

About the Book:

Science, Engineering and Technology cross nearly every facet of modern life and, as problem solvers, engineers are perfectly capable of managing technical activities, mastering innovative ways of science and engineering field, when they spend time and efforts understanding and acting in the field. Scientific and technological innovation, as strategic support to improve social productivity and overall national strength, must be placed at the center for development of any country.

The framework includes engineering and technology as they relate to applications of science. Engineering is used to mean engagement in a systematic design practice to achieve solutions to particular human problems. Technology is used to include all types of human-made systems and processes.

The edited book is a collection of peer-reviewed scientific papers submitted by active researchers in the International Conference on Science, Engineering & Technological Innovation. This book can be helpful to understand the various concepts of Science and Technological Innovation to the researchers and academia.

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International Conference on Science, Engineering & Technological Innovations - 2024



International Conference on Science, Engineering & Technological Innovations

Date: 18 – 19 October, 2024

Conference Proceedings



Edited by

**Dr. Jessica C.
Dr.(hc) Rania Lampou
Dr. C. M. Patel**

Jointly organized by :

International Scientific Research Association
Eurasian Research Organization
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Editors

Dr. Jessica C.

Dr.(hc) Rania Lampou

Dr. C. M. Patel



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- Edited by: Dr. Jessica C., Dr.(hc) Rania Lampou, Dr. C. M. Patel

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Objective of the International Conference:

- Our main objective is to promote scientific and educational activities towards the advancement of common citizens’ life by improving the theory and practice of various disciplines of science and engineering.
- To meet and discuss the practical solutions, scientific results and methods in solving various problems with people who are actively involved in emerging research fields.
- To organize lectures by scientists and experts and to disseminate their ideas and concepts among the science and technology community.
- Provide the delegates to share their new ideas and the application experiences face to face.
- The aim of the conference is to provide platform to students, scholars, academicians and industry persons to converse and share the ideas.

About the Conference :

International Conference on Science, Engineering & Technological Innovations (ICSETI-2024) conducted on 18 – 19 October, 2024. It aims at bringing together students, scholars, researchers, academicians and industry persons to deliberate on contemporary issues concern to Science, Engineering and Technology research and applications.

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About the Special Issue / Conference Book:

Science, Engineering and Technology cross nearly every facet of modern life and, as problem solvers, engineers are perfectly capable of managing technical activities, mastering innovative ways of science and engineering field, when they spend time and efforts understanding and acting in the field. Scientific and technological innovation, as strategic support to improve social productivity and overall national strength, must be placed at the center for development of any country.

The framework includes engineering and technology as they relate to applications of science. Engineering is used to mean engagement in a systematic design practice to achieve solutions to particular human problems. Technology is used to include all types of human-made systems and processes.

The special issue / conference proceedings / edited book is a collection of peer-reviewed scientific papers submitted by active researchers in the International Conference on Science, Engineering & Technological Innovation. This book can be helpful to understand the various concepts of Science and Technological Innovation to the researchers and academia.

Dr. Jessica C.

Founder President, International Scientific Research Association.

Email : scientificresearchassociation@gmail.com



Message

Dear Colleagues !

I am grateful to co-organizing institutions, all the speakers, committee members and presenters of 'International Conference on Science, Engineering & Technological Innovations' (ICSETI-2024) The overwhelming response to the contributors were acknowledged in very positive manner and its shows that new age is very much eager to work with technical literature. The rising researcher and scholar from various institutions and in-house participants motivate us to improve ourselves.

We are currently in the era of science and engineering revolution, spearheaded by recent developments in engineering, technology and sciences, providing sustainable solutions to various issues.

Here I am delighted that the series of conference on contemporary issues in computer technology has successfully completed its three folds and entered into fourth one, it's all due to the valuable efforts of faculty members of computer science and engineering department.

I extend my best wishes for the editorial team of the special issue, at last I hope this technological literature interaction will be a source of inspiration to upcoming educationists, technocrats and stakeholders.

Jessica

ICSETI - 2024 Conference Chair
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Dr(hc) Rania Lampou
President, Eurasian Research Organization
Email : info@eurasianresearch.org

MESSAGE

Dear Colleagues !

I am glad to be the part of Organizational Committee of “International Conference on Science, Engineering & Technological Innovations’ (ICSETI-2024)”, jointly organized by ‘International Scientific Research Association’ and Eurasian Research Organization, in collaboration with ‘Research Culture Society’ (18 – 19 October, 2024).

We have an exciting program at the conference that will allow participants a good platform to present their research work, extend networks, and future research directions. I hope that all participants will have a productive approach at this online conference.

I sincerely hope that this conference will deliberate and discuss all the different facets of this exciting topic and come up with recommendations that will lead to a better world.

I wish the conference great success.

A blue handwritten signature of Dr(hc) Rania Lampou.

Dr(hc) Rania Lampou
President, Eurasian Research Organization,

Dr.C. M. Patel



Director, RESEARCH CULTURE SOCIETY

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Message

Dear Professional Colleagues,

It is gratifying to note that 'International Scientific Research Association'; Eurasian Research Organization and ISRA in collaboration with 'Research Culture Society' (Government Registered Scientific Research organization) are organizing - 'Eurasian Conference on Science, Engineering & Technological Innovations' during 18 – 19 October, 2024.

The aim of the conference is to provide an interaction stage to researchers, practitioners from academia and industries. The main objective is to promote scientific and educational activities towards the advancement of common citizen's life by improving the theory and practice of various disciplines of science and engineering. Provide the delegates to share their new research ideas and the application experiences face to face.

