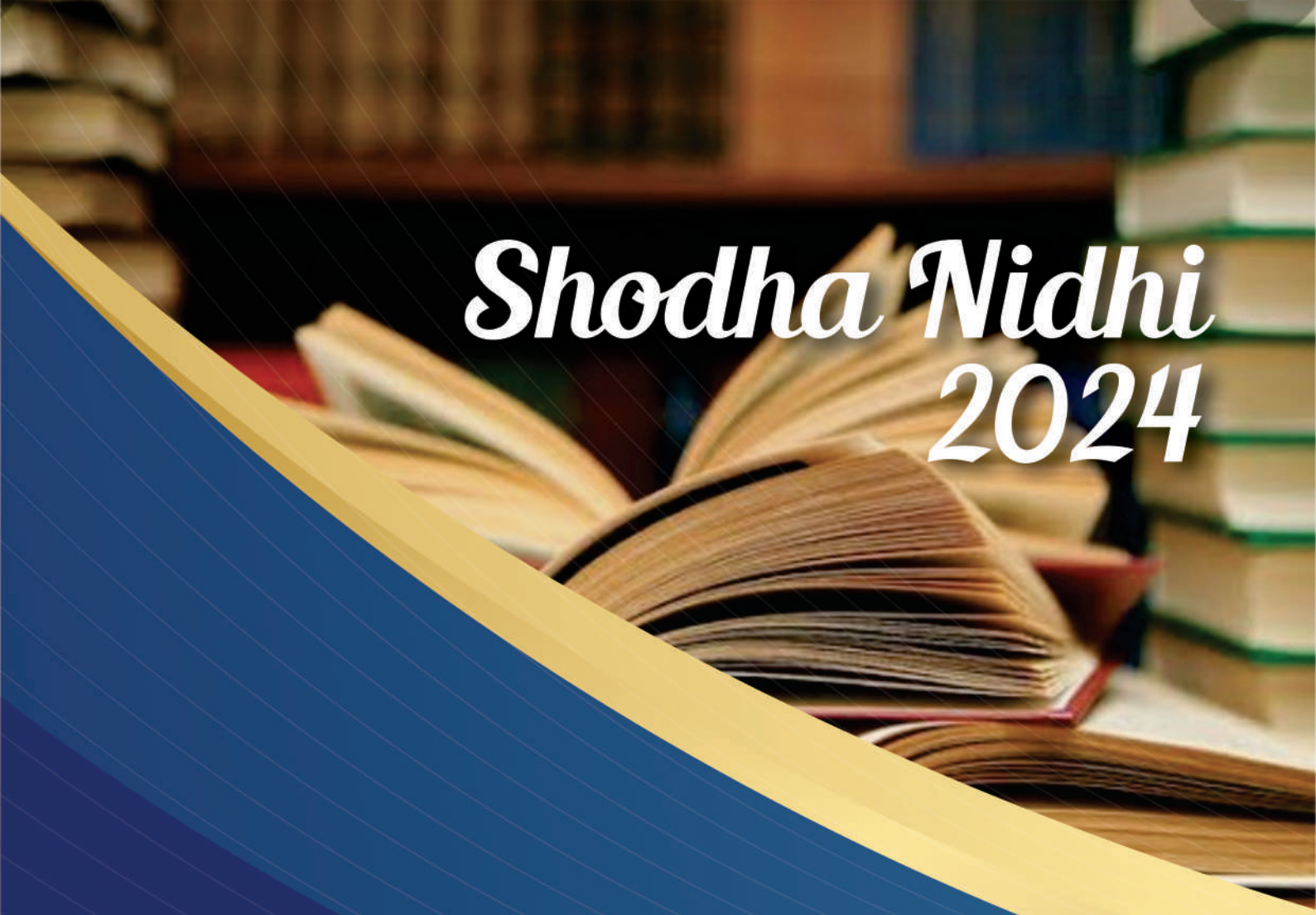

Shodha Nidhi 2024

A COMPENDIUM OF RESEARCH PUBLICATIONS

VOL - VII

ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution

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“To get to know, to discover,
to publish- this is the
destiny of a Scientist”

By François Arago

ESTD: 2002

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Message from the DIRECTOR

It is my great honour to share my message for the seventh volume of the Compendium of Research Publications by SJEC. Research publication is a testament to academic excellence, creativity, and the relentless pursuit of innovation in human development. Researchers chart the course toward solving complex problems, crafting roadmaps that adapt and evolve when obstacles emerge. Along this journey lies an infinite horizon of possibilities, each offering the potential to expand our understanding and enrich the tapestry of human knowledge.

This publication is a curated collection of selected research works contributed by the esteemed academicians of our institute. It stands as an embodiment of the relentless pursuit of innovation and the creation of cutting-edge technologies that will shape the future of human development. This compendium catalyses progress by fostering new ideas and breakthroughs, inspiring further exploration and discovery.

I extend my heartfelt gratitude to everyone who has contributed their expertise and dedication to this endeavour. This compendium sparks a renewed interest in research and innovation and cultivates a vibrant environment where creativity and collaboration thrive, paving the way for a brighter and more innovative future. The publication of the research compendium is the result of the dedicated efforts of the editorial team, and I deeply value their contributions.

Thank you and God be with you all

Rev. Fr Wilfred Prakash D'Souza
Director

Message from the
ASST. DIRECTOR

"The more you know, the more you know you don't know." Socrates

I am delighted to announce the publication of "The compendium of research publications" from St Joseph Engineering College, encompassing the year 2024. My heartfelt congratulations go to the Librarian and her dedicated team for their efforts in making this achievement possible. I extend my warmest appreciation to our researchers who, through their unwavering dedication, have contributed to various esteemed journals, bringing prestige to SJEC.

Knowledge isn't about having all the answers—it's about asking questions, staying curious, and being okay with not knowing everything. This collection of research articles from the faculty of St Joseph Engineering college is a celebration of that spirit. It's a reminder that learning is a journey, not a finish line.

In this compendium, you'll find the abstracts of the hard work and dedication of our faculty, who have taken the time to explore, experiment and share their findings. Their efforts are not just about adding to the world's knowledge but also about inspiring others to take that first step into research. To those who have contributed, thank you. Your work lights the way for others.

For those who find research challenging or overwhelming, this is for you too. Research isn't about being perfect or knowing everything from the start. It's about trying, learning and growing. Every small step counts and every question you ask matters. Don't be afraid to start, even if the path seems unclear. This compendium is more than just a collection of articles—it's an invitation. An invitation to stay curious, to keep exploring and to remember that the journey of learning is one we're all on together. Let's keep asking questions, seeking answers and discovering the endless possibilities that lie ahead.

Rev. Fr Kenneth Rayner Crasta
Assistant Director

Message from the PRINCIPAL

"If we knew what we were doing, it would not be called research, would it?"

- Albert Einstein

It is with great pride and admiration that we present this compendium of research publications, showcasing the remarkable scholarly contributions of our esteemed faculty members. Each publication represents not only their academic dedication but also their commitment to advancing knowledge, fostering innovation, and addressing the evolving challenges of our world.

The diversity and depth of research encapsulated in this volume reflect the wide range of expertise and passion that our faculty members bring to their respective fields. Their hard work, creativity, and intellectual rigor are truly inspiring and continue to enhance the reputation of our institution.

We would also like to extend our sincere appreciation to the editors of this compendium, whose tireless efforts have ensured that this collection is presented in a cohesive, organized, and accessible manner. Their attention to detail and dedication to excellence have been instrumental in bringing this project to fruition.

Together, the research published here and the editorial process have enriched our academic community and set the stage for future scholarly endeavors. We congratulate all involved and look forward to the continued impact of their work in the years to come.

With Best Wishes,

Dr Rio D'Souza
Principal

Message from the

OFFICE OF THE DEAN
RESEARCH & DEVELOPMENT

It gives me immense pleasure to present this year's Research Compendium of St Joseph Engineering College, Mangaluru. Research is the foundation of technological advancement and innovation, and as engineering educators, we have a profound responsibility to contribute to the growth of knowledge that drives societal progress.

At SJEC, we recognize the importance of fostering a strong research culture. To support and encourage our faculty in their research endeavors, we have introduced various initiatives, including publication incentives, project grant incentives, seed money for research, research awards, conference attendance support, and publication assistance. These schemes aim to provide both motivation and financial backing for impactful research work.

This is the perfect time and place to engage in research. With a young and dynamic faculty base, we have the potential to make a significant impact on the academic and industrial landscape. I urge all faculty members to seize this opportunity, collaborate across disciplines, and contribute to cutting-edge innovations that benefit society.

Let us continue our journey of excellence in research and make meaningful contributions that uphold the legacy of SJEC as a center of knowledge and innovation.

Dr Purushothama Chippar
Vice Principal

Editorial

The spontaneous contributions from our faculty / students enabled us to bring out the Seventh Volume of the Compendium of Research Publications successfully. This volume of the Compendium consists of 143 research articles published during the year 2024 by our faculty in scholarly International Journals, Conference Proceedings, Books and Book Chapters. Out of these 62% were published in International Journals, 33% in International Conferences and others in Book Chapters. We congratulate our esteemed faculty / students for their contribution.

We thank the Management, Principal Dr Rio D'Souza and Dean R&D Dr Purushothama Chippar for their valuable advice and motivation in bringing out this volume. Thanks to the members of the Editorial Board for their constant support in compiling the Research Publications.

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IJ-24	B Ravikiran Kamath M Sudheer Vidyasagar Shetty Deepak Kothari Thrivikram Prabhu	Fabrication and mechanical testing of glass fiber reinforced epoxy matrix composites modified with powdered metallic fillers	Journal of Mines, Metals and Fuels,72(2), 2024, pp 103-109	88
IC-25	Rolvin D'Silva K G Binu Thirumaleshwara Bhat	Investigation of the effect for a higher biodiesel blend and titanium dioxide nanoadditive on the performance parameters of CI engine	AIP Conference Proceedings, 3060, 2024, pp 030004	89
IJ-26	Jiju Antony Michael Sony Bart Lameijer Shreeranga Bhat Raja Jayaraman Leopoldo Gutierrez	Towards a design science research (DSR) methodology for operational excellence (OPEX) initiatives	The TQM Journal, 36(8), 2024, pp 2383-2397	90
IJ-27	Praveen Barmavatu Sonali Anant Deshmukh Mihir Kumar Das Ahmad Arabkoohsar José Antonio García-Merino Marco Rosales-Vera Rolvin Sunil Dsilva Mangalaraja Ramalinga Viswanathan Baburao Gaddala Vineet Singh Sikarwar	Heat transfer characteristics of multiple jet impingements using graphene nanofluid for automobile industry application	Thermal Science and Engineering Progress 55, 2024, pp 102993	91
IJ-28	Jiju Antony Shreeranga Bhat Anders Fundin Michael Sony Lars Sorqvist Mariam Bader	Quality management as a means for micro-level sustainability development in organizations	The TQM Journal, 36(8),2024, pp 2260-2280	92
IJ-29	Jiju Antony Arshia Kaul Shreeranga Bhat Michael Sony Vasundhara Kaul Maryam Zulfiqar Olivia McDermott	Critical failure factors for Quality 4.0: an exploratory qualitative study	International Journal of Quality & Reliability Management, 41(4), 2024, pp 1044-1062	93
IJ-30	Ravikantha Prabhu Sharun Mendonca Pavana Kumara Bellairu Rudolf Charles D'Souza Thirumaleshwara Bhat	Optimization of dry sliding wear performance of TiO_2 filled bamboo and flax fiber reinforced epoxy composites using Taguchi approach	World Journal of Engineering, 21(5), 2024, pp 882-893	94
IJ-31	P R Srijithesh E V Gijo Pritam Raja Shreeranga Bhat S Mythirayee Ashok Vardhan Reddy Taallapalli Girish B Kulkarni Jitendra Siani H R Aravinda	Leveraging lean six sigma principles in an Indian tertiary care hospital: a case study	International Journal of Quality & Reliability Management, 42(2), 2024, pp 600-630	95

