) epoxy composites are susceptible to moisture absorption. To help resolve this problem, Surface modified montmorillonite nanoclay (1.5 wt%) was dispersed and incorporated in the epoxy PALF composite as a third phase. Using ultrasonication and magnetic stirring processes, nanoclay was disseminated in epoxy matrix. This was followed by compression molding and hand layup techniques to create both epoxy PALF and epoxy nanoclay PALF composites. By immersing the fabricated composite samples in artificial seawater till saturation, the effect of surface modified nanoclay on artificial seawater absorption was examined and analysed. Moisture uptake was determined from regular weight readings, and diffusion coefficient was computed from the graph of moisture uptake vs square root of time and related diffusion equation. With the addition of nanoclay, the diffusion coefficient and saturation moisture uptake were lowered by 54% and 74%, respectively. Impact of artificial seawater absorption on tensile and flexural properties was assessed. Tensile strength lowered by 16% for nanoclay composites and 23% for epoxy PALF composites. While there was no appreciable change in the nanoclay composite, the tensile modulus for the epoxy PALF composite decreased by 15%. A similar pattern was also seen in the flexural characteristics as well. Scanning Electron Microscopic (SEM) Images of fractured specimen revealed better interfacial bonding in epoxy-PALF composites containing surface modified montmorillonite nanoclay, which is the reason for its superior performance. Nanoclay can be used in natural fiber epoxy composites to enhance the interfacial bonding and reduce the artificial seawater absorption.

Keywords: Natural Fiber; Pineapple Leaf Fiber; nanoclay; artificial seawater immersion; Diffusion.

Development and Experimental Studies on Flexible Transfer Lines for Liquid Helium Application

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Transfer of cryogenic fluids from one location to the other is a common laboratory and commercial occurrence. Vacuum insulated transfer lines (with or without superinsulation) are the most efficient to minimize the loss of the cryogenic fluid by evaporation and heat transfer. Flexible transfer lines are most convenient to transfer cryogenic fluids in view of the maneuverability of the lines especially under space constraints, although they lead to higher heat load and pressure drop when compared to the rigid lines. This paper discusses the design, development and experimental studies on vacuum and super insulated flexible transfer lines made of stainless-steel bellows for liquid helium applications. The transfer line is approximately 2.9 m long with the ID of the inner bellow and the OD of the outer bellow being 20.5 mm and 62.1 mm respectively. Temperature sensors and pressure transducers are attached to different locations of the transfer line to monitor its performance during cool down and steady state operation. The results of our experimental studies on pressure drop cool-down and mass flow rates for liquid nitrogen at different inlet pressures are also presented in this paper.

Keywords: Cryogenic fluid; Super insulation; Transfer line; Pressure drop; Heat load.

RAiSE23 – 412

Analysis and Modeling of 581 kWp Grid-Integrated Solar Photovoltaic Power Plant of Academic Institution Using PVsyst

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Solar photovoltaic (PV) technology has become increasingly common in the energy sector in recent years. India is incredible in terms of renewable and non-renewable energy sources. India's average solar insulation is 5,000 T kWh per year (or 500 TW). The main objective of this paper is to present a design of 581 kWp on-grid solar photovoltaic system at the academic institution using PVsyst software. In our study, works have been carried out to indulge the power losses which occurred due to interconnections, temperature, irradiation, inverter, wiring, soiling, power electronics, and grid availability. The results of our investigation showed the average global horizontal irradiation and PV Plant Performance ratio (PR) were found to be 5.28 kWh/m 2 /day and 84.14 %, respectively. And the investigation results of per year production capacity of the proposed plant was found to be 971271 kWh which is completely CO_2 -free, and it saved Rs. 79,15,858/- of electricity bill per year at an academic institution.

Keywords: Grid Integration; PVsyst; Renewable Energy; Solar Photovoltaic; Solar Plant.

RAiSE23 – 414

Deformations of Geocell Reinforced Tracks Using FEM

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Numerous nations, including the United States, China, and India, rely on railways for transportation, which necessitates the modernization of existing tracks and the installation of new ones. Geocells can be utilized as a material for track reinforcement to reduce track deterioration and associated maintenance costs. Using Midas GTS NX software, three-dimensional geocell-reinforced tracks are modeled in this investigation. The modeling was used to demonstrate the effects of geocell on settlement reduction and vertical stresses. The results of FEM studies indicate that presence of geocell can enhance the efficacy of railroad tracks.

Keywords: FEM; railways; geocell; parametric studies

RAiSE23 – 415

Effect of Mesh-Type Strengthening Systems on Seismic Behaviour of Masonry Structures

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Construction of unreinforced masonry (URM) buildings is prevalent for habitats belonging to low-income groups, especially in developing countries, with ease of construction being the main preference reason. However, the extent of vulnerability of such structures is relatively high during seismic events. Huge losses of property and casualties were witnessed during past earthquakes due to the brittle nature of the failure. Many studies were carried out in the past to improve the seismic performance of URM buildings by employing various strengthening techniques. It is observed from the literature that the mesh-type strengthening technique was most effective in improving the seismic performance of URM structures in terms of strength, ductility, and delay in collapse time. This manuscript summarises the past research carried out to improve the seismic performance of URM structures by using mesh-type strengthening techniques. The critical observations in terms of failure pattern and performance enhancement are presented. This paper may help users to select the most adequate strengthening technique for real-life masonry structures.

Keywords: Unreinforced masonry; Earthquake; Brittle behaviour, Mesh type strengthening.

RAiSE23 – 417

Elderly Fall Detection System Using ERF in Machine Learning

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Fall detection systems play a key role in addressing the health risks faced by elderly individuals. This work implements a Fall Detection System using machine learning techniques. The work used a fall detection dataset and pre-processes it by encoding categorical variables using one-hot encoding and handling missing data details about ADLs and associated data are culled from a particular database. Classifiers such as Support Vector Machine, Logistic Regression, Random Forest, AdaBoost, and Gradient Boosting (GB) were trained and evaluated using the dataset. Training the classifier on a split dataset allows for the evaluation of its performance using a variety of metrics. The components that make it up are the confusion matrix, F1 score, recall, accuracy, and precision. Furthermore, in order to determine the major elements that contribute to fall detection, the system displays the importance of features. Bar charts showing the relative importance of features, a heatmap showing the confusion matrix, and feature-specific box plots showing the distribution of data are all part of the visualisations included. The ERF model emerged victorious in a comparison of models, achieving the highest level of accuracy. The purpose of this Fall Detection System is to improve the well-being of the elderly by accurately detecting and reporting instances of falls.

Keywords: Human Activity Recognition, KNN, Random Forest, Risk Prediction, Machine Learning.

RAiSE23 - 418

Diagnosis of Autism in Children using Deep Learning Techniques by Analyzing Facial Features

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Autism Spectrum Disorder (ASD) is a complex neurological disorder that results in aberrant personality traits, cognitive function, and interpersonal relationships. It impacts the child's linguistic and social skills, interaction abilities, and capacity for logical thought. It is possible to use the human face as a physiological identifier since it can serve as an indicator of brain function, thus helping with early diagnosis in a simple and effective way. The purpose of this study is to detect autism from facial images using a deep-learning model. To accurately identify autism in children, we used three pre-trained CNN models: VGG16, VGG19 and, EfficientnetB0 as feature extractors and as a binary classifier. The suggested models were trained using a publicly available dataset from Kaggle that included 3014 images of children characterized as autistic and non-autistic. The model yielded an accuracy of 84.66%, 80.05% and 87.9% respectively

Keywords: Autism spectrum disorder, deep learning; facial images, detection, CNN.

RAiSE23 - 420

Conflicting Information Spreading Model Considering User's Opinion Protection and No Co-operation Ability for Information Security

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Political parties do campaign, publicity, and oppose the opinions of other par ties using social networks. They always try to create agenda against the opposition and protect their opinion until voting. It is interesting to see the dynamics of two opposite news spread. Here, we presented a mathematical model of conflicting information spread in a homogeneously mixed population on social networks. We incorporated no co-operation with other parties' opinion ability and no loss of enthusiasm of users. We obtained fixed points, their existence, and stability conditions. The system experiences flip bifurcation and Hopf bifurcation when both kinds of users exist in a social system results disbelief among users. Also, the system is chaotic, which is a significant cause of the unpredictability of data. Moreover, we suggested a strategy for controlling complex dynamics and securing information for emergencies.

Keywords: Computational model; Opinion protection; No co-operation; Bifurcation and Chaos; Information security.

RAiSE23 - 421

Experimental and Analytical Investigation on Mechanical Characteristics of Powder Metallurgy based Aluminum Matrix Reinforced with Different Particulates

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Over the last few decades, "Discontinuously Reinforced Particulate Composites (DRPCs)" are a popular class of composite materials with considerable challenge in processing, characterization and machinability because of their increased strength-weight ratio, stiffness, specific strength and oxidization when compared to various metals and their alloys. This paper discusses experimental and numerical investigation on mechanical characteristics of aluminum metal matrix reinforced with various reinforcement particulates such as silicon carbide, aluminium oxide, and zirconium oxide, compaction pressure (kN) and hold time (s) based on Design of Experiments (DOE) and Finite Element Analysis. Initially this paper discusses the process optimization of Aluminum Matrix reinforced with different particulates experimentally to identify the favourable processing conditions by varying reinforcement materials, compaction pressure (kN) and hold time (s) based on TDOE (Taguchi's Design of Experiments). Further, this paper concentrates to determine "maximum principal stress, equivalent elastic strain and equivalent (von-mises) stress" based on Finite Element Analysis (ANSYS Workbench-2023R1). Further, surface metallurgy of work material under microscopic level using Scanning electron microscope is explored. The results of the experimentation showed that the highest hardness values achieved were 106.3688 BHN, 76.118 BHN, and 103.22 BHN for ZrO_2, Al_2O_3, and ZrO_2 reinforcement materials, respectively. Increasing the compaction pressure from 8 to 12 kN resulted in a slight decrease in surface roughness and porosity. Higher compaction pressures facilitated better particle distribution and improved interfacial bonding, leading to smoother surfaces and lower void content. The combination of input parameters that achieved the highest hardness value was ZrO_2 reinforcement material, 10 kN compaction pressure, and 50 seconds hold time. The understanding gained experimentally and analytically from this research can be applied for future processing of Aluminum Matrix Reinforced with different particulates.

Keywords: Discontinuously Reinforced Particulate Composites (DRPCs); Hardness; Surface Roughness; Porosity; Taguchi Design of Experiments(TDOE); Silicon Carbide (SiC); Aluminium Oxide (Al_2O_3); Zirconium Dioxide (ZrO_2); Finite Element Analysis (FEA).

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Tribological Behaviour of Powder Metallurgy Based Ti-6Al-4V-SiCp Metal Matrix Composites

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Metal Matrix Composites (MMCs) have achieved significant attention in engineering applications because of their exceptional properties, like increased ratio of strength-to-weight and resistance to wear. However, their manufacturing processes pose challenges for industries, such as oxidation, porosity, and chemical reactions. To address these challenges, this study investigates the processing and sintering (500°C) of Ti-6Al-4V-SiCp composites and their mechanical properties, particularly hardness, wear and frictional force using a statistical approach. The main objective of this research is to identify optimal processing conditions for Ti-6Al-4V-SiCp composites that yield maximum hardness, minimal wear and frictional force. The study varies three key parameters, namely, Compaction Pressure (Ton/sq.inch), SiC (Wt.%), and PVA Binder (Wt.%) using Taguchi's Design of Experiments (TDOE). Further, the response surface methodology (RSM) is used to develop second-order models to predict the output values under different processing conditions, by correlating with the values obtained from TDOE. The results indicate that the most significant influence on the output is exerted by SiC (Wt.%), followed by PVA Binder (Wt.%) and Compaction Pressure (Ton/sq.inch). To achieve higher hardness with minimal wear and frictional force during processing, SiCp (15 Wt.%), Compaction Pressure (4 Ton/sq.inch), and PVA binder (3 Wt.%) is recommended. Finally, microstructural analysis using (SEM) scanning electron microscope images, optical macrographs and (AFM) atomic force microscopy revealed that the inclusion of 15 Wt.% SiCp resulted in improved hardness, wear and frictional force compared to 20 Wt.% SiCp. In conclusion, this study provides valuable insights into optimizing the processing parameters of Ti-6Al-4V-SiCp samples, enabling the production of materials with enhanced hardness and wear resistance.

Keywords: Surface Metallurgy; Taguchi's Design of Experiments(TDOE); Ti-6Al-4V; SiC; Response Surface Methodology(RSM); Hardness; Wear; Frictional Force; Atomic Force Microscopy; Scanning Electron Microscopy(SEM).

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Energy Management Control strategy based on Harris Hawks Optimization Technique for Fuel Cell Hybrid Electric Vehicle

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The focus and sales of EVs are slowly getting into the scope, as the source of the vehicle is one of the significant focuses where the integration in the power system is becoming the crucial issue. The work consists of hybrid sources, the battery as the primary source, the fuel cell, and the ultra-capacitor as an auxiliary source. The hybrid system provides the grip of the FCEV. Fuel cell constraints are the SOC of the battery and the H2 level. These three sources of the hybrid systems are connected to the DC bus via the proper DC-to-DC converters. This paper will discuss the combination of Harris Hawks Optimization (HHO) for energy management and control of these source systems, constraints mandated sources, and ensuring stability. The proposed system provides a satisfactory energy management system for the hybrid system. Using the proposed technique, the fuel consumption-settling period is reduced. The proposed method was implemented and validated with and without the HHO technique where implemented.

Keywords: Electric vehicles, Battery, Fuel cell, ultra-capacitor, Solar, Harris Hawks Optimization HHO technique.

RAiSE23 - 425

Exploring the Potential of Copper Slag and Quartz as Fine Aggregate Replacements in Concrete: A Comprehensive Study

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In the realm of civil construction, river sand stands as an essential ingredient that cannot be overlooked. With the ever-increasing surge in construction activities, the demand for river sand has surged in tandem, resulting in its escalating scarcity and subsequently, its price surge across the entire nation. Addressing this quandary from an economic perspective becomes imperative. Moreover, such efforts contribute to environmental conservation by mitigating the adverse repercussions of extensive sand mining. Present study delves into the utilization of copper slag as a viable alternative in the production of cement mortars, particularly as a partial replacement for fine aggregate. Experiments were conducted on concrete cubes and cylinders to determine the compressive strength and split tensile strength respectively. Five cubes and cylinders were tested after 7,14 and 21 days of curing. Extensive characterization of copper slag was conducted, encompassing its chemical composition, mineralogical attributes, and size distribution. The research also explored the influence of varying proportions of copper slag on critical parameters of the waste material, while concurrently subjecting cement mortars to compressive assessments. The findings highlight that mortars containing copper slag exhibit superior compression resistance compared to river sand-based mortars. Specifically, a 50% replacement of river sand with a blend of copper slag and quartz demonstrates the highest strength, surpassing other compositions. Notably, partial substitution of sand with copper slag outperforms both quartz and sand individually, with the optimal strength achieved at a 50% replacement rate. Copper slag, with its pozzolanic properties, showed greater strength-enhancing potential, while quartz also exhibited positive effects. These findings are promising for optimizing concrete mix designs, reducing environmental impacts through the use of industrial byproducts, and exploring natural alternatives.

Keywords: Copper slag; sand; quartz; compressive strength; split tensile strength.

RAiSE23 - 426

Heuristic driven approach for Efficient Workflow Scheduling in IaaS Cloud using Hybrid Optimization Algorithms

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The recent trends of Infrastructure as a Service could be a trade show that conveys IT framework like computing, capacity, and arrange assets on a pay-as-you-go premise over the web. Today IaaS expect replies as boundless as business registering itself. On the off chance that concentrate after contextual analysis, we experience organizations who've moved most of their activities to "the cloud." For the most part, that implies they presently use SaaS applications rather than authorized on-prem applications, and they've moved their restrictive programming and frameworks from the server farm to IaaS Providers. For years cloud savants have discussed whether there's truly such an amazing concept as the confidential cloud in IaaS structure that is, on premises, in the client's server farm. All things considered, one of the greatest advantages of IaaS is that it eases the weight of obtaining, provisioning, and keeping up with actual framework. IaaS outgrew the more extensive transformation from conventional equipment situated server farms to virtualized and cloud-based foundation. By eliminating the proper connection among equipment and working programming and middleware, associations found that they could scale information conditions rapidly and effectively to fulfill responsibility needs. To utilize IaaS, a trade can buy a benefit arrange from a cloud computing benefit supplier that can direct its computing foundation so clients can center on errands like acquiring and overseeing their possess computer program. This will incorporate things like computer servers and applications for websites and versatile gadgets. Along these lines, the endeavor can smooth out its genuine equipment foundation while giving the required assets to serve the plan of action.

Keywords: Cloud datacenter; Cloud parameters; Security system; Cloud component; Security parameters; Cloud datastores.

RAiSE23 - 429

Visual Object Detection using Audio Data in Smart Cameras

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Today, The Internet of Things and Machine Learning are evolving. One use of these two fields is people, cars, houses, etc. It is a search tool that uses groups of digital images and videos to find semantic objects. Thanks to the information received from the camera, the image of the product is quite good and accurate. But they face less visibility issues. This article aims to solve this problem by using sound data to identify objects. Microphones are used to estimate the angular position of sound emitting objects. Objects already in the camera's field of view are detected and tracked using optics; however, when they are out of sight, the microphone uses the object's sound to calculate their angular position. The camera rotates in that direction while calculating the angle. This ensures that objects are outside the frame even if they are outside the frame. We use machine learning to recognize faces after finding objects from IoT devices. The proposed system combines IoT and machine learning for local products and discovery. Combine the audio data recorded by the microphones with the data seen by the camera to create a more reliable and authentic experience. While object detection is great at capturing good data, field of view only makes it difficult to identify moving objects outside the camera's field of view. Audio files recorded by the microphone can be used to circumvent this limitation. Even if the object is out of the camera's field of view, the system can determine the position of the object by estimating the angle of the light source. This provides continuous search and detection capabilities, making it possible to change the dynamic rotation of the camera based on the calculation of the object's position. Such systems create networks of interconnected sensors that work together to improve the detection of IoT devices such as cameras and microphones. When an object is detected, a combination of machine learning algorithms creates a face, enabling the body. This is especially true in situations where an individual's identification is required, such as surveillance or access control.

Keywords: Haar cascades, GCC-PHAT, Internet of Things (IoT), Machine Learning (ML), Object detection, Visual object detection, Audio data, Angular position estimation, Microphone localization, Optical flow, Connected sensors, Surveillance systems, Access control systems, Real-time monitoring, Sensor fusion, Audio-visual tracking, Multi-modal object localization, Dynamic sensor adjustment.

RAiSE23 – 434

An Effective Network Intrusion Detection System Using Recursive Feature Elimination Technique

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Machine learning is an emerging area in research. Nowadays, researchers are utilizing machine learning across all domains to find optimal solutions. In the realm of cyber security, machine learning aids in the expansion of an Intrusion Detection System (IDS). These systems are proposed to identify and classify cyber-attacks on the network. However, an exhaustive assessment and performance evolution of various machine learning algorithms remains unavailable. Malware exhibits dynamic characteristics, continuously altering its methods of attack; thus malware datasets must be systematically updated and benchmarked. In this study, we introduce a framework designed to nurture a versatile and efficient IDS, adept at identifying and categorizing unexpected and evolving cyber threats. This is achieved through the use of Recursive Feature Elimination (RFE). In RFE, the algorithm is run recursively until a selected number of features are identified to enhance efficiency and reduce computational cost. Rapid detection of these attacks can facilitate the identification of potential intruders, and damage will be less. An IDS (Intrusion Detection System) can exist in the form of a software solution or a hardware setup, tasked with the continuous surveillance of a computer or network to spot potential attacks or unauthorized entries. Upon detecting any irregularities, it promptly notifies the administrator or user, providing an opportunity to locate and remedy the existing security gaps. Therefore, the development of an efficient and accurate intrusion detection system can help mitigate network security threats. This understanding drove us to devise an Intrusion Detection System leveraging reverse feature elimination for feature selection. We attained remarkable accuracies, with an average rate between 98% and 99% across all the classifiers and against all four types of attacks. The Random Forest and Decision Tree models stood out, each achieving peak accuracies of 99% in both KDD-99 and NSL-KDD Datasets.

Keywords: Intrusion Detection System; Naïve Bayes; KNN; Random Forest; Reverse Feature Elimination.

RAiSE23 – 436

Eco-friendly Adsorption of Cationic (Methylene Blue) and Anionic (Congo Red) Dyes from Aqueous Solutions Using Sawdust

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In this study, sawdust (SWS) was employed as an eco-friendly and low-cost adsorbent for the removal of anionic (Congo red, CR) and cationic (methylene blue, MB) dyes from aqueous solutions at 25 °C. The investigation encompasses various parameters affecting the adsorption process, including weight of sawdust adsorbent, pH, initial dye concentration, and equilibrium time. Characterization techniques such as Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) were conducted for an in-depth understanding of the adsorption mechanism. Optimal conditions were found to be SWS weight of 0.1 g/L, dye concentration of 15 mg/L, and equilibrium time of 1 hour. Under these conditions, removal percentages of 95.88% for MB and 67.78% for CR were achieved, with adsorption capacities of 14.35 mg/g and 10.22 mg/g, respectively. The results demonstrate that SWS, though considered waste, has significant potential as a low-cost adsorbent for dye removal from aqueous solutions. Removal efficiency increased with SWS weight, ranging from 75.54% to 98.50% for MB, and 50.86% to 80.012% for CR, while adsorption capacity (Qe) inversely correlated with surface weight, ranging from 45.55 to 9.12 mg/g for MB, and 15.23 to 8.076 mg/g for CR.

Keywords: Sawdust; Adsorption; Aqueous Solutions; Cationic Dye; Anionic Dye

RAiSE23 – 437

Synthesis, Characterization, and Regeneration of Ag/TiO_2 Nanoparticles: Photocatalytic Removal of Mixed Dye Pollutants

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Titanium dioxide nanoparticles were prepared via the hydrothermal method, and silver was supported on TiO2 nanoparticles to form Ag/TiO2 using the photo reduction method. The prepared samples were dried overnight at 60 ∘C and then calcined at 500 ∘C for 2 hours. Structural and morphological characterization were carried out using X-ray diffraction, Field emission-scanning electron microscopy (FE-SEM), and Transmission electron microscopy (TEM). The adsorption performance and photocatalytic activity of the Ag/TiO2 were investigated using malachite green dye (MG) as a model organic pollutant in water. Along the way, the effects of various parameters were examined, such as regeneration experiments and removal of a laboratory sample (a mixture of several dyes) from aqueous solutions. The photocatalytic degradation efficiency reached 83.9%, 78.8%, and 68.5% during three cycles, compared to the standard solution (fresh), which reached 90.9%. These results underscore the potential application of Ag/TiO2 in environmental remediation, particularly in the degradation of organic dyes.