I believe, this International Conference will help in redefining the strong connection between students and academicians from different institutions. An additional goal of this international conference is to combine interests and scientific research related to General Science, Physical Science, Applied Sciences, Engineering and Technology Development to interact with members within and outside their own disciplines and to bring people closer for the benefit of the scientific community worldwide.

My best wishes to the committee members, speakers and participants of this scientific conference ICSETI-2024.



Dr.C. M. Patel
Director, Research Culture Society.

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Dr. Jessica C., Founder President, Scientific Research Association.

Dr.(hc).Rania Lampou, STEM instructor and an ICT teacher trainer, at the Greek Ministry of Education, at the Directorate of Educational Technology and Innovation, Greece. & President, Eurasian Research Organization, E.U.

Keynote Speakers :

Dr. Daria Suprun, Professor, Department of Social Work and Rehabilitation, National University of Life Science and Environmental Sciences of Ukraine, Kyiv, Ukraine.

Dr.(hc).Rania Lampou, STEM instructor and an ICT teacher trainer, at the Greek Ministry of Education, at the Directorate of Educational Technology and Innovation, Greece. & President, Eurasian Research Organization, E.U.

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Analyzing research on biological Trace Elements: A scientometric and citation perspective

¹ Anandraj K.C , ² Dr. S Aravind

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Abstract: *Abstract: This scientometric study examines biological trace element research trends, citation impact, and collaborations from 2003 to 2023 using Web of Science data, analyzing 5,582 records. Data were meticulously organized in spreadsheets for accuracy, and HistCite software provided comprehensive citation insights. Out of 5,582 publications, 4,928 specifically focus on biological trace elements. The distribution of research outputs spans 114 distinct domains across 1,504 journals worldwide, accumulating a total citation count of 182,968. Zinc, copper, and iron are prominent elements studied, with Environmental Sciences and Ecology, Chemistry, and Biochemistry & Molecular Biology leading in impact. Collaboration is strong, reflected in multi-authored publications and high citation counts with 28,390 authors. Key authors and journals include Hu B, Becker JS, and Chen BB, Biological Trace Element Research, Journal of Analytical Atomic Spectrometry, and Environmental Science and Pollution Research. This analysis underscores extensive global collaboration among 5,583 institutions and 3,895 institutional departments. Leading institutions such as Centre National De La Recherche Scientifique(France), Chinese Academy of Sciences(China), and Helmholtz Association illustrate(Germany) global research collaboration. Top collaborative departments identified include The University of 'Sindh National Centre of Excellence in Analytical Chemistry', 'The University of Oxford Mathematical', and Physical and Life Sciences Division', The analysis covers 132 countries, highlighting significant contributions from China with 1007 publications (PEI: 2.46, AI: Very High), the USA with 955 publications (Perfromance Evaluation Index: 4.69, Activioty Index: Very High), France with 474 publications (PEI: 1.85, AI: High). This study underscores the dynamic landscape of biological trace element research, crucial for advancing human health, nutrition, and environmental sustainability through targeted research and collaboration.*

Keywords: *Biological trace elements, Trace minerals, Micro nutrients, Scientometrics, Citation analysis*

Could the ‘green gold’ be the future of sustainable bioplastics?

Naphibaniarlin Kshiar

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Abstract: *Bioplastics are increasingly recognized as a sustainable alternative to conventional petroleum-based plastics, owing to their environmental benefits and favorable mechanical properties. Bamboo, a rapidly growing and renewable resource, provides a biodegradable solution that mitigates the ecological impact of plastic waste. The high cellulose content in bamboo is crucial for bioplastic production, imparting the material with essential strength and flexibility. In contrast to traditional plastics, which can persist in the environment for centuries, bamboo-based bioplastics degrade more rapidly in natural settings, thereby reducing waste accumulation in both terrestrial and aquatic ecosystems. Moreover, the production of bamboo bioplastics generally consumes less energy and results in lower greenhouse gas emissions, enhancing their environmental profile. Bamboo cultivation itself is highly sustainable, as it requires minimal water, no pesticides, and can thrive on marginal lands unsuitable for other crops. This contributes to the environmental viability of bamboo bioplastics and supports rural economies while promoting biodiversity. Additionally, bamboo bioplastics can offer a solution to microplastic pollution, as they are engineered to break down into non-toxic organic compounds rather than persistent plastic particles.*

Key Words: *Bioplastics, Bamboo-bioplastics, Microplastic pollution, Plastic waste, Environmental sustainability.*

Nutritional Status and Prevalence of Anemia among Adolescent in Aizawl, Mizoram

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Abstract :

Background : Adolescence is a critical period of growth and development, characterized by increased nutritional needs. However, malnutrition and anaemia are prevalent among adolescents worldwide, significantly impacting their health, academic performance and overall well-being. However, nutritional supplements and nutrition education is required to reduce anemia. The study was carried out to find out the prevalence of anemia among adolescents in Aizawl, Mizoram. **Materials and Methods :** The study was conducted among 620 students between 15-19 years of age from different higher secondary schools in Aizawl, after getting informed consent from the schools. Questionnaire pertaining to assess the information regarding sociodemographic status, height, weight, BMI, haemoglobin and 24 hour dietary recall was designed. **Results and Discussion :** Over all samples, the prevalence of anemia was found to be 41.2%.The majority of the anaemic girls which were 256 in number were having mild degree anemia. BMI for age was referred to calculate BMI range . It was found out that 85% were normal, 11% were overweight, 12% were underweight and 8% were obese. From the 24 hour dietary recall method, the majority of the students did not meet the requirements and the food that they consumed was not high in iron content with very less inclusion of greens. **Conclusion :** The diet consumed by the average adolescent does not meet their daily requirement. Hence, the diet they consumed is not sufficient for an adolescent girls. The results of the study will affect between anemia and socioeconomic status, dietary modification, food diversification and consumption of iron rich foods. Also, inclusion of a greater variety of iron rich foods in daily meals will prevent anemia to a great extent among adolescents. Further study will also be conducted beyond this.