IJ-32	Girish H Raghuvir Pai	Dynamic performance and stability characteristics of a multi pad externally adjustable fluid film bearing	Australian Journal of Mechanical Engineering, 22(1), 2024, pp 133-148	96
IJ-33	Maryam Zulfiqar Michael Sony Shreeranga Bhat Jiju Antony Willem Salentijn Olivia McDermott	Unlocking the potential: empirical analysis of enablers, barriers, benefits and technologies for integrating Industry 4.0 and Lean Six Sigma in manufacturing organisations	The TQM Journal, 36(8), 2024, pp 2360-2382	97
IJ-34	Kaavya Kanagaraj Shiju George Asha Joseph Sushanth H Gowda	Adolescent identity search algorithm with optimised video-based activity classification using hierarchical auto-associative polynomial convolutional neural network	International Journal of Ad Hoc and Ubiquitous Computing, 45(4), 2024, pp 254-265	98
IJ-35	Sawan Shetty Raviraj Shettya Rajesh Nayak Adithya Hegdea Uday Kumar Shetty S V Sudheer M	DOE coupled MLP-ANN for optimization of thrust force and torque duringdrilling of CCFRP composite laminates	Cogent Engineering, 11(1), 2024, pp 2319397	99
IJ-36	Ravikantha Prabhu Sharun Mendonca Pavana Kumara Bellairu Rudolf Charles DSouza Thirumaleshwara Bhat	Effect of TiO2 filler on mechanical and tribological properties of owen bamboo fiber reinforced epoxy composite	World Journal of Engineering, 21(4), 2024, pp 781-792	100
IJ-37	Melwyn Rajesh Castelino N Mallikappa Shashikantha Karinka Vijeesh Vijayan H Shivananda Nayaka James Valder	Enhancing mechanical properties of Ti-64 alloy through ECAE: lubricant optimization, microstructural evolution and optimal process parameters	International Journal on Interactive Design and Manufacturing, 2024, pp 1-18	101
IJ-38	Swaraj D Lewis Purushothama Chippar	Effect of buoyancy force in phase change material-based metal hydride reactor	Journal of Thermal Science and Engineering Applications, 16(6), 2024, pp 061007 (10 pages)	102
BC-39	Canute Sherwin D P Shahid N R Hritish S N Sujan Kumar R Nikhil K Raju	Arduino-based robotic arm for farm security in rural areas	Mathematical Models Using Artificial Intelligence for Surveillance Systems, 2024	103
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IJ-1	Ganavi K K Shakila B	Influence of psychological biases on investing choices among individual investors in Mangalore city Karnataka	Journal of Propulsion Technology, 45(1), 2024, pp 1310-1321	104
IJ-2	P Ananth Alias Rohith Bhat B Shakila Prakash Pinto Iqbal Thonse Hawaldar	Comparing the performance of GARCH family models in capturing stock market volatility in India	Shanlax International Journal of Management, 11(3), 2024, pp 11-20	105
IJ-3	K Manjula Babitha Rohit Prakash Pinto	Short-term performance of Indian initial public offerings (IPOs)	Shanlax International Journal of Management, 11(3), 2024, pp 21-25	106
BC-4	Anjali Ganesh	Venture capital: a next generation financing in India	Research and Reviews in Literature, Social Sciences, Education, Commerce and Management Vol I, 2024	107
IJ-5	Acharya Chitralekha J Anjali Ganesh	Impact of emotional intelligence on organizational citizenship behaviour	Journal of Tianjin University Science and Technology, 57(4), 2024, pp 218-231	108

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IJ-6	Dharmananda M Anjali Ganesh Ranadheer Mandadi Reema Frank	An empirical study of a train of causativeness from financial stability to financial inclusion	Journal of Tianjin University Science and Technology, 57(4), 2024, pp 187-192	109
IJ-7	Cherian Xavier	A study on the role of HRMS in talent management and retention in current context	International Journal of Research Publication and Reviews, 5(6), 2024, pp 2541-2548	110
IJ-8	Prakash Pinto Vinish Pallikkara Slima Pinto Iqbal Thonse Hawaldar	Unveiling the entrepreneurial mindset: exploring orientation and intentions among students of prominent engineering disciplines	Journal of Innovation Entrepreneurship, 13(33), 2024, pp 1-26	111
IJ-9	Vinish Pallikkara Prakash Pinto Iqbal Thonse Hawaldar	Navigating waiting situations at retail checkouts: associated emotional discomfort and its impact on shopping satisfaction	Management and Marketing, 19(2), 2024, pp 256-274	112
IJ-10	Anjali Ganesh Shrisha H S	Adaptive filter for reducing false positives in face recognition from image and video input	Journal of Hunan University Natural Sciences, 61(9), 2024	113
IJ-11	Kepulaje Abhaya Kumar Prakash, Pinto Birau Ramona Iqbal Thonse Hawaldar Iqbal Thonse Tan Yong Wanke Peter	Cross-border linkages between the global rubber spot and futures markets	Regional and Sectoral Economic Studies, 24(2), 2024, pp 159-174	114
MASTER OF COMPUTER APPLICATION				
IJ-1	Meganathan Manjunath B R Anand V Murugesh	Security establishment using deep convolutional network model in cyber-physical systems	Multimedia Tools and Applications, 83, 2024, pp 76201-76221	115
IJ-2	Sadananda Lingayya Sathyendra Bhat Jodumutt Sanjay Rangrao Pawar Anoop Vylala Senthilkumar Chandrasekaran	Dynamic task offloading for resource allocation and privacy-preserving framework in kubeedge-based edge computing using machine learning	Cluster Computing, 27, 2024, pp 9415-9431	116
ENGINEERING MATHEMATICS				
IJ-1	Jagadeesha B K B Srinivas K S Prasad	The C-prime fuzzy graph of a nearring with respect to a level ideal	Palestine Journal of Mathematics, 1(3), 2024, pp 230–242	117
IJ-2	Sabina Rachana Crasta Jagadeesha B	Graph of a rough approximation set	Palestine Journal of Mathematics, 13(3), 2024, pp 194–209	118
IJ-3	Ramananda H S Salma Shabnam	A construction of a lattice by substitution sum of a lattice and boolean algebra	Palestine Journal of Mathematics, 13(3), 2024, pp 148-153	119
IJ-4	Jagadeesha B S Lavanya	Line graph associated with C prime graph of a near ring	Proceedings of the Jangjeon Mathematical Society, 27(4), 2024, pp 605-614	120
IC-5	K N Prathibha Gururaj Upadhyaya B Jagadeesha Renuka Tantry	A novel evaluation on the impact of modern pedagogical tools for improving the learning outcomes of engineering mathematics.	Proceedings of the International Conference on Advances in Computing, Communication and Applied Informatics, Chennai, 9-10 May 2024, pp 1-6	121
IJ-6	A J Harsha H S Ramananda S Shabnam	Representation of a lattice by a graph with respect to an ideal and its characterization	Proceedings of the Jangjeon Mathematical Society, 27(4), 2024, pp 585-592	122

IJ-7	Salma Shabnam Ramananda H S	Lattice CST(L1) obtained by the substitution sum in formal context	Journal of Computational Analysis and Applications, 33(4), 2024	123
IJ-8	Sandhya Dass H S Ramananda A Ankith Savio	Eye-tracking in education: analysing the relationship between student's performance and videonystagmography report	Proceedings of the International Conference on New Frontiers in Communication, Automation, Management and Security, Bangalore 2024, pp 1-6	124
IJ-9	Nandish N S P Usha Ramananda H S Sandeep R	An estimation of cordial label-based topological indices via qspr analysis for heart attack medication treatment heart attack medication treatment	African Journal of Biological Sciences, 6(4), 2024, pp 248-268	125
IJ-10	Nandish N S P Usha Ramananda H S	Investigating the characteristics of anti-malarial drugs by cordial label-based topological indices	African Journal of Biomedical Research, 27(3S), 2024, pp 4271-4283	126
IJ-11	Nandish N S P Usha Ramananda H S	QSPR analysis on bone marrow cancer medications via topological indices and regression model	African Journal of Biomedical Research, 27(1S), 2024, pp 296-308	127
ENGINEERING PHYSICS				
IJ-1	Raghavendra Bairy H Vijeth K Rajesh Suresh D Kulkarni Neelamma Gummagol M S Murari	Enhanced optical third-harmonic generation in phase-engineered nanostructured zn1−xcdxs thin films for optoelectronic device applications	Journal of Physics D: Applied Physics 57(16), 2024, pp 165102	128
IJ-2	L M Clavian P C Rajesh Kumar K V Anil Kumar D Narayana Rao N K Shihab Ganesh Sanjeev	Comprehensive analysis on the z-scan response of thermally evaporated CuTPP thin films in terms of h aggregation and charge transfer dynamics	The Journal of Physical Chemistry C: Physical Properties of Materials and Interfaces, 128(8), 2024, pp 3460-3472	129
BC-3	L M Clavian P C Rajesh Kumar K V Anil Kumar D Narayana Rao N K Shihab Ganesh Sanjeev	Nonlinear properties of PMMA composite thin films	Science and Technology - Recent Updates and Future Prospects, Edited by Khalil Kaasmi, 5, 2024, pp 70-77	130
BC-4	Raghavendra Bairy Vijeth H Rajesh K Rohan S Deshmukh	Synthesis and characterization of CdS and ZnS nanostructured thin films for opto-electronic energy applications	Thin Film Nanomaterials: Synthesis, Properties and Innovative Energy Applications, 2024 pp 1-35	131
IJ-5	Rajesh K Vincent Crasta Bairy Raghavendra Rajesh Kumar P C	Dielectric, photoluminescence, thermal and mechanical properties of cuo nanoparticles filled polyvinyl alcohol/polyvinyl pyrrolidone blends for high frequency device applications	ECS Journal of Solid State Science Technology,11, 2024, pp 113014	132
ENGINEERING CHEMISTRY				
IC-1	Pramila Rita DSouza K Jyothi Prathima S Sheetal Fernandes Smitha DSouza	Corrosion mitigation of mild steel by N-substituted sulfonamide derivative: experimental and theoretical evaluation	Fourth International Conference of Advancement in Research & Development, Hyderabad, Telagan, 30-31 January 2024	133
IC-2	Prathima S K Jyothi Pramila DSouza Sheetal Fernandes Smitha DSouza	Investigation of corrosion inhibition of mild steel in hydrochloric acid by pyrazoline derivative using experimental and computational approaches	Fourth International Conference of Advancement in Research & Development, Hyderabad, Telagan, 30-31 January 2024	134