Keywords: Nanoparticles; photocatalytic; Malachite green dye (MG); silver; Titanium dioxide

RAiSE23 – 438

Characterization and Removal Efficiency Analysis of MWCNT/Clay Nanocomposites for MB Dye Adsorption

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Multi-walled carbon nanotubes (MWCNT) combined with clay have shown potential as effective adsorbents for dye removal. This study aims to characterize MWCNT/Clay Nanocomposites and analyze their removal efficiency for Methylene Blue (MB) dye under various conditions. The nanocomposites were characterized using techniques such as FESEM, TEM, EDX, TGA, and XRD. The removal efficiency was studied concerning different weights, concentrations, temperatures, pH levels, and comparative amounts of CNT in the composites. The findings revealed distinct properties and behaviors of the nanocomposites, with removal efficiency significantly influenced by weight, MB dye concentration, temperature, and pH. Higher CNT content in the composite corresponded to better removal results. The study demonstrates the potential of MWCNT/Clay Nanocomposites in wastewater treatment, with insights into optimal conditions for dye removal. The investigation adds valuable knowledge to the field and indicates promising directions for future research.

Keywords: MWCNT/Clay Nanocomposites; MB dye removal; Adsorption efficiency; Characterization techniques; Wastewater treatment

RAiSE23 - 439

Bond Graph Modeling and Simulation of Hybrid Piezo-Flexural-Hydraulic Actuator

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In this study, a hybrid piezo-flexural-hydraulic actuator is modeled and simulated using bond graph methodology. The hybrid actuator comprises of piezo-electric stack actuator, mechanical flexural amplifier, and hydraulic piston actuator. The piezo-electric stack actuator produces electrically controllable displacement. This displacement is amplified by cascading combination of flexural amplifier and hydraulic actuator. A domain independent bond graph model for the proposed hybrid actuator is developed. Using this bond graph, a mathematical model and state space representation for the hybrid actuator is derived. The bond graph model is simulated using 20-sim bond graph simulation software. The results of the simulation provide displacement characteristics and sensitivity analysis for each component and the hybrid actuator as a whole. The study plays a significant role in understanding dynamic behavior of a multi-domain system using bond graph methodology.

Keywords: Piezoelectric-stack actuator (PSA); Amplified piezoelectric actuator (APA); Piezo-hydraulic actuator (PHA); Mechanical flexural amplifier; Hydraulic piston actuator

RAiSE23 - 440

Bending Stresses in Profile Corrected Gears

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In the present investigation, bending stress of a profile corrected altered tooth-sums gear train, for a constant center distance, is estimated using a C-language program developed for the unique purpose. The number of teeth altered by ± 4% is considered and bending stress is estimated for both 25° and 20° pressure angle gears. The stress concentration factor is estimated by using the equations of Dolan and Broghamer along the tooth root fillet and used for estimating the bending stress. Since the stress concentration depends on the type of fillet radius, in this work, the bending stresses are computed in the tooth for various fillet radius generated by rack cutters such as; sharp corner tip, rounded corner tip, protuberance tip and fully rounded tip. Based on the computed bending stress results from the C-program it is found that the bending stress are less in tooth radius generated by fully rounded tip cutter compared to rounded corner tip, sharp corner tip and protuberance tip. Also, it is noticed that the bending stress induced is less in negative alteration in tooth-sums compared to positive alteration and standard tooth-sums gears.

Keywords: Spur-gears; Rolling contact fatigue; Rolling; Scuffing; Scaling.

RAiSE23 - 441

Games Is 5, 7, 3, 2 AND 1st Letters of Semigraph

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A semigraph, defined as a generalization of the graph by E. Sampathkumar, allows an edge to have more than two vertices. The idea of multiple vertices on edges gives rise to multiplicity in every concept in the theory of graphs when generalized to semigraphs. Semigraph is a generalization of a graph with multiple vertices on an edge, hence semigraph finds an application in every field where a graph has an application. Games and puzzles can be designed, developed, and generated using graphs, thus semigraph can also be used to do the same. A well-known puzzle "SUDOKU" can be seen as a semigraph. This article gives games which are based on the structural properties of semigraphs and hence been considered as an application of semigraphs.

Keywords: Semigraphs; vertices: games; puzzles; subset.

RAiSE23 - 445

Efficient Deep Learning-Based Cyber-attack Detection for Internet of Medical Things Device

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The usage of IoT in the medical field, often referred to as IoMT, plays a vital role by facilitating the exchange of sensitive data among medical devices. This capability significantly contributes to enhancing the quality of patient care. However, it comes with privacy issues that compromise the security of the data collected by medical sensors, making them vulnerable to potential cyber threats such as data modification, replay attacks etc... These attacks can lead to significant data loss or unauthorized alterations. Machine learning, particularly in Cyber Attack Detection systems, is crucial for identifying and classifying such attacks. Yet, the main challenge lies in adapting to the dynamic and unpredictable nature of malicious attacks and creating scalable solutions to combat them. The objective of this paper is to detect cybersecurity threats, with a particular focus on man-in-the-middle attacks that occur within the IoMT communication network. The study utilizes Principal Component Analysis (PCA) for feature reduction and employs multi-layer perceptron to classify unforeseen cyber-attack IoT based healthcare devices. The study evaluates the effectiveness of this proposed strategy using real-time data from the St. Louis Enhanced Healthcare Monitoring System (WUSTL-EHMS). The findings indicate that the multi-layer perceptron outperforms other tested classifiers, achieving an accuracy score of 96.39%, while also improving the performance by reducing the time complexity.

Keywords: Principal Component Analysis; Cyber Attack Detection; Internet of Medical Things; multi-layer perceptron; Deep Learning

RAiSE23 - 447

Chromatographic Approaches for the Isolation and Detection of a New Antifungal Phenolic Compound from Lichen Heterodermia Leucomelos (L.) Poelt

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Chemical investigations play a crucial role in the identification of novel compounds. In the present study, chromatographic approaches were used for the screening of antifungal metabolite. Lichen Heterodermia leucomelos was collected from Kodagu district, Karnataka, India and extracted using ethyl acetate, methanol, and acetone solvents. Obtained crude extracts were tested against pathogenic fungi Fusarium oxysporum and Fusarium solani. Well diffusion assay showed highest zone of inhibition with 19.6 ±0. 5 mm in the methanol extract against Fusarium oxysporum and 17.0 ±0. 5 mm against Fusarium solani. Minimum inhibitory concentration of 0.0975mg/ml was observed in methanol extract and TLC-bioautography showed active band at Rf 0.74 in methanol against Fusarium oxysporum. Isolation and purification of the active compound were carried out by silica gel Column chromatography. Fraction 5 was found to be active against Fusarium oxysporum and Fusarium solani. Gas Chromatography- Mass Spectroscopic analysis detected the most predominant compound as Methyl 2,4-dihydroxy-3,6-dimethylbenzoate (syn. Atraric acid). This is the first report where atraric acid has been isolated from lichen Heterodermia leucomelos. The results obtained from this study justify that Atraric acid, a phenolic compound can be a promising source as a natural fungicide which could be exploited for industrial purposes.

Keywords: Lichen, TLC- bioautography, column chromatography, GC-MS, Atraric acid.

RAiSE23 - 448

Impact of filler electrodes on welding properties of dissimilar welded 316L/201 Austenitic Stainless Steels

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In this research, gas tungsten arc welding method was used to join 201 and 316L austenitic stainless steels using various filler electrodes (316L, 309L and 309LMo), resulting in dissimilar welds and its various properties, namely, microstructural evolu-tion, mechanical behavior and corrosion behavior was investigated. The ferrite-austenite solidification mode was attained and therefore, the formation different types of ferrite (lathy ferrite and skeletal ferrite) was formed in austenite matrix in all the filler electrodes weldments weld zones, however, the variation in content of the ferrite was observed. The ferritoscope was used to estimate the ferrite content in weld zone and for E316L, E309L and E309LMo filler electrodes, the ferrite number observed were 8.78, 9.05 and 12.69 units, respectively. Hence, the 316L filler electrode exhibited least ferrite content while the 309LMo filler electrode weldment displayed a higher ferrite content ascribed to the varation in the chemical composition of filler electrodes (different chemical composition of ferrite stabilizer elements, namely, chromium, mo-lybdenum, etc). Further, the mechanical characteristics, including microhardness and tensile characteristics, were determined to be higher in the 309LMo filler electrode weldment, followed by the 309L and 316L filler electrode weldments, primarily due to the increased ferrite content. All the welds exhibited failure in the ductile mode. Moreover, higher sensitization was observed in the 309LMo filler electrode weldment, with the 309L and 316L filler electrode weldments following suit, which is ascribed to the higher ferrite content. This higher ferrite content resulted in higher interphase regions of ferrite/austenite, thus resulting in higher sensitization.

Keywords: Dissimilar Welding; 316L ASS; 201 ASS; GTAW; Mechanical behavior; Corrosion

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Finite Element Study on Coconut Inflorescence Stem Fiber Composite Panels Subjected to Static Loading

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Natural fiber reinforced composites (NFCs) were alternatives to synthetic fiber reinforced composites, since they were abundant in nature, inexpensive, lightweight, and have a high strength-to-weight ratio. Natural fibers encompass a diverse composition, including lignin, hemicellulose, wax, and cellulose. Natural fibers were environmentally friendly, biodegradable, renewable, reusable, and sustainable. In bio-composite's, natural fibers such as jute, banana, hemp, coir, kenaf, areca nut, coconut inflorescence stem fibers, were blended with resin. Natural fiber reinforced bio composites have various applications in the construction industry, automobile industry, aerospace industry, sports equipment and gadgets, textile industry and hotel industry. Fibers from natural sources were also be used as reinforcement in composites, for example roofing sheets, bricks, door panels, furniture panels, panels for interior decoration. The mechanical properties of natural fiber-reinforced composites were profoundly influenced by the bonding between the fibers and the matrix. The study involves the testing of compact tension (CT) specimens under mode I fracture conditions and employs three-dimensional finite element analysis (FEA) using ANSYS software to enhance our understanding of the material's fracture behavior. Finite element analysis was performed on Coconut inflorescence stem fiber reinforced composites (CIFRCs) panels with preformed cracks. Numerical simulation was carried out using ANSYS software. Properties such as crack growth initiation, stress-intensity factor and stresses along the length of a CIFRC panel was examined by finite element analysis (FEA). ASTM D-5045 standards was followed for the specimen size and ASTM E399 standard for the pre-crack for finite element. Simulation results were found to be good agreement with analytical results.

Keywords: Natural fibers, composite, Coconut inflorescence stem fiber, crack growth initiation, stress-intensity factor, Finite element analysis.

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A Numerical Study on Coconut Inflorescence Stem Fiber Reinforced Panels Subjected to Tensile Load, Compressive Load and Flexural Load

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Natural fiber reinforced composites were seeking an increasing amount of interest, and they are becoming more popular as a replacement for synthetic fiber reinforced composites. Natural fiber reinforced composites were important due to their lightweight nature, strength, and their favorable qualities, which include eco-friendly, non-toxicity, and bio-degradability as a potential building material. Natural fibers such as hemp fibers, jute fibers, banana fibers, coconut fibers, sisal fibers, bamboo fibers, arecanut fibers and kenaf fibers have been used for making composites panels because of their strength to weight ratio. Coconut inflorescence stem fibers has been considered for our study. Coconut inflorescence stem reinforced composites panels are often subjected to tensile load, compression load and flexural load. Tensile strength, compressive strength and flexural strength play a vital role when these panels were subjected service loads. In this context finite element analysis (FEA) has been carried out on coconut inflorescence stem reinforced panels subjected to tensile load, compressive load and flexural load. Linear analysis has been performed for the mechanical properties by using ANSYS software. A Coconut inflorescence stem reinforced composite specimens of dimension 280 mm × 25 mm × 3mm (length × width × thickness) for tensile loading, 145 mm × 25 mm × 4 mm for the compressive load and 150 mm × 25 mm × 4 mm for flexural load has been considered for present study, as per ASTM-D3039, ASTM-D3410, ASTM-D790 standards respectively. Finite element analysis results showed good correlation with analytical results.

Keywords: Natural fibers, Composites panels, Coconut inflorescence stem fibers, Finite element analysis and ANSYS.

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Synergistic Effects of Cold Rolling and Age Hardening On the Hardness and Tensile Characteristics of AA6061 Hybrid Composites

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The present study involves the fabrication of aluminium alloy 6061 matrix hybrid composites with varying weight fractions of silica sand and copper particles by employing the conventional stir casting method. The combined influence of age hardening (AH) and low temperature thermomechanical treatment (LTMT) on the hardness and tensile properties of AA6061 hybrid composites was investigated. Microstructure analysis and the improvement of Brinell hardness values confirmed the uniform dispersion of the particles in the matrix. The composites exhibited higher tensile strength and hardness than the base alloy. The peak hardness and tensile strength at the peak aged condition of the hybrid composites were determined through the Vickers hardness and tensile test, respectively. Both AH and LTMT enhanced the properties of the hybrid composites, and a comparison between them revealed the best results for LTMT hybrid composites. The LTMT hybrid composite with 3 wt.% silica sand and 3 wt.% copper (3S3C) subjected to 12% rolling deformation and aged at 100 °C had the highest Vickers hardness and tensile strength of 144.26 HV and 290 MPa, respectively. The hardness and tensile strength of AA6061-3S3C hybrid composite subjected to LTMT in peak aged condition showed an improvement of 125 and 97%, respectively, compared with those of AA6061 alloy. Fracture surface analysis of the thermomechanical treated composites in peak aged condition showed a mixed mode of failure dominant with the ductile fracture.

Keywords: AA6061 hybrid composites; Silica sand; Copper; Low temperature thermomechanical treatment; Fractography.

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CNAIS : Performance Analysis of Clustering of Non-Associated Items Set Techniques

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Mining technologies depend upon their outcomes, focusing only on certain data features in the database. They select only certain features related to the process from the integrated data resources with varieties of data and transform them into a form suitable for mining tasks. Different implementations of mining techniques will run on data sources which may be huge in volume for extracting different knowledge outcomes suitable for various analyses and decision-making. The proposed study gives the design and development of the Clustering of Non-Associated Items set (CNAIS) over transactional database. Working of algorithm and its application over data set is given and results are noted. Comparisons with the state-of the art show that CNAIS has the better performance.

Keywords: Performance, Association mining, accuracy, precision, recall

RAiSE23 - 465

Supervised Sentiment Analysis of Indirect Qualitative Student Feedback for an Unbiased Opinion Mining

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In education domain, the significance of student feedback and other stakeholders for raising educational standards has received more attention in recent years. This has led to the development of various tools and approaches aimed at gathering feedback from students and evaluating the performance of staff members and other aspects of education. There are two main methods to collect feedback from students; Direct and Indirect method. In the direct method, feedback is collected by distributing a questionnaire and taking their responses. The limitation of this method is that true experience of students is not revealed, there is room for bias in collection and assessment of such questionnaire. To overcome this limitation, the indirect method can be followed where social media posts can be used to collect the feedback from the students as they are active on social media and use it for expressing their opinion as posts. To address the problem of manual annotation of large volume of data, this paper proposes a machine learning method that uses sentiment 140 dataset as the training set to automate the process of annotations of tweets. The same method can be used to label any qualitative data. 5000 tweets are scraped and are considered for this study. Various pre-processing methods including byte-order-mark removal, hashtag removal, stop word removal, tokenization is applied to the data. The cleaned data is then processed by term frequency – inverse document frequency (tf-idf) trigrams approach. Tf-idf technique using trigrams captures negation for sentiment analysis. The vectorized data is then processed by various machine learning algorithms to classify the polarity of tweets. The performance metrics like accuracy, precision, recall and F1-score are compared. The performance of the ridge classifier shows a better result compared to others with 95.16 % Accuracy, 94% Precision, 94% Recall and F1-score of 94%.

Keywords: Feedback, Education, Direct method, Indirect method, Sentiment Analysis.

RAiSE23 - 466

Future Fusion+UNet(R2U-Net) Deep Learning Architecture for Breast Mass Segmentation

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R2U-Net, or Recurrent Residual U-Net, is a U-Net extension that includes both residual and recurrent connections for image segmentation tasks. R2U-Net's value resides in their goals and architectural changes. R2U-Net is an image segmentation task-focused network that mixes residual and recurrent connections to boost performance and manage sequential data. Deep learning (DL)-based semantic segmentation algorithms have shown state-of-the-art performance in recent years. These approaches, in particular, have been successfully used to medical picture classification, segmentation, and detection tasks. U-Net is one of the most prominent deep learning techniques for these applications. These proposed structures for segmentation problems have various advantages. To begin, a residual unit is useful while training deep architecture. Second, using recurrent residual convolutional layers to accumulate features offers superior feature representation for segmentation tasks. Third, it enables us to create a better U-Net architecture with the same number of network parameters but improved performance for medical picture segmentation. The suggested models are put to the test on three benchmark datasets: blood vessel segmentation in retina images, skin cancer segmentation, breast cancer segmentation, and lung lesion segmentation. The experimental results reveal that the model outperforms analogous models such as (R2U-Net) on segmentation tasks. The Accuracy of the R2UNet model was 95.6%, while the FF+(AlexResNet+R2Unet) result was more than 97%, with Accuracy (%):97.4, AUC (%):97.35, Precision (%):97.4, F1- score (%):95.26, and Recall (%):97.16. The employment of these segmentation approaches in the identification and diagnosis of breast cancer produces outstanding results. Our proposed method could provide a more precise diagnosis of breast cancer, perhaps improving patient outcomes.

Keywords: Medical Image Processing, Image Segmentation, Feature-based Method, Recurrent Residual Convolutional Neural Network.

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Comparative Analysis of Fine-tuning I3D and SlowFast Networks for Action Recognition in Surveillance Videos

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Human Action Recognition is consider to be a critical problem and it's always a challenging issue in computer vision applications especially video surveillance applications. State-of-the-art classifiers introduced to solve the problem are computationally expensive to train and require very large amounts of data. In this paper we solve the problems of low data and resource availability of surveillance datasets by employing transfer learning and fine-tuning the Inflated 3D CNN model and the SlowFast Network model to automatically extract features from surveillance videos from the SPHAR dataset for classification into respective action classes. This approach works well to process the spatio-temporal nature of videos. Fine-tuning is done on the networks by replacing the last classification (dense) layer as per the available number of classes in the constructed new dataset. We ultimately compare the performance of both fine-tuned networks by taking accuracy as the metric and find that the I3D model performs better for our use-case.

Keywords: Human Action Recognition, Fine-Tuning, Deep Learning, Surveillance, Convolutional Neural Network, SPHAR.

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Power-Yeoh: A Yeoh-Type Hyperelastic Model with Invariant I2 for Rubber-Like Materials

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Rubber-based materials play an important role in various engineering and healthcare applications. Numerous hyperelastic models have been proposed in the long line of literature to model these nonlinear elastic materials. Due to the need to balance simplicity with accuracy, purely invariant I1 based models have been proposed which possess certain limitations with respect to the accurate description of their mechanical behaviors. In this paper, we choose to improvise upon the Yeoh model, one of the classical and most popular I1 based hyperelastic models with high versatility. The Yeoh model is modified by adding a generalized power-law type term. The model's capabilities are analyzed under homogeneous deformation modes such as uniaxial tensile, biaxial tensile and pure shear loading conditions. Experimental data pertaining to rubber-based materials are used to apply to the proposed hyperelastic model. Also, the interesting phenomenon of thin balloon expansion is investigated by applying the model to relevant experimental data on elastomeric balloons available in the literature. A genetic algorithm based least squares optimization routine is carried out to determine the material constants while applying to the reported experimental data. The results of curve fitting to experimental data pertaining to rubber-based materials showed the capability of the model to describe such multiaxial loading responses with acceptable accuracy ($R2 \geq 0.95$). The model also showed the capability to describe both the limit-point instability and the strain stiffening in thin rubber balloons demonstrating its versatility and suitability for modeling rubber-like materials under various applications. The model's performance can be further extended in the future by coupling terms related to anisotropy, compressibility, damage, etc., according to requirements.

Keywords: Yeoh model; Hyperelasticity; Second invariant; Invariant I2; Elastomers

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Estimation of Energy Storage Capability of the Parallel Plate Capacitor Filled with Distinct Dielectric Materials

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The present article aims to investigate the behavior of parallel plate capacitors in considering different dielectric materials and also varying the gaps between the plates. The study aims to shed light on estimating the capacitance and energy storage characteristics of the capacitor model both numerically and analytically. The analytical and numerical approaches are utilized to justify the existing capacitance of the model with varying materials and gaps. The 3D model of the capacitor was developed in COMSOL Multiphysics package. The gap between the parallel plates and the dielectric medium between the plates was varied. Gaps of 2, 4, and 6 mm and different dielectric materials such as air, nylon, PDMS, and PVDF were considered. The simulation results show that the capacitance of the capacitor decreases with an increase in the gap between the plates. Further, as the dielectric constant of the material increases, there is more amount energy storage in the capacitor model. Thus, the developed model was validated. It is noticed that analytical and numerical approaches have proven the capacitance of the parallel plate capacitor being close to each other. Further, the PVDF material was found to exhibit higher capacitance and more energy storage capability. The findings can potentially advance the design and optimization of capacitor-based systems, enabling the development of improved sensors, actuators, and efficient energy storage applications.

Keywords: Energy storage; Capacitance; Dielectric material; Multiphysics

RAiSE23 - 472

A Secure Lightweight Cryptographic Algorithm for the Internet of Things Based on DNA Sequences

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The widespread adoption of the Internet of Things (IoT) across various domains has ushered in numerous applications into our daily lives. Ensuring the security of sensitive data, including private information and images, generated by IoT devices, and transmitted wirelessly, is paramount. However, IoT devices are often termed "constraint devices" due to their limited computational resources like CPU power and memory capacity. Also ensuring the integrity of IoT devices and networks is imperative to foster trust in the capabilities and benefits of IoT technology. Addressing data tampering, device vulnerabilities, and network weaknesses through proactive security measures is essential for realizing the full potential of the IoT while safeguarding against potential risks and disruptions. Traditional encryption approaches prove inadequate, as they demand excessive computational power, a challenge for IoT devices. To address this, a novel and less intrusive encryption method has been proposed, leveraging the inherent unpredictability of DNA nucleotide sequences. This approach is tailored to accommodate the resource constraints of IoT devices. By harnessing the intrinsic randomness of DNA sequences, a robust secret key is generated, significantly bolstering resilience against attackers. The key is crafted through uncomplicated substitution techniques and transposition operations. Upon satisfying the computational requisites of IoT devices and safeguarding image security, this DNA-based key comes into play for photo encryption. Rigorous testing has demonstrated its effectiveness, showcasing superior attributes in terms of key size, encryption speed, and distortion minimization when compared to alternative encryption techniques. This innovative encryption paradigm not only upholds the integrity of IoT-generated data but also does so without overwhelming the devices' limited computing capabilities.

Keywords: DNA Sequence, Internet of Things; Security; Image Encryption; Integrity.

RAiSE23 - 473

Pv-Wind Hybrid Energy System Using Improved Deep Neural Network Based Voltage Source Controller for Microgrid Environment

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Presently, there has been a huge rise in the demand for power owing to the increase in the population and commercial organizations. Traditional power plants are not able for increasing needs of customer. Finding a different way to meet the consumer's need is the main problem in the current situation. MostRES (renewable energy sources), such as wind, solar, fuel cells, and hydro/water sources, are environmentally beneficial. The amount of available resources has no bearing on how much electricity can be produced using RES. Due to differences in natural resources, there is a constant fluctuations in availability of RES. In this technical study, two significant RE (Renewable Energy) power sources-PV (photovoltaic) cells and WES (wind energy systems)-are studied in various weather scenarios. It first created a cutting-edge intelligent controller system, which aids in tracking the peak power point. Due to the unpredictable nature of the weather, the MPPT (Maximum Power Point Tracking) controller is required for RES. The main objective of this study is to present a unique method for PV and wind-based power generating systems that relies on IDNN (Improved Deep Neural Network) and MPPT. A hybrid PV/WES systems are integrated into MG (microgrids), power quality may be improved and THD values can be reduced. It is confirmed from the result of simulation that the proposed IDNN system yields better performance in different operating situations by means of lower MSE (Mean Square Error) rates, lower THD (Total Harmonic Distortion) and lower computational complexity than the existing methods.