Keywords : Adolescence, anemia, socioeconomic status,BMI,Haemoglobin,24 hour dietary recall method.

Static Refraction Test (A Geophysical Tool) For Thane Creek Portion (Underwater) For 21km Long Undersea Tunnel, Mumbai Ahmedabad High Speed Rail Project, Mumbai

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Abstract: *The static refraction test (SRT) was carried out for 21 km long undersea tunnel of MAHSR project for the first time in India to decipher the subsurface characteristics of the rockmass under water for design.*

This work summarizes the results and interpretations of SRT survey along the proposed alignment with aim to obtain the quantitative overburden material and firmed rock depth and weathered and hard rock interface with its thickness to identify anomalous zones within the rock mass its condition of the proposed tunnel under water.

SRT was carried out on 2 longitudinal lines along the center line of alignment (1.6km), and 8 cross lines of 590m length at 200-300m spacing.

*Based on seismic velocity (V_p) of different layers, engineering properties of rock mass “ Q ” & “ RMR ” have been assessed by using empirical relations of Barton and rock mass strength “ σ_c ” through Linear Regression Equation by **Freyburg, 1972**.*

In addition to Barton’s relationship, Japanese classification standard for Mountain tunnel, 2008 has also been adopted to access the rock mass grade. Q & RMR , rock mass grade and “ σ_c ” are vital inputs, which are used for design of tunnel based on SRT.

*SRT results along the alignment shows top most layer (1.17m to 55.20m with V_p of 1600-2200m/s) sea sediments along with highly to completely weathered rock having followed by bedrock (2m to 40m with V_p of 2800-5100m/s). Lower V_p of 2800-3500m/s indicates strongly weathered and jointed nature of basalt with Q value varies from 0.2 to 1.0 and RMR of 40 to 50, categorized as **very poor** with rock mass grade “ I_N ”.*

*At tunnel grade, V_p of 3300-4200m/s interpreted as slightly weathered to fresh less jointed basalt, moderately strong to strong with Q value varies from 0.63 to 5.01 and RMR 47 to 51 categorized as very poor to fair. Rock mass strength (σ_c) varies from 84MPa to 115.5MPa categorized as **very poor to fair** with rock mass grade “ II_N to III_N ”.*

*V_p of the order of 4600-5100m/s interpreted as fresh basalt, strong with Q value of 12.59 to 39.81 and RMR 67 to 74. Rock mass strength (σ_c) varies from 129.5MPa to 147MPa categorized as **good** with rock mass grade “ IV_N ”.*

Key Words: Tunnel, SRT, MAHSR, Q , RMR , rock mass, strength, grade.

Polymer Nanocomposite: Self-healing and CO₂ Absorption Potential

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Abstract: *This study examines the synthesis of innovative Polymer Nanocomposites (PNCs) that combine self-healing and Carbon dioxide (CO₂) adsorption properties. By integrating Graphene Oxide (GO) into polymer matrices, we developed nanocomposites that demonstrate improved mechanical strength, self-healing efficiency, and Carbon dioxide (CO₂) capture capabilities. The approach involved using functionalized nanomaterials within polymer matrices to produce composites that are notably resilient to mechanical damage while actively adsorbing Carbon dioxide (CO₂) from the atmosphere. The reversible bond formation chemistry within these composites enables them to regain structural integrity after damage, due to the interactions between the polymer chains and nanofillers. The addition of nanomaterials also enhances both surface area and reactivity. As the search of green energy alternatives intensifies, interest in Graphene Oxide (GO)-modified polymer composites is rising. While fully replacing fossil fuels remains challenging, effective Carbon dioxide (CO₂) capture and mitigation are critical environmental concerns today. Graphene Oxide (GO) and its composites emerge as promising, cost-effective solutions for commercial Carbon dioxide (CO₂) capture. Thus, developing Graphene Oxide (GO) polymer nanocomposites that provide both self-healing and self-cleaning functionalities could transform the field. This paper highlights the potential of these novel GO nanocomposites designed for dual purposes of self-healing and Carbon dioxide (CO₂) capture. The findings suggest that these advanced nanocomposites offer significant promise for sustainable materials engineering, aiding in both self-repair mechanisms and climate change mitigation. Future research will aim to optimize material composition and evaluate long-term performance in practical applications.*

Key Words: *Graphene Oxide (GO), polymer nanocomposite; Self-healing; Carbon dioxide (CO₂) Absorption.*

Latest Technological Trends to Improve Cognitive Load and Motivation in Healthcare