IC-3	Sheetal Tresa Fernandes K Jyothi Pramila DSouza Prathima S Smitha DSouza	Structural hybrids of sulfonamide and thiazole moieties: synthesis, characterization, evaluation of antimicrobial activity and theoretical studies	Fourth International Conference of Advancement in Research & Development, Hyderabad, Telagan, 30-31 January 2024	135
IC-4	Smitha Maria DSouza K Jyothi Pramila DSouza Prathima S Sheetal Fernandes	Quinazoline scaffold: synthesis, characterization, and biological evaluation through the integration of computational approaches	Fourth International Conference of Advancement in Research & Development, Hyderabad, Telagan, 30-31 January 2024	136
IJ-5	Pramila Rita Dsouza Jyothi Kudva Adiyodi Sunil Kumar Prathima Shekara Damodara Naral Adka Nityananda Shetty	Experimental and theoretical approach for the corrosion deceleration of mild steel in hydrochloric acid medium by two sulfonamide derivatives	ChemistrySelect, 9(11), 2024, pp 1-18	137
IC-6	Sheetal Tresa Fernandes K Jyothi Pramila DSouza Prathima S Smitha DSouza	Sulfonamide fused thiazole hybrids: antibacterial, antitubercular activities and quantum chemical insights	International Conference on Advancements in Science, Engineering and Management, Purnea, Bihar, 30 - 31 May 2024	138
IC-7	Smitha Maria DSouza K Jyothi Pramila DSouza Prathima S Sheetal Fernandes	Synthesis, characterization, and biological analysis of quinazoline scaffols enhanced by computational techniques	International Conference on Advancements in Science, Engineering and Management, Purnea, Bihar, 30-31 May 2024	139
BC-8	Prathima Shekara Jyothi Kudva Rajitha Sadashiva Damodara Naral	The corrosion behavior of a Pyrazoline derivative on mild steel in hydrochloric acid medium: Electrochemical and quantum chemical investigation	Recent Advances in Electrochemical Science and Technology, Springer Proceedings in Materials, Vol 47, 2024, pp 163-174	140
IJ-9	P Dayananda Janardhana Nayak Jyothi Kudva D M Chethan Vineetha Telma D'Souza	Synthesis, characterization, Antimicrobial and DFT studies of novel quinolino-pyrazole derivatives	ChemistrySelect, 9(32) 2024, pp 1-5	141
IJ-10	K D Venu Prasad Balakrishna Kallauraya Ramesh S Bhat Subrahmanya I Bhat Vinuta Kamat Mahesh Akki Amit Kumar K Jyothi B R Bharat	Synthesis, characterization, and evaluation of pyrimidinone-linked thiazoles: DFT analysis, molecular docking, corrosion inhibition, and bioactivity studies	Heliyon, 10(20), 2024, pp 1-14	142
CENTRAL LIBRARY				
BC-1	Felcy D'Souza	Awareness and adoption of AI technologies in the libraries of Karnataka	Proceedings of the International Conference on Intelligent Libraries, Vol 2, Bangalore, 2024, pp 30-34	143

SUMMARY OF PUBLICATIONS 2024

ARTICLES	CSE	ICBS	CIVIL	EC	EE	ME	MBA	MCA	BASIC SCIENCE	LIBRARY	TOTAL
IC	23	6	-	8	2	1	-	-	7	-	**47**
IJ	3	2	6	9	3	37	10	2	16	-	**88**
BC	1	-	-	-	1	1	1	-	3	1	**8**
TOTAL	**27**	**8**	**6**	**17**	**6**	**39**	**11**	**2**	**26**	**1**	**143**

IC–International Conference, **IJ**- International Journal, **BC**- Book Chapter

COMPUTER SCIENCE AND ENGINEERING

MPInet: Medicinal Plant Identification using Deep Learning

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ABSTRACT

Botanists, chemists, and healthcare professionals have substantial difficulties in classifying and identifying medicinal plants. The conventional techniques for identifying plants are hard, time-consuming, and need a great deal of knowledge. Convolutional neural networks (CNN), a deep learning approach, have paved the path for the automatic identification of medicinal plants based on leaf photographs. The proposal named MPInet is a VGG16 model trained on custom collected dataset specifically for identifying the 10 medicinal plants which grows commonly around populated areas. The datset has 3000 samples spread across 10 species. The proposed model achieved performance accuracy of 99.4 percent, precision value of 99.6 percent, recall value of 99.5 percent and F1 Score of 98.8 percent. MPInet can be integrated to mobile devices and may be used for educational purpose.

**Full paper: Proceedings of the Seventh International Conference on Electronics, Communication and Aerospace Technology, DOI: 10.1109/ICECA58529.2023.10395327, Coimbatore, 2024, pp 654-657.*

NVS-GAN: Benefit of Generative Adversarial Network on Novel View Synthesis

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ABSTRACT

The methodology to generate new views for an object from provided input object view is called Novel View Synthesis (NVS). Humans imagine novel views through prior knowledge gathered through their lifetime. NVS-GAN predicts the novel views through computation. Literature survey reveals that there are limited NVS models with low Trainable Parameter Count (TPC) and low model size. Also, a study on the effect of different loss functions on NVS models was lacking. Lowering the TPC indicates less computational steps for the model to predict the output, therefore desirable. Combined with a low model size, the proposed model will become more suitable for deployment in diverse devices having limited resources for computation. Application of right combination of loss functions yield better accuracy. To address these research gaps, NVS-GAN is proposed. NVS-GAN is a Generative Adversarial Network (GAN) approach which yields NVS-Generator which performs NVS. NVS-Generator incorporates identity skip connections, bilinear sampling module, Depthwise Separable Convolution (DSC) as design features and results in low TPC, model size. In addition to discriminator loss, NVS-GAN is trained with different combinations of loss functions i.e. Mean Absolute Error (MAE) loss, Structural Similarity Index Measure (SSIM) loss, Huber loss on chair and car objects of ShapeNet dataset. The performance of NVS-Generator on test set measured in terms of MAE and SSIM is tabulated and analysed. The performance is compared with existing NVS models. The proposed NVS-GAN experiment recorded reduction in NVS-Generator TPC in 37 %–54.6 % range and reduction in model size between 37.2 % and 47.6 % range. NVS-Generator reduced MAE upto 55 % and improved SSIM upto 4 % than existing models. Summarily, NVS-GAN increased model performance and made the model "lightweight".

**Full paper: International Journal of Intelligent Networks, DOI: org/10.1016/j.ijin.2024.04.002, Vol 5, 2024, pp 184-195.*

Finite State Automata Based Cryptosystem for Secure Data Sharing and De-duplication in Cloud Computing

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ABSTRACT

In the era of high-speed internet access, a surge in redundant data generation is observed across different media sources and devices, posing challenges in computational and storage efficiency during data outsourcing and retrieval. Addressing this issue and optimizing storage efficiency is essential to curtailing redundant data creation within storage servers. The potential compromise of sensitive data within outsourced information is susceptible to both internal and external threats. Thus, securing data during both data-in-transmission and data-at-storage is imperative. However, conventional cryptosystems alongside deduplication services face a dilemma due to the conflict between encryption and deduplication. Furthermore, prevailing cryptosystems pose false keys and false ownership claiming, bruit-force, and dictionary attacks during the secure deduplication process. To tackle these challenges, this paper utilizes a Finite State Automata (FSA) based cryptosystem alongside deduplication, complemented by Proof of Ownership (PoW) and Data Integrity Verification (DIV) protocols. This method ensures robust data security effectively by resolving the encryption-deduplication paradox. Empirical evaluation validates the efficacy of the proposed method, showcasing improvements over the existing system. It also demonstrates reduced communication and computational complexity and improved storage efficiency, and fortified security provisions during data deduplication.

**Full paper: SN Computer Science, DOI: org/10.1007/s42979-024-03101-y, Vol 5, Issue No. 6, 2024, pp 774.*

Cross-Lingual Short-Text Semantic Similarity for Kannada–English Language Pair

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ABSTRACT

Analyzing the semantic similarity of cross-lingual texts is a crucial part of natural language processing (NLP). The computation of semantic similarity is essential for a variety of tasks such as evaluating machine translation systems, quality checking human translation, information retrieval, plagiarism checks, etc. In this paper, we propose a method for measuring the semantic similarity of Kannada–English sentence pairs that uses embedding space alignment, lexical decomposition, word order, and a convolutional neural network. The proposed method achieves a maximum correlation of 83% with human annotations. Experiments on semantic matching and retrieval tasks resulted in promising results in terms of precision and recall.

**Full paper: Computers, MDPI, DOI: org/10.3390/computers13090236, Vol 13, Issue No. 9, 2024, pp 236.*

Stock Market Sentiment Analysis and Stock Prediction

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ABSTRACT

Analysis and forecasting of stock sentiment has always played a significant role in determining the stock markets' profitability. To examine and forecast the performance of specific stocks, ETFs, etc., these methods have been developed. Thus, it becomes essential to have a sophisticated system that could extract all relevant information about the Stock market in order to assess their performance and provide the traders with the necessary support. The goal of the work is to forecast trends by scraping online stock prices. This stock prediction model was developed using three distinct studies and approaches, including sentiment analysis, machine learning algorithms, and technical analysis using technical indicators, to ensure a more accurate prediction. Different people employ various strategies when it comes to investing in stocks. Our approach combines the outputs from the three prediction techniques into a single result. The results of these three approaches taken together will help the investor forecast the stock performance.

**Full paper: AIP Conference Proceedings, DOI: org/10.1063/5.0229743, Vol 3131, Issue No 1, 2024, pp 020016.*

Detection of Brain Disorders using Ocular Responses

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ABSTRACT

This paper introduces an innovative approach to early detection of Autism Spectrum Disorder (ASD) by integrating Artificial Intelligence (AI) with eye-tracking data, addressing the challenge of delayed intervention, especially in resource-limited settings. Drawing from previous research and advancements, the work aims to present an AI-driven solution for early ASD detection using ocular responses. By tracking eye movements via webcam during video viewing, the process generates a graph representing eye scan paths, which are then transformed into images for classification to determine ASD presence. The methodology integrates a Convolutional Neural Network (CNN) model with eye-tracking data, facilitating early ASD detection. Experimental results highlight the approach's efficiency, demonstrating benefits in cost, labor, and space ef-ficiencies. In essence, this work offers an inventive solution for early detection of brain disorders, particularly ASD, with potential for future advancements in ASD detection methodologies. Future research may explore the applicability of ocular responses in diagnosing other brain disorders.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750701, Mangalore,18-19 October 2024, pp 304-308.*

Optimizing Energy Usage in Educational Environments through the Internet of Things and Deep Learning Techniques

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ABSTRACT

Excessive electricity consumption in educational environments, particularly classrooms, poses significant financial and environmental challenges. Existing solutions utilize various technologies such as surveillance cameras, power monitoring modules, and occupancy sensing systems to detect occupancy and control electrical appliances accordingly. However, the inefficient management of energy resources within classrooms leads to unnecessary consumption and increased costs. Artificial Intelligence (AI) can assist by implementing smart systems that use IoT devices and deep learning algorithms to autonomously detect occupancy and manage electrical appliances. This approach optimizes energy usage, reduces wastage, and leads to more sustainable and cost-effective educational facilities. The proposed study addresses this pressing issue through the integration of IoT technology and deep learning algorithms to autonomously identify occupancy status within classrooms. By leveraging this data, the system optimizes energy usage by controlling electrical appliances, thereby mitigating unnecessary wastage, and promoting sustainable practices within educational institutions. The study assesses existing energy-saving methods in classrooms and identifies their limitations. A novel solution is proposed that utilizes surveillance cameras for occupancy detection, streamlining energy management without additional hardware costs. The proposed model demonstrated 92% accuracy when compared with the state-of-the-art architecture YOLOv3 with SSH, representing conclusive outcomes derived from its operational processes, delineated both qualitatively and quantitatively.