Keywords: PV-wind power hybrid energy system; Improved Deep Neural Network (IDNN); microgrid environment; Total Harmonic Distortion (THD); Maximum Power Point Tracking (MPPT).

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A Hybrid Modified Artificial Bee Colony (ABC) Based Aritificial Neural Network Model for Power Management Controller and Hybrid Energy System for Energy Source Integration

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Small MGS (Micro Grid Systems) are capable of decreasing energy losses. Long-distance power transmission lines are constructed by integrating distributed power sources with energy storage subsystems, the current trend in developments of RES (Renewable Energy Sources). Although energies produced by RES do not cause pollutions, they are stochastic and hence challenging to manage. This disadvantage makes high penetrations of RES risky for stability, dependability, and power quality of main electrical grids. The energy obtained from RES must thus be integrated in the best possible way. The hybrid system, which encompasses connected tiny, modular generating and storage units can play significant roles in the electricity domain. It has shown to be the most successful way to fulfil energy demands with higher levels of dependability, flexibility, and economy. To provide maximum energy sustainability and best energy usages, hybrid energy systems must manage energy efficiently. In order to improve power management and to make better use of RES, this research study offers hybrid energy power management controllers based on hybrid MABC (Modified Artificial Bee Colony) and ANN (Artificial Neural Network) for MGS, PVS (Photovoltaic System) and WT (Wind Turbines). Controlling power flows between grids and energy sources is the suggested approach for power controls. D/R (Demands/Rresponses), customer reactions, offering priorities, D/R properties like COEs (Cost Of Energies), their sizes (lengths) are considered in this work Along with current techniques, suggested model is implemented in MATLAB/Simulink platform.

Keywords: Micro Gird (MG), photovoltaic (PV), Wind Turbine (WT), Modified Artificial Bee Colony (MABC), Artificial Neural Network (ANN).

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Weighted Particle Swarm Optimization Based Algorithm and Power Management Strategy for Grid Hybrid Energy System

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In an independent RES (Renewable Energy Systems), one of the primary concerns necessary to be addressed is the sustenance of the power balances between supplies and requirements that are cost-optimized in residences that are linked to these systems. The amount of power generated through RES has substantially risen, with solar and wind being the two primary sources in RES. Small scale distributed grid networks are rapidly expanding in modern power systems, and DG (distributed generations) play an important role. Micro grids are very recent additions to electrical infrastructures. Power management is primarily required for smooth operation, maintaining consistency and robustness, and controlling the actual and reactive power of independent DG. But, the batteries are expensive, moreover during the charging and discharging process, huge amounts of power is lost, and characterize important problems, which have to be averted. This paper intro-duces the WPSO (Weighted Particle Swarm Optimisation) method for controlling energy systems and grid hybrid energy systems that comprise PV (photovoltaic), wind turbine, batteries, and diesel generators. By maximising the power derived from RES and reducing battery power usage, energy is preserved and the cost of energy consumption (energy of diesel) is reduced. Meteorological data from Spain was used in simulations of this work. The method depends on the data forecast of renewable energy one day in advance and the everyday load power consumption profile. The results of the simulation show that the proposed WPSO outperforms existing algorithms in terms of energy, cost, and battery life.

Keywords: Weighted Particle Swarm Optimization (WPSO); energy management system and grid hybrid energy system; PV (photovoltaic); DG (distributed generations); RES (Renewable Energy Systems).

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Enhancing Power Efficiency in 4IR Solar Plants through AI-Powered Energy Optimization

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Maximizing the efficiency of solar energy in Industry 4.0 requires an automated AI-powered system. The AI-powered system relies on intelligent algorithms to identify the most efficient energy sources for the industry's needs and adjust accordingly while learning from every task it is given. To increase the efficiency of solar energy, the system first utilizes sensors to monitor the environment and conditions of the solar cells, optimizes the solar energy for the machines running in the Industrial setting, and then stores the energy in a Reserve storage system. By continually monitoring and adjusting the energy settings, the AI-powered system efficiently maximizes the efficiency of the solar energy generated for industrial use. Furthermore, the system can be customized according to your industry's changing needs and requirements, providing you with the ability to reduce costs in energy usage while improving the efficiency and productivity of your machines.

Keywords: multi-class, classification, skin disease, deep neural networks, CNN

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Image Fusion Techniques based on Optimization Algorithms: A Review

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Image fusion techniques have gained popularity in the field of image processing due to their ability to blend relevant attributes from different source images. This results in the creation of a single composite image that holds a richer set of information and greater utility. In this research, we initially examined traditional methods of fusing images in both spatial and transform domains. However, these methods encounter several challenges like diminished contrast, noise interference, and excessive duplication. To effectively address these issues, we employed adaptive image fusion approaches utilizing optimization algorithms inspired by natural processes, specifically YSGA (Your Selected Nature-Inspired Optimization Algorithms). These algorithms actively search for the best possible solution within the context of image fusion by evaluating an objective function. Consequently, the central aim of this study is to thoroughly investigate and assess the performance of optimization algorithms, taking into consideration various influencing factors.

Keywords: Image Fusion, DWT (Discrete Wavelet Transform), Enhancement, PSO (particle swarm optimization), YSGA (Yellow Saddle Goatfish Algorithm).

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A Novel Hyper Spectral Model to Optimize the Prediction Rate for Heart Disease in Modern Healthcare Networks

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Coronary heart disease is one of the maximum extreme and leading causes of death in these countries globally. Heart disease's correct and timely prognosis is crucial to save it from further morbidity and mortality. In recent years, the appearance of present-day healthcare has led to an-alyzing and improving the latest diagnostic models for heart ailments. Hyper spectral imaging methods are rising as appropriate and reliable techniques for heart ailment prediction. This paper presents an optimized hyper spectral model for coronary heart disorder prediction, which uses each depth and spatial feature. The proposed version extracts depth and spatial features to recognize heart ailment in clinical scans. The depth function extraction layer is designed to phase the scans and become aware of suspicious areas with anomalies. The spatial feature extraction layer is de-signed to seize the features in those areas for similar spatial analysis. The extracted functions are then used to train a CNN primarily based version for the type of coronary heart disorder. The effects of the proposed version were tested and compared with other existing methods and determined to be extra correct. The proposed model is robust and presents greater accuracy and better overall performance for heart disorder analysis.

Keywords: heart disease, accurate, diagnosis, hyper spectral, analysis.

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An Enhanced Time Series Analysis to Improve the Performance of 5G Communication Systems

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5G communication systems are rapidly becoming integral in numerous areas such as user experience, productivity and performance, due to increased bandwidth, lower latencies and superior signal coverage. As such, ensuring a high-performance 5G network has become more important than ever before. To this end, different performance metrics such as throughput, latency and packet error rate must be measured and monitored on a regular basis. Time series analysis has emerged as a promising tool to measure, diagnose, and predict the performance of 5G communication systems. By considering the time dimension of metrics such as latency, throughput, and packet error rate, time series analysis provides a comprehensive view of the system and can potentially uncover patterns that are otherwise hidden in isolated metrics. Moreover, this type of analysis can also be used to fine tune system parameters to improve system performance, detect faults, and identify trends in the system. In this way, time series analysis is an ideal tool for understanding, optimizing, and maintaining 5G communication systems.

Keywords: 5G, communication, bandwidth, latency, signal coverage, throughput.

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The Intelligent Connection Management Model to Enhance the Security of Cloud Computers in High Dense Fog Networks

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Cloud-based secured connection management model (CS-CMM) for high density fog networks is a novel approach that leverages cloud resources and the proliferation of computing power at the edge of networks. The model seeks to address the challenges encountered when managing large FoNets of numerous devices. The proposed model uses encrypted and secure connections between devices and the cloud infrastructure. This allows for comprehensive and secure management of nodes, devices, and links. The proposed model utilizes shared communication channels to allow for optimal utilization of connectivity resources, and to reduce the latency of communication. The model also utilizes secure protocols for distributed computing and secure communication, ensuring end-to-end security for all nodes. The proposed model employs self-organizing algorithms and adaptive techniques to enable rapid adaptation to changes in network density and topology. This model provides a secure, efficient, and reliable means of managing high density fog networks.

Keywords: cloud, secure, connection, fog networks, power, edge, encryption.

RAiSE23 – 483

A Novel Information Security Framework for Securing Big Data in Healthcare Environment Using Blockchain

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The Blockchain based information security framework for health care big data environment is a framework designed for the secure storage, access and transmission of health care data in big data environments. It combines the privacy and security advantages of encryption and decentralized networks offered by Blockchain technology with the scalability of distributed systems to provide an effective secure platform for big data applications. The framework is based on the principles of confidentiality, immutability and immutability to ensure the security and privacy of health care data. The framework is designed to support a wide range of information sources and use cases including patient records, clinical research, medical imaging, genomic data and pharmaceutical trials. It is also designed to be compatible with existing distributed computing and data querying technologies such as Hadoop and Spark, which will help organizations to improve the accessibility of health care data. The Blockchain based framework will also provide an audit trail, allowing hospitals and other organizations to better monitor and control access to their data. This will enable organizations to ensure compliance with HIPAA and other regulations, while providing enhanced confidentiality and privacy to users and patients.

Keywords: Blockchain, framework, security, wide range, information, healthcare.

An Innovation Analysis of Time Series Based Detection Model for Improved Cancer Detection in Modern Healthcare Environment

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Cancer is one of the leading causes of death in the world. Early detection is important for successful treatment and survival of many cancer types. Technological advances have enabled researchers to develop more precise and reliable methods of cancer detection that go beyond traditional methods such as biopsy and imaging. Through methods such as blood tests, MRI scans, and gene expression profiling, it is now possible to quickly and accurately diagnose many types of cancer. Early cancer detection can lead to improved patient outcomes and even help save lives. Time series analysis is a data mining technique used to identify and analyze the temporal patterns in datasets. The proposed model reached 91.30% accuracy, 90.11% precision, 92.46% recall and 90.12% F1-score. This enhanced version of time series analysis incorporates multiple layers of data sources and uses advanced machine learning algorithms to identify patterns that could signal the presence of a tumor. Innovations in time-series analysis for cancer detection can significantly impact modern healthcare. Time-series analysis is a mathematical method used to analyze trends in data over multiple periods. It can identify patterns that could indicate early signs of cancer.

Keywords: Time series analysis, data mining, dataset, cancer detection, tumor, multi-dimensional, machine learning

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An Enhanced Automation Analysis for Structural Algorithm in Agro-Industries Using Iot

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The Internet of Things (IoT) based structural algorithm for automatic agriculture refers to the system of using powerful real-time data collected from a variety of sensors with software and analytics to autonomously manage agro-ecosystems. This algorithm can be used to monitor environments, analyze data, and use this knowledge to take specific actions to help farmers and producers maximize their production and profitability. This algorithm provides an unprecedented level of precision, accuracy and control over the agricultural environment, allowing greater efficiency and optimization in farming practices. It enables monitoring, scheduling, and control of different agro-ecosystem components, such as water, soil, fertilizer, light, humidity, temperature, soil pH and crop growth. The algorithm can also point to general trends and patterns in the environment, as well as offer timely advice to farmers in response to real-time conditions. The algorithm is also capable of automatically diagnosing and responding to unexpected problems, which can help prevent costly mistakes and excessive waste of water, fertilizer, energy etc.

Keywords: IoT, structural algorithm, sensors, software, agriculture, water, soil, fertilizer.

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Novel Nano-Formulation Concept of Ketorolac Locaded with PLGA: Design, Development and Analysis

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The main objective of the present work is to formulate Ketorolac tromethamine (KT) loaded PLGA nanoparticles (NPs) with sustained effect and improved bioavailability. Ketorolac tromethamine (KT) is well known NSAID (Nonsteroidal anti-inflammatory drug) reported with multiple pharmacological activities. Ketorolac tromethamine (KT) loaded PLGA (poly-lacticco-glycolic acid) nanoparticles were prepared for determining the cytotoxicity activity on the SCC 29 colon cancer cell lines. The process of KT nanoparticle fabrication includes solubility in dichloromethane, blending with (non-ionic surfactant) Pluronic F68 followed by ultrasonication and solvent evaporation. In this study five formulations were prepared (F1-F5) which are subjected to stability testing at various pHs, Drug release and in vivo pharmacokinetic studies. The prepared nanoparticles showed better oral absorption and good cytotoxic properties than KT alone.

Keywords: Cytotoxicity; Dug stability; Ketorolac; Pluronic F68; PLGA Nanoparticles.

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An Innovative Intrusion Detection System for High Dense Communication Networks Using Artificial Intelligence

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The emergence of machine learning (ML) strategies inside community security has led to principal advances in improving clever artificial Intelligence (AI) primarily based intrusion detection structures. Intrusion Detection systems (IDS) are used to locate malicious conduct in conversation systems and the internet. A smart AI-based IDS comprises some additives that enable it to provide an automatic and green safety solution for high-density verbal exchange structures. Present IDS stumble on intrusions and anomalies primarily based on predefined guidelines and signature pat-terns, at the same time as clever AI-primarily based IDS uses ML fashions to method significant volumes of information from both outside and internal sources to hit upon anomalies that could imply a safety breach. Smart AI-based totally IDS combines diverse ML fashions inclusive of supervised studying, unsupervised learning, deep studying, neural networks, and reinforcement gaining knowledge to create a holistic security solution.

Keywords: AI, network security, intrusion detection, machine learning, high dense, communication.

RAiSE23 - 489

The Machine Learning Based Task Automation Framework for Human Resource Management in MNC Companies

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Recently, Machine learning based Task Automation Framework have been gaining attention in Human Resource Management of Multi-National Companies (MNCs). Task Automation Frame-work helps MNCs to automate repetitive HR tasks, analyze data quickly & accurately, forecast workforce and recognize employees. MNCs are now beginning to use ML algorithms in combination with Artificial Intelligence (AI) to streamline the HR processes. Most MNCs have large-scale operations and decentralized organization structures which put additional pressure on HR teams to carry out intricate and tedious manual processes. To ease the process, ML based Task Automation Framework facilitates HR teams to leverage the power of AI and perform HR management tasks in a more effective and efficient manner. The ML based Task Automation Framework utilizes automation bots which can simulate all processes of HR management such as recruitment, time attendance, tracking employee records, scheduling calendar and office administration tasks. The Machine Learning based Task Automation Framework utilizes predictive analytics to identify trends, patterns, behavior, anomalies, and important insights from the large volumes of structured and unstructured data.

Keywords: machine learning, MNC, artificial intelligence, HR process, task automation.

RAiSE23 - 490

An Enhanced Analysis of Blood Cancer Prediction Using ANN Sensor Based Model

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Blood cancer diagnosis is a critical medical procedure, yet difficult and expensive for clinical personnel to perform accurately. Artificial neural networks have been shown to be effective in diagnosing a range of diseases, due to their powerful ability to identify and classify patterns in data. Here, we present a study that employed one such ANN to diagnose blood cancer from data gathered from network sensors. First, a sensor network was placed in an animal model to capture various physiological data, including cardiac and respiratory rates, body temperature, and blood pressure. This data was then sent to an ANN which used a classification system based on the type of cancer for diagnostic analysis. Our results showed that the ANN was able to accurately diagnose a blood cancer with an accuracy of 92.1%, and that its accuracy improved with the addition of more data. Our study demonstrates that ANNs can be successfully used to accurately diagnose blood cancer using data from network sensors, which could reduce costs and provide faster results in clinical settings.

Keywords: blood cancer, medical, clinical test, ANN, sensor.

RAiSE23 - 491

Phase-image Encryption Based Elliptic Curve and Double Random Phase Encoding

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In this paper, we proposed an enhanced asymmetric cryptosystem scheme for image encryption with the combinations of Elliptic Curve and Fourier transformation. Our proposed encryption and decryption process is highly secure with smaller key size compared to other schemes due to Elliptic Curve Cryptography. The experimental results prove that the image encryption scheme proposed in this research is effective and has strong anti-attack and key sensitivity. Computer-based simulations have been performed for the scheme to complete the measurable examination utilizing histograms plots, and correlation distribution of adjacent pixels. Moreover, the security of this encryption scheme relies on the Elliptic Curve Cryptography, which has high security. The validation of the scheme is shown on a grayscale image and all the computations are performed in MATLAB (R2021a). The security against several attacks like noise, CPA and occlusion is also shown.

Keywords: Elliptic curve cryptography, Image encryption, Fourier Transformation, Encoding, Security.

RAiSE23 - 493

Study of Different Properties of Graphene Oxide (GO) and Reduced Graphene Oxide (RGO)

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Graphene oxide (GO) and reduced graphene oxide (rGO) are well-known for their exceptional characteristics in a variety of applications. Reduced graphene oxide differs from graphene oxide in terms of morphological aspects, quality, functionalized groups, and crystallinities. Several attempts to synthesize GO and rGO have been documented in studies. The paper discussed the numerous ways to synthesize GO and rGO, and a literature review revealed, Hummer's stands out as the most commonly used. Graphite is mixed with potassium permanganate, sodium nitrate, and strong sulfuric acid to make GO. Notably, Hummer's technique has the advantage of faster synthesis and higher GO quality. The paper discusses several investigations, including morphological and structural characteristics, chemical bonding information, and mechanical properties of GO and rGO. Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), and the Vickers Hardness Tester are generally used to study these characteristics. The FTIR analysis revealed that the most common peaks in both GO and rGO were found to be associated with the O-H, C=O, C-OH, and C-O functional groups. XRD examination, on the other hand, revealed a diffraction peak at $2\theta = 10.2°$, indicating oxidized graphite in the case of GO, as well as a graphitic peak at $2\theta = 26.3°$, indicating graphitic graphite. Furthermore, the addition of GO and rGO into ceramics or polymers was dis-covered to cause significant changes in their mechanical characteristics, such as tensile strength, Young's modulus, and others. This demonstrates the revolutionary potential of graphene in improving the performance of composite materials.

Keywords: Graphene Oxide (GO), Synthesis, SEM, FTIR, XRD.

RAiSE23 - 494

Enhancing Skin Disease Segmentation with Weighted Ensemble Region-based Convolutional Network

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Skin diseases are a prevalent and diverse group of medical conditions that affect a significant portion of the global population. One critical drawback includes difficulty in accurately diagnosing certain skin conditions, as many diseases can share similar symptoms or appearances. In this paper, we propose a Weighted Ensemble Region-based Convolutional Network (WERCNN) methodology that consolidates Mask R-CNN (Mask Region-based Convolutional Neural Network) with the weighted average ensemble technique to enhance the performance of segmentation tasks. A skin disease image dataset obtained from kaggle is utilized to segment the skin disease image. This study investigates the utilization of Mark R-CNN in skin disease segmentation, where it is prepared on a skin disease image dataset of dermatological pictures. The weighted average ensemble model is utilized to optimize the weights of the Mask R-CNN model. The performance metrics Accuracy, Precision, Recall, Specificity, and F1-score are to be employed; this can achieve the values of 94.7%, 93.6%, 93.9%, 92.6%, and 93.7% respectively. With regards to skin disease segmentation, the WERCNN has shown extraordinary in accurately segmenting the impacted regions of skin images, by providing valuable insights to dermatologists for diagnosis and treatment planning.

Keywords: Skin Disease Segmentation, Mask Region-based Convolutional Neural Network, Weighted Average Ensemble, Skin condition, Human body.

RAiSE23 - 495

Image Processing using Feature-based Segmentation Techniques for Analysis of Medical Images

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Image Segmentation is one of the very important optimistic and emerging fields using IoT-based smart systems in all image-processing applications. Researchers are giving a lot of effort to analyzing various X-Ray medical images using different techniques available in image segmentation for a better outcome and accurate results. Based on the specific application, various image segmentation techniques like thresholding, region growing, watershed, clustering algorithms, fuzzy algorithms, etc., are used to segment or partition the input images, label each pixel in the images, locate the points, edges, boundaries and objects to identify various problems in the medical images. In addition, the identification of important parameters, detection of bone fractures and bone diseases, and decreasing the death rate of patients suffering from various health problems are challenging re-search work in medical images. If the detection of disease or fracture is carried out at an earlier stage, then the chances of growth of survival among human beings can increase. In this research paper, the analysis for the automatic detection of bone fracture in the early stage by taking two input x-ray medical images that are captured using IoT-based sensors at different timings. This process is carried out in 4 stages: In the first stage- we acquire input images and perform pre-processing by using geometrical transformation and register the input images, in the second stage- the registered image is segmented using the adaptive k-means clustering method, in the third stage- automatic detection of the important features in X-Ray image is extracted using image registration feature-based method (like point-based, edge-based, line-based, or contour-based). Automatic feature extraction is carried out for the detection of bone fracture in the early stage to increase the complexity of geometrical alignments of input images. Finally, in the fourth stage, the performance of the results is analyzed by calculating the accuracy and error rate by using IoT-based smart medical sensors.

Keywords: IoT (Internet of Things), Medical Image Processing, Image Segmentation, Image Registration, Adaptive K-means Clustering Method, Feature-based method.

RAiSE23 - 496

A Novel DV –HOP and APIT Localization Algorithm with BAT-SA Algorithm

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Localization technology is essential for making wireless sensor networks'(WSN) information processing and information collecting applications actually feasible. The beacon information is made available to the unknown nodes using the route exchange protocol. These data's are more useful to determine the coordinates of neighboring nodes. Consequently, it is discovered that the algorithm for localizing nodes always has a flaw. Consequently, a brand-new metaheuristic termed Bat with Simulated Annealing is proposed to fix the flaw in the WSN standard node localization technique. The overall effectiveness of identifying the nodes is enhanced as a result of the large reduction in localization error. The most popular localization estimation techniques are the Distance Vector Hop (DV-Hop) method and Approximate Point-In-Triangulation (APIT), which have high node localization accuracy and simple deployment in real-time environments. The primary benefits and its disadvantages, which give it a slight disadvantage in preference, are presented in this work. Both strategies are compared for their conventional performance and efficiency when combined with the Bat-SA algorithm.

Keywords: Metaheuristic; Bat; Location algorithm; DV-Hop; Simulated Annealing.

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A Novel and Optimized Efficient Transmission Using Dynamic Routing Technique for Underwater Acoustic Sensor Network

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Underwater acoustic sensor networks involve deploying sensors underwater to establish a wireless network framework aimed at discovering new resources, detecting targets, and monitoring pollution. However, the primary challenge in these networks lies in enhancing energy efficiency and extending the sensor's lifespan, as manually recharging batteries deep within the sea or ocean is not feasible. To address this, we have employed a dynamic network model for target sensing. In order to improve the energy, transmission, and overall lifespan of the Underwater Acoustic Sensor Network (UASN), we have devised a Heuristic Search Algorithm called the Multi-population Harmony Search Algorithm. Additionally, a Dynamic Routing Technique has been developed to dynamically determine whether a given set of sensors should operate or enter sleep mode, with the objective of effectively covering the specified targets.