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Abstract: *Healthcare domain is one of the most complex environments to work. It is constantly advancing and evolving. With this speedy change, there is a need for effective strategies to manage cognitive load and improve motivation of healthcare students and professionals. Due to technological advances, there is a huge scope to develop innovative solutions to address these challenges. One of these is the use of Augmented Reality (AR). AR helps in managing the cognitive load by overlaying complex, digital information onto real world. This helps the professionals to visualize data in 3D and immerse themselves in real-time experience to have better understanding to make an informed decision. Such experience reduces mental effort required to access and process complex information and focuses more on patient care than administrative burdens. In Healthcare training and education, AR is proving to be a game changer by providing interactive simulations. Students can engage in real scenarios, and experience clinical skills in a safe environment. This hands-on immersive approach not only improves skills and knowledge retention but also boosts confidence which leads to increased motivation. With such user-friendly tools, the user can navigate complex tasks more efficiently. This will not only improve individual performance but also contribute to better patient outcomes, eventually leading to a more all-rounder and motivated healthcare team to meet the demands of modern medicine. However, a significant gap exists in terms of the implementation and accessibility of AR technologies across diverse settings. Due to lack of sufficient resources, many professionals are still unaware of AR's potential and its integration into daily practice. Thus, as AR integration continues to advance, it is essential to address the existing gaps in AR adoption, training of faculties- students, and resource allocation to fully utilize the potential of AR to improve healthcare education and patient care.*

Key Words: *Augmented Reality, Cognitive Load, Motivation, Healthcare Education, Clinical Training, Technology Integration, Simulation-Based Learning, Immersive Learning.*

Advancements in Radiology Through Radiomics and Computer-Aided Diagnosis: A Comprehensive Review

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Abstract: *Imaging plays a crucial role in assessing various medical conditions, encompassing tasks such as screening, monitoring, detecting, and predicting a range of diseases. However, the effectiveness of radiological images in disease identification heavily depends on the observer's expertise. Imaging modalities like X-ray, ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) are employed individually or in combination, based on the disease type and clinical questions. Despite their utility, a common limitation of these methods is that their analysis is primarily based on visual interpretation. Some features within images may escape detection by the human eye, while quantitative analysis of regions of interest (ROI), such as Hounsfield units (HU) in CT or standardized uptake values (SUV) in PET, can provide average parameter values. However, these methods often fail to comprehensively describe the spatial distribution of features within the images. To overcome these limitations, significant research is focusing on developing computer-aided diagnosis (CAD) systems that assist in quantitative analysis, aiming to reduce observer-dependent variability. These systems aid radiologists by interpreting data from medical images, ensuring greater diagnostic consistency. Radiomics, a vital field intersecting image editing, pattern recognition, artificial intelligence, and medical imaging, has emerged as a key tool for improving CAD systems. Computer-Aided Diagnosis (CAD) systems build upon this foundation, following a structured process that includes image preprocessing, feature extraction, feature selection, and classification. These stages employ advanced image processing techniques alongside machine learning models such as support vector machines (SVM) and random forests (RF), as well as deep learning approaches like convolutional neural networks (CNN). CNNs, in particular, have significantly advanced the field by automating the extraction and analysis of features from medical images, demonstrating remarkable success in disease diagnosis. Transfer learning architectures like GoogLeNet, AlexNet, VGG16, and ResNet have further enhanced performance, achieving over 90% accuracy in classifying hepatocellular carcinoma (HCC) and other pathological conditions. The review highlights that ongoing advancements in imaging technology and radiomic analysis for building CAD models will play a critical role in the future management of diseases.*

Key Words: *Radiology, Radiomic Features, Computer-Aided Diagnosis, Machine Learning, Deep Learning*

A Comprehensive Review of Gaussian Noise in Medical Imaging: Sources, Effects and Mitigation Strategies

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Abstract: *Medical imaging is an important aspect of diagnosis and treatment planning in current healthcare, and its quality and reliability are undeniably valuable. The limitation of Gaussian noise, though, persists as a significant challenge that has the detrimental effect of reducing image quality and, therefore, the validity of interpretations made from them. Drawing from the above discussions, this paper seeks to provide an understanding of Gaussian noise in imaging medicine in light of the observations made in this analysis. It begins with the identification of the primary reasons that cause Gaussian noise: system bounds, patient movement, and electromagnetic interference. After that the paper considers how the Gaussian noise influences the specificity in the technique like ultrasound, CT, and MRI, hence resulting in decrease of image contrast, resolution and diagnostic capability. This paper explores diverse means of mitigating these concerns that ranges from software discrepancies, such as filter noise and machine learning to other hardware solutions and enhanced imaging. It is to this end that it is possible to develop a clear and concise overview of the concept of Gaussian noise in medical imaging through this review in an attempt to expose novel facts and information that boosts the image quality and enhance the accuracy of diagnostic outcomes. The results underscore the need for continuous development and cutting across different disciplines to ensure development of improvement and effective noise elimination strategies that would improve patient care and clinical outcomes.*

Key Words: *Gaussian noise, Medical imaging, Image Quality, Noise reduction methods, Ultrasound*

Deciphering the Perturbation of an Imidazo-Pyrimidine Derivative with Bovine Serum Albumin: A Combined Spectroscopic and Theoretical Study

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Abstract: *The current article delves to decipher the interaction between an imidazo-pyrimidine derivative, named 2-(4-bromophenyl)-4-(4-chlorophenyl) benzo[4,5]imidazo[1,2-a]pyrimidine abbreviated as IPD and the widely studied Bovine Serum Albumin (BSA) using a combination of spectroscopic and theoretical methods. The compound was synthesized following a reported protocol and was characterized using conventional IR and NMR spectroscopic analyses. The structural conformation and the underlying structure-activity correlation of IPD was deciphered through quantum chemical calculations deploying density functional theory using Gaussian 09W software. Through steady state absorption and fluorescence studies conducted in an aqueous buffered medium the binding affinity of IPD with BSA was explored shedding light on the underlying mechanisms. Additionally, assessment of micropolarity surrounding the bare and protein bound IPD and potassium iodide (KI) induced quenching studies offer insights into the dynamic nature of the interaction. Furthermore, we investigate the impact of chaotropic agent urea on the IPD bound protein uncovering potential structural alterations induced by the protein denaturation. The strong binding interaction between IPD and BSA was substantiated through the various experimental observations and was corroborated via theoretical in-silico molecular docking studies. Our findings contribute to a deeper understanding of the IPD-BSA interaction, with implications for various biomedical applications.*