**Full paper: Proceedings of the Third International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), DOI: 10.1109/ICEEICT61591.2024.10718470, Tiruchirappalli, 24-26 July 2024, pp1-7.*

Wearable Sensor-Based Gait Analysis: Advanced Feature Extraction Techniques

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ABSTRACT

Gait irregularities among adults are common in clinical settings and can result in severe consequences such as falls and injuries, leading to increased healthcare costs. Presently, gait evaluation primarily relies on subjective assessments using standardized clinical tools. Although motion capture systems like Qualisys and Vicon offer more objective analysis, they depend on costly, intricate equipment in specialized gait laboratories. Due to limited accessibility, involving factors like equipment scarcity, demand for technical expertise, in-person patient visits, complex procedures, and high costs, these methods remain largely inaccessible. Consequently, there is a pressing need for a more objective and cost-effective gait assessment solution. The proposed work introduces an economical automated feature extraction approach to address this issue. Leveraging Inertial Measurement Unit (IMU) sensors, comprising a three-axis gyroscope and accelerometer system captures precise foot position and orientation data crucial for comprehensive gait analysis. IMU sensors have gained popularity due to their adaptability in clinical environments and non-clinical settings like patient residences or community spaces. With the help of a microcontroller mounted on the barefoot, the IMU sensor collects raw gyroscope and accelerometer data for gait analysis. These data are wirelessly transmitted via Bluetooth to a computer for subsequent in-depth analysis, enabling effective feature extraction for comprehensive gait assessment.

**Full paper: Second International Conference on Advances in Information Technology (ICAIT), DOI: 10.1109/ICAIT61638.2024.10690387, Chikkamagaluru, 24-27 July 2024.*

Multisport Dynamics Explored Through Advanced Activity Recognition Techniques in Athletic Performance

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ABSTRACT

Recognition of human activities has drawn a lot of interest lately in the field of computer vision and machine learning. Group activity recognition is a significant subcategory in which several people participate in a common activity. The primary obstacle in these tasks is learning the relationships between individuals in a scene and understanding their evolution over time. The suggested study offers a new taxonomy to classify state-of-the-art (SOTA) group activity recognition approaches and subcategorizes the current literature. It also critically analyzes these techniques. To understand scenes involving multiple people, models must describe individual actions in context and infer collective activities. Accurately capturing relationships between actors and performing relational reasoning is crucial for comprehending group activities. However, modelling these relationships is challenging due to the limited availability of interaction information, relying only on individual action labels and collective activity labels. Inferring relationships from other aspects is thus essential. Group activity recognition has garnered increased research attention recently due to its importance in video understanding. The difficulties lie not only in recognizing individual actions but also in exploring scene information and collaborative relations among people. This research addresses these challenges by providing a comprehensive review of existing techniques, offering a structured approach to categorize them, and highlighting the importance of relational reasoning in understanding group activities.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750755, Mangalore, 18-19 October 2024 pp132-137.*

Optimizing Human Activity Recognition for Precision in Yoga Practice Analysis

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ABSTRACT

The proposed system on enhancing human activity recognition in yoga presents an innovative solution using advanced technologies to accurately and quickly analyze data of yoga poses. Through meticulous data collection and preprocessing, including noise removal, normalization, and handling missing data, the system ensures a clean and standardized dataset. Pose estimation algorithms contribute to accurately mapping the body's posture, extracting essential features like joint angles and body orientation. The features form the basis for a powerful machine learning model, trained on a labelled dataset and employing neural networks, enabling the system to recognize yoga poses with remarkable precision. The study embraces an iterative enhancement process, continuously refining the model based on feedback and performance metrics, ensuring ongoing improvements in accuracy. Ultimately, the proposed system represents a cutting-edge solution for advancing human activity recognition in yoga, providing practitioners with real- time feedback and guidance, fostering improved techniques, and enhancing the overall yoga experience.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750694, Mangalore, 18-19 October 2024, pp 410-415.*

Assessing Variations in Water Quality Parameters: An Analysis of Variance Study for Environmental Monitoring

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ABSTRACT

Due to escalating environmental concerns associated with water quality degradation, this study focuses on comprehensively assessing water quality parameters-pH, Turbidity, Conductivity, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Nitrate, and Chloride-collected from Varthur Lake in Bangalore. Using histograms and box plots, we preliminarily explored the changes in various parameters. Subsequently, we conducted an in-depth and detailed seasonal analysis using one-way ANOVA with three seasons (monsoon, winter, and summer) as independent variables and water quality parameters as dependent variables. Our findings underscore significant variations across seasons, elucidating critical insights into the dynamics of water quality fluctuations. Furthermore, the study highlights the importance of water quality assessment in developing environmental management strategies, especially amid growing concerns about water quality deterioration.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750656, Mangalore, 18-19 October 2024, pp 88-89.*

Early Detection of Cardiovascular Disease Atrial Fibrillation

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ABSTRACT

Cardiovascular disease remains a leading cause of mortality worldwide, and the early detection of its underlying conditions is crucial for effective prevention and management. This research paper presents a comprehensive approach to address the challenge of early prediction and detection of cardio-vascular diseases (CVDs) focusing on atrial fibrillation (AF). The proposed work integrates advanced machine learning techniques to study risk assessment and deep learning for ECG analysis. The Kaggle's Cardiovascular Disease Dataset and Cleveland's Heart Disease Dataset are used for the experimentation. The study also discusses practical application implementation, exploring the integration of developed models into healthcare systems for real-time risk assessment and disease detection. Results demonstrate that Random Forest Classifier gives superior performance with both datasets.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750649, Mangalore, 18-19 October 2024, pp 298-303.*

Alzheimer's Disease Prediction using Deep Learning

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ABSTRACT

This paper addresses the challenge presented by Alzheimer's disease,which is a progressive brain disorder known for its detrimental effects on memory, cognition, and daily functioning, ultimately compromising patient independence. Given its status as the leading cause of dementia in the elderly, there is an urgent need for accurate and early diagnosis, particularly in light of projected increases in caregiving costs. By leveraging MRI data from the Open Access Series of Imaging Studies (OASIS), this study mainly focuses on harnessing deep learning techniques, notably Convolutional Neural Networks (CNNs), to achieve precise detection and staging of Alzheimer's disease across its various stages, including Mild Dementia, Moderate Dementia, Very Mild Dementia, and Non-Dementia. By enabling timely diagnosis, the proposed approach facilitates access to early interventions, such as medical therapies and lifestyle adjustments, crucial for mitigating disease progression and enhancing patients' quality of life. Through the accurate classification of these distinct disease stages, healthcare professionals can intervene proactively, offering more effective treatments and support to both individuals affected by Alzheimer's and their families.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750739, Mangalore, 18-19 October 2024, pp 371-376.*

Predicting Bioactivity Using Chemical Fingerprint Models & Cell Morphology with Deep Neural Networks

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ABSTRACT

This paper presents a novel approach to enhance the bioactivity prediction of drug compounds by integrating chemical fingerprint models with cell morphology data through deep neural networks. Traditional methods often rely on singular data modalities, which may limit prediction accuracy. Our proposed methodology addresses this limitation by leveraging a multimodal dataset analysis, aiming to improve the efficiency of drug discovery processes. The study meticulously outlines steps including data collection, preprocessing, model development, training, evaluation, and integration, grounded in established practices in deep learning. By integrating diverse data sources, our approach demonstrates promising results in enhancing bio-activity predictions, potentially reducing costs, labor, and resources associated with drug discovery. This research contributes to advancing predictive modeling in pharmaceutical research. It sets the stage for future investigations aiming to broaden application scope and refine predictive models to meet evolving demands in drug discovery.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750662, Mangalore,18-19 October 2024, pp 309-315.*

SmartDefend - IOT Security Using Machine Learning

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ABSTRACT

With the advent of the fourth industrial revolution in recent years, technological advancements have led to massive exponential growth in the Internet of Things (loTs), fog computing, computer security, and cyberattacks. One of the most promising techniques for mitigating cybersecurity risks and ensuring security is machine learning, or ML. In order to address the current security and privacy issues, a number of research have suggested smart intrusion detection systems (IDS) using intelligent architectural frameworks that use AI. This paper presents a systematic literature review (SLR) that maps, surveys, and categorises the body of research on machine learning techniques for identifying cybersecurity threats in Internet of Things environments. Notably, random forests (RF) and support vector machines (SVM) are two of the most popular techniques because of their effective memory usage and excellent detection accuracy. The system aims not only to detect anomalies but to delve deeper, providing detailed insights through the precise classification of detected anomalies into specific attack types. Among the seven algorithms examined, the Random Forest Classifier yields the best accuracy of 92.72% in binary classification and 92.40% in multiclass classification.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750744, Mangalore, 18-19 October 2024, pp 109-114.*

Gesture-Enhanced Presentation Control for Education

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ABSTRACT

Presentation skills are vital in many areas of life. Giving presentations is probably a common experience for anyone, whether they are a worker, student, business owner, or employee of an organisation. The requirement to manage and manipulate the slides with a keyboard or other specialised device might make presentations seem tedious at times. Enabling users to control the slideshow with hand gestures is the aim of this work. Gestures have become increasingly common in human-computer interaction in recent years. Several PowerPoint functionalities have been attempted to be controlled by hand movements by the system. This system maps motions using multiple Python modules and uses machine learning to identify motions with minute variances. Creating the perfect presentation is becoming increasingly difficult due to a number of aspects, including the slides, the keys to switching the slides, and the audience's composure. An intelligent presentation system that is based on hand gestures makes it simple to update or modify the slides. Allowing viewers to explore and manipulate the slideshow with hand movements is the technology's main objective. The technique recognises various hand motions for a variety of tasks using machine learning. A means of recognition opens up a line of communication between people and machines.