Keywords: Underwater Acoustic Sensor Network, Dynamic Routing Technique, Efficient Transmission, Under water Communication, Network Scalability.

RAiSE23 - 499

Deep Learning Based Coverless Image Steganography on Medical Images Shared Via Cloud

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Coverless image steganography is the technique of generating the image with inherent color, texture information of image represents hidden secret information. Recently Generative Adversarial networks (GAN) deep learning transformers are used to generate the secret hidden image. Although having been proven that this approach is resistant to steganalysis attacks, it modifies critical information in the images which makes the image not suitable for applications like disease diagnosis from medical images shared over cloud. The color and textural modification introduced by GAN affects the feature vector which is extracted from certain image regions and used for disease diagnosis. To solve this problem, this work proposes an attention guided GAN which transforms the images only in certain regions and retains the originality of image in certain regions. Due to this, there is not much distortion to features and disease classification accuracy.

Keywords: Steganography, Generative Adversarial networks (GAN), Medical images, Texture, Hidden image.

RAiSE23 - 505

Effect of Anodization on Mechanical and Corrosion Behaviour of Accumulative Roll bonded Mg-Zn/Al-7075 Composites

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Interest in lightweight composites has grown as a result of significant weight reduction requirements in engineering applications. It has been claimed that a multilayered laminate composite made using accumulative roll bonding (ARB) and two distinct alloys combines the benefits of both alloys. Due to their high specific strength, good castability, good machinability, high damping capacity, magnesium-based alloys have drawn a lot of interest as lightweight materials. However, magnesium's limited ductility, weak creep resistance, and corrosion resistance are three significant drawbacks. The main goal of this research is to create ultra-fine grained multilayered composite materials with superior corrosion and mechanical properties. This is required to meet the standards for applications in the automotive, electronics, and aerospace industries, among others. This effort involved the development of Mg-Zn/Al based multilayered composites employing Mg-Zn alloy and anodized Al7075 alloy for up to four passes at 300 °C. The development of Mg-Zn/anodized Al7075 based multilayered composites using accumulative roll bonding as the SPD technique was done in this work to examine the effects of anodization on mechanical and corrosion characteristics. The composites underwent a comprehensive microstructural characterization using a scanning electron microscope (SEM) and phase analysis using X-ray diffraction. Microhardness and tensile tests were also used to examine the mechanical characteristics. With the use of electrochemical polarization and immersion tests, the multilayered composite's corrosion behaviour was investigated. The homogeneous dispersion of alumina (Al_2O_3) produced by the anodization process is what gives anodized multilayered composites their good corrosion resistance.

Keywords: ARB, Anodization, Multidirectional forging, Mg-Zn/Al composite, Corrosion.

RAiSE23 - 507

Electrochemical Sensing of Nitrites from Effluent Water Using 2D Catalytic Materials

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The highly sensitive nanoscale detection of nitrites in polluted water is one of the major concerns due to its serious environmental hazards. The fabrication of a cost-effective electrochemical nitrite sensor is one of the challenging aspects of modern research. In the present work, MXene has been synthesized using conventional HF etching method selectively. The MXene was further doped with Ag by chemical reduction method. The aqueous solution of AgNO3 undergoes direct reduction in the presence of layered two-dimensional titanium carbide MXene resulting in the formation of a Ag/MXene composites. XRD and Electron Microscopy analysis have been used to characterize the composites. Electrochemical studies viz. Cyclic Voltammetry (CV) and Chronoamperometry have been performed using Ag/MXene composite nanomaterial as catalyst for sensitive detection of nitrites. A low limit of detection (LOD) was achieved in effluent water which shows the high sensitivity of the electrode towards nitrites in real water analysis.

Keywords: MXene; Ag/MXene composites; nitrite detection; chronoamperometry; electrochemical sensors.

RAiSE23 - 508

Investigation of Plane Strain Fracture Toughness and Failure Analysis of AISI-4140 Alloy Steel

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AISI-4140 alloy steel is a widely used material in various fields of engineering like Automotive, Aerospace, Oil and Gas industries, Construction, and Structural engineering. Its preference in di-verse industries is mainly due to its excellent combination of strength, toughness, and wear resistance properties. Understanding the fracture toughness of AISI-4140 alloy steel is essential for ensuring the structural integrity and reliability of engineering components made from this material. The current study focuses on the experimental evaluation of fracture toughness due to its critical role in determining the material's resistance to fracture and crack propagation. In this research, the plain-strain fracture toughness of AISI-4140 alloy steel material is investigated. The compact Tension specimens (CT) with three different thicknesses 12.5 mm, 20 mm, and 25 mm, are prepared as per ASTM Standard E 399-90. The initial pre-crack in the specimen is introduced using fatigue loading. The fracture toughness testing is conducted using the established procedures, and the specimens are subjected to controlled loading until a fracture occurs. The Scanning Electron Microscopy analysis of fractured surfaces allowed for a detailed examination of the fracture features, including crack propagation paths and microstructural characteristics. The average fracture toughness value for the AISI-4140 alloy steel is determined as 44.8 MPa √m.

Keywords: Fracture Toughness, Scanning Electron Microscopy, AISI-4140 alloy Steel, Plain-strain Condition, CT Specimen.

RAiSE23 - 511

An Analytical Model for Dynamic Spectrum Sensing in Cognitive Radio Networks Using Blockchain Management

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Recent advancements in wireless communication technology have brought about the pressing issue of increasing spectrum scarcity. This challenge in spectrum allocation arises from ongoing research in the field of wireless communication. With the continuous emergence of new wireless applications, the demand for available spectrum resources is steadily rising, resulting in a dwindling pool of available frequencies. Unfortunately, a significant portion of the spectrum remains underutilized within wireless networks. Cognitive Radio (CR) presents an innovative solution to this problem by enabling unlicensed secondary users to coexist with licensed primary users within allocated spectrum bands without causing interference to the primary users' communications. This technology promises to address spectrum redundancy challenges and substantially improve spectrum utilization efficiency. Cognitive Radio Networks (CRNs), alternatively known as Dynamic Spectrum Access Networks, are comprised of multiple CR nodes and are frequently referred to as Next Generation (XG) communication networks. These XG communication networks are expected to offer high-speed data transmission capabilities to adaptable users through a variety of wireless architectures and dynamic access protocols. In recent times, CRNs have attracted significant attention in the realm of research. However, research concerning the security aspects of CRNs has been notably limited. Since CRNs share similarities with traditional wireless networks but operate in an external wireless medium, they are more susceptible to various types of attacks compared to their wired counterparts. This vulnerability stems from the fact that wireless media can be intercepted or exploited, potentially leading to channel congestion or data interception.

Keywords: Blockchain, CRN Security, Error Rate, NES Algorithm.

RAiSE23 - 512

Hydrothermal Synthesis of Mesoporous FeTiO3 for Photo-Fenton Degradation of Organic Pollutants and Fluoride Adsorption

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Metal oxide semiconductor-based photocatalysis and AOP are promising methods to treat various recalcitrant pollutants such as organic dyes present in the industrial wastewater streams. AOPs rely on the highly reactive OH• radicals that facilitate the non-selective destruction of most organ-ic pollutants. Here, we present the novel synthesis of mesoporous $FeTiO_3$ catalyst via a simple, hard template-free, aqueous solution-based hydrothermal synthesis method. The surfactant, TTAB has been used as the structure directing agent, the removal of which led to the formation of the mesoporous structure. The synthesized material has been characterized by various characterization techniques such as TGA, FTIR, BET, XRD, and SEM techniques. The obtained catalyst has been studied for its photocatalytic application in the presence of H_2O_2 towards the degradation of organic dyes as representative pollutants namely, rhodamine B (RhB), and methylene blue (MB) under direct solar light irradiation. The various characterizations confirm the formation of mesoporous $FeTiO_3$ with a pore size of ~7.5 nm and a specific surface area of 65 ± 5 m^2/g. The influence of H2O2 oxidant on the removal of the said dyes has also been studied at various concentrations in the presence of the synthesized catalyst to determine the optimum dosage of H_2O_2. The catalyst is found to be efficient in the complete synergistic adsorption-led photo-Fenton-like removal of MB in just 30 min of irradiation time while the 96 % RhB was observed to be degraded in 240 min. Moreover, this catalyst has also shown potential for fluoride adsorption that reaches up to more than 50% in 90 min.

Keywords: Photocatalysis, mesoporous, wastewater treatment, fluoride adsorption, solar light active.

Parametric Optimization of Solar Air Heaters Having Hemispherical Protrusion Roughness in V-Notch Pattern on Absorber Plate: A Meta-Heuristics Optimization Approach

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Artificial roughness in the form of protrusions has become a popular technique to improve the thermo-hydraulic performance of SAHs. So, utmost attention should also be given to determining the suitable parametric values that directly affects the performance of SAHs Hence, in this work, an attempt has been made to optimize the performance of solar air heater having hemispherical protrusion roughness in V-notch pattern on absorber plate using two different meta-heuristic optimization algorithm i.e. Grey wolf optimization (GWO) algorithm and Dragonfly (DA) algorithm. This study makes use of the correlation equations for the friction factor (f_f) and Nusselt number (Nu), which were developed after conducting the experiments. Four independent parameters namely Reynolds number (Re= 3600-21700), relative protrusion height (e_p/D_h = 0.027-0.069), relative pitch (p/e_p = 6-14), and attack angle (α_a= 15º-75º) were considered to obtain the optimal value of Nu and f_f. In single objective optimization, the maximization of Nu and the minimization of ff are two objective functions. The GWO has delivered the best solutions for both objectives with a faster computational rate and less variation. This was validated by a convergence curve and box plot. The maximum value of Nu is found to be 144.567 corresponding to Re=21700, ep/D_h=0.07, p/e_p =8.54, α_a=750 and the minimum value of f_f is found to be 0.012 corresponding to Re=21700, e_p/Dh=0.03, p/e_p =14, α_a=150. Pareto multi-objective optimization provides compromise solutions that provide flexibility to the decision-maker to select a parametric setting. The maximum THPi obtained by GWO and DA is 1.62 and 1.63 respectively.

Keywords: Meta-heuristic, Optimization, Solar air heater, Hemispherical protrusion, Nusselt number, Friction factor.

RAiSE23 - 516

Investigation of Machining Parameters and Surface Quality of AZ-31 Magnesium Alloy Subjected to Spark Machining

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Magnesium alloys are commonly used in various industries such as automotive, aerospace, electrical, medical, and sports, etc. The material is preferred in the making of engine blocks, transmission cases, and structural parts due to its unique material properties like lightweight and durability. It also offers a good strength-to-weight ratio and directly contributes to the fuel efficiency of vehicles. Due to its usage in various industries, it is essential to understand its behavior under machining. But machining of magnesium alloys can present significant challenges compared to other conventional structural metals and alloys. The research work focuses on investigating the application of a Plug-Electrical Discharge Machine (EDM) for machining the AZ-31 Magnesium Alloy and aims to analyze the surface quality of the machined surface for the selected input parameters. Experiments were conducted on a mirror-finished flat specimen by keeping the incision depth and servo voltage constant at 0.3 mm and 45 V respectively. A copper tool is used to make 9 unique incisions on the surface using selected values of Pulse-On-Time (T_{on}), Pulse-Off-Time (T_{off}), and Current (I). The surface analysis using optical microscopy revealed that the surface roughness increased drastically with the combinations of high values of I, T_{on}, and T_{off}. The tests conducted using Profilometer confirm the proportional relationship between the input parameters and the surface roughness of the AZ-31 Magnesium Alloy.

Keywords: Magnesium Alloy, Electrical Discharge Machining (EDM), Roughness, Profilometer, Optical Microscopy.

Investigating the Impact of Carbon Nanotube Reinforcement on Wear Performance of Bio-based Epoxy Composites: A Taguchi Experimental Approach

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The present research work explores the influence of carbon nanotubes (CNTs) on the 1 wear behavior of bio-based epoxy composites fortified with Cashew Nutshell Liquid (CNSL), a 2 renewable resource. The study leverages the advantageous properties of bio-based epoxy, specifically 3 FormuLITE, making it a promising candidate for a multitude of applications. CNTs, recognized for 4 their excellent mechanical and thermal properties, were subjected to acidic oxidation to augment their 5 functionality. This functionalization improves their bonding with the bio-based epoxy matrix, thereby 6 enhancing the overall composite properties. Using Taguchi's experimental design methodology, wear 7 tests were conducted, and the results demonstrated that the weight percentage of CNTs (Wt% CNT) 8 significantly influences the wear behaviour. As the Wt% CNT increased, a considerable reduction in 9 wear was observed, signifying the positive impact of CNTs on enhancing wear resistance. However,10 factors such as speed, distance, and load did not significantly alter the wear characteristics of the 11 composites. These findings emphasize the potential of CNT incorporation into bio-based epoxy 12 composites as a strategy to bolster their wear resistance properties. This work opens avenues for the 13 development of durable and sustainable composite materials, aligning with the escalating global 14 demand for environmentally friendly alternatives. Future investigations may focus on optimizing 15 additional parameters to maximize wear resistance, broadening the application scope of these 16 bio-based epoxy composites across various industries. Ultimately, this study contributes to the 17 advancement of knowledge concerning the synergistic effects between CNTs and bio-based epoxy, 18 endorsing their adoption as high-performance, eco-friendly materials.

Keywords: Air injection, Thrust vectoring, Boundary layer, Pressure ratio, Throat.

RAiSE23 - 601

Development of Gas Dynamic Nozzles: A Preliminary Computational Study

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The design and optimization of a supersonic nozzle are of great interest in aerospace and propulsion system applications. Designing and maintaining a mechanically simple nozzle is always beneficial over a complex nozzle that is currently in use. A detailed simulation-based study has been made to design a virtual nozzle that produces the same effect as a traditional nozzle while using simpler geometries and secondary air injection. Secondary air injection is widely used for fluidic thrust vectoring. Because such a nozzle is operated by varying the thickness of the boundary layer, it is possible to control the effective throat area, and hence get a variety of exit pressures and Mach numbers by just varying the input momentum ratios (or pressure ratios). A similar concept was kept in mind, and various geometries such as flat plate geometry, divergent geometry and convergent-divergent geometry were tested for different jet pressure ratios, number of jets, location of the jets and geometric parameters of the virtual nozzle. The main objective of the work was to achieve an exit Mach number of 2 from a subsonic flow. In order to achieve this, the lengths of various geometries and the input pressure ratios are altered iteratively based on the findings obtained in each test case. All of the results attempt to acquire the required exit Mach number while accounting for numerous complexities in fluid flows such as shock waves, vorticities, and so on. Although the desired Mach number is not achieved, it establishes a strong foundation and idea that has the potential to revolutionize propulsion systems and create nozzles that are mechanically simple, weigh less and do not require any actuating mechanisms to operate.

Keywords: Bio-based epoxy; Carbon Nanotubes; Taguchi; Wear; Cashew Nutshell Liquid

RAiSE23 - 603

Leaky ReLU-ResNet for Plant Leaf Disease Detection: A Deep Learning Approach

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Plant diseases can result in significant yield losses, posing a threat to food security and economic stability. Deep neural networks, particularly Convolutional Neural Networks (CNNs), have exhibited exceptional success in image classification tasks, often surpassing human-level performance. However, conventional methods for leaf disease detection re-lied on manual inspection by agricultural experts, leading to limited scalability and precision. To tackle these challenges, this research introduces a novel approach called Leaky Rectilinear Residual Network (LRRN) for plant leaf disease detection. The LRRN model comprises three key modules - data pre-processing, feature extraction, and classification. It integrates ResNet architecture with the Leaky ReLU activation function to classify plant diseases. Experimental evaluations were performed on affected plant leaf disease images from the Plant Village dataset, utilizing performance evaluation metrics to assess the proposed model. The achieved results were compared with state-of-the-art techniques, demonstrating superior accuracy (94.56%), precision (93.48%), F1-score (92.83%), recall (93.12%), and specificity (92.58%). These findings substantiate the effectiveness of the proposed LRRN method in plant leaf disease detection.

Keywords: ResNet, Leaky ReLU, Plant disease, Deep learning, Disease detection, Feature extraction, Pre-processing.

RAiSE23 - 605

Attention-Guided Deep Learning Texture Feature for Object Recognition Applications

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Image processing-based pattern recognition applications often use texture features to identify structural characteristics. Existing algorithms, including statistical, structural, model-based, and transform-based, lack expertise for specialized features extracted around potentially defective regions. This paper proposes an attention-guided deep-learning texture feature extraction algorithm that can learn features at various regions with varying complexities, addressing the lack of expertise in existing techniques. This approach can be used for applications such as minor fabric defects and hairline faults in PCB manufacturing.

Keywords: texture features; deep learning; object recognition; PCB manufacturing; attention-guided deep learning models

RAiSE23 - 606

A Model of Gamification by Combining and Motivating E-Learners and Filtering Jobs for Candidates

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Early in the 1990s, recommender systems emerged to assist users in dealing with the cognitive overload caused by the internet. Since then, similar systems have expanded into many more capacities, such as assisting users in exploration, enhancing decision-making, or even providing entertainment. To achieve such novel goals, the system must take into account user attributes. Understanding the user task and how to modify the advice to assist it are made possible by these features. Recommender systems for education have been proposed in related research. These recommender systems assist students in locating the learning materials that best suit their requirements. The online social media platform uses various methods to pull many uses to use their services. One of the primary requirements of the online social platform is to engage the user in an effective way. For this purpose, online media starts to use gamification to improve the user participants. The reward system for online Medias widely uses gamifiction elements such as points, badges, etc. Thereby, in a badge-based system, an unachieved badge highly influences gamification system. In this paper, unachieved and achievable badges were recommended using item-based collaborative filtering recommendation model. This enables us to gather information from the candidates and make accurate predictions about the jobs that might suit them. This is also durable in the sense that any missing data about the candidate does not affect the algorithm as a whole as it is capable at making assumptions regarding the missing data based on similar data already stored in the database. Beyond this, we employ this algorithm to host courses on the website. The empirical observation shows that the proposed model has recommended the badge with 70 percent accuracy.

Keywords: Gamification Challenge learning, Distance learning, Technology enhanced learning.

RAiSE23 - 608

Design of Prediction Model to Predict students' Performance using Educational Data Mining and Machine Learning

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The development of a knowledge- and information-based society can be aided by higher education. Through research and extension efforts, higher education institutions must perform a variety of functions, including building an intelligent human resource pool, gaining new skills, and creating new knowledge. As a result, the development of skilled workers with the ability to think critically, creatively, and logically is the primary focus of higher education institutions. However, there are some significant obstacles in the way of offering quality education, such as how to identify low-performing students and their causes. Predicting student performance has become challenging as a result of the vast quantity of data in educational databases. The lack of a developed system for assessing and monitoring student achievement is also not being considered. There are primarily two causes for this kind of situation. Initially, there was inadequate study of the various prediction techniques to select the ones that would best predict students' success in educational environments. The second is the lack of investigation into the courses. In this research work, efforts have been made to identify low-performing students through the proposed Back Propagation Neural Network for Student Performance Analysis (BPNN-SPA) model, which generates more accurate, efficient, and dependable results as compared to some of the existing techniques and models. The performance of the proposed model is compared with support vector machine and random decision and evaluated by four significant performance metrics, namely sensitivity, specificity, accuracy, and the F-measure. Based on the performance measures, the proposed BPNN-SPA achieved better accuracy than existing algorithms.

Keywords: Educational Data Mining, Machine Learning, Support Vector Machine, Random Decision, Back Propagation Neural Network.

RAiSE23 - 609

Performance Analysis of Physical Layer Based MIMO- WiMAX

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High data transmission rates over wide regions and to clients in locations where broadband service is not accessible are provided by WiMAX, an IEEE 802.16 standard for Broadband Wireless Access (BWA). The use of several antennas to send and receive data is a common feature of MIMO systems in wireless communication. In order to enhance the performance of WiMAX systems, WiMAX-MIMO devices have been created. An analysis of MIMO-WiMAX systems using various modulations and coding rates in a Rayleigh fading channel is presented in this work. Matlab software is used to examine the relationship between bit error rate and signal-to-noise ratio at various cyclic prefixes and with single and multiple transceivers. The codes of Alamouti STBC have been put into action. Alamouti STBC Codes are used to examine the BER performance of MIMO – WiMAX.

Keywords: MIMO, STBC, WIMAX.

RAiSE23 - 610

LS Dyna Impact Modelling on CFRP Composite Aircraft Panel with Various Impactors

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In the aviation industry, the usage of composites is increasing day by day because of their unique feature in terms of damage tolerance and high structural integrity. It inspires to focus on dynamic behaviour of subsonic aircraft hat-shaped CFRP composite panels using LS dyna tool to prove its excellent impact behavior with the help of spherical, ogival and conical impactors. High-velocity impact simulations done in this research work duplicates the Foreign Object Damage on aircraft panels. The impact load locations are identified from the literature and notable damage features such as stresses, delamination length, internal energy absorbed, resultant force, delamination zone, resultant acceleration and resultant velocity are compared for the chosen impactor shapes. The elastic and plastic failure zones are displayed very clearly in the results to avoid any further damage in the future. All results help to understand the composite shell behaviour and different damage patterns.

Keywords: spherical, ogival and conical impactors, hat stringer, composite plate, delamination, impact location.

RAiSE23 - 611

Efficient Bloom Filter-Based Routing Protocol for Scalable Mobile Networks

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Non-geographic routing protocols are inefficient when applied to large-scale mobile networks composed of hundreds of nodes. On the other hand, geographic routing protocols have the disadvantage of needing a location sensor. The goal is to address the challenges of efficient content retrieval and routing scalability in NDN-based networks by leveraging the benefits of both NDN and Bloom Filter technologies. In this article we propose a routing protocol for mobile networks, which is scalable to networks composed of hundreds of nodes. The protocol does not require any localization equipment and is adapted for devices with limited memory and/or processing resources. This goal is achieved through the use of bloom filters to efficiently store and spread topological information. In the methodology followed, nodes do not forward messages with topological information to other nodes. To make the process efficient, each node aggregates the topological information it receives from its direct neighbors with its own and only the result of this operation is transmitted to the remaining nodes. Several simulations were carried out in the Qualnet network simulator in order to validate the algorithm proposed by Hybrid Routing Algorithm with NDN (HRAN). The obtained results were compared with other non-geographic protocols for mobile networks. HRAN seems to be a routing protocol designed for MANETs, utilizing bloom filters to manage topological information. A bloom filter is a data structure used to test whether an element is a member of a set. It uses a bit array and multiple hash functions to determine if an element is present in the set. This type of data structure allows storing a large amount of binary information in an efficient way, reducing the resources required by the routing protocol.

Keywords: Routing protocols, Bloom filters, Hybrid Routing Algorithm with NDN (HRAN); Binary information, Mobile networks.