Key Words: *pyrimidine, fluorophore, protein, molecular docking, computation, binding.*

Towards Intelligent Elderly Care: A Survey on Human Activity Recognition Technologies

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Abstract: *The increasing demands in several fields have sparked interest in human activity recognition (HAR) in recent years. Applications of HAR include security environments for automatic detection of abnormal activity to alert the appropriate authorities, healthcare systems to monitor activities of daily living (ADL). Globally, there are more than 962 million individuals over the age of 60. As people age, their ability to perform daily duties decreases along with their physical activity, which has an impact on their mental and physical health. Few studies have concentrated on the recognition of human activities in elderly individuals, despite the fact that many researchers employ machine learning and deep learning techniques to identify human activities. This paper explores the various technologies employed in HAR, including wearable sensors, vision-based systems, environmental sensors, and smartphones, with a focus on elderly people. It also reviews machine learning and deep learning techniques used for activity recognition. Despite the advancements, challenges such as privacy, accuracy, user compliance, and system integration remain, warranting further research to enhance the reliability and scalability of HAR systems for elderly care.*

Key Words: HAR, ADL, machine learning, deep learning.

Characterization Of Ambient Air Quality In Urban Coimbatore

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Abstract: Air pollution is a leading environmental-health challenge facing in the world today and is signified by the presence of substances beyond the natural occurrence limit in the atmospheric air. The WHO's air quality guidelines aim to reduce the global burden of disease caused by air pollution, aligned with the targets set in the sustainable development goals (SDGs). In addition, the relationship between air pollutants and possible health impacts in urban Coimbatore was not yet explored in an environmental health perspective. To address this gap, a study was conducted to examine the air quality in urban Coimbatore to unveil its status and identifying any violations. This study investigates particulate matter in two size fraction ($PM_{2.5}$, PM_{10}) in urban Coimbatore by collecting samples using an ARA-N-FRM portable air sampler.^[1] We have analyzed the $PM_{2.5}$, PM_{10} data for three months of period (September- December, 2023). The monthly trend of changes and their pattern was compared. Three months of data on $PM_{2.5}$ and PM_{10} levels collected from urban Coimbatore have not exceeded the permissible limits of National Ambient Air Quality Standards. However, it was noted that the chemical composition of particulate pollutants could still pose health risks. The study also discussed the observed data, patterns, and permissible limits, and outlined plans for further research.

Key Words: Air pollution, Air Quality, Particulate matter.

Scoping review on pharmacological and non-pharmacological management available for myofascial trigger points

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Abstract: *Individuals from any age or background can be affected by musculoskeletal pain, which is mostly caused by Myofascial Trigger Points (MTrPs). This article aims to provide a comprehensive overview of the available treatments for MTrPs by synthesizing the current literature on this topic. The study explored various management methods, including pharmacological interventions, manual therapies, physiotherapy techniques and other traditional approaches.*

Pharmacological interventions, like anti-inflammatory drugs, trigger point injections with local anaesthetics or botulinum toxin and oral or glucocorticoid injections are evaluated for their short-term and long-term efficacy in pain management or to treat MTrPs. The review emphasizes the importance of considering potential side effects and patient-specific factors in choosing pharmacological treatments.

Physical therapy techniques encompass a broad spectrum of interventions, such as stretching, exercise, manual therapy, electrotherapy, hot or cryogenic therapies and postural correction. Exploring the evidence supporting these approaches and their role in preventing MTrP recurrence.

The effectiveness of trigger point release techniques with dry needling, manual trigger point compression, Deep Friction massages and instrument-assisted soft tissue mobilization have also been evaluated. It highlights the role of skilled practitioners in locating and treating MTrPs to alleviate pain and restore function.

Electrotherapy encompasses various modalities such as Ultrasound, TENS, IFT, Shockwave and Iontophoresis, each utilising distinct mechanisms of action. These therapeutic methods have been evaluated both as standalone treatments and in combination with other modalities, manual therapy, and exercise interventions.

Other complimentary interventions include acupuncture, vacuum therapy, prolotherapy etc., were assessed for their potential benefits in MTrP management.

By addressing the multifaceted nature of MTrPs and the diverse treatment approaches, this review seeks to inform evidence-based clinical decision-making and improve the quality of care for individuals suffering from myofascial pain.

Keywords: *Myofascial Trigger Point; Myofascial Pain Syndrome; Treatment; Musculoskeletal pain, medical management*

Assessment of Water Quality Parameters of Sarayan River Basin, Central Ganga Plain, India

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Abstract: Sarayan River is a groundwater fed meandering river covering Lakhimpur Kheri and Sitapur districts of Uttar Pradesh. Twenty samples (20) were analyzed in order to assess the water quality of the study area. The study of physico-chemical parameters, along with tools like Geographical Information System (GIS) for spatial analysis, helps in assessing the overall condition of surface water in the study area. All analyzed physical and chemical parameters of water samples meet permissible limits except for pH, where one sample exceed the permissible limit. Based on the Water Quality Index (WQI) data for twenty sample stations in the study area, it is seen that the overall water quality of the study area is predominantly excellent, with 15 out of 20 stations falling into excellent category. These stations have WQI values ranging from 21.37 to 46.91. The remaining five stations have water quality classified as good, with WQI values ranging from 41.35 to 61.79. The lowest WQI value of 21.37 is at station RW 3 which indicates the best water quality, while the highest WQI value of 61.79 is at station RW 18 which indicates the poorest quality among the analyzed samples.