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Classification of Diseases in Vegetable Bearing Plants Using Deep Learning Methods

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ABSTRACT

Deep Learning methodologies can be used for computer vision application. Early detection of disease in crops is critical for producing profitable crop yield. To detect diseases in tomato and potato plant leaves, a convolution neural network-based classifier was created in this work. The types of diseases that are detected are of fungal, bacterial, viral and due to pests. The dataset used was an augmented version of Plant-Village Dataset. The proposed model achieved 98.14% training accuracy and a validation accuracy of 96.8 % when only potato plant data was used. The proposed model correctly classified with an accuracy of 93% in training and an accuracy of 91 % in validation. When the models were tested with new images in varying lighting conditions, they achieved an average accuracy of 85.3%.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750780,Mangalore,18-19 October 2024, pp 138-143.*

Paddy Care: Paddy Disease Identification and Classification Using Deep DenseNet Network

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ABSTRACT

Half of the world's population depends on rice as a staple crop, but disease threats to it are significant, particularly in major exporting nations like India. The delayed and inefficient nature of manual detection techniques worsens environmental issues brought on by excessive pesticide use. Beyond traditional approaches, recent deep learning innovations such as CNNs, In-ception V3 and MobileNetV2 show promise in disease diagnosis. Compared with existing methods, our proposed Deep DenseNet Network (DNN) achieves an astonishing 99.94 % accuracy in diag-nosing rice diseases. To have a greater agricultural impact, future research will concentrate on improving computing efficiency and expanding disease detection capabilities. Future research should focus on enhancing disease detection and computational efficiency for sustainable agricultural systems through deep learning and advanced image classification.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750707, Mangalore, 18-19 October 2024, pp 377-382.*

Identification and Prediction of Type of TB Based on Drug Resistance Using Machine Learning

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ABSTRACT

Tuberculosis (TB) has remained a major health concern and is the second deadliest infectious disease worldwide after Covid-19. This situation demands innovative approaches for detection and treatment, particularly in developing countries with limited resources for confirmatory tests. Traditional methods of diagnosis of the disease are based on multiple types of samples and various type of tests for each sample. In this study, we try to identify presence/absence of TB in an individual based on microbiological test results such as Microscopy, Culture and DST from the NIAID dataset which consist of patient cases from eleven countries of Eastern Europe, Asia and sub-Saharan Africa. Once presence of TB is confirmed, we try to classify the type of TB such as Mono, Poly, Multi or Extensive-Drug Resistance. Diagnosing of type of TB determines the drugs to be administered which is unique for each suspected individual. The research methodology involved data collection, preprocessing, and training ML models like Random Forest, Logistic Regression, Gradient Boosting classifier and KNN to predict TB types and identify drug resistance. The proposed method can be employed for identification of type of TB and suggest medication regimen based on DST results.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750664, Mangalore,18-19 October 2024, pp 400-403.*

Bidirectional Communication System for Deaf-Blind Individuals

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ABSTRACT

In a world that thrives on connectivity and communication, we often take for granted the power of simple yet profound interactions. For individuals with sensory impairments, particularly the deaf-blind community, these fundamental human connections are often limited, making everyday life a challenge. In response to this challenge, we propose an innovative and transformative project that aims to bridge the communication gap for the deaf-blind community, enabling them to engage in text-based conversations with ease. While advancements in technology have greatly improved communication for many, those who are both deaf and blind remain largely excluded from the digital world. This exclusion hinders their ability to engage in meaningful conversations, access information, and connect with others, leading to social and informational isolation. While existing solutions often focused on either blindness or deafness, this project aimed to provide a holistic communication solution for individuals with both impairments. Through rigorous testing, the bidirectional communication system demonstrated its ability to accurately transcribe speech-to-text, translate text-to-braille, and facilitate seamless interaction between users and hardware peripherals. The project's novel solution for deaf-blind communication brings significant advantages namely cost saving, streamlined labor, efficient space utilization, and energy conservation. The integration of speech-to-text with real-time braille hardware interaction enhances user experience, reducing the need for extensive manual interpretation.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750680, Mangalore, 18-19 October 2024, pp 115-119.*

Detecting Ransomware Threats using Machine Learning Approach

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ABSTRACT

The rise of ransomware-related cyber-attacks poses a severe threat to organizations across various sectors. This research addresses the urgent need for robust detection mechanisms using advanced machine learning (ML) models. Ransomware, characterized by irreversible encryption of user data, demands proactive strategies for identification and prevention. This study leverages publicly available ransomware and benign executable files from sources such as VirusTotal which are run in a sandboxed environment to obtain a dataset to train an ML model capable of differentiating between diverse ransomware samples and classifying them based on specific characteristics. The process begins with meticulous data preprocessing ensuring the dataset's quality. Feature extraction algorithms are employed to identify relevant characteristics, streamlining the dataset and optimizing model performance. The model is trained on the dataset to effectively learn patterns. Evaluation metrics, including accuracy, precision, recall, F1-score, and the ROC curve, provide comprehensive insights into the model's effectiveness.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750622, Mangalore, 18-19 October 2024, pp 126-131.*

Prediction and Modelling of Suicidal Mental Tendencies

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ABSTRACT

Suicide remains a pressing public health concern worldwide, necessitating effective predictive and preventive strategies. Predicting suicidal tendencies is a complex endeavor, as it involves multifaceted interactions between biological, psychological, and environmental factors. Advances in computational modeling and machine learning have provided promising avenues for understanding and forecasting these tendencies. Such models often integrate clinical data, including psychiatric history, symptom severity, and demographic information, with biological markers and psychosocial variables. The objective of our work is to identify patterns and risk factors that may indicate heightened suicidal risk. Ongoing research seeks to refine predictive models, incorporate real-time monitoring, and develop targeted interventions, aiming to reduce the incidence of suicide and provide timely support to those at risk. The application of suicide text analysis extends to user-friendly interfaces, allowing individuals to input text, receive predictions, and access relevant support. The analysis involves preprocessing techniques such as text normalization, stop-word removal, and stemming to enhance the quality of input data. Various machine learning algorithms, ranging from Naive Bayes to sophisticated ensemble methods, are explored to determine their effectiveness in predicting suicidal ideation.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750643, Mangalore, 18-19 October 2024, pp 404-409*

A Hybrid Approach for Skin Disease Detection Using GrabCut Segmentation and Inception-v3 Network

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ABSTRACT

Recently, deep learning algorithms have gained considerable interest due to their phenomenal capability of multitask detection and classification in various skin-related diseases. The goal of this paper is to propose a new skin disease diagnosis using a deep learning pipeline that incorporates some state-of-the-art preprocessing and classification techniques. Firstly, the extraction of the ROI is performed using the GrabCut algorithm, an already known technique in picture segmentation used for skin lesion isolation. Once the extraction process of the ROI has been accomplished, the resultant segmented images will be fed into the Inception-v3 deep neural network. This got several academicians and practitioners to praise the efficiency of the neural network for complex image classification tasks. Ensuring that the model is robust and generalizable, it has been trained and tested on a dataset with a wide variety of skin diseases. The results are indicative of the effectiveness of the methodology, which resulted in 98.34% classification accuracy. Considering such immense accuracy, there is scope for integrating efficient ROI extraction using GrabCut methodology along with a sophisticated deep learning model such as Inception-v3. An exactly similar approach could make a very valuable contributions toward early and accurate diagnosis of skin diseases by providing clinicians with a trusted tool for better decisions. These findings reveal the possible improvement in diagnostic accuracy that is applicable in comparison to other conventional approaches.

**Full paper: International Conference on Cybernation and Computation, DOI: 10.1109/CYBERCOM63683.2024.10803192, Dehradun 15-16 November 2024, pp 436-440.*

Pay-by-Palm: A Contactless Payment System

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ABSTRACT

Current payment systems, including cash, credit cards, and UPI can be inconvenient for users, prompting the need for a more robust and user-friendly payment system. Biometric authentication methods like palm prints can enhance security and the user experience, but there is a lack of a reliable system that integrates palm print recognition with e-wallets to facilitate payments at participating merchants. Existing payment systems fail to provide a secure and convenient way to pay using palm prints, with challenges regarding the accuracy, reliability, and privacy of palm print recognition technology. By integrating palm print recognition technology with e-wallets, this work aims to meet the growing demand for a more advanced payment system that enhances the user experience while providing a secure way to make payments.

**Full paper: Advances in Data-Driven Computing and Intelligent Systems, Lecture Notes in Networks and Systems, 892, 2024, pp 329-344.*

Enhancing Road Safety through Innovative Traffic Sign Detection and Recognition with YOLOv5

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ABSTRACT

Traffic signs are vital for maintaining smooth traffic flow and preventing accidents, conveying crucial information to drivers through pictorial representations. However, drivers often overlook these signs, leading to potential accidents due to factors like difficulty in focusing, fatigue, and environmental conditions. To tackle this issue, innovative machine-learning techniques have been developed. While traditional traffic sign detection relied on conventional object detection methods, recent advancements, particularly the YOLOv5 ('You Only Look Once') algorithm, have significantly improved accuracy and speed. YOLOv5, with its grid structure, is renowned for achieving a remarkable accuracy rate of 90.25%. Our proposed solution leverages YOLOv5 for object detection, dividing images into a grid to locate objects efficiently. The technology not only enhances accuracy but also provides real-time analysis and alerts users through audio signals. In future work, our goal is to further enhance the model's accuracy, expand its capabilities for detecting various signs, and implement it in real-time applications.

**Full paper: International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics, DOI: 10.1109/IITCEE59897.2024.10467719, Bangalore, 24-25 January 2024, pp 1-4.*

Virtual Trial System using Haar Cascades Classifier Algorithm

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ABSTRACT

In shopping, many still prioritize the traditional in-store experience, often hindered by long queues for trial rooms. However, the introduction of Virtual Mirrors offers a transformative solution through Virtual Trial Rooms, enabling customers to effortlessly try on a diverse range of clothing items without the need for physical fitting, revolutionizing the shopping process.The "Virtual Trial Room" employs a Kinect Sensor to enable a real-time virtual fitting experience, where the system captures the user's skeletal data and utilizes it within Unity to overlay clothing onto the user's image. This live streaming video displaying the user adorned in the selected clothing is then presented as the output on the screen.

**Full paper: Proceedings of the 15th International Conference on Computing Communication and Networking Technologies, DOI: 10.1109/ICCCNT61001.2024.10724466, IEEE, Kamand, 24-28 June 2024, pp 1-6.*

GAN-Based Encoder-Decoder Model for Multi-Label Diagnostic Scan Classification and Automated Radiology Report Generation

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ABSTRACT

X-ray imaging is one of the most popular diagnostic imaging techniques and plays a critical role in the diagnosis and treatment process. Given the huge volume of patients and scans performed in most hospitals each day, the current practice of manual analysis of such scan images by experienced radiologists is a time-consuming and often error-prone process, worsened by the cognitive burden experienced by the radiologists. Conventional diagnostic reports written by radiologists after radiological image capture contain radiography-specific keywords (tags), observations of different body parts in the image (findings), and the actual diagnosis (impression). Automated multi-label classification of X-ray scans for disease prediction, and generation of an associated textual diagnostic scan report can ease the burden for radiologists, while also enabling fast, localized, and explanatory analysis. In this work, GAN-MLC, a CNN-LSTM description generator model trained in the adversarial setup, is proposed for the multi-label classification of X-ray images and improved feature learning for capturing disease-specific findings. Experiments performed on the NIH Chest X-ray Dataset revealed that the proposed GAN-MLC outperformed CNN-based models by a significant margin of more than seven percent. For the text diagnostic report generation task, the GAN-MLC achieved promising BLEU scores and was more robust against overfitting issues.