RAiSE23 - 612

A Comparative Study of Coverage Hole Detection Techniques in Wireless Sensor Networks

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In crucial applications, sensor node coverage of the objective zone must be stabilized in Wireless Sensor Networks (WSN). A network with holes in coverage is more susceptible to node failures or malicious attacks. According to the total number of hops used to transport data, nodes may calculate their distance from the sink node. A coverage hole may be present if a node notices a much higher hop count than its neighbours. The network becomes more robust and resilient to diverse problems by proactively recognizing and correcting coverage holes. Coverage hole identification aids in the efficient use of network resources. By identifying places with poor coverage, resources such as electricity and bandwidth may be efficiently deployed to increase coverage in specific areas or extend the network lifetime overall. However, some node sensors die while the network operates due to energy restrictions, which may disturb the inclusion of the objective zone, resulting in a coverage hole. Due to limited battery life, the existence of impediments, and physical damage to sensor nodes, coverage holes may emerge in sensor networks. Early identification of coverage holes enables prompt maintenance and troubleshooting, which minimizes the need for future major and expensive replacements or reconfigurations. The loss on the region of interest may be calculated by locating the coverage holes and identifying the malfunctioning node that created it. This article discusses many coverage hole-detecting methods, classification approaches, and different performance comparison assessments. Compared to conventional techniques for detecting coverage holes, the investigated methods contribute to the universal viewpoint on holes and compute the number of holes quite precisely.

Keywords: Coverage hole detection, Wireless Sensor Networks, Node failure mitigation, Energy-aware WSN, Coverage hole analysis

RAiSE23 - 613

Resolution Enhancement of Brain MRI images using Deep Learning

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One of the most widely used imaging techniques in medicine is magnetic resonance imaging (MRI). It is a tool that doctors use to comprehend human anatomy and carry out more accurate analyses. In the study of brain anatomy, image processing super resolution technology has become important to overcome physical restrictions due to image deterioration caused by hardware constraints, lengthier scanning periods, and artefacts. Super resolution is an approach to raise an image's resolution while improving the image's quality from a low-resolution (LR) image to a higher-resolution (HR) image. The study provides an overview of deep learning techniques for creating super-resolution (SR) MRI brain images. A widely used deep learning(DL) technique, accessible brain MRI dataset and quantity evaluation matrices has been presented, that is mostly used for image super resolution. Factors affecting hardware constraints and artifacts include Magnetic Field Homogeneity, Gradient Nonlinearity, Radiofrequency (RF) Coil Sensitivity, Signal-to-Noise Ratio (SNR), Gradient Coil Performance have been taken into account. This research focuses mostly on brain MRI images as a contribution to the medical industry for super resolution.

Keywords: Super resolution; MRI images; Resolution Enhancement; Deep Learning.

RAiSE23 - 617

Differential Evolution Optimized NOMA for Sum Rate Maximization

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Non-orthogonal multiple access (NOMA) is a potential technology to support high network density, while satisfying the quality of service (QoS) demands. To maximize the attainable sum rate of individual users and minimize outage, the power allocation (PA) factors must be optimized. In the proposed work, differential evolution (DE) algorithm is implemented to optimize the power factors assigned to users. The proposed optimization maximizes sum rate by ≅5.87% to ≅12.65% compared to random PA. The near user requires ≅8.24 dBm to ≅14.13 dBm less transmit power, whereas the cell-edge user requires ≅6.56 dBm to ≅9.18 dBm less transmit power compared to random PA to attain an outage probability of 10^{-3}.

Keywords: Differential evolution (DE), non-orthogonal multiple access (NOMA), outage, power allocation, quality of service (QoS), sixth generation (6G), sum rate.

RAiSE23 - 618

A Brief Review on Graphitic Carbon Nitride and Conducting Polymer Nanocomposite Electrodes for Supercapacitor

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The growing demands of next-generation electric and hybrid electric vehicles and high-power electronic devices necessitate higher power density, longer cycle life, and enhanced safety at a reduced cost. To address these challenges, supercapacitors have emerged as a potential technology offering several advantages such as higher power density, excellent cycle stability, environmental friendliness, wide temperature range performance, intrinsic safety in charge storage, and rapid charging and discharging capabilities. Recently, research has focused on developing nanomaterials that would improve the capacitive performance of supercapacitors. Graphitic carbon nitride (g-CN) exhibits distinct chemical and physical characteristics that are advantageous for diverse applications including energy conversion and storage. g-CN integrates the benefits of nitrogen doping, such as increased surface polarity and better surface wettability, with the advantages of carbon-based compounds, such as ease of availability, abundance in nature, and cost efficiency. The considerable advance in research on g-CN has inspired the development of various g-CN nanocomposites to achieve high efficiency by eliminating certain limitations. To overcome the is-sues related to conductivity and specific surface area g-CN can be composited with conducting polymers as one of the modification strategies. Recently researchers have experimented with various g-CN-conducting polymer nanocomposites as electrode materials for supercapacitors. Based on the studies conducted, g-CN-conducting polymer nanocomposites have achieved good stability, adequate conductivity, and better specific capacitance. This brief review provides an over-view of g-CN/conducting polymer nanocomposites as supercapacitor electrode materials. It covers synthesis strategies, compares with g-CN composites of graphene and carbon nanotubes (CNTs), discusses factors affecting their electrochemical performance, and outlines future research directions for high-performance supercapacitors.

Keywords: Graphitic carbon nitride, Conducting polymer, Nanocomposite, Supercapacitor, Electrode.

RAiSE23 - 619

Analytical and Biological Evaluation of Chromium Complex with Organic Detector NTADBrP: Stability, Calibration, and Inhibition Studies

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This study provides a comprehensive investigation into the formation, characteristics, and biological activity of a chromium complex with the organic reagent NTADBrP. The article presents detailed insights into the H1-NMR spectrum of the organic reagent and examines the optimum conditions for chromium complex formation, considering the effects of time, pH, and temperature. The stoichiometry and stability constant of the complex were determined using specific methods, leading to the calculation of a significant stability constant. Additionally, a calibration curve for the chromium ion was derived, and the complex's biological activity against Escherichia coli and Staphylococcus bacteria was studied. These findings contribute to the understanding of chromium complex behavior and open new avenues for applications in analytical chemistry and pharmaceutical research.

Keywords: Chromium Complex; Organic Reagent NTADBrP; Spectral Analysis; Optimal Conditions; Biological Activity

RAiSE23 - 620

A Mini-Review on Graphene: Exploration of Synthesis Methods and Multifaceted Properties

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Graphene, a single layer of carbon atoms arranged in a two-dimensional lattice, has emerged as a material of immense scientific and technological interest. This review article provides a comprehensive overview of the various synthesis techniques for graphene, including Chemical Vapor-deposition (CVD), epitaxial growth on SiC, mechanical cleavage, and exfoliation of graphite oxide. The article further delves into the distinctive electronic, mechanical, optical, and thermal properties of graphene that make it a promising material for numerous applications. From high electrical conductivity to remarkable strength and unique optical characteristics, graphene's attributes are explored in detail. The thermal stability of graphene, its interaction with different substrates, and potential applications in electronic devices are also discussed. The review concludes with a summary of the current state of research and prospects for future exploration, emphasizing graphene's potential to revolutionize various industrial sectors.

Keywords: Graphene; Synthesis Techniques; Electronic Properties; Optical Properties; Mechanical Properties; Thermal Properties

RAiSE23 - 621

Exploration of Zinc Oxide Nanoparticles for Efficient Photocatalytic Removal of Methylene Blue Dye: Synthesis, Characterization and Optimization

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Water pollution, particularly through industrial effluents, is a significant environmental challenge. The present study explores the synthesis, characterization, and photocatalytic application of Zinc Oxide nanoparticles (ZnO NPs) for the degradation of Methylene Blue (MB) dye. ZnO NPs were synthesized via the hydrothermal method, and their structural and morphological features were examined using X-ray diffraction, Transmittance Electron Microscopy, and FESEM techniques. A systematic study was carried out to investigate the effects of catalyst mass dosage, initial dye concentration, and light intensity on the photocatalytic degradation efficiency. Results showed that the synthesized ZnO NPs are effective in MB dye degradation, and the process adheres to first order kinetics. This work not only demonstrates the potential of ZnO NPs in addressing industrial dye pollution but also contributes valuable insights toward the development of cost-effective and environmentally sustainable water treatment solutions.

Keywords: Zinc Oxide Nanoparticles; Photocatalytic Degradation; Methylene Blue Dye; Hydrothermal Synthesis; Water Treatment

RAiSE23 - 623

A Secure Framework for Communication and Data Processing in Web Applications

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Web applications are used most widely, and the application deployed on the web doesn't always satisfy all the security policies. This may arise due to less secure configuration or less knowledge in security configurations or due to insure coding practices. There are large number of security practices like SSL certificates, secure coding practices and security auditing practices. Even though a lot of practices are available, a lot of security loopholes are still available for hackers to steal information. A secure web application framework is discussed here which incorporates solutions to major security loopholes that attackers may use for stealing information or compromising the systems. This security framework proposed here ensures an encrypted data transfer making the data safe and server-side vulnerability detection and avoidance for major attacks like SQLi, XSS. The client side of the framework will be responsible for validations, encryption, and session management through a JavaScript module. The server side of the framework is responsible for decryption and validation, data management, and URL management. The framework deployed with PHP showed a good outcome when tested with Arachni web application security scanner. The framework will be further studied for performance with huge workloads. Further, the work will be extended to cover other attacks.

Keywords: SQLi, SSL encryption, AES, PHP, XSS, Web application framework.

RAiSE23 - 625

Mapping Sustainable Cities and Communities (SDG 11) Research: A Bibliometric Review

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Sustainability is a prime concern in the present scenario, and to achieve the United Nations 2030 agenda, every country is putting in its best effort. Sustainable Development Goal (SDG) 11 explains Sustainable Cities and Communities' concern for society. Rapid urbanisation and accommodating the masses, which started shifting from rural to urban society, brought the construction of cities in full swing. This study reviewed the publication and citation trends, sources, trending topics, thematic evolution and thematic map (niche, motor, basic and emerging or declining themes) through metadata extracted from the Scopus database using the Biblioshiny (R-tool) open-access software tool. After applying the inclusion and exclusion criteria, only 537 metadata appeared sufficient for the final analysis. This research answered various research questions, an eye-opening lesson in the present scenario, where every country is marching towards achieving the SDG 2030 agenda. Major publications appeared after the launch of the SDG 2030 agenda, i.e., in 2015. Citations also increased after 2016 and reached its peak in 2021 with 1808 citations. Sustainable development goals and sustainability appeared as the most trending topics, whereas recently, some topics have also emerged which can play a significant role in achieving the SDG 2030 agenda. Various themes such as sustainable development goals, remote sensing, machine learning, and Ethopia have emerged recently that need to be focused on by future researchers to understand this growing concern better, along with the policy development and strict practice approach. More focus is required on the emerging themes, which can be helpful one step ahead towards SDG 11. More research and mega-cities with a sustainability approach can be a milestone in attaining the SDG 11 target.

Keywords: SDG 11, Sustainable Cities and Communities, Sustainability, Bibliometric, Biblioshiny.

RAiSE23 - 626

A Linear Differentiation Scheme for Camouflaged Target Detection using Convolution Neural Networks

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Camouflaged objects are masked within an existing image or video under similar patterns. This makes it tedious in detecting target objects post-classification. The pattern distributions are monotonous due to similar pixels and non-contrast regions. In this article, a Distribution-Differentiated Target Detection Scheme (DDTDS) is proposed for segregating and identifying camouflaged objects. First, the image is segmented using textural pixel patterns for which the linear differentiation is performed. Convolutional neural learning is used for training the regions across pixel distribution and pattern formations. The neural network employs two layers for training and pattern differentiation linearly. The differentiated region is trained for its positive rate in identifying the region around the target. The non-uniform patterns are used for training the second layer of the neural network. The proposed scheme pursues a recurrent iteration until the maximum segmentation is achieved. The metrics of positive rate, detection time, and false negatives are used for assessing the proposed scheme's performance.

Keywords: Camouflaged Target Detection, Convolution Neural Network, Linear Differentiation, Pattern Detection, Segmentation.

RAiSE23 - 628

Biomaterials: a sustainable solution for circular economy

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In the field of material science, biomaterials like biobased polymers are now being emphasized as substitutes for traditional petroleum-based plastics, hence addressing a major problem of plastic pollution. A few of the reasons behind bringing this concept to the front are the need to rely less on fossil resources, reduce carbon emissions, focus on non-renewable resource allocation, and most importantly promote a circular economy. The high production cost is a hindrance in scaling up the production and market for biobased and biodegradable plastics but microbial production of such monomers or polymers using easily available and inexpensive substrates, like waste streams, can be seen as a potential strategy to overcome this challenge. These polymers show physical, chemical, and mechanical properties similar to conventional plastics and can be applied as alternatives in different sectors like architecture, construction, electronics, biomedical, and agriculture. According to a report published by the Intergovernmental Panel on Climate Change (IPCC), climate change now requires immediate mitigation. Looking at this need, the construction industry has started using biobased materials to focus on reducing CO2 emissions caused by this sector. Similarly, improved barrier and mechanical properties, and antimicrobial, and antioxidant properties have made biomaterials popular in the food packaging industry. Starch, polylactic acid, and polyhydroxyalkanoates are commonly used as raw materials in this sector. The biocompatibility and biodegradability of these materials have made them a suitable substitute for conventional plastics in the biomedical sector for tissue engineering, implant modulation, drug delivery, etc. The present paper will focus on highlighting the multi-functionality of such biobased materials that will further open plentiful opportunities for great innovations.

Keywords: biobased plastics, biodegradable, microbial production, substrates, plastic pollution.

RAiSE23 - 630

Combining Forth and Rust: A Robust and Efficient Approach for Low-Level System Programming

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Rust is a modern programming language that addresses the drawbacks of earlier languages by providing features such as memory safety at compilation and high performance. Rust's memory safety features, includes ownership and borrowing, which makes it an ideal choice for systems programming, where memory safety is critical. Forth is a stack-based programming language that is widely used for low-level system programming due to its simplicity and ease of use. This research paper aims to explore the combination of Forth and Rust programming languages to create a more robust and efficient solution for low-level system programming. The primary objective is to demonstrate the implementation of essential Forth operations, including addition, subtraction, assignment, comparison, if-else statements, while loops, push operations, and dump operations in Rust. The implementation of these operations in Rust is demonstrated using code from actual implementation. The research paper also discusses the advantages of using Rust for low-level system programming. Rust's memory safety features, coupled with its high performance, make it an ideal choice for systems programming, where memory safety and performance are critical. The combination of Forth and Rust provides a more efficient and safer solution for low-level system programming, making the implementation more robust. Our implementation tries to leverage these properties of both the languages to make a memory-safe and low-level system programming language. The research paper also includes code snippets to provide a practical demonstration of how the Forth operations can be implemented in Rust.

Keywords: Rust, Forth, Compiler, Memory Safe, Stack-based.

RAiSE23 - 634

Integrating Pedagogical Approaches in the Study of Conic Sections using Differential Equation and Analysis via Bayesian Inference

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In science and technology, the application of mathematics and mathematical modelling is crucial. A more conceptual and axiomatic approach has been taken in developing the narrative from geometry in the enormous history of mathematics. Mathematics is distinct from all other topics due to its use of theorems, proofs, axioms, corollaries, examples, results, and analysis. Applications of mathematics can be found, among others, in management sciences, biosciences, chemical technology, computer sciences, information technology, and the medical industry. Differentiation and its extensions are among the most frequently used branches in mathematics. Different curves are created when a plane connects with the surface of a cone. Conic portions are what they are called. Conic sections have uses in physics and architecture, among other fields. In this study, differential equations are used to determine the conic section's type and locate its center. The effectiveness of conventional and innovative teaching strategies is compared using Bayesian inference. The Bayesian Method is employed to update the prior assumptions regarding the relative efficacy of the two approaches. Data on student performance in four different types of classes are gathered for the analysis.

Keywords: Mathematical Modeling, Differential Equation, Partial Differential Equation, Conic Section, Center, Bayesian Inference, Teaching Methods.

RAiSE23 - 635

Performance Evaluation of Various Ni-Based Catalysts for the Production of Hydrogen via Steam Methane Reforming Process

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Steam methane reforming (SMR) attitudes highly recognised and pivotal in industrial H2 production, contributing over 40% to global hydrogen production. The prime objective of this study is to optimise the significant parameters intricated with the SMR process to achieve the utmost conversion of CH4 to H2. To attain this, a sophisticated one-dimensional unsteady state heterogeneous Plug Flow Reactor (PFR) model was methodically constructed and simulated using the renowned Aspen HYSYS® software. The study comprehends an exhaustive comparison of seven diverse sets of catalysts, primarily categorised based on different weight percentages of Ni in Ni/Al2O3 catalysts, along with various promoters incorporated to enhance the conversion rate in the SMR process. This comprehensive evaluation identifies the most operative catalyst configuration for optimising CH4 conversion. The results obtained through the simulations revealed that CH4 conversion intensifies with an increase in temperature, while it weakens with higher pressures within the catalyst set considered for the study. The analysis yielded promising conclusions by comparing the simulated CH4 conversion percentages at various temperatures with data from existing literature. The maximum absolute error encountered was a mere 3.72%, signifying the accuracy and reliability of the developed model. Moreover, the Mean Absolute Error (MAE) calculated was an admirably low 1.42%, suggesting the robustness of the proposed approach. The findings lay the foundation for future innovations and improvements in the field, ultimately fostering more efficient and sustain-able hydrogen generation. As the demand for clean energy exaggerates, the optimisation of the SMR process becomes increasingly vital, making this study a crucial step towards meeting global energy needs while minimising environmental impact.

Keywords: Steam Methane Reforming, Plug Flow Reactor, Aspen Hysys, Catalysts, Mean Absolute Error.

RAiSE23 - 639

Experimental Investigation of Two and Three Blade Savonius Hydrokinetic Turbine for Hydropower Applications: A Study across Various Turbine Positions from Channel Centre to Channel Wall

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Hydrokinetic energy has gained significant attention in recent years as a promising renewable energy source due to its low environmental impact and potential for use in remote locations. This research aims to optimize the performance of the Savonius hydrokinetic turbine, a crucial component of zero-head hydropower systems, for efficient renewable energy extraction from flowing water. Laboratory-scale experiments with two and three-blade Savonius turbines at different channel positions investigate geometric dimensions and design parameters like the power coefficient (CP) and Torque coefficient (CT). The experimental results are compared with previous research, confirming the superiority of the two-blade configuration, which achieved CP and CT at the same TSR and channel locations. Specifically, the two-blade Savonius turbine demonstrated a CP of 0.27 and a CT of 0.37 at TSR 0.7 and the channel's center placement. Placing the turbine at the channel center yields the best performance for both configurations. This study provides valuable insights for enhancing the efficiency of hydrokinetic turbines, contributing to renewable energy technology advancements, and addressing climate change and energy security challenges. The Savonius hydrokinetic turbine has the potential to be a sustainable energy source.

Keywords: coefficient of torque; coefficient of power; tip speed ratio; hydrokinetic turbine; Two blade, Three blade.

RAiSE23 - 641

Towards Comprehensive Home Automation: Leveraging IoT, NodeRed, and Wireless Sensor Networks for Enhanced Control and Connectivity

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Automation appears widespread today, although it has not yet been widely used in everyday life. Most of the market-available home automation systems are object-dependent, pricey, and lack some key capabilities. This paper develops a low-cost home automation system enabling the Internet of Things (IoT). NodeRed, an open-source tool that employs nodes to do specific tasks visually, will be used by the system to develop the IoT. This technology can control numerous objects within the home, including outlets, from anywhere across the globe. Each room in the house will be adopted with Wireless Sensor Network (WSN) technology, which will record the information and upload it to the web server. These WSN technologies will be linked together via the publish-and-subscribe Message Queuing Telemetry Transport (MQTT) protocol, which is a mechanism for establishing communication between various devices. The third feature has the potential to completely trans-form notifications. If there is any uncertainty, the house member will be cautioned by email or Twitter. Through the IoT, the entire idea advances home automation.

Keywords: Internet of Things; MQTT; NodeRed; Rasberry Pi 3; Smart Home; Home Automation.

RAiSE23 - 645

Performance Characteristics of a Single Cylinder DI Diesel Engine with Intake Air Oxygen Enrichment

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Nitrogen forms 79% of ambient air and takes part in all combustion processes causing harmful pollutants and reducing the overall useful power extracted. The present study focuses on the performance and emission characteristics of a single-cylinder, four-stroke compression ignition engine with a modified intake for oxygen enrichment while equivalently reducing the ambient air intake. Four variations of oxygen intake at 21%, 21.5%, 22% and 23% of the ambient atmospheric conditions were considered for the present study. The testing operations also included four variations in load. The study indicated that a higher brake thermal efficiency of 30% could be attained at full load conditions. Additionally, a 12% increment in-cylinder pressure at 75% loading condition due to the oxygen enrichment resulted in a 10% reduction in ignition delay. Unburnt hydrocarbons were reduced by 7%, whereas NOX increased by 10% at 75% loading condition. Soot reduced by 95% 100% loading conditions. This work will form the basis for future work that involves substituting nitrogen in the intake with oxygen, and this can lead to better combustion and higher in-cylinder temperatures and pressures while not resulting in an increase in NOX and particulate matter emissions.

Keywords: Oxygen, enrichment, engine, NOX, UBHC.

RAiSE23 - 650

Fractal-Enhanced Microstrip Antennas: Miniaturization, Multiband Performance & Cross-Polarization Minimization for Wi-Fi Applications

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Due to the fast advancement of technology and industry, we are now going into the world of miniaturization. Also, all wired systems are shifted into wireless and thus there is a need for antennas to transmit and receive data in and out of gadgets. All these gadgets are to be miniature in size and the antennas for transmitting and receiving the signals inside a gadget have also to be miniaturized. Microstrip antennas have the properties of low profile compact size etc. Fractal geometries which can see in nature like clouds, trees, mountains, etc. inspired many researchers to use them while making antennas. Fractal geometries give a lot of benefits when used for making Microstrip antennas like features of size filling and multiband along with low profile and compact size. In this paper, four fractal antennas Sierpinski carpet, Sierpinski gasket, Circular patch, and Koch fractal are designed. The three iterations of the above four antennas are done. The size of the antennas are 20 mm×26mm×1.6mm. FR4 epoxy with full ground is used here for antenna generation. These antennas can be used for 5GHz band Wireless applications. These give very good re-turn loss at 5.2GHz.Maximum return loss is given by the Koch fractal at its 3rd iteration of -39.85dB with a gain of 3.6 dB. In order to reduce the Cross polarization Square slot is added in all the for antennas in the feed line and by this method cross polarization reduced upto -60dB.For the Simulation purpose, Ansys HFSS is used and it uses FEM for the analysis of complex EM problems and gets very accurate results. 3D and 2D radiation patterns are also analysed and is found that they are directional in nature with very low radiation toward the back side.

Keywords: Fractal antenna, Sierpinski gasket, Sierpinski carpet, Sierpinski circular, Koch fractal, Cross polarization.

RAiSE23 - 651

Optimizing and Analyzing a Centrifugal Compressor Impeller for 50,000 RPM: Performance Enhancement and Structural Integrity Assessment

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The rotating vanes (or blades) in the centrifugal impeller gradually increase the energy of the working fluid, which is the essential element that lends a compressor its centrifugal nature. Because an impeller is a rotational component, its strength and shape are crucial to the compressor's overall performance. In the current study, the centrifugal compressor radial impeller is optimised in the form of shark configuration (dorsal fin) with no changes in the remaining blades for better performance and to predict the impeller's structural integrity at 50,000 rpm to enhance the efficiency of combustor. After the design study of impeller, the inquiry will make use of Solid Works 2019 and ANSYS. The impeller is modelled using Solid Works, and CFD simulation is carried out using ANSYS. The overall deformation, or Von-Mises stress, of the impeller, is investigated by doing structural analyses of the impeller for two different materials such as aluminium alloy 2618 and Ti 6-2-4-6 alloy. The research shows the design criteria of material selection for different applications.