Keywords: Sarayan, Water Quality Index, Permissible, Physico-chemical.

Advancing Indigenous and Recycling Technological Innovations for Sustainable, Eco-Friendly Manufacturing.

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Abstract: *Advancing Indigenous and Recycling Technological Innovations for Sustainable, Eco-Friendly Manufacturing.*

In the modern age, technology is perhaps the most important resource to any nation. If technology drives a country's economic development, its management at national and enterprise levels is crucial. It must be strategically planned and developed with sustainability and eco-friendliness in mind. Firms should harness internal forces for green technological growth, identify challenges requiring eco-friendly solutions, and evaluate alternatives. Effective management of technology, focused on sustainability, ensures long-term growth, competitiveness, and environmental responsibility.

We all generate trash daily without giving it much thought, leading to vast amounts of waste driven by consumerism. Today, garbage disposal has become a global crisis, posing a serious threat to sustainability, the environment, and human survival.

This paper presents a comprehensive exploration of the opportunities for the successful development and dissemination of innovative indigenous and recycling technologies for Sustainable and Eco-Friendly Manufacturing. The author, with two patents to his name and decades of hands-on research and practical experience, has made substantial contributions to this field, notably through technology awareness initiatives, skill-building workshops, and outreach via mass media. Rooted in the needs of local communities and the availability of indigenous raw materials, these technologies are tailored to the specific demands of the region. They optimize the use of low- or no-cost resources and meet a range of critical criteria. These include addressing basic rural needs, absorbing a significant labor force, preserving traditional occupations, and requiring minimal skill levels. Moreover, they enable small-scale production, promote energy efficiency, support waste recycling, and remain non-polluting. Importantly, these innovations are deeply integrated with local culture, compatible with existing social structures, and have gained broader recognition. Above all, they embody the core principles of green manufacturing and sustainability, offering an adaptable, community-centered approach to development that aligns with both environmental and socio-economic goals.

Key Words: *Technology, Sustainability, Eco-friendliness, Recycling, Innovation, Green manufacturing.*

CNN-LSTM Hybrid Deep Learning Model for Remaining Useful Life Estimation

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Abstract: Remaining Useful Life (RUL) of a component or a system is defined as the length from the current time to the end of the useful life. Accurate RUL estimation plays a crucial role in Predictive Maintenance applications. Data driven approaches for RUL estimation use sensor data and operational data to estimate RUL. Traditional regression methods, both linear and non-linear, have struggled to achieve high accuracy in this domain. Although Multilayer Perceptron (MLP) has been applied to predict RUL, it cannot learn salient features automatically, because of its network structure. While Convolutional Neural Networks (CNNs) have shown improved accuracy, they often overlook the sequential nature of the data, relying instead on features derived from sliding windows. Since RUL prediction inherently involves multivariate time series analysis, robust sequence learning is essential. In this work, we propose a hybrid approach combining Convolutional Neural Networks with Long Short-Term Memory (LSTM) networks for RUL estimation. Although CNN-based LSTM models have been applied to sequence prediction tasks in financial forecasting, this is the first attempt to adopt this approach for RUL estimation in prognostics. In this approach, CNN is first employed to efficiently extract features from the data, followed by LSTM, which uses these extracted features to predict RUL. This method effectively leverages sensor sequence information, uncovering hidden patterns within the data, even under multiple operating conditions and fault scenarios. For comparative purpose, we also evaluate the performance of various machine learning algorithms including Gradient Boosting, MLP, CNN, LSTM and Random Forest on the NASA CMAPSS dataset, which includes sensor data linked to the RUL of various jet engines. Our results demonstrate that the hybrid CNN-LSTM model achieves the highest accuracy, offering a superior R^2 score compared to the other methods.

Model	RMSE	R2 Score
Linear Regression	43.18	0.46
Random Forest	6.68	0.42
XG Boost	17.35	0.65
Multilayer Perceptron	4.51	0.52
CNN	16.82	0.79
LSTM	15.93	0.75
CNN + LSTM	13.34	0.86

Key Words: Predictive Maintenance, CNN, LSTM, Remaining Useful Life, MLP

Flow Analysis In Restriction Orifice For Various Orifice Ratio And Number Of Stages To Achieve Maximum Pressure Drop Using CFD

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Abstract: Industries such as petroleum refineries, fertilizer production, and thermal power plants often handle high-pressure situations. Just after processing very high pressure drop is required to before releasing it into the surrounding environment. However, this pressure drop should be so gradual so not to cause any damage to structural component of pressure reducing device along with it device should not cause any hindrance in pressure drop. This objective is precisely achieved through the use of restriction orifice. Unfortunately, there are not many design guidelines available for restricting orifice. This study performed using Ansys Fluent software and Computational Fluid Dynamics (CFD) techniques to analyze the effect of different regulated orifice ratios—0.4, 0.5, 0.6, 0.7, and 0.8—on pressure drop. The analysis is conducted for 5 and 6 no of stages, regulating pressure drop from 50 MPa to 70 MPa.