**Full paper: Handbook of AI-Based Models in Healthcare and Medicine, 2024, pp 93-109.*

INTELLIGENT COMPUTING & BUSINESS SYSTEMS

A Comprehensive Survey Exploring the Application of Machine Learning Algorithms in the Detection of Land Degradation

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ABSTRACT

Early and reliable detection of land degradation helps policymakers to take strict action in more vulnerable areas by making strong rules and regulations in order to achieve sustainable land management and conservation. The detection of land degradation is carried out to identify desertification processes using machine learning techniques in different geographical locations, which are always a challenging issue in the global field. Due to the significance of the detection of land degradation, this article provides an exhaustive review of the detection of land degradation using machine learning algorithms. Initially, the current status of land degradation in India is presented, along with a brief discussion on the overview of widely used factors, evaluation parameters, and algorithms used. Consequently, merits and demerits related to machine learning-based land degradation identification are presented. Additionally, solutions are prescribed in order to reduce existing problems in the detection of land degradation. Since one of the major objectives is to explore the future perspectives of machine learning-based land degradation detection, areas including the application of remote sensing, mapping, optimum features, and algorithms have been broadly discussed. Finally, based on a critical evaluation of existing related studies, the architecture of the machine learning-based desertification process has been proposed. This technology can fulfill the research challenges in the detection of land degradation and computation difficulties in the development of models for the detection of land degradation.

**Full paper: Journal of Degraded and Mining Lands Management, DOI: 10.15243/jdmlm.2024.114.6471, Vol 11, Issue No 4, 2024, pp 6471-6488.*

A Novel Stock Prediction Using Algorithmic and Fundamental Approaches

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ABSTRACT

This study presents an integrated strategy for stock forecasting and algorithmic trading by combining fundamental analysis, technical analysis, and insights from reliable financial sources. The system employs machine learning to analyze re al- time stock data from Zerodha, generating accurate buy/sell signals. Core components include the examination of company financials, key performance indicators, technical indicators such as moving averages and RSI, and the integration of signals from trustworthy financial news outlets. Machine learning models for predictive cost analysis further refine decision-making processes. Automated trade execution via Zerodha's API facilitates seamless operations. This multifaceted approach aims to enhance the precision and automation of trading systems compared to traditional methods. By harnessing diverse data sources and advanced analytical techniques, the system aspires to offer dependable trading signals and optimize market operations, providing traders with a competitive advantage. The project endeavors to develop a robust stock valuation and trading framework that adapts to evolving market conditions, ensuring efficiency and reliability in algorithmic trading.

**Full paper: International Journal of Research and Analytical Reviews(IJRAR),DOI:http://www.ijrar.org/IJRATIDUP114.pdf, Vol 11, Issue No 4, October 2024, pp 469-478.*

Nurturhub: A Smart Maternal Health Monitoring Device for Post Partum Depression

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ABSTRACT

Wearables integrated with AI and IoT platforms are used to monitor stress, maternal health, and mental illness, offering personalized insights and recommendations. The device uses sophisticated sensors, such as heart rate (HR), blood volume pulse (BVP), and electrodermal activity (EDA) sensors, to gather physiological data from expectant moms. These technologies promise enhanced healthcare outcomes through continuous data-driven interventions. The proposed work of Nurturhub, pioneers a transformative approach to pregnancy care by integrating advanced technology to prioritize the holistic well-being of expectant mothers. Through the integration of machine intelligence and sensor technology, Nurturhub provides a comprehensive solution for prenatal care, enabling individualized health insights and ongoing monitoring. Its use throughout pregnancy may lead to better mother health outcomes, early postpartum depression identification, and general well-being. The methodology employs comprehensive sensor data extraction, preprocessing, and model development, resulting in exceptional accuracy in stress classification and personalized recommendations for maternal health management. By leveraging technology and compassionate support, Nurturhub sets a new standard for comprehensive perinatal care, with future endeavors aimed at expanding to encompass additional health parameters and enhancing data security measures.

**Full paper : Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750573, Mangalore, 18-19 October 2024, pp 339-344.*

IoT-Based Heart Disease Monitoring using Neural Networks for Detecting Arrhythmia and Assessing Hypertrophic Cardiomyopathy(HCM) Risk

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ABSTRACT

Advancements in deep learning and IoT technology have the potential to revolutionize healthcare, as evidenced by recent developments in remote health monitoring systems. Even if they are cutting-edge, current systems frequently fall short regarding cost-effectiveness, patient-centered treatment, and real-time accuracy. Conventional approaches that rely on hospital-centric models are less accessible and resource-intensive, especially in rural areas. Furthermore, a lot of IoT-based solutions have trouble with early intervention and accurate data, both of which are necessary for managing chronic disorders like heart disease. This research offers a novel IoT system for monitoring remote cardiac illnesses, such as arrhythmia and hypertrophic cardiomyopathy (HCM). The MLX90614 non-contact body temperature sensor, the AD8232 ECG sensor, and the heart rate sensor are integrated into the system along with NodeMCU for data collecting and storage. A Deep Neural Network (DNN) model for heartbeat classification is trained using the information gleaned from these sensors, which is then saved in Excel sheets for examination. Our methodology, which shows an impressive 98% accuracy rate, emphasizes using a simplified DNN model trained on Excel data to achieve accurate heartbeat predictions, in contrast to traditional CNN-based approaches. Additionally, a web application has been provided to improve accessibility and facilitate early detection of potential health issues, optimizing patient care. With continued study and development, the suggested approach promises to improve accuracy and efficiency even more, marking a substantial improvement in home healthcare technology.

**Full paper : Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750729, Mangalore, 18-19 October 2024, pp, 388-393.*

DStruct: Handwritten Data Structure Problem Solving using Detectron2 and YOLO

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ABSTRACT

This project presents a comprehensive approach to address the challenges of handwritten data structure and algorithm (DSA) problems through the integration of computer vision, Optical Character Recognition (OCR), and algorithmic analysis. Our methodology entails the creation of meticulously annotated datasets of handwritten graph images, crucial for training our models effectively. Leveraging state-of-the-art techniques, we employ Detectron2 and YOLO for robust detection of handwritten elements, including nodes and edges in DSA problem graphs. Additionally, the Microsoft Azure OCR API facilitates the accurate extraction of textual content from handwritten images, providing essential data for algorithmic analysis. Through experimentation and evaluation, our approach demonstrates remarkable accuracy and efficiency gains compared to conventional methods, with accuracy rates about 95% in adjacency matrix generation and 81% in weighted matrix generation. These results underscore the efficacy of our methodology in streamlining algorithmic problem-solving processes, significantly reducing manual effort, and enhancing productivity. The implications of our findings extend beyond mere efficiency gains, as the automation of DSA problem analysis holds promise for accelerating learning and education in the field. Future work will focus on refining our models, expanding to tackle diverse DSA problems, and exploring educational applications to empower learners and educators alike in the realm of data structures and algorithms.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI: 10.1109/DISCOVER62353.2024.10750745, Mangalore, 18-19 October 202, pp 1-6.*

Artificial Intelligence Assisted Student States Monitoring Based on Enhancing Cognitive and Emotional Feedback Mechanism using Collaborative Learning Environments

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ABSTRACT

The survey elaborates the specified exploration of rising generation which enhances the pupil's cooperative problem-solving in computer network troubleshooting by analyzing the present literatures and also add-ons to the discussion about improving learning studies through pedagogical origination and technological integration through synthesizing literature evaluation, methodological development, and empirical evaluation. The effects offer clear cut explanation on how AI-driven structures for remarks can transfigure coaching methods and encourage the continued growth of educational strategies.A preliminary exploration is carried out to scrutinize multimodal data, which includesvarious methods to identify students' cognitive and affective conditions, methodically distinct educational results with and without feedback systems, and crafting novel techniques for in-the-moment analysis and adaptation of instructional strategies. In the pilot project, a new approach is introduced called Feedback and Emotion based Student State Analysis (FESSA), in which it evaluates the students work in small groups to solve problems cooperatively while their eye movements and emotional reactions are monitored. To understand the emotional and cognitive processes involved in learning, this research based data is evaluated. To examine the effect of feedback structures on learning results and scholar engagement, a comparative analysis is performed. The cause of this assessment is to offer steerage for evidence-based coaching practices in efficient learning environments. In the end, creative approaches are generatedafter identifying the research gap through literature for the analysis and real-time modification of instructional strategies, emphasizing prompt modifications to student reactions and changing learning necessities. The results of this study are projected to contribute significantly to education on the effectiveness of creative learning strategies and response systems. The mission goal is to enhance mastering via the usage of ultramodern technology which includes synthetic intelligence and multimodal data evaluation. This research and its findings ultimately enhance the effectiveness and relevance of teaching in today's educational settings.

**Full paper: Proceedings of the International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), DOI: 10.1109/ACCAI61061.2024.10601800, Chennai, 9-10 May 2024, pp 1-5*

Malware Detection using Machine Learning

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ABSTRACT

Malware continues to be the largest issue that Internet users confront in the modern world. Polymorphism is one of this kind of malware's characteristics. Malware that continuously alters its distinguishing features in order to evade detection with conventional signature patterns is known as polymorphic malware. Ransomware-based behavioral analysis uses not only personal data but also the actions it generates within or after a certain period of time. This model can be used to detect malware families and predict whether a review, whether positive or negative, is malware. It can also be used to train other machine learning techniques. This work discusses how different machine learning techniques can be used to improve behavioral analysis and behavior-based malware detection and classification systems. Which malware family the process comes from and which anti-malware or anti-virus software can create a unique signature to identify it. Malware can be classified as spyware, financial support ransomware, etc. depending on their motivation. can be classified as. A fundamental grasp of malware types and their techniques is necessary in order to use machine learning to malware detection.

**Full paper: Second International Conference on Advances in Information Technology (ICAIT), DOI: 10.1109/ICAIT61638.2024.10690638, Chikkamagaluru, 24-27 July 2024.*

An Optimized Hybrid Quantum Deep Neural Network Model for Quantum Audio Steganography and Steganalysis

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ABSTRACT

Because of the development of quantum registering and quantum correspondence organizations, scientists are presently keen on how pictures and sounds can be addressed in quantum terms. The principal parts of the recommended model are (a) quantum sound steganography and (b) quantum sound steganalysis. From the outset, LSB-based quantum stego sound was made with a plan for quantum sound steganography in view of the LSB technique. Then, another deep learning model that joins the Advanced quantum Deep Neural Network and the quantum repetitive brain network is recommended. The better Mel-Frequency Cepstral Coefficients (MFCCs), Ghastly Data transfer capacity, Zero-Crossing Rate, and Tonal Centroid Features (Tonnetz) are a portion of the elements that are utilized to prepare the blended deep learning model. With the assistance of the new half breed enhancement model, the heaviness of the Advanced quantum Deep Neural Network is adjusted. Gazelle Optimisation Algorithm (GOA) are theoretically improved by the planned hybrid optimisation model. The GOA was made to some degree to seem to be the way gazelles figure out how to remain alive in our current reality where foes are the standard .