Keywords: Von-Mises stress, impeller, aluminium alloy 2618, Ti 6-2-4-6 alloy, CFD analysis.

RAiSE23 - 901

Comparative Mechanics of Post-Cured and Non-Post-Cured Eggshell GFRP Composites

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The growing need for advanced materials has led to research that combines sustainable practices with composite technology. This study looks at the effects of using eggshell, a common waste material, as a filler in glass fiber/polyester composites. It also explores the potential improvements from post-curing processes. Eggshells, which contain calcium carbonate, are expected to increase stiffness and strength. This helps meet goals for both sustainability and better material performance. The research investigates the mechanical properties of both non-post-cured and post-cured composites, with and without eggshell fillers. Extensive tests were carried out on tensile, flexural, and stress-strain behaviors to understand how the filler and post-curing affect the composites. Early results show that post-curing improves the mechanical properties of the composites, possibly because of better cross-linking in the polymer. Eggshell fillers further enhance these properties, showing their positive impact on composite reinforcement. The carbonized eggshell variant was especially impressive among the materials tested. This research not only emphasizes the potential use of waste materials in improving composite technology but also gives insights into the important role of post-processing techniques like post-curing. These findings could help in the design and manufacture of sustainable, high-quality composite materials, balancing environmental concerns with performance.

Keywords: Glass fibre/Polyester Composites; Eggshell Fillers; Post-Curing; Mechanical Properties; Sustainable Materials

RAiSE23 - 950

Hybrid Feature Selection and Classifying Stages through ECG Signal For heart Disease Prediction

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Disease is one of the biggest causes of mortality today. Clinical data analysis must predict cardio-vascular disease. Machine learning (ML) may aid decision-making and prediction using the healthcare field's massive data set. ECG demonstrated the electrical activity of the human heart, and variations in the signal's morphology have provided improved knowledge of different types of arrhythmia depending on the state of the heart. In order to accurately forecast cardiac disorders, this study effort proposed a hybrid feature selection model and classification together with the ECG wave graph. The QRS, which is the time interval of the binary data, is determined using the suggested technique of determining the ECG signal's time interval from the R-peaks level to the next level using the double squared difference signal. This approach involves many rounds of data sorting for decreasing noise, thresholding an ECG difference signal by examining the time interval between QRS, and then comparing relative magnitudes to identify the area of interval processing to evaluate accuracy results. In order to choose the best features, the modified chicken swarm optimization algorithm (MCSO) are proposed. If the wave was aberrant, the user of the dataset patients would be impacted by cardiac ailments, according to the suggested research's unique machine learning methods of the multi-module neural network system (MMNNS). The dataset, which was collected from the machine learning dataset vault at UCI, was used as an individual ECG signal from the Heart Database. As a consequence, the findings demonstrate that each approach has a particular advantage in achieving the aims that have been set out.

Keywords: Heart disease, ECG signal, Modified chicken swarm optimization algorithm (MCSO), cuckoo search algorithm (CSA), multi-module neural network system (MMNNS), Heart Disease Prediction, Hybrid Feature Selection, Cardiovascular Health Prediction.

RAiSE23 - 951

Firefly Optimized Resource Control and Routing Stability in MANET

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A mobile adhoc network (MANET) is a network that comprises mobile devices positioned in various places functioning without any central administration. Routing in MANET plays a vital role when the data packet (DP) is sent from source to destination. In order to improve the routing stability in MANET, resource utilization (i.e., energy and bandwidth) has to be controlled. An effective firefly resource-optimized routing (FFROR) technique controls resource utilization and improves routing stability during data packet (DP) transmission in MANET. Initially, in FFROR, the firefly resource optimization (FFRO) algorithm generates the population of fireflies (i.e., mobile nodes). It calculates the light intensity of every firefly based on objective functions (i.e., minimum energy consumption and minimum bandwidth utilization). The FFRO algorithm ranks fireflies according to the light intensity and finds the best resource-optimized mobile node (MN) to send the DP to the destination. This, in turn, helps in finding the resource-optimized mobile nodes and choosing the route path for sending the DP to the destination. The proposed FFROR technique uses the FFRO algorithm to increase routing stability and throughput. The simulation is carried out to analyse the performance of proposed FFROR techniques with parameters such as energy consumption, bandwidth availability, routing stability, and throughput.

Keywords: mobile ad hoc network; firefly resource-optimized routing; objective functions; routing stability; resource-optimized mobile nodes

RAiSE23 - 954

An Artificial Intelligence Based Scheme for the Management of Vaccines during Pandemics

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The pandemic like COVID-19 cause a massive blow to the global economy and its impacts will be large and endure across all domains of life. One of the crucial factors in fighting this pandemic is the proper management and administration of the limited vaccines available. The objective of the proposed research is to apply an Artificial Intelligence approach based on fuzzy logic for the allocation of vaccines to state authorities by a central Government. The objective is achieved by developing an Artificial Intelligence technique based on fuzzy logic inference system which takes into account the population and the number of active pandemic cases for inferring the proportion of available vaccine doses to be allocated to the states. This approach ensures that sufficient doses of vaccines are available in the states on priority where the proportion of the spread are more and vaccines are not wasted in states where the proportion are less. The proposed scheme is simulated using MATLAB. The results show that the proposed Artificial Intelligence base approach can ensure proper distribution of the available vaccine doses to the states and enhances the fight against pandemics.

Keywords: Pandemic, Fuzzy Inference System, Mamdani Inference, Vaccine, MATLAB.

RAiSE23 - 956

An Efficient Routing Algorithm for Implementing IOT Based WSN using Dinzo Optimizer

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We propose an energy-efficient cluster based routing protocol for IOT wireless sensor networks (IOT WSNs). The nature of sensor nodes with limited batteries and inefficient protocols are the key limiting factors of the sensor network lifetime. We aim to provide for a green routing protocol that can be implemented in a wireless sensor network. We proposed a new routing and data gathering method through network clustering based on modified Dingo Optimizer. Our pro-posed protocol's most significant achievement is the reduction of the excessive overhead by employing Dingo Optimizer based cluster head selection. We use data compression process at each sensor node which will minimize energy spend and improve the network lifetime of the IOT network. As a result, the scalability of a wireless sensor network can be increased

Keywords: Internet of Things, Wireless Sensor Network, Base station, DINGO optimize.

M-Shaped Conformal Antenna with FSS Backing for Gain Enhancement

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A Frequency selective surface (FSS) integrated conformal antenna is modelled and analytical study is presented in this article. A novel antenna design known as the "M-shaped Conformal Antenna with FSS Backing for Gain Improvement" makes use of both the conformal structure and FSS technology to increase gain. The geometric shape of the M-shaped antenna, which might resemble the letter "M" or a collection of M-shaped parts, is what gives it its name. This structure can be created to alter the antenna's resonance frequency, increase bandwidth, or adjust the emission pattern. The radiation pattern of the antenna may be precisely controlled by combining an M-shaped construction with an FSS. You may customize the radiation pattern to concentrate energy in particular directions or sectors, boosting gain and coverage, when necessary, by modifying the FSS's geometry and physical characteristics. The combination of features makes it extremely ideal for a variety of applications where optimum gain is a crucial need, such as aerospace, communications, and radar arrays. It also enables fine control of the radiation pattern, frequency-selective gain, and interference elimination. The designed antenna consists of an M-shaped structure on the front side along with a complement split ring resonator and a defective ground structure on the bottom side. Antenna resonating at wideband covering several lower band wireless communication applications like Bluetooth, Wireless Fidelity (Wi-Fi), Industrial Communication Scientific & Medical-ISM, Long Term Evolution-LTE, advanced 5G, and Wireless LAN with impedance bandwidth of 65%. The FSS beneath the antenna structure acts as reflector and providing additional gain and efficiency improvement of 22% and 12% respectively. The prototype measurement supporting the simulation results with good matching in reflection coefficient and gain.

Keywords: Conformal, Metamaterial, Monopole, Flexibility, M-shaped antenna.

RAiSE23 - 960

Histopathological Image Analysis Using Deep Learning Framework

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Breast cancer has the greatest mortality rate. Histologic imaging evaluation must detect this problem early. Traditional methods are time-consuming and limit pathologists' skills. Breast cancer histopathology picture segmentation is neglected by existing HIA because to its complexity and lack of historical data with exact annotations. Histopathology breast cancer images are classified using graph-based segmentation. Graph-segmented images retrieve relevant features. Using recursive feature removal, breast cancer photographs are categorized. Breast cancer symptoms can be detected by appropriately classifying breast histopathology scans as abnormal or normal. Modern medicine diagnoses and predicts diseases, including cancer, using histopathological image analysis. Due to picture identification and feature extraction, deep learning can automate and improve histopathological image analysis. The study extensively analyses deep learning frameworks in histopathology image analysis. Starting with histopathological image interpretation's challenges, the study emphasizes the intricate patterns, cell structures, and tissue anomalies that demand professional attention. It then examines CNNs, RNNs, and their variants' design and ability to catch subtle features and patterns in histopathological images. We examine tumor detection, grading, segmentation, and prognosis using deep learning in histopathology. For each problem, the article evaluates cutting-edge deep learning models and approaches to demonstrate their accuracy and efficiency. While training deep learning models for histopathology image analysis, the study tackles data collection, preprocessing, and annotation. We also analyze automated clinical systems' ethical and regulatory ramifications. Deep learning-based histopathological image processing case studies show patient care and applications. Multi-modal data fusion, transfer learning, and explainable AI may increase histopathological image analysis accuracy and interpretability.

Keywords: Histopathological image analysis Deep learning Convolutional neural networks Medical image analysis Digital pathology.

RAiSE23 - 961

A Gray Wolf Optimization based Framework for Emotion Recognition on EEG Data

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Human emotions trigger reflective transformations within the brain, leading to unique patterns of neural activity and behavior. This study connects the power of electroencephalogram (EEG) data to investigate deep into the intricate impacts of emotions, considering their reflective significance in our daily lives. The versatile applications of EEG signals encompass an array of domains, from the categorization of motor imagery activities to the control of advanced prosthetic devices. However, EEG data presents a difficult challenge due to its inherent noisiness and non-stationary nature, making it imperative to extract salient features for classification purposes. In this paper, we introduce a novel and effective framework reinforced by Grey Wolf Optimization (GWO) for the recognition and interpretation of EEG signals using a real-world dataset. The core objective of our research is to unravel the intricate neural signatures that underlie emotional experiences and pave the way for more nuanced emotion recognition systems. To measure the efficacy of our proposed framework, we conducted experiments utilizing EEG recordings from a unit of 30 participants. During the experiments, participants were exposed to emotionally charged video stimuli, each lasting one minute. Subsequently, the collected EEG data was meticulously analyzed, and a Support Vector Machine (SVM) classifier was employed for the robust categorization of extracted EEG features. Our results underscore the potential of the GWO-based framework, achieving an impressive accuracy rate of 93.32% in accurately identifying and categorizing emotional states. This research not only provides valuable insights into the neural underpinnings of emotions but also lays a solid foundation for the development of more sophisticated and emotionally intelligent hu-man-computer interaction systems.

Keywords: Emotion Recognition, EEG, GWO, SVM, Feature Selection.

RAiSE23 - 962

Enhancing Virtual Experiences: A Holistic Approach to Immersive Special Effects

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To create a more immersive experience, electronic content developers utilise hardware solutions that not only display images and produce sounds but also manipulate the viewer's real environment. These devices can control visual effects like lighting variations and fog, emit scents, simulate liquid effects, and provide vibration or locomotion sensations, such as moving the viewer's chair. The goal is to emulate additional sensations for the viewers and engender the belief that they are truly present within the virtual environment. These devices are typically found in specially designed cinemas referred to as xD cinemas, such as 4D, 5D, 9D, etc., where each effect is treated as an additional dimension, enhancing the overall experience. Currently, all these effects are triggered by timers. The system determines which effect to play based on timers. This approach is problematic, for it requires programming each device for each movie. In this research, we address this problem by introducing the idea of Special Effect Tags (SETs) that can be added in the subtitle files. The SETs aim to serve as a standard that will allow the various devices to know when each artificial phenomenon should be triggered. They are generic and can support infinite artificial phenomena, also known as dimensions. This paper introduces the idea of a common special effect framework and a generic architecture of a special effects player that is independent of any specific hardware solutions.

Keywords: Subtitles; special effects; olfactory displays; smart lights; movie haptics; hue lights; peltier; cinema xD; film; internet of things (IoT).

RAiSE23 - 963

A Comprehensive Analysis of FND (Fake News Detection) Models: A Systematic Literature Review and Current Challenges

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In today's age of social networking, web news inconsistencies have become a pressing concern. These discrepancies can lead individuals wrong when making important purchase decisions. De-spite the existing research in this area, there is a need for more empirical and rigorous investigation into the inconsistencies reported in reviews. False reporting and disinformation on social media platforms can significantly impact societal stability and peace. Fake news is frequently disseminated on social media and can easily influence and deceive populations and governments. Many re-searchers are working towards distinguishing between fake news and genuine news on social media platforms. The practical and timely identification of fake news can help to prevent its spread. Our study focuses on how machine learning and deep learning algorithms are used to detect fraudulent data. The most fundamental and practical techniques deployed over recent years are investigated, classified, and defined in numerous datasets in an extended review model. Additionally, simulation mediums and recorded indicators of performance are reviewed in detail. The review, as mentioned above, provides a comprehensive analysis of key research findings, delving into pertinent issues that may impact individuals in the academic and professional realms interested in augmenting the re-liability of automated FND models.

Keywords: Deep learning, machine learning, used data sources, simulation platforms, FND models.

RAiSE23 - 965

Early Detection of Alzheimer's Disease: An Extensive Review of Advancements in Machine Learning Mechanisms Using Ensemble and Deep Learning Technique

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Alzheimer's disease (AD) is the most common dementia in seniors, impacting memory, cognition, and behavior. Early diagnosis is vital, but AD's complexity poses challenges. This study integrates diverse machine learning algorithms to boost diagnostic accuracy. The dataset, including instances with missing values, uses effective imputation techniques. Various feature selection methods identify key characteristics, while Synthetic Minority Oversampling Technique (SMOTE) addresses class imbalance. An Ensemble Classification algorithm combines multiple models for enhanced accuracy, outperforming existing approaches. Using a robust AD dataset from UCI, this research advances AD diagnosis for more precise early detection strategies.

Keywords: Alzheimer's disease (AD), Machine Learning, early detection, diagnosis, Ensemble Classification.

RAiSE23 - 966

Analytical Modelling of Trapezoidal Monopole Structured Antenna for Wi-Fi, ISM and Wireless Communication System Applications

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A dual-band monopole antenna of a trapezoidal shape is modelled and analytical study is presented in this article. The designed model is working between 2.5-3GHz by producing bandwidth value of 500 MHz & 4-5 GHz with the bandwidth value of 1000 MHz. The designed antenna polarization is linear, and the radiation is non-directive. The performance bandwidth is 4:1, 2:1 and 5:1 at 2.5, 2.6 and 4.5 GHz and the gain value is 2.3 dB, 2.9 dB and 5.1 dB respectively. An impedance value of 50 ohms is observed at the port during the analysis. The analyzed model is best suitable for the wireless communication applications of ISM, Wi-Fi and WLAN with moderate gain and efficiency. In wireless communication systems, effective and adaptable antennas are in high demand. This work proposes an analytical modelling technique for a trapezoidal monopole structured antenna for Wi-Fi, ISM, & other wireless communication systems. Proposed antenna has compact size, broad frequency coverage, and omnidirectional radiation patterns. The analytical model considers the antenna's geometric characteristics, material qualities, and operating frequencies using electro-magnetics laws. Through rigorous mathematical definitions, the study reveals the antenna's resistance, radiation efficiency, and gain patterns across the necessary frequency bands. Furthermore, this analytical model predicts antenna performance without time-consuming simulation or costly prototypes. A thorough analysis assesses the trapezoidal monopole antenna's suitability for Wi-Fi, ISM, and wireless communication applications, addressing their individual requirements and limit. Bandwidth, gain, radiation efficiency, and impedance matching are examined to show the an-tenna's capacity to fulfil modern wireless system needs.

Keywords: Bluetooth, LTE, WLAN, Wireless Communication, ISM.

RAiSE23 - 967

Design Implementation of Trapezoidal Notch Band Monopole Antenna for LTE, ISM, Wi-MAX and WLAN Communication Applications

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This article analyses & describes a trapezoidal dual-band monopole antenna. The notch band monopole disables 4.4 to 5.7GHz commercial communication equipment. The basic type operates at 2.5-4.4GHz with 500MHz marginal bandwidth and 5.7-7GHz with 1000MHz bandwidth. Present research optimises multiband trapezoidal antennas. Trapezoidal antennas improve multi-band wireless antennas. GSM, LTE, Wi-Fi, and 5G frequency bands start design. Inefficient and space-wasting, traditional antennas lack frequency range. Benefits of trapezoids. Changing trapezoidal element sizes and angles enables the antenna transmit many frequencies. Sloping trapezium sides allow impedance changes without networks or tuning. Numerical calculation and electro-magnetic modelling optimise the trapezoidal antenna's performance throughout communication band. Impedance matching, gain, and radiation efficiency provide transmission reliability. Broadband trapezoidal forms eliminate band-specific antennas & switches. Simplified antenna integration makes modern devices cheaper and simpler. In multiband applications, trapezoidal antennas outperform normal antennas, says this study. The antenna fits numerous wireless communication devices and systems due to its modest size and wide band coverage. The redesigned structure with notch increases operating band bandwidth and notches application bands between 4.4 and 5.7GHz. Interference handling with a notch band monopole antenna model. By modifying trapezoidal geometry, we generate selective impedance transition notches to target crucial interference frequencies. Modern wireless communication systems with complicated interference situations can trust its careful engineering to provide good efficiency and radiation patterns across a wide frequency band while actively rejecting interfering signal. The peak realized gains obtained at 2.5GHz is 2.4 dB, at 3.4GHz it is 3.5GHz and at 5.8GHz it is 4.7 dB.

Keywords: Monopole Antenna, Communication Applications, Trapezoidal Shape, Notch Band Design, Dual-Band Frequency.

A Compact CPW Fed Textile Substrate Based Half Circular Spike Monopole Antenna

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A coplanar waveguide type fed half circular spike shaped monopole antenna is designed on textile substrate and analyzed in this paper. The best suitable textile substrate is analyzed in this work by experimenting the current model performance characteristics on Silk, Jeans and Cotton fabrics and presented the analytical study. Cotton material model providing bandwidth of 9.4 GHz, silk material providing 9.2 GHz bandwidth and jeans material providing 9.1 GHz. A maximum gain of 9.5 dB attained for 3.6 GHz of 5G band and 8.2 dB at 5.8 GHz of WLAN band. Antenna is prototyped on cotton substrate and bending analysis is also performed at 15-degree, 30-degree and 45-degree in vertical and horizontal conditions and found the satisfactory results for specified application. Compact, wearable antennas with varied performance are in demand as wireless communication systems evolve. The antenna is designed for wearable and textile-integrated wireless communication. The textile substrate makes the antenna flexible and integrates into garments, wearable gadgets, and smart textiles. The paper describes how to choose textile materials and design the half-circular spike monopole antenna. Electromagnetic simulations evaluate the antenna's impedance matching, radiation pattern, and bandwidth. The CPW feedline is designed to efficiently transfer power to the antenna, improving performance. The study also examines the antenna's longevity and resilience in textile materials, addressing real-world issues like bending and washing. This examination verifies the antenna's wearable functionality and reliability.

Keywords: Circular Spike, Jeans, Cotton substrate, Silk, Textile.

RAiSE23 - 973

Investigation of Thorium Isotopes Near the Closed Shell (126-82) Using the Interacting Boson Model-One

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This study investigates the nuclear structure of thorium isotopes 224Th, 226Th, and 228Th utilizing the Interacting Boson Model-One (IBM-1). By calculating the energy levels of these isotopes and comparing them with empirical data, we ascertained that 224Th and 226Th align with the SU (3) symmetry, while 228Th conforms to the U (5) symmetry. Various ratios, including the ratio of the fourth to the second excited energy level (E_4^+)/(E_2^+), provide additional metrics for structural characterization. The study also explores the theoretical probabilities of electric quadrupole transitions B (E2) using IBM-based calculations. Employing the IBM Parameter (IBMP) program, we assessed the nuclear surface potential, offering insights into nuclear deformation, which is further elucidated by the analysis of contour lines in specific regions.

Keywords: Interacting Boson Model-one, Electric transitions, Potential energy, Thorium isotopes

RAiSE23 - 974

Seasonal Variation of Land Surface Temperature in Babylon Governorate: A Remote Sensing and GIS Analysis

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The primary objective of this research is to quantify the Land Surface Temperature (LST) across different seasons in the Babylon Governorate for the year 2022. Utilizing data from LANDSAT 8, the study focuses on three key spectral bands: thermal, red, and Near-Infrared (NIR). Spatial distribution maps of LST are generated for winter, spring, summer, and autumn, and descriptive statistics are employed to characterize the LST features for each seasonal map. The findings reveal a significant seasonal variation in LST. Specifically, the maximum temperature recorded in summer is approximately three times higher than that in winter, with a difference of nearly 46 °C. Conversely, the minimum temperature varies from 18 ∘ C in summer to approximately 4.5 °C in winter.

Keywords: Land Surface Temperature, Normalized Difference Vegetation Index, Geographic Information Systems, Remote Sensing, Babylon City

Synthesis, Characterization, and Biological Activity Study of New Heterocyclic Compounds

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The synthesis of novel heterocyclic compounds is achieved through a multi-step process involving azo dye [S1], ester [S2], and hydrazide [S3]. Initially, azo dye [S1] is synthesized through the reaction between resorcinol and p-aminobenzoic acid. Subsequently, ester [S2] is formed by reacting azo dye [S1] with concentrated sulfuric acid. Hydrazide [S3] is then synthesized by reacting ester [S2] with 80% hydrazine hydrate. Further reactions of hydrazide [S3] with various anhydrides (maleic anhydride, phthalic anhydride, 3-nitrophthalic anhydride, succinic anhydride) result in cyclization facilitated by acetic acid, yielding six-membered heterocyclic compounds. Additionally, compound [S3] undergoes cyclization with acetyl acetone, ethyl acetoacetate, methyl acetoacetate, and diethyl malonate to produce five-membered heterocyclic compounds. The biological activity of these synthesized compounds is also investigated. Characterization of the prepared compounds is performed using techniques such as Fourier-Transform Infrared Spectroscopy (FT-IR), Proton Nuclear Magnetic Resonance (1HNMR), Carbon-13 Nuclear Magnetic Resonance (13C-NMR), and Elemental Analysis (CHNS).