Key Words: CFD, Restriction orifice, Pressure drop, Number of stages, Orifice ratio.

IoT-Based RWS Waste Management System: Transforming Urban Sanitation through Smart Technologies

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Abstract: A waste management system is a technique used by an organization to dispose of, reduce, reuse, and prevent waste. This will help to create a cleaner, safer, more hygienic environment and enhance operational efficiency while reducing management costs, resources, and roadside emissions. The main concern with our environment is waste management, which impacts society in several ways. The detection, monitoring, and management of waste are some of the major problems we are facing nowadays. The traditional way of manually monitoring waste is a cumbersome process that utilizes more human effort, time, and cost, which can be easily avoided with our proposed model. The main objective of our system is to detect, monitor, and manage the waste through the RWS Waste Management System (Recycle, Wet, and Solid Waste Management System), which provides information on how much garbage is collected by the smart dustbin and, whenever the bin is full (Threshold 75%), sends an alert message to the authorities who collect the garbage. The smart dustbin management system is built on a microcontroller-based system that has ultrasonic sensors on the dustbin. It will sense the item to be thrown and open the lid with the help of the servo motor. Also, it checks the level of the dustbin, whether it's full or not. If the maximum is reached, it will send an alert message, and the concerned authority can be sent for the garbage collection. There is a voice assistant for proper garbage disposal, as well as a website where the data can be publicly viewed. This is our solution, a method in which waste management is automated. The NodeMCU module has been used in our system as a microcontroller for connection to the Wi-Fi and for powering and retrieving values from other components, such as the ultrasonic sensor. The ultrasonic sensor is used to measure the amount of garbage present in the dustbin at any point in time. This function is performed by the ultrasonic sensor by measuring time between emission and reception of the ultrasonic waves and then calculating the distance using the speed-distance-time formula. It provides a digital output to the NodeMCU with a 5.5V battery input.

Key Words: Internet of Things , Thingspeak , Waste Management , Smart Cities , Smart Dustbin, Garbage Monitoring

Enhancing recommendation accuracy through meta-level hybrid approaches

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Abstract: Recommendation systems are very important in the rapidly developing field of e-commerce since they improve user experiences and increase revenues. Even if they work well, traditional strategies like content-based and collaborative filtering have drawbacks including data sparsity and the cold start issue. Combining different recommendation algorithms has led to the development of hybrid recommendation systems as a potential solution to these problems. This research provides a meta-level hybrid strategy that uses a meta-learning framework to incorporate deep learning models, content-based filtering, and collaborative filtering. We use a gradient-boosting machine for meta-learning optimization after training the model and pre-processing the data. Our suggested method performs better than individual base models and basic hybrid combinations on the MovieLens in terms of precision, recall, F1-score, and mean squared error, according to experimental evaluations. The outcomes demonstrate how well the meta-model can combine the advantages of each base model, greatly improving suggestion accuracy. This work highlights the potential of meta-level hybrid systems to deliver precise, tailored recommendations and points to directions for future research into more effective algorithms and wider applications across many e-commerce areas.

Key Words: Recommendation systems, Hybrid approaches, Meta-learning, Collaborative filtering, Content-based filtering, Deep learning, E-commerce, Data sparsity, Cold start problem.

Optimizing Maritime Routes for Sustainability: A Machine Learning Review

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Abstract: *Digital Technology Marine transportation is essential for conducting global trade. But it is one of the greatest contributors of greenhouse gas emissions. Various methods put forward by machine learning can be used to control pollution, reduce fuel consumption, and lessen travel time. Therefore, it becomes a necessity to find out better maritime routes which resolve the issues. This paper studies the latest approaches in machine learning that can be used for sustainable maritime transportation giving emphasis to heuristic approaches, Radial Basis Function, Neural Networks (RBFNN), and the Whale Optimization Algorithm (WOA). Machine learning techniques such as Reinforcement Learning (RL) and Monte Carlo simulations can be used to model uncertainties which includes fuel prices, delays at the port and weather patterns. Sulfur dioxide emissions can be more accurately predicted using AutoML TPOT and non-linear regression. Routes can be optimized based on real time data using a three-dimensional dynamic programming algorithm. A comparison of various models such as LSTM networks The SHAP (Shapley Additive Explanations) were also performed to find factors affecting emissions in shipping. The impact of heuristic algorithms like simulated annealing, Asymmetric Traveling Salesman Problem and genetic algorithms were also studied to obtain optimized shipping routes based on fuel costs. Hybrid approaches which combined traditional optimization algorithms with machine learning methods showed better results.*

Key Words: *ML, RBFNN, WOA, RL, LSTM, SHAP.*

Analysis and Accuracy of Filtering Techniques in Computer Vision

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Abstract: *Image analysis is one of the growing requirements in today's world. The images are now-a-days obtained from various sources. These sources may range from a number of devices that may also be based on the cloud. The image that is captured is also considered under various environments that may not provide the clear details of the image. The details of the image may not be obtained leading to misleading facts. Certain type of filtering techniques needs to applied to obtain a clearer image and obtain understanding of the image to get complete data. The filtering techniques remove noise from the data and obtain the data. This will solve most of the problems that arise when the images are taken under different circumstances and will provide a solution. [1]. At the same time we need to find the accuracy the filtering techniques have obtained. This will help us to gain more insight in the details of the filters that are applied for the process of filtering in images.*