**Full paper: Proceedings of the 2nd IEEE International Conference on Advances in Information Technology, ICAIT 2024, Chikkamagaluru, pp 1-6.*


CIVIL ENGINEERING

Development of Sustainable Conductive Cementitious Composite Using Graphite-Coated Spent Catalyst Waste

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ABSTRACT

This study presents an innovative approach to developing sustainable conductive composites by coating graphite onto the surface of spent catalyst waste through nano-surface engineering techniques. The process ensures uniform adsorption of graphite onto the surface of the spent catalyst waste particles, followed by oven treatment and milling. This results in better integrity and effective bonding, leading to the production of graphite-coated spent catalyst waste (G-SCW). Scanning electron microscopy indicates the successful coating of spent catalyst waste with graphite. The research investigates the effect of G-SCW on the cementitious properties of paste and mortar. Incorporating G-SCW results in acceptable workability and setting time, while the compressive strength increases at early and later stages, with up to 20 % G-SCW content. The addition of G-SCW in the mortar significantly reduces the electrical resistivity, resulting in a 63 % reduction in resistivity compared to the reference mix, thereby enhancing the conductivity. Hydration studies confirm the presence of pozzolanic reaction in blended paste, as evidenced by a decrease in calcium hydroxide content. The sustainability assessment indicates a substantial reduction in embodied carbon and possibly producing mortar with lower cement content. These findings suggest great potential for developing sustainable conductive mortar with G-SCW, enabling smart building construction, and supporting sensor networks for structural health monitoring.

**Full paper:Journal of Building Engineering, DOI: https://doi.org/10.1016/j.jobe.2024.109864, Vol 93 September 2024, pp 109864*

Evaporation from Dams Governing the Water Cycle Dynamics of a Regulated River Basin from The Western Ghats: Sharavati, India

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ABSTRACT

Study focus: A small mountainous river system, Sharavati, was selected to study the impact of river damming on the hydrological cycle. Sharavati river flow is regulated by two dams, Linganamakki and Gersoppa. Despite the Western Ghats' global significance in controlling local and regional climates, the effects of damming on its hydrological cycles have received limited attention. A stable water isotopic approach was employed in the study. New hydrological insights for the region: The line-conditioned excess (lc-excess) was primarily negative across all seasons. Notably, the pre-monsoon season exhibited comparatively higher evaporation with high negative lc-excess, while the postmonsoon lc-excess values approached zero, indicating minimal evaporation. The sampling points from the dams exhibited very high evaporation signals, the evaporative loss during the pre-monsoon season from the Linganamakki reservoir was estimated as 10 %, and from the Gersoppa dam was 6 %. Consequently, ground water sampled near the dams, plotted along the local evaporation line indicating recharge from the evaporated reservoir water. Damming has affected the hydrological cycle of the heavily regulated Sharavati River, transforming the entire catchment into a connected, narrow lake-like structure, especially during the pre-monsoon season. Since the Western Ghat river systems are regulated by many large and small dams, it is pertinent to study the impact of damming on the hydrological cycles of the entire system.

**Full paper: Journal of Hydrology: Regional Studies, DOI: https://doi.org/10.1016/j.ejrh.2024.101896 Vol 54, August 2024, pp 101896*

Improving Landfill Liner Performance with Bentonite-Slag Blend Permeated with Ammonia for a Municipal Solid Waste Landfill

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ABSTRACT

Leachate emanating from landfills contains ammonia which may cause serious health effects on living things. An effectively designed clay barrier should not allow the contaminant to infiltrate the soil and groundwater systems. The utilization of certain industrial by-products in engineered landfill barriers, not only reduces the need for conventional liner materials but also helps in sustainable waste management. This study investigated the hydraulic conductivity, unconfined compressive strength, compaction, and adsorption characteristics of lithomargic clay blended with an optimum percentage of bentonite (10%) and granulated blast furnace slag (15%) permeated with ammonia. The results revealed that increasing the content of granulated blast furnace slag decreased the maximum dry density while increasing the optimum moisture content. In comparison to lithomargic clay, the hydraulic conductivity of the amended soil liner permeated with ammonia decreased from a value of 3×10^{-8} m/s to 5×10^{-10} m/s. The unconfined compressive strength of the amended soil specimens showed an increasing trend with curing times (i.e., 0, 14, 28, and 56 days). The batch adsorption results revealed that Freundlich and Langmuir's isotherm fits the equilibrium adsorption data and the adsorption of ammonia on clay liner follows non-linear behaviour. Overall, the experimental results implied that lithomargic clay blended with 10% bentonite and 15% granulated blast furnace slag can be used as an impermeable soil reactive barrier in engineered landfills.

**Full paper:Journal of Environmental Management, DOI: https://doi.org/10.1016/j .jenvman.2024.122013, Vol 367, 2024, pp 122013*

Valorization of Coffee Cherry Waste Ash as a Sustainable Construction Material

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ABSTRACT

This study explores the potential of treated coffee cherry waste (T-CCW) as a partial replacement of cement in mortar. T-CCW was characterized and incorporated into pastes and mortars at 5 %– 25 % cement replacement. The main objectives were to examine the fresh and hardened prop erties, hydration, and environmental assessment. Results showed that the high specific surface area and porous structure of T-CCW particles increased water demand and accelerated setting times. T-CCW incorporation of up to 15 % enhanced compressive strength at all curing ages due to improved hydration and limited pozzolanic reactions. Ultrasonic pulse velocity indicated good homogeneity and compactness in T-CCW blended mortars. Microstructural analysis revealed that T-CCW enhanced cement hydration, leading to a denser matrix. Environmental analysis showed a reduced embodied carbon and cement intensity index compared to the control mix. Overall, the optimal performance was observed at 15 % T-CCW replacement, significantly improving engi neering properties and environmental impact. Further, the fishbone diagram addresses various factors to optimize the use of T-CCW as a cementitious composite. These findings demonstrate the potential of T-CCW as a sustainable construction material, offering a promising pathway towards environmentally friendly and resource-efficient building practices while addressing waste man agement in the coffee industry.

**Full paper: Journal of Building Engineering, DOI: https://doi.org/10.1016/j.jobe.2024.110796, Vol 97, November 2024, pp 110796.*

Areca Nut Husk Biochar as a Sustainable Carbonaceous Filler for Cement: Pyrolysis Temperature and its Effect on Characterization, Strength and Hydration

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ABSTRACT

l groups in AB at higher temperatures, confirming enhanced carbonization. Thermogravimetric analysis (TGA) revealed greater thermal stability of AB. X-ray diffraction (XRD) indicated a carbon-rich amorphous structure and crystalline graphite carbon formation in AB. Incorporating AB at 2 % into cementitious composites substantially increased the compressive strength compared to the control mortar. At 7 and 28 days, the compressive strength increased by 8 % and 12 % for AB 300, 16 % and 21 % for AB 400, and 27 % and 34 % for AB 500. This improvement was due to the micro filler effect of AB, which improved the compactness of the cementitious matrix. Hydration studies from TGA showed that the addition of AB accelerated early-stage hydration, with the degree of hydration increasing from 46 % (in control mix) to 48–53 % in AB blended mixes using Bhatty's method. FTIR analysis demonstrated improved hydration of silicate phases and C-S-H formation in the presence of AB, supported by XRD analysis. AB blended mortar reduced the CO_2 equivalent emission by 22 % compared to the control mortar attributed to its carbon sequestration capacity. These results highlight the potential of AB as a sustainable carbonaceous filler for cementitious composites, offering an environmentally friendly option for future research in construction materials.

**Full paper: Industrial Crops and Products, DOI: https://doi.org/10.1016/j.indcrop.2024.119883, Vol 222, Part 4, December 2024, pp 119883.*

Study on the Performance of Hydrophilic Curing Agent and Environmentally Friendly Non-Pozzolanic Filler for the Development of Self-Curing Self-Compacting Concrete

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ABSTRACT

Self-compacting concrete (SCC) is often used when compaction is difficult, requiring special attention to the curing process. However, traditional curing methods usually fail in practice. Despite taking precise measures to control water evaporation, surface water on vertical structure elements can still be problematic. To address these challenges, this study seeks to investigate the possibility of creating self-curing self-compacting concrete (SCSCC). Since the curing agent used has a significant impact on the production of SCSCC, this study examines the effects of using polyethylene glycol (PEG), a hydrophilic agent, at varying rates of 0.5%, 1%, 1.5%, and 2% on the fresh, hardened, and durability characteristics of the material. Additionally, to improve the sustainability properties of SCSCC, manufactured sand (M-sand) acquired from crushing rocks is used as a filler. Overall, the results indicate that the use of superplasticizer and M-sand is enough to achieve the required flowability for SCC mixtures without requiring specific fillers, and this method is effective in immediately controlling bleeding and segregation while maintaining the necessary compressive strength at all ages. The hardened properties of SCSCC were found to be improved by increasing the PEG content up to 1.5%, with an optimal range of 0.75% superplasticizer. Furthermore, the results demonstrate that the self-cured specimen, cured with PEG, has greater acid resistance than the conventionally cured one.

**Full paper: Environmental Science and Pollution Research, Vol 31, Issue No 55, 2024, pp 64210–64227.*

ELECTRONICS AND COMMUNICATION ENGINEERING

A Study on Secured Encryption of Medical Images using Significant Visual Cryptography

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ABSTRACT

The medical images of people are important and sensitive and cannot be shared with the public considering privacy measures. Maintaining the confidentiality of the medical image is essential, and leakage of such information can cause great loss. Therefore, the information has to be secured while being transferred through a third party, which can be any network medium. Thus, there is a need for developing a robust encryption algorithm. These algorithms improve the security of the ongoing pictures by compromising the nature of the picture and utilizing complex calculations. Algorithms that work on the nature of the picture by utilizing complex cycles, for example, error diffusion, halftoning, wavelet transform, and dithering, lead to time complexity. Thus, a compact and efficient cryptographic algorithm is proposed with fewer mathematical computations that ensure the secured transmission and reception of medical images through the medium using Significant Visual Cryptography (SVC). In SVC, initially, the quality of the secret images (SI) is improved by using the Error Abatement Technique (EAT). The output of EAT is used to generate random share values, which are then implanted in cover pictures. The shares that are transmitted do not reveal the secret information present in the original image because of the steganography features involved in this technique. The integrated check value (ICV) is calculated over the region of interest (ROI) at the encryption and decryption sides to provide additional security. Quality and security analyses have been carried out to ensure the robustness of the algorithm. The detailed study proved that the proposed algorithm beat the constraints of the current calculations. The concept of checking the integrity value and steganography features enhanced the effectiveness of the algorithm.

**Full paper: Engineering Research Express, DOI:10.1088/2631-8695/ad3dad, IOP Publishing Ltd, Vol 6, Issue No 2, 2024, pp 1-19.*

Optimizing Load Distribution for Efficient Content Delivery Networks in Suburban Areas

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ABSTRACT

Ensuring uninterrupted traffic flow is crucial for the efficient design and deployment of content delivery networks. The growing need for internet bandwidth in suburban areas has pushed service providers to upgrade their networks in order to meet the increasing demands. Nevertheless, it is essential to consider the importance of resource optimization in terms of reducing costs. An alternative plan must be devised by the service provider to effectively manage unpredictable fluctuations in demand. Enhancing the efficiency of computational resources enables network operators to adjust resource quantities in response to fluctuating traffic demands. Datacenters are interconnected using optical networking technologies. Our research focuses on developing a load distribution architecture that optimizes network utilization by minimizing redundancy. To optimize the utilization of these resources, it is crucial to strategically arrange the placement of SMF in OXCs. This will enable the establishment of a network of optical paths that effectively connect the data centers catering to users. Using SFPs of higher order will result in higher initial installation costs. However, the cost of upgrading the switches to meet the growing demand can be fairly substantial. Various devices can be used to establish network connectivity and facilitate the exchange of data. Afterwards, the proposed work is validated to assess its optimization and efficiency through the application of the Porter 5 force model. The results indicate that the proposed method of implementing higher order SFP is an effective approach for addressing the growing need for increased bandwidth.