Keywords: Resorcinol, Azo dyes, Pyridazine, Phthalazine, Pyrazole and biological activity

RAiSE23 - 976

Spectrophotometric Method for the Determination of Ciprofloxacin in Pure and Pharmaceutical Preparations: Development and Validation

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Ciprofloxacin (Cip) is spectrophotometrically identified through the formation of a colored charge-transfer complex, exhibiting a maximum absorbance at 440 nm. This complex is generated by the reaction of the drug's secondary amine with sodium nitroprusside (SNP) in an alkaline medium, in the presence of hydroxylamine (NH2OH). Classical univariate analysis was employed to optimize the experimental conditions affecting the formation of the charge-transfer (CT) complex. The method presented herein offers a straightforward and sensitive approach for quantifying Ciprofloxacin within a concentration range of 50.0 − 250.0 μg/mL. The method exhibits a molar absorptivity of 364.4817L/mol · cm and a coefficient of determination (r2) of 0.997. Validation of the method was achieved through the determination of the regression equation, accuracy, precision, and detection limit. The procedure was successfully applied to the quantification of Ciprofloxacin in pharmaceutical formulations, demonstrating satisfactory recovery and precision. Statistical validation corroborated the reliability and repeatability of the obtained results.

Keywords: Ciprofloxacin determination, Spectrophotometry, Charge transfer

RAiSE23 - 977

Spectrophotometric Determination of Amaranth Dye Using a Two-Step Green Cloud Point and Magnetic Solid-Phase Extraction Approach

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The present study introduces a two-step extraction methodology that integrates cloud point extraction (CPE) with magnetic solid-phase extraction (MSPE) for the extraction and quantification of amaranth dye. Initially, the dye is extracted using CPE in the micellar phase of the non-ionic surfactant Triton X-114. Subsequently, hydrophobic tetraethyl orthosilicate (TEOS)-modified Fe3O4 magnetic nanoparticles (MNPs) are employed to recover the micellar phase. A comprehensive evaluation was conducted to optimize the key parameters influencing the efficacy of both CPE and MSPE techniques, as well as signal enhancement. Under optimized conditions, the proposed methodology exhibited a linear response in the concentration range of 10 to 90 µg Kg−1 , with a correlation coefficient (R2) 8 of 0.9945. The detection limit was determined to be 8.443 µg g−1. This robust and environmentally friendly approach offers a promising avenue for the accurate and efficient determination of amaranth dye in various applications.

Keywords: Cloud Point Extraction (CPE), Magnetic Solid-Phase Extraction (MSPE), Amaranth Dye, Spectrophotometric Determination, Magnetic Nanoparticles (MNPs)

RAiSE23 - 978

Indian Legal Corpus (ILC): A Dataset for A dataset summarizing Indian Legal Proceeding using Natural Language

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There is a significant backlog of legal proceedings in several large countries, including India. There have been technical advancements in intelligent devices that can process and summarize legal documents. However, developing such data-driven systems requires a scarcity of high-quality corpora. Legal AI focuses on using artificial intelligence technology, particularly Natural Language Processing (NLP), to help with legal duties. Legal professionals frequently consider how to solve problems using rule-and symbol-based methods, but NLP researchers are more interested in data-driven and embedding methods. So, in this paper, we present Indian Legal Corpus (ILC), a dataset for Indian legal document summarization. Our dataset differs from the existing summarization datasets in a way that our summaries are highly abstractive. This dataset offers new research opportunities for Legal documents with an abstractive approach. ILC is highly abstractive, concise, and of high quality, as indicated by human and intrinsic evaluation. We are releasing our dataset and models to encourage future research on Legal abstractive summarization.

Keywords: summarization; abstractive; extractive; legal document summarization

RAiSE23 - 1001

Using Artificial Intelligence Methods to Create a Chatbot for a University Questions and Answers

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A chatbot is a computer program that uses general rules and Artificial Intelligence techniques to simulate human conversation. This paper highlights the different scenarios of human-computer interaction and the journey it has gone through from evolution to evolvement to innovation to the development of the technical era. Here, the main focus is on the ways humans interact with the computer and how it has changed day-to-day life and reduced human efforts in performing everyday activities. There is an impact of HCI (Human Computer Interaction) on people and has consequences in the form of both advantages and disadvantages of this interaction. The various innovations and machines have given birth to human-computer interaction as well as technology interaction. The main objective is to style the interface amongst men as well with Personal Computers (PCs) as usual as the interface amid beings. The user can interact in this system using text or voice. As per way as interaction is concerned direct, indirect and strategic interaction of humans with computers and the latest gadgets is possible. Dynamic intelligence makes it like real-time communication with an individual. It can handle the user request, and offer relevant information that can be used as a friend one would seek for knowledge. The proposed system is developed using the Rasa of an open-source platform. Further, the article focuses on the features and role of chatbots in an educational context. High precision in sentence analysis is attained with the aid of the proposed method up to a 91% hit ratio. The hit rate for the similarity computation is high. The system can handle a broader variety of requests as a consequence of its ability to recognize many ways to phrase the same inquiry and map them to related results.

Keywords: LSTM, Natural Language Understanding, Rasa, Web scrapping, chatbot, communication, RNN, Human Computer Interaction.

RAiSE23 - 1002

Geopositional Data Analysis Using Clustering Techniques to Assist Occupants in a Specific City

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Geolocation and Geographic Information Systems (GIS) are becoming essential tools in several sectors. Clustering-based geopositional data analysis has enormous potential for helping the citizens of a given city. The insights gained from this kind of study can assist inhabitants and tourists in making better-educated decisions and improve overall quality of life by shedding light on numerous facets of the city's infrastructure, services, and facilities. Due to its capacity to combine databases and display geographic data, GIS has proven important in a variety of industries. City planners and other stakeholders may learn a lot about the requirements of the city's residents by clustering geopositional data. Making wise judgments based on this knowledge will raise the standard of living for everyone who lives, works, and visits the city. The purpose of this research is to use k-means clustering to identify the best houses to live in for immigrants according to their expectations, amenities, price, and proximity to the workplace or educational institution, and provide them with the best accommodation suggestions. After gathering the geo-locational data of the city to which the immigrants have moved the details will be cleaned, and analyze the data using different data pre-processing and data exploratory techniques. At last, the data will be clustered using the k-means Clustering algorithm. The number of data clusters (K) is predicted by K-Means. It is computationally efficient and operates perfectly when clusters are spherical and comparable in size. It's essential to handle data privacy and security properly while working with geopositional data. The quality of life for those who live in cities can be improved by utilizing clustering algorithms to analyze geopositional data.

Keywords: Geographic Information Systems, Immigrant Accommodation, Data Analysis, K-Means, Clustering, Geolocation.

RAiSE23 - 1003

Agricultural Farm Production Model for Smart Crop Yield Recommendations Using Machine Learning Techniques

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Smart agricultural monitoring is the use of cutting-edge technology to manage all elements impacting plants and lowering crop yield quality. The main objective of smart crop monitoring and management is to guarantee farmers optimal productivity. Additionally, the market for worldwide smart crop management is expanding continuously as a result of the rising need for smart agricultural techniques. Machine learning techniques have the potential to be utilized to provide intelligent agricultural yield suggestions that will assist farmers in increasing their crop yields and profitability. Machine learning algorithm is used to analyze massive collections containing previous yield statistics, meteorological data, soil data, and other parameters in order to discover patterns and associations that might be used to predict agricultural yields. An IoT-based smart crop recommendation system is proposed here to help the farmers with the recommended crops to cultivate based on dynamic situations. The methodology used in this system is that the farmer has to enter the details of the conditions around the field. Once the data is entered into the system will be analyzed. This will predict the state of environmental conditions and predict the crop that is suitable under these situations to give more yields. The web application is also built here for the former to analyze the information regarding the crops and to generate those reports. To find better crops under various conditions, the K-Nearest Neighbour (KNN) technique is used. At last, the farmer gets better results based on his conditions around the form field to plant the crop that is appropriate to those conditions. The proposed system helps a huge number of farmers by using IOT devices and web applications for smart irrigation.

Keywords: Smart Irrigation, Climate, Farmers, Recommendation System, Crop, Yield, Machine Learning, IoT, KNN.

RAiSE23 - 1005

Using Chemical Precipitation to Recover Struvite from Household Wastewater for Agricultural Fertiliser Utilization

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Struvite is a substance that can be extracted from wastewater, has the potential to replace conventional manufactured fertilizers and reduce environmental issues. A slow-release fertilizer can more effectively be used by matching the nutrient requirements of plants through the growing period and gradually supplying N and P for crop growth. Struvite is an ecologically friendly fertiliser because of its progressive fertiliser treatment and high quality. The research indicates that the solubility and absorption of struvite by plants are equivalent to those of artificial phosphorus fertilisers such as triple superphosphate or potassium phosphate. Struvite is recognized to be an effective fertiliser for grass, tree seedlings, ornamental plants, vegetables, and flower beds. Struvite precipitation removes phosphorus and nitrogen from sewage water, hence alleviating phosphorus shortages from non-renewable phosphorus sources and water eutrophication. A struvite would also be useful in grasslands and woods where fertilisers are used. However, the agricultural utility of struvite was not thoroughly investigated. As a result, this work is reported as a pot experiment designed to assess the fertiliser value of struvite. Experiment settings and pot experiments were conducted to establish the optimal value from two factors. The initial pH for struvite synthesis was 9. The formulated struvite fertilisers were compared to standard phosphorus fertilisers in pot trials. Fourier-transform spectroscopy and SEM with EDAX have been employed to support the quantitative findings. To summarize, struvite precipitation is a desirable and effective method for removing phosphate and nitrogen from domestic sewage water and using it as fertiliser.

Keywords: Struvite recovery, Domestic wastewater, Chemical precipitation, Fertiliser, SEM, EDAX.

RAiSE23 - 1006

Human Emotion Detection Using DeepFace and Artificial Intelligence

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An emerging topic that has the potential to enhance user experience, reduce crime, and target advertising is human emotion recognition utilizing DeepFace and AI. The same feeling may be expressed differently by many individuals. Accurately identifying emotions can be challenging in light of this. It can also be helpful to understand an emotion's significance by looking at the context in which it is presented. Depending on the application, one must decide which AI technology to employ for detecting human emotions. Because of things like lighting and occlusion, using it in real-world situations can be difficult. Not every human emotion can be accurately detected by technology. Human-machine interaction technology is becoming more popular, and machines must comprehend human movements and expressions. When a machine recognizes human emotions, it gains a greater understanding of human behavior and increases the effectiveness of work. Text, audio, linguistic, and facial movements may all convey emotions. Facial expressions are important in determining a person's emotions. There has been little research done on the topic of real-time emotion identification utilizing face photos and emotions. Using the Artificial Intelligence-based deepFace approach, the proposed method recognizes real-time feelings from facial images and live emotions of persons. The proposed module extracts the facial features from an active shape deepFace model by identifying 26 facial points to recognize human emotions. This approach recognizes the emotions of frustration, dissatisfaction happy neutral, and wonder. The proposed technology is unique in that it implements emotion identification in real-time, with an average accuracy of 94% acquired from actual human emotions.

Keywords: Emotion Detection, Age Prediction, Gender Prediction, Race Prediction, Deepface, Deep Learning.

RAiSE23 - 1007

A Methodical Review of Iridology-Based Computer-Aided Organ Status Assessment Techniques

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Pseudoscience known as iridology makes the unsubstantiated claim that it can identify medical disorders by examining the iris, the colored portion of the eye. Iridology does not provide a reliable means of diagnosis, and there is no scientific proof to back up its claims. To find patterns that are connected to particular medical conditions, computerized iris analysis software may need to examine thousands of iris images. A method of iridology known as Computer-Aided Iridology (CAI) uses software to study the iris. CAI still isn't a medically accepted diagnostic technique and isn't any more trustworthy than conventional iridology. Applying technology in medical science had a great impact on diagnosing diseases. Decision-making is the most critical task in computer-aided applications. Computer vision and deep learning make this task more accurate and are widely used in many applications, mainly in diagnosing diseases. The methodologies, data acquisition source, and volume of data used for both training and testing on pre-diagnosis of human organs utilizing iris patterns are thoroughly studied. Understanding the limitations of it allows researchers to concentrate on creating and evaluating improvements in technology that could boost its accuracy and usefulness. Iridology is considered as having no use for years and becomes effective when combined with technology. This study includes various technical factors used in iridology for the pre-diagnosing of diseases. Recognizing the limitations of iridology allows healthcare providers to stay away from errors in diagnosis and prevent individuals from going after redundant procedures or therapies based solely on iridology assessments.

Keywords: Iridiology, Organs, Human Body, Diagnosis, Normalization, Segmentation, Features.

RAiSE23 - 1009

A Methodical Review of Iridology-Based Computer-Aided Organ Status Assessment Techniques

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Pseudoscience known as iridology makes the unsubstantiated claim that it can identify medical disorders by examining the iris, the colored portion of the eye. Iridology does not provide a reliable means of diagnosis, and there is no scientific proof to back up its claims. To find patterns that are connected to particular medical conditions, computerized iris analysis software may need to examine thousands of iris images. A method of iridology known as Computer-Aided Iridology (CAI) uses software to study the iris. CAI still isn't a medically accepted diagnostic technique and isn't any more trustworthy than conventional iridology. Applying technology in medical science had a great impact on diagnosing diseases. Decision-making is the most critical task in computer-aided applications. Computer vision and deep learning make this task more accurate and are widely used in many applications, mainly in diagnosing diseases. The methodologies, data acquisition source, and volume of data used for both training and testing on pre-diagnosis of human organs utilizing iris patterns are thoroughly studied. Understanding the limitations of it allows researchers to concentrate on creating and evaluating improvements in technology that could boost its accuracy and usefulness. Iridology is considered as having no use for years and becomes effective when combined with technology. This study includes various technical factors used in iridology for the pre-diagnosing of diseases. Recognizing the limitations of iridology allows healthcare providers to stay away from errors in diagnosis and prevent individuals from going after redundant procedures or therapies based solely on iridology assessments.

Keywords: Iridiology, Organs, Human Body, Diagnosis, Normalization, Segmentation, Features.

Properties and Performance Evaluation of Natural Fiber and PLA Composites for FDM 3D Printing: A Comprehensive Review

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Fused Deposition Modelling (FDM) 3D printing is a rapidly advancing technology with wide-ranging applications across industries. One particularly intriguing aspect of this technology involves the use of natural fiber and polylactic acid (PLA) composites, known for their eco-friendliness and potential to revolutionize sustainable additive manufacturing. This comprehensive review aims to deeply explore the properties and performance of these composites within FDM 3D printing. By combining renewable natural fibers with biodegradable PLA, a genuinely environmentally responsible alternative to traditional 3D printing materials emerges. Natural fibers offer a trifecta of advantages: low density, robust mechanical properties, and cost-effectiveness, making them ideal for PLA composites in FDM printing. The review primarily focuses on meticulously evaluating critical mechanical attributes, with a special emphasis on tensile strength and flexural properties, incorporating the latest research findings to remain at the forefront of this evolving field. This study caters not only to seasoned researchers but also to engineers and professionals interested in harnessing the potential of natural fiber and PLA composites in FDM 3D printing. The goal is for this work to act as a catalyst for sustainable additive manufacturing, inspiring further breakthroughs and innovation in this promising and environmentally-conscious domain. Ultimately, by exploring the synergistic possibilities of natural fiber and PLA composites, we aim to steer the course towards a more sustainable future for additive manufacturing.

Keywords: Fused Deposition Modelling (FDM), 3D printing, Natural fiber, Polylactic Acid, Natural Fiber Composites.

RAiSE23 - 1030

Experimental Analysis of Feature-Based Image Registration Methods in Combination with Different Outlier Rejection Algorithms for Histopathological Images

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Registration involves aligning two or more images by transforming one image into the coordinate system of another. Registration of histopathological slide images is a critical step in many image analysis applications including disease detection, classification, and prognosis. It is very useful in Computer-Aided Diagnosis (CAD) and allows automatic analysis of tissue images, enabling more accurate detection and prognosis than manual analysis. Due to the complexity and heterogeneity of histopathological images, registration is challenging and requires the careful consideration of various factors, such as tissue deformation, staining variation, and image noise. There are different types of registration and this work focuses on feature-based image registration specifically. A qualitative analysis of different feature detection and description methods combined with different outlier rejection methods is conducted. The four feature detection and description methods experimentally analyzed are Oriented FAST and rotated BRIEF (ORB), Binary Robust Invariant Scalable Key points (BRISK), KAZE, and Accelerated KAZE, and the three outlier rejection methods examined are Random Sample Consensus (RANSAC), Graph cut RANSAC (GC-RANSAC), and Marginalizing Sample Consensus (MAGSAC++). The results are visually and quantitively analyzed to select the method that gives the most accurate and robust registration of the histopathological dataset at hand. Several evaluation metrics, the number of key points detected, and a number of inliers are used as parameters for evaluating the performance of different feature detection–description methods and outlier rejection algorithm pairs. Among all the combinations of methods analyzed, BRISK paired with MAGSAC++ generates the most optimal registration results.

Keywords: image registration; feature extraction; feature detection; feature description; outlier removal

RAiSE23 - 1031

Assessing the Friction and Wear Behavior of AZ91-based hybrid composites reinforced with nano hBN / micron TiB2 ceramic particles using WASPAS and ARAS technique

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The combination of lightweight nature and mechanical properties of the AZ91 makes it a suitable material for defense, aerospace, and automotive components. The study of friction and wear properties of AZ91 contributes to the understanding of interactions of surfaces in relative mo-tion. The hybrid ceramic reinforced composites can be tailored to offer enhanced mechanical and tribological properties. The present study highlights the development of AZ91-based hybrid com-posites reinforced with nano hBN and micron-sized TiB2 ceramic particles. The hBN is used as a hybridizing agent in the perspective of improving the friction and wear behavior of the composites. The Taguchi L16 orthogonal array was used to prepare the experimental plan. The normal load, sliding speed, and sliding distance were considered as influencing factors in the experiments against the responses, wear rate, and coefficient of friction. The multi-objective decision-making methods such as Additive Ratio Assessment System (ARAS) and Weighted Aggregated Sum Product Assess-ment (WASPAS) were employed to optimize the experiments. The presence of hBN decreased the wear rate and coefficient of friction of the hybrid composites. The adhesive mode of wear mecha-nism was found to be operative in the composites.

Keywords: AZ91, hybrid composites, friction, wear, ARAS, WASPAS, wear mechanisms

RAiSE23 - 1032

Relevance of Automatic Number Plate Recognition System in Vehicle Theft Detection

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Smart vehicle technologies have revolutionized human life in the current era. Smart vehicles, referred to as connected and autonomous vehicles (CAV) are equipped with advanced technologies that increase their safety and security. These technologies have the potential to transform various aspects of society in terms of transformation. This research paper presents the analysis of Automatic Number Plate Recognition (ANPR) systems and a comparison at each stage in the aspect of technologies and algorithms involving computer vision. The research paper compares algorithms used for number plate recognition at various ANPR stages. ANPR is also known as Automatic License Plate Recognition (ALPR) System in many countries. These ANPR systems are generally used in different applications like Security Surveillance, Traffic Management, and Electric Toll Collection Systems, including Law enforcement, parking enforcement, etc. Several factors can destroy the performance of ANPR systems. These factors can lead to inaccuracies in plate recognition or cause the system to fail to identify license plates correctly. Some common factors that can undermine ANPR performance include Poor Image Quality, Non-Standard Plates, Weather Conditions, Vehicle Speed, Plate Obstructions, Lighting Conditions, and hardware-based constraints. These challenges make ANPR an interesting area for research. In, addition to enhancing the performance of ANPR, other technologies like RFID, and GPS can be used. The paper also focuses on the number plate recognition rate after applying different algorithms. This research aims to improve the state of knowledge in ANPR, which includes various algorithms and ANPR steps analysis for number plate detection by citing relevant previous work.

Keywords: Automatic Number Plate Recognition, Image Processing, Vehicle Theft Detection, Intelligent Transportation System, Number Plate Extraction, Segmentation and Recognition.

RAiSE23 - 1033

Navigating the Divide: Digital Kiosks and Mobile Apps as Complementary Human-Centered Self-Service Technologies

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This work sheds light on the effectiveness of digital kiosks in targeting specific audiences in contrast to centrally managed mobile phone applications. To this end, we have conducted a case study, where a digital kiosk was developed to support the academic activities of the computer science department. Our results show that the students continue to use the mobile phone application. However, the digital kiosk added the following main benefits to the service: Firstly, being in a physical location and thanks to their larger screens, digital kiosks are 'eye-catching' devices, which makes them ideal for advertising products/services or communicating relevant information. Secondly, they are brilliant points of attraction. By seeing other people standing in front of any of them, members of the target audience are encouraged to imitate, even if they did not have the intention to do so. Thirdly, even if the services are available from a mobile phone application, some people do not wish to create an account, download and install the application on their devices, and/or give permission to it, which can potentially invade their privacy and security. Lastly, and equally important, digital kiosks are human-centered technologies that can be more appealing to people who seek social interaction. With this, we conclude that digital kiosks cannot replace mobile phone applications. Rather, they are further technologies that enhance the overall self-service.

Keywords: Self-service technologies; digital kiosks; mobile applications; service points; human-machine interface; human-centered technologies.

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Assessment of ^{222}Rn Activity in Bottled Water from Baghdad and Its Radiological Impact

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This study investigates the radiological impact of 222Rn activity concentrations in bottled drinking water sourced from local markets in Baghdad, Iraq. Utilizing the Solid-State Nuclear Track Detector (SSNTD) technique with CR-39 detectors, 222Rn activity concentrations were measured in 25 bottled water samples. Concentrations ranged from 1.5 to 11.12 Bq/L, with an average value of 4.58 Bq/L. To assess the potential health risks, the Annual Effective Dose (AED) due to 222Rn ingestion was calculated. The potential radiation doses ranged from 3.21 × 10−6 Sv/y for infants to 1.17 × 10−5 Sv/y for adults. These values are significantly lower than the established dose limit of 0.1 × 10−3 Sv/y, thereby indicating a negligible radiological risk to consumers. The study also explored the correlation between Total Dissolved Solids (TDS) and 222Rn concentrations, finding a direct relationship between higher TDS values and elevated 222Rn levels. The findings of this research contribute to the understanding of natural radionuclide levels in drinking water and their implications for public health

Keywords: bottled drinking water; ^{222}Rn; radiological impact; SSNTD; CR-39

RAiSE23 - 1036

Tomographic Evaluation of The Efficacy of Three Rotary Retreatment Systems for Retreatability of Root Canals Obturated with Two Different Techniques

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The objective of this in vitro study was to compare the efficacy of three different rotary systems, namely D-RaCe, R-Endo, and Edgefile XR, in the removal of root canal obturation materials during non-surgical retreatment procedures. Lower first premolars with straight oval canals were utilized, and microcomputed tomography (micro-CT) was employed as an evaluation method. The study also aimed to investigate the influence of two different initial obturation methods, the single cone and the continuous wave compaction techniques, on the amount of residual material after retreatment. The findings revealed that none of the retreatment systems could completely eliminate the obturation material, corroborating existing studies. However, Edgefile XR outperformed the other systems in terms of reduced residual material. The continuous wave compaction method for initial obturation resulted in fewer remnants compared to the single cone technique. This contradicts prior research suggesting that the two methods offer comparable sealing abilities. The study underscores the advantages of using micro-CT for evaluation, as it provides a more accurate three-dimensional assessment of the residual materials in the canals. Despite its limitations, such as the focus on straight canals and the in vitro setting, the study provides crucial insights for clinicians. It suggests that the choice of rotary system and initial obturation method can significantly impact the success of root canal retreatment procedures.