Key Words: *Image, Filtering, Accuracy, Vision.*

Content-Aware Image Retargeting: The Role of CNNs in Seam Carving Enhancement

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Abstract: *This literature review explores the integration of Convolutional Neural Networks (CNNs) with seam carving for intelligent image retargeting. The study focuses on key advancements in image retargeting techniques, particularly the seam carving algorithm, a content-aware image resizing method that adjusts images by adding or removing seams of low energy pixels. This method is widely recognized for its ability to preserve the visual quality of resized images while minimizing distortion. However, traditional seam carving faces limitations in maintaining critical content during retargeting, especially when dealing with complex images.*

CNNs, known for their ability to learn hierarchical features in image data, present a promising solution to enhance seam carving. Through a comprehensive review of existing research, this paper investigates how CNNs have been effectively used in computer vision tasks, including object detection, scene understanding, and image classification, to improve the content-aware aspects of image retargeting. The primary focus is on how CNNs can guide the seam selection process by analyzing image content and ensuring that vital regions and objects are preserved during resizing.

By examining prior works on CNN-based retargeting methods and analyzing the benefits of integrating deep learning models with traditional algorithms, the literature review highlights the strengths of combining CNNs with seam carving. This includes improved content preservation, adaptive retargeting, enhanced automation, and flexibility across varying aspect ratios and image types. The review concludes by identifying gaps in current research and proposing how this intelligent integration can contribute to developing an automated, efficient image retargeting system capable of delivering high-quality results with minimal artifacts.

Evaluating the Impact of Problem-Based Learning in Programming Courses

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Abstract: *Computer programming is a fundamental aspect of engineering education, yet it often presents significant challenges due to its emphasis on problem-solving skills. Proficiency in programming is crucial for the development and implementation of various technologies, serving as a key indicator of a software developer's professional capabilities, and graduates with strong programming skills typically enjoy a competitive edge in the job market. This paper explores the use of Action Research (AR) methodology to enhance engineering students' programming and problem-solving abilities through an intervention class that employs the Problem-Based Learning (PBL) approach. By integrating real-world problems into the learning experience, the PBL approach fosters deeper engagement and understanding among students. We conducted evaluations to assess the effectiveness of this instructional strategy, focusing on student performance and attitudes towards programming. Preliminary findings indicate that the PBL approach not only improves technical skills but also enhances students' confidence and motivation. Through reflective practice and continuous feedback, this study aims to provide valuable insights into optimizing programming instruction within engineering curricula. Our findings contribute to the ongoing discourse on effective pedagogical strategies for teaching programming and underscore the importance of equipping students with the skills necessary to succeed in a rapidly evolving technological landscape. By sharing these insights, we seek to inform educators and curriculum developers about best practices for cultivating programming expertise among engineering students, ultimately preparing them for successful careers in the field.*

Key Words: *Problem-Based Learning (PBL), programming skills, Action Research (AR) methodology.*

Effective Methods in Removal of Ocular Artifacts from EEG Signal

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Abstract: *The brain signal is an EEG, usually accompanied by a lot of noise and artifacts which should also be removed and redefined to obtain faithful brain signals. Applying electrical activities of the brain to three performance methods, which are Independent Component Analysis (ICA), Fast Independent Component Analysis (FastICA) and Principal Component Analysis (PCA) to extract unobserved neural activities and ocular artifacts such as eye blinks. Evaluation and contrast of these techniques were based on their ability to extract relevant neural information, suppress noise, and interpret physiological signals. The comparison highlights how the different methods processed EEG signals. Based on the metrics values FastICA was more effective in reducing ocular artifacts and separating sources. This analysis will assist researchers studying EEG techniques in selecting the most suitable method for their specific goals. The choice of method hinges on the desired outcome of the EEG analysis, particularly whether the primary focus is to minimize noise or to preserve the original brain activity signal.*

Key Words: *Ocular artifacts, Independent Component Analysis (ICA), Principal Component Analysis (PCA), and Fast Independent Component Analysis (FastICA).*

Conceptual design of solar powered high altitude long endurance unmanned aerial vehicle

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Abstract: *The conceptual design of a Solar-Powered High Altitude Long Endurance (HALE) Unmanned Aerial Vehicle (UAV) presents a significant advancement in sustainable aerospace technology. As the impact of fossil fuels on environment is increasing and fossil fuel resources are depleting sharply. Also, the Endurance by conventional engine-based UAV is limited upto some hours. The battery powered UAV also have limited Endurance Flight in Air. Therefore, Solar Powered UAVs are the need and necessity. With UAVs Categorised as LALE, MALE and HALE depending upon Altitude of operations. This article will deal with HALE category of Solar powered UAVs. The HALE Solar UAVs have certain advantages as per their applications as at high altitudes i.e in Stratosphere region which is 17 kms Altitude above ground, abundant sunlight is available throughout the year and wind speed is least helping in the stable flight of Solar UAV. This type of UAV will use suns energy (solar irradiance) to obtain required electrical power using Solar cells mounted on wings and propel by propellers directly using solar energy during daytime and during night time it will glide with its propellers in off condition. Alternative Energy storage concept to reduce Electrical energy storage device called Gravitational potential storage. It will have batteries that can store electrical power to be used for powering only avionics payload during night time. By proper selection of batteries and solar cells and by doing Energy balance Endurance of Months can be obtained. Applications of Solar HALE UAVs include Environment monitoring like Forest Fire, Act as a communications relay replacing hundreds of mobile Towers, Surveillance of a particular region, act as a pseudo satellite etc.*

Key Words: *Solar HALE UAV, Endurance, Solar Cells, Batteries, Stratosphere, Solar irradiance, Electrical power, Gravitation potential storage, Fossil fuels.*