**Full paper: Hunan Daxue Xuebao/Journal of Hunan University Natural Sciences, DOI: 10.5281/zenodo.13119983, Vol 61, Issue No 07, 2024, pp 68-78.*

Identifying Subtypes of Acute Lymphoblastic Leukemia Using Blood Smear Images: A Hybrid Learning Approach

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ABSTRACT

Leukemia is a type of blood cancer that affects a large number of people worldwide. Detecting and classifying leukemia is crucial in determining the treatment plan for patients and improving their chances of survival. The design of a hybrid model comprising MobileNet as a feature extractor and Support vector machine algorithm to classify the leukemia cells into four classes: benign, pre-B, early pre-B, and pro-B. The confusion matrix calculates various performance metrics such as F1 score, accuracy, recall, and precision in this method. The experimental results show that the suggested model performs better than the existing state-of-the-art models for leukemia cell classification, obtaining a remarkable existing state-of-the-art model for leukemia cell classification, obtaining an accuracy in classification of 99.3%. The proposed approach can aid in the early detection of leukemia, leading to better treatment outcomes and improved patient survival rates.

**Full paper: Journal of the Institution of Engineers(India)SeriesB, DOI: org/10.1007/s40031-024-01069-0, 2024, pp 1-12*

Nurturing Future Engineers Through Industry- Oriented Training: The Imperative of Core Competencies

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ABSTRACT

This research paper investigates the transformative effects of Industry-Oriented Training (IOT) at St Joseph Engineering College both on engineering and management graduates. The IOT course under evaluation emphasizes five essential skill sets: communication, self-evaluation, leadership, team building, and problem-solving. The study analyzes the impact of this comprehensive training endeavor on students' academic performance, employment, and career paths. The findings demonstrate the tangible benefits of the well-planned and structured IOT curriculum. The program's participants graduate with the critical problem-solving abilities essential for success in challenging work environments. The investigation extends beyond traditional academic metrics to demonstrate the substantial impact of IOT on professional and personal development. This study emphasizes the critical significance of effective communication, the potency of self-evaluation in fostering adaptability, the transformative potential of leadership skills, the value of teamwork in achieving common goals, and the critical significance of problem-solving prowess in addressing contemporary challenges. This study indicates how industryoriented training acts as a catalyst for holistic growth, enabling students to not only meet but also exceed the expectations of the engineering and management landscape's constantly evolving expectations. For educators, organizations, and corporations committed to fostering the next generation of dynamic and competent professionals, the paper offers insights that will be invaluable.

**Full paper: Journal of Engineering Education Transformations, DOI: 10.16920/jeet/2024/v37is2/24141, Vol 37, Issue No 2, 2024, pp 931-938.*

Volumetric Analysis of Choroid Plexus for The Early Detection of Alzheimer's Disease

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ABSTRACT

Alzheimer's Disease (AD) is a chronic cognitive neurodegenerative condition characterized by cognitive dysfunction, including memory loss and language impairment. This research introduces a Computer-Aided Detection (CAD) system designed for the early detection of AD through the calculation of volume of Choroid Plexus (CP). The study incorporates seventy-five T1-weighted image samples, each comprising twenty-five cases of AD, Neuropathological Change (NC), and Mild Cognitive Impairment (MCI). CP volume is determined by computing compactness and circularity. The methodology involves skull stripping, followed by Canny edge detection and morphological filtering to identify the Region of Interest (ROI). Compactness and circularity are then calculated from the ROI. Classification of MRI images into AD, MCI, and NC is based on predetermined values for compactness and circularity of CP. The study reveals average compactness values of 107.48, 82.34, and 66 for AD, NC, and MCI, respectively, with corresponding circularity values of 0.13, 0.16, and 0.22.

**Full paper: Proceedings of the 13th International Conference on Software and Computer Applications. New York, DOI: org/10.1145/3651781.3651807, New York, 1-3 February 2024, pp 172-177.*

Non-Invasive Diabetes Detection System using Photoplethysmogram Signals

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ABSTRACT

Diabetes Mellitus (DM) is a chronic condition, where the body is unable to control blood sugar levels. In this paper, a non-invasive method to classify diabetic and non-diabetic cases is discussed. The collection of blood samples from patients by puncturing their fingers causes discomfort, pain, and infection, which are serious drawbacks of commercially available invasive blood glucose level monitoring systems. A novel non-invasive device for classifying blood sugar level is developed using a Near-Infrared sensor (NIR). Photoplethysmogram (PPG) signals, which are sensitive to blood glucose levels, are acquired using NIR sensors. ANOVA statistical analysis is used to identify significant features from the PPG signal. Quadratic SVM provided better results for features such as first derivative crest, time of inflection, and age in classifying the diabetic and non-diabetic subjects. Results from real-time PPG signals are compared with features taken from a diabetes dataset from Kaggle. The results showed that proposed PPG signal analysis method performed better.

**Full paper: International Conference on Data & Information Sciences, Lecture Notes in Networks and Systems, Springer, DOI: org/10.1007/978-981-99-6906-7_39, 2024, pp 457–467.*

Low Power Single Cycle RISC V Processor for Biomedical Applications

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ABSTRACT

Edge computing has become the preferred choice over cloud computation due to the growing popularity of the Internet of Things (IoT). However, the scarcity of resources at the periphery presents a significant obstacle, especially in terms of energy efficiency. This problem poses a significant barrier to the expansion of edge computing devices. Power consumption is of utmost importance in applications such as wearable technology and health monitoring systems. Using intricate, pipelined, versatile processors in these inexpensive applications is not efficient. It leads to an excessive consumption of power. As a result, edge computing systems demand solutions that are minimal in power consumption yet still capable of delivering enough performance output. The purpose of our study is to introduce a power-efficient RV32IM processor that utilises a single-cycle RISC-V Instruction set architecture (ISA). This processor is tailored specifically for biomedical-based edge nodes with limited resources. The comparison result indicates that the proposed architecture has a power consumption of 0.09 mW/MHz with an area of 0.24 mm2 and is most suitable for low-end or wearable biomedical applications.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI:org/10.1109/DISCOVER62353. 2024.10750715, Mangalore, 18-19 October 2024, pp 176-180.*

Implementation of Digital FIR Filter Using Optimized Hybrid Arithmetic Unit

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ABSTRACT

As mobile computing and multimedia applications gain traction, there's a growing need for high-speed computational systems in digital signal processing (DSP), particularly in telecommunications. Digital Finite Impulse Response (FIR) filters are crucial in achieving optimal results. This paper introduces a high-performance FIR filter design utilizing a hybrid architecture that combines adders and multipliers to optimize filter performance. Given the significance of power consumption in electronic devices like mobile phones, the paper also addresses the challenge by presenting the design and implementation of a low-power FIR filter for DSP applications, focusing on reducing dynamic power while maintaining filter efficiency.

**Full paper: Proceedings of the IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), DOI:10.1109/DISCOVER62353.2024. 10750574, Mangalore, 18-19 October 2024, pp 187-191.*

Revolutionizing Vehicle Safety: IOT-Enabled Inter Vehicular Communication for Real-Time Data Transfer and Emergency Response Via Wi-Fi

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ABSTRACT

The integration of Internet technology has led to the seamless incorporation of cloud computing into automotive systems, resulting in the development of autonomous vehicles known for enhanced efficiency and robust security. Through the utilization of Wireless Fidelity (Wi-Fi) technology, intervehicular communication has been established, employing internet proto- cols as the conduit for the real-time transmission of diverse sensor data between two vehicles. This exchange forms the basis for intelligent decision-making processes, with Node Microcontroller unit (NodeMCU) chipsets serving as integral components in the intricate framework. Operative within the 2.4GHz frequency spectrum, these chipsets facilitate the expeditious transfer and real-time processing of data, demonstrating the mechanisms that yield visual outputs through seamless integration with cloud infrastructure. The outcomes yielded were both efficacious and precise, evincing a seamless data transfer devoid of any latency. The two chipsets demonstrated facile data transmission through a cloud-based repository, amenable to simultaneous access by a tertiary chipset. Real-time inputs and outputs conformed meticulously to external environmental conditions, validating the anticipated efficacy of the proposed model. Leveraging Wi-Fi technology provided the system with an encrypted channel for data transmission, thereby enhancing speed and resulting in rapid and accurate inter-vehicular responses. This strengthens security and expedites Cellular Vehicle-to-Everything (CV2X) communication

**Full paper: Proceedings of the 11th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), DOI: 10.1109/ICRITO61523.2024.10522257, Noida , 14-15 March 2024, pp 1-6.*

Fire Prediction and Detection in Waste Management Site

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ABSTRACT

Secure trash disposal is essential in today's waste management because of its significant effects on the environment and public health. An increasing increase in fires poses a serious threat to financial stability and ecosystems, unleashing toxic pollutants, even in the face of major developments in waste facilities. Strong early fire prediction and detection systems must be put in place in order to meet this issue. These solutions, which make use of cutting-edge technologies like complex sensors and data analysis, promise to improve early warning capabilities. This proactive strategy offers a critical advancement in the face of growing global waste worries because it not only protects lives but also lessens its negative effects on the environment.

**Full paper: International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE), Vol 10, Issue No 7, 2024, pp 1-7.*

A Comprehensive Study on Image Segmentation Using Pulse-Coupled Neural Networks

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ABSTRACT

Pulse-Coupled Neural Network (PCNN) operates as a matrix of neurons, each uniquely corresponding to a pixel in the image being processed. Unlike traditional neural networks, PCNN does not require any training, making it highly suitable for image segmentation tasks. However, the complexity of PCNN arises from its numerous parameters, making parameter selection a challenging endeavor. In this work, we introduce a simplified PCNN architecture that includes an automatic parameter determination method. This approach is specifically designed for binary image segmentation and has been tested on various images, yielding results with distinct and desirable features. The proposed network iterates only four times, enhancing its efficiency. During pre-processing, RGB images are converted to HSV color space, and the V component undergoes further processing. This component is first filtered using an averaging filter, followed by a sharpening filter. The parameters for the PCNN are then generated automatically, eliminating the need for manual selection and making the network highly suitable for real-time image processing. The performance of the proposed network has been verified through tests on a variety of images.

**Full paper: International Journal of Scientific Research in Engineering and Management (IJSREM), DOI:10.55041/IJSREM35526, Vol 8, Issue No 6, 2024, pp 1-5.*

A Smart IOT Solution for Monitoring and Predicting Grocery Freshness and Quality

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ABSTRACT

According to the statistics,40% of the food produced is wasted before it reaches the consumers. The core problem lies in logistics and infrastructure. Firstly weather varies widely and it makes generalization difficult. This makes it impossible for perishables to naturally survive long-haul transport. Secondly, cold storage facility is not available and affordable to all farmers. Today food spoilage is a crucial problem. The food we consume can affect in any form of contamination that may occur due to storage or chemical changes within the food. This makes it necessary to develop a system that can help people to identify and predict the freshness of food or quality of food items. A smart grocery management system helps users manage groceries in large warehouses and long transportations. Users no longer have to worry about continuous food monitoring. This project aims to ensure the freshness of grocery by predicting the spoilage