Keywords: Root Canal Retreatment; D-RaCe; R-Endo; Edgefile XR; Microcomputed Tomography; Continuous Wave Compaction; Single Cone Technique; Residual Material

RAiSE23 - 1070

Characterization and Hazard Evaluation of Biomedical Waste Bottom Ash Generated During Covid-19 Pandemic

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Biomedical waste is considered as a hazardous waste since it contains a number of pathological and infectious waste. The disposal of this waste is critical as it has the potential to contaminate the environment and cause the spread of infectious diseases. One of the most accepted methods to dispose off biomedical waste is via incineration. However, disposal of the ashes resulting from incineration process could result in pollution to the environment. In this study, the biomedical waste incinerated ash collected from the state of Karnataka in India, during the COVID-19 wave, was characterized in detail. Physical properties of the bottom ash were evaluated, such as specific surface area using BET analysis, loss of ignition, specific gravity. The chemical constituents of the ash were determined by digestion using the tri-acid method and evaluated using ICP-OES instrument. Morphological characteristics were analysed using SEM, XRF and XRD techniques. Leaching evaluation was performed using TCLP-1311 procedure. The results indicate that the ash is highly alkaline and contains certain heavy metals such as Cr, Cd, Pb, Zn, Li, Hg, Co, Ag, Al, Ni, and Mn. The major compounds in the ash consisted of calcite, lime, and halite. Furthermore, the ash was leached using milli-Q water in order to simulate leaching conditions in the landfill site. Heavy metals above the W.H.O. drinking water standards were detected in this leachate indicating that there is a potential for groundwater contamination as well.

Keywords: COVID-19; Biomedical waste; Incineration; Ash; Heavy metals; Groundwater contamination

RAiSE23 - 1071

Versatile PVC-DDM Polymer: A Dual-Action Defense Against Gram-Positive and Gram-Negative Bacteria

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Microbial difficulties include a wide range of problems that arise from interactions between microorganisms and their habitats. Infectious diseases, antibiotic resistance, microbial pollution in food and water, and the impact of microbial populations on ecosystem health are among the concerns addressed. Understanding and dealing with microbial problems is critical for protecting human health, supporting sustainable agriculture, and maintaining the balance of nature. The synthesis of polyvinyl chloride (PVC) based antimicrobial polymer was investigated in this study which has the potential to inhibit the growth of bacteria. The polymer was synthesized by reacting PVC with 4,4-diamminodiphenylmethane (DDM). The synthesized pol-ymer was characterized using FTIR and NMR spectral studies. The thermal property was studied using thermo-gravimetric analysis (TGA). The resulting polymer exhibited excellent antimicrobial activity against Gram-positive (Staphylococcus aureus) and Gram-negative (Escherichia coli) bacteria. The antimicrobial efficacy of the polymer was evaluated through the spread plate method. The synthesized PVC-DDM polymer holds great promise for applications in biomedical fields, paints, water purification systems, and other areas requiring effective antimicrobial properties. Further studies are warranted to explore its potential for broader applications and to optimize its performance.

Keywords: Polyvinyl chloride (PVC); 4,4-diamminodiphenylmethane (DDM); polymer; antibacterial activity; coatings; paints.

RAiSE23 - 1072

Modern Communication Methods in Higher Education: A Post-COVID-19 Analysis

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During COVID-19, The traditional educational landscape witnessed the rapid and unprecedented adoption of modern communication methods to facilitate remote Learning and academic interactions. Various online education platforms have enriched content deliveries, paved the way for learners across the globe, and enriched the learning environment for learners and facilitators who design, deliver, and try their best to make it exciting and engaging. Apart from this, even the traditional mode of education encourages the use of blended and hybrid Learning so that the deliverables are improved, and advancement in the usage of hybrid, innovative smart classes is encouraged by higher educational institutions. This study delves into the paradigm shift in higher education brought about by the COVID-19 pandemic, explicitly focusing on the transformation of communication methods. It also focuses on various effective communication methods (online and physical classes) higher education institutions adopt. This study has considered secondary data and argued on online learning skills, classroom learning/flipped classroom method, problem-based Learning, cooperative Learning, assessment evaluation techniques, four quadrant approach, and outcome-based teaching-learning pedagogy for all higher education programs. Furthermore, the research considers the long-term impact of these modern communication methods on the future of higher education. It explores whether adopting these technologies will persist or evolve as institutions transition back to in-person learning and whether a blended approach to education will emerge. In conclusion, this research provides a timely assessment of the transformation of communication methods in higher education post-COVID-19, shedding light on the opportunities, challenges, and potential pathways for the sustainable integration of modern communication methods in the academic realm.

Keywords: Teaching-learning Methods; Online learning; Communication Methods, Higher Education, 4'Quadrant approach.

RAiSE23 - 1073

Exploring Dynamic Enhancements in MHD Heat Transfer with Second Order Slip Model in Radiative Fluid Flow through Porous Media along a Stretching Cylinder

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This study delves into the complex dynamics of magnetohydrodynamic (MHD) flow within a porous medium while taking into account the impact of thermal radiation. The primary focus of the investigation centers around a cylinder that is vertically elongating, serving as a means to characterize the behavior of a viscous, incompressible fluid. Notably, the analysis introduces an added layer of intricacy by incorporating both second-order momentum slip and first-order thermal slip boundary conditions.By applying well-suited similarity variables, the governing equations encompassing continuity, momentum, and energy are transformed into a set of non-linear ordinary differential equations. The method employed to effectively handle these equations is the finite element method, known for its robustness in numerical approaches. This approach facilitates the exploration of detailed insights into the distribution of velocity and temperature, consequently revealing nuanced patterns and prevailing trends.A thorough examination of diverse physical parameters offers a comprehensive understanding of their respective influences, thus providing a holistic perspective on their roles within the system. The research goes on to present explicit formulations for critical parameters, including the skin-friction coefficient, Nusselt number, fluid velocity, and temperature surrounding the cylinder. These formulations are visually elucidated through informative graphical depictions.Beyond its theoretical contributions, this research carries tangible practical significance across domains such as thermal engineering, fluid dynamics, and energy systems. Its insights have the potential to impact the optimization and design of real-world processes and systems, underscoring its relevance to technological advancements in these fields.

Keywords: Stretching Cylinder; Radiation; Momentum slip; Thermal slip; Porous medium; Finite element method

RAiSE23 - 1074

State-of-the-Art: Improvisation in Spinal Surgery Using AR (Augmented reality), MR (Mixed Reality) and VR (Virtual Reality)

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The day-by-day extended reality and its subset, technologies are growing with effective hardware's, which increases its utilization in various sectors like education, training, sports and healthcare. Healthcare is one the domain of concern. Considering the same, the main focus of the paper is on spine surgery. In orthopaedic surgery, the main use of virtual reality (VR) is for education, pre-operative planning and intraoperative use. Yet the training to be imparted still lags behind. Orthopaedics training committees in North America and Europe have endorsed the use of virtual reality for educational purposes. Spine surgery is one the main focus wherein virtual reality (VR) is applied. In the past, open techniques and instruments that could be seen in real time were used to perform spine surgery. Significant advancements in minimally invasive spine surgery (MIS) have been made in the spine. Virtual reality (VR) has been used in preoperative contexts for spine surgery. VR and Mixed Reality (MR) are used largely for education and training, whereas Augmented Reality (AR) is used in surgical situations. Here in the paper, AR, VR and MR utilization is explored for spinal surgery. There are many procedures in spinal treatment like Pedicle screw placement, cervical spine, and Deformity where the AR concept can increase the efficacy of the treatment while providing accurate and augmented information on demand to surgeons. The aim of the paper is to discuss in detail the ways to assess the clinical utility of AR-VR-enabled spinal surgery technology and propose a business feasibility model for users such as patients, hospitals, research centers, and other parties interested in implementing new technology.

Keywords: Augmented Reality, Virtual Reality, Mixed Reality, Spinal Surgery, Healthcare.

An Autonomous Robotic Vehicle (ARV) with Integrated Manipulation: Arduino-Based Control Approach

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The integration of autonomous capabilities and robotic manipulation in mobile vehicles has significant interest across various industries. In this paper, we present the development and implementation of an innovative Autonomous Robotic Vehicle (ARV) controlled through Arduino-based mobile applications. The ARV is designed to showcase autonomous navigation, obstacle avoidance, and manipulation functionalities, facilitated by a seamlessly integrated robotic arm. The research methodology entails the careful selection of fundamental hardware components, encompassing the vehicle chassis, motors, sensors, and a versatile robotic arm. Arduino serves as the underlying platform for orchestrating the entire system. The software development process is discussed in detail, elucidating the communication and interaction between the mobile application and the Arduino board. Advanced control algorithms are deployed to enable real-time decision-making for navigation, obstacle detection, and simultaneous coordination of the robotic arm. A series of rigorous experimental tests were conducted to assess the ARV's performance in diverse scenarios, encompassing both indoor and outdoor environments. The results demonstrate the robustness and efficacy of the ARV in autonomous navigation, precise obstacle avoidance, and successful object manipulation using the integrated robotic arm. This research represents a significant advancement in the field of autonomous robotics, showcasing an innovative application of Arduino apps in controlling an autonomous robotic vehicle with manipulation capabilities. The demonstrated potential of the ARV holds promising implications across multiple industries, such as manufacturing, logistics, and search-and-rescue operations. Additionally, the incorporation of Arduino apps presents a scalable and cost-effective solution for implementing autonomous functionalities in mobile robotic systems. The findings from this study lay the foundation for future advancements and applications in the domain of autonomous robotics.

Keywords: Arduino-based mobile applications, fundamental hardware components, Advanced control algorithms

RAiSE23 - 1076

Novel Spectrophotometric Assay for Amlodipine in Pure and Dosage Forms

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A rapid, simple, and sensitive spectrophotometric method has been developed for the assay of Amlodipine (MLD). The method is based on the oxidation of the amine group in MLD by a KBr and $KBrO_3$ oxidizing agent. This oxidized compound subsequently reacts with Congo red reagent to produce a purple-colored solution. The absorption peak occurs at a wavelength of 579 nm, with a linear concentration range of 5–300 µg of MLD per 10 ml (0.5–30 µg/ml). The molar absorptivity and Sandell sensitivity values were calculated to be 1.926×10^4 L/mol.cm and 0.0212 µg/cm2, respectively. The limits of detection and quantification were 0.557 and 1.485 µg.ml−1, respectively. The method has been successfully validated and applied to the quantification of MLD in commercial dosage forms.

Keywords: Amlodipine, KBr, KBrO3, Spectrophotometry, Oxidative Reaction, Coupling Reaction, Congo Red

RAiSE23 - 1077

Unleashing the Potential of Technology-Driven Learning Management Systems for Student-Centric Excellence to Empower Higher Education

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After the COVID-19 pandemic, most institutions have adopted an online information management system, also called a "learning management system." This learning management system is an effective tool for students in learning innovative and academic courses, as per their choice of timings through self-learning material, e-tutorials and participating in online sessions, participating in assessment processes, and submitting assignments and quizzes. Not only this, but they can also clarify their doubts through the synchronous and asynchronous modes of discussion boards. The learning management system tool has been adopted in all academia after post-Covid, and now certificates, diplomas, graduation, and post-graduation programs are also being run through online platforms where working professionals can learn and improve their knowledge and skills as per their choice on weekends. It has helped the learners in their professional upliftment and other career endeavors. It has been markedly seen that all prime universities tried and adopted the online information system, viz. flipped classrooms, availability of online e-learning content via Learning management, recorded classes, library records, academic management system for students' performance records, and registration system. It has become possible due to the major adoption of information technology, communicating, and bonding for all stakeholders via online and internet resources. This comprehensive review aims to identify the successful academic tools that top universities use to popularize the online education. This study will discuss online learning skills, e-flipped classrooms for online systems, e-problem-based learning, assessment evaluation techniques, and outcome-based teaching and learning pedagogy used in online learning systems for effective learning for learners.

Keywords: COVID-19, Teaching-learning; Online; Outcome based; Communication skills

RAiSE23 - 1078

Study of Spectral Properties and Biological Activity of Binuclear Mixed Metal Bridged Thiocyanate Complexes Containing Schiff Base Based on Isatin

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Two new Schiff base ligands were prepared from condensation of isatin with primary amines. These Schiff bases were characterized by IR , uv. Visible ,mass spectra and elemental analysis . These ligands were treated with tetrathiocyanate with molar ratio 1:1 to afford binuclear mixed metal monomeric bridged complexes of the type LM Cd SCN)4 where M = Co(II) or Ni(II) .These complexes were identified by different spectral techniques and magnetic susceptibility . The results indicated that all complexes have a coordination number equal four and non electrolytic , also cobalt complexes were paramagnetic while nickel complexes were diamagnetic .Moreover , antifungal and antibacterial activity of the Schiff base ligands and their complexes were studied against some microorganisms and compared with standard compounds. It was found that the prepared compounds had a good antimicrobial activity.

Keywords: Isatin, Bridged Thiocyanate, Spectral, Schiff base, Binuclear complexes, Biological.

Spectrum Inversion Method for Fiber Mitigation Losses

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In the fields of optical fiber communications and medical applications, optical fiber systems are regarded as crucial systems with a wide range of applications. As a consequence of this, when the signal propagate through the optical fiber's core, there are power losses in the signal's transmission and nonlinear phase change during refractive index variation. In this paper, a hybrid optical method was introduce based on spectrum inversion due to optical phase conjugation plus fiber dispersion compensator , to reduce the overall fiber losses and improve system performance. the obtained results using this method can enhanced the system performance compared to other traditional methods. Using hybrid compensator the Q-Factor becomes 20 at laser power 5 mw while Q-Factor for the same system 5 for the same laser power.

Keywords: fiber nonlinearities, cross phase modulation, optical phase conjugation

RAiSE23 - 1080

Selecting a Suitable Flat in a High-Rise Apartment by Evaluation of Heat, Light, and Ventilation

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In scientific literature, the impacts of heat, light, and ventilation on indoor settings have been extensively studied. It shows how important it is to consider a building's HLV characteristics in the context of its surroundings. These elements have a direct impact on a building's comfort level, energy effectiveness, and general sustainability. Many studies have investigated the effects of heat, light, and ventilation individually, rather than in combination with each other. This is because these factors have complex and dynamic interactions with each other, making it challenging to study them comprehensively. However, not many studies in this area have been made considering Indian geographical conditions. It can be challenging for a customer to find an apartment in a high rise building that meets their needs. Thus, using DesignBuilder tools at four different locations in India, a simulation was made and an analysis on the effects of HLV was performed for a symmetrical 10-storey building with adjacent buildings. An in-depth discussion of the air change rate of the building, daylighting performance in relation to different floors, and the difference between the indoor and outdoor temperatures of the building has been performed in this study. The criteria for choosing an apartment in a high rise building in accordance with the client's requirements have also been derived from these results. Analysis on the effect of heat shows that the higher-density and taller surrounding buildings have a more pronounced effect on reducing the temperature difference. In the analysis of light, the height and distance of the surrounding buildings play a significant role in casting shadows on the main building. Ventilation analysis showed that higher floors have better ventilation compared to the lower floors and an increase in distance of the surrounding building increases the air change rate. The energy consumption analysis highlights that when the main building is surrounded by multiple buildings, energy consumption tends to decrease. The results indicate that as the building distance increases, energy consumption increases. Similar patterns are shown in all of the locations which were simulated, but the energy consumption load depends on the climatic condition of each location. Ahmedabad has the highest energy consumption load followed by Delhi, Guwahati, and Bangalore, irrespective of the distance and height of the surrounding buildings from the main building. Based on these findings, the guidelines were drawn for the selection of a suitable flat based on the requirement of the customer.

Keywords: HLV analysis; surrounding building; high rise building; energy analysis

RAiSE23 - 1081

Multiwalled carbon nanotube/Polyaniline Supercapacitors: Impact of bentonite clay liquid crystals

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A supercapacitor is a form of energy storage technology that can store and supply high power electricity quickly and for a significant number of cycles. The performance of a supercapacitor is significantly influenced by the materials chosen for the electrodes and electrolyte. The usage of liquid crystals has been found to considerably increase the supercapacitor's efficiency. In this study, the electrochemically co-deposited and template directed composite electrodes-based supercapacitors were compared. The materials used for composite electrodes were multiwalled carbon nanotubes and polyaniline. The lyotropic liquid crystalline properties of naturally occurring bentonite clay in Na 2 SO 4 solvent were used to enhance the performance of the supercapacitors. X Ray Diffraction (XRD), Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM) were used to characterize the structural properties of electrodes. Using a polarised optical microscope (POM), the critical micelle concentration of bentonite clay in Na 2 SO 4 is determined to attain the lyotropic liquid crystal of bentonite clay. In this study, we have demonstrated that, at a critical micelle concentration of 0.055 g/cm 3 in 0.2 N Na 2 SO 4 solvent, a naturally occurring bentonite clay composite exhibits evident nematic liquid crystalline properties. The techniques employed for electrochemical characterization of supercapacitors included Cyclic Voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS), and Galvanostatic Charge/Discharge (GCD) cycling. In the presence of bentonite clay liquid crystal, electrochemically co -deposited composite electrode supercapacitors produced the highest capacitance of 730 F/g and power density of 5000 W/Kg, while template directed composite electrode supercapacitors produced the highest capacitance of 690 F/g and power density of 5000 W/Kg. Because bentonite clay liquid crystal was present, the Nyquist plot obtained due to electrochemical impedance studies revealed a lower charge transfer resistance of 1.8 Ω and 2.5 Ω for electrochemically co-deposited and template directed composite electrode based supercapacitor. The electrorheological impact of the bentonite clay lyotropic liquid crystal also caused a suppression in the supercapacitor's self discharge. The galvanostatic charge discharge cycling study demonstrated that the cycling stability with the capacitance retention of 80-85% was found in all the supercapacitors. Lyotropic liquid crystal and a composite electrode that was electrochemically co-deposited were found to be the best materials for supercapacitors.

Keywords: Supercapacitor; Multiwalled carbon nanotube; polyaniline; Bentonite clay; Liquid crystal

RAiSE23 - 1091

Classification of Knee X-ray Images & Severity Grading of Knee Osteoarthritis

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Knee osteoarthritis (OA) is most common musculoskeletal, degenerative chronic disease in the world. Radiologists depend on the knee x-ray images in order to grade knee osteoarthritis severity based on Kellgren-Lawrence Grading on a scale of [0-4]. With the implementation of the Convolutional Neural Network (CNN), the model is built and trained using the Osteoarthritis Initiative (OAI) dataset, which is in the form of X-ray images from 4,214 subjects. Deep Learning methods are used to predict the knee OA severity using the techniques such as Feature Learning, Batch Normalization and the model is evaluated based on the Precision, f1-score and Recall and accuracy and loss curves.

Keywords: knee Osteoarthritis; Convolutional Neural Network (CNN); KL grades; Classification; Confusion Matrix.

RAiSE23 - 1092

Effect of Violet Laser Irradiation on the Optical Properties of Polyvinyl Alcohol/Methyl Orange Composite Thick Films: As a Model for Medical Applications

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The study investigates the impact of violet laser irradiation on the optical properties of thick films composed of Polyvinyl alcohol (PVA), Methyl Orange (MO), and their composite (PVA/MO). Aimed at exploring potential medical applications, the films were synthesized through a casting process involving the dissolution of PVA and MO in distilled water. The optical properties, including absorbance spectra, energy gaps, and various optical constants, were meticulously measured before and after exposure to laser irradiation. The results revealed a notable decrease in absorbance spectra and optical constants, alongside an increase in energy gaps, suggesting a structural modification induced by the laser treatment. These findings hold significance for the advancement of materials with customized optical features, potentially serving as a model for future developments in optoelectronic and photovoltaic devices. The research outcomes provide a foundation for the exploration of polymers and dyes in medical applications, particularly in the realm of non-invasive surgical procedures and simulations.

Keywords: Polyvinyl alcohol; Methyl Orange; Laser Irradiation; Optical Properties; Photovoltaic Applications; Medical Applications

RAiSE23 - 1095

Non-linear Optical Properties for Thin Films of Fluorescein Organic Laser Dyes Doped with PVA Polymer and Al2O3 Nanoparticles

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This article presents a comprehensive study on the optical properties of Fluorescein dye doped with PVA polymer and Al2O3 nanoparticles. The investigation covers the material's absorbance behavior, surface morphology, and non-linear optical characteristics. Through the use of UV-VIS spectrometry and AFM, the study demonstrates how doping affects the dye's absorption spectrum and grain size on the surface. The application of the Z-scan technique further allows for the measurement of the non-linear refractive index and absorption coefficient, revealing self-defocusing lensing and distinguishing the absorption phenomena in both solutions and thin films. The results underscore the potential of Fluorescein-based materials in the development of advanced optical devices, offering valuable insights for future research in material science and photonics.

Keywords: Fluorescein dye; PVA polymer; Al2O3 nanoparticles; UV-VIS spectrometry; AFM; Z-scan technique; non-linear optical properties; two-photon absorption; saturable absorption; optical devices.

RAiSE23 - 1099

Machine Learning-Based Weld Classification for Quality Monitoring

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The welding industry plays a fundamental role in manufacturing. Ensuring the weld quality is critical when safety, reliability, performance and the associated cost are taken into account. Tungsten Inert Gas (TIG) weld quality assessment can be a laborious and time-consuming process. Current state of the art is quite simple, with a person continuously monitoring the procedure. However, this approach has some limitations. Operator decisions can be subjective, and fatigue can affect their observations, leading to inaccuracies in the assessment. In this research project, a deep learning approach is proposed to classify weld defects using convolutional neural networks (CNN) to automate the process. The dataset used for this project is sourced from Kaggle, provided by Bacioiu et al. The proposed CNNbased approach aims to accurately classify the weld defects using the image data. The study trains model on the welding dataset, using five convolutional layers followed by five pooling layers, and finally three fully-connected layers. Softmax activation function is employed in the output layer to categorize the input into the six weld categories. The per-class metrics such as precision, recall and F1-score suggest that the model is dependable and accurate.

Keywords: Automation, CNN, Deep Learning, TIG, Weld Classification

RAiSE23 - 1101

Material Validation of Aluminium Cast Product

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Automotive safety encompasses various measures, including seat belts, airbags, and advanced driver assistance systems, to minimize the risk of accidents and protect vehicle occupants. Seat belts play a crucial role in restraining occupants during collisions, reducing the likelihood of serious injuries. The effective usage of seat belts improves automotive safety by lowering the chance of harm during collisions. A part of a vehicle's seat belt system is commonly referred to as a "retractor spindle" by using the term. The seat belt webbing's movement and tension are managed by the seat belt retractor spindle. The selection of spindle material is crucial for seat belt retraction and extraction, with aluminium alloy favoured due to its lightweight and high strength, ensuring efficient and reliable performance in automotive safety systems. In this regard an attempt has been made to create a simulation material model for $AlSi_9Cu_3$ which intern leads to spindle break load simulation. For a specimen and a spindle made of the same material, experimental and finite element analysis are conducted. In the beginning, specimen level tests are carried out, and behaviour is studied using the damage model and material model. MAT_ADD_EROSION is a damage model and MAT_PLASTICITY_COMPRESSION_TENSION is material model in LS-Dyna. The obtained ultimate strain value is used create the material card. Spindle analysis is done with the same control cards and material cards. From the observation we concluded that the proposed simulation material model for $AlSi_9Cu_3$ predicts spindle breaking load and failure modes to acceptable levels after conducting the experimental test and finite element analysis on spindle.

Keywords: Aluminium alloy, uniaxial tension, shear, bending, compression.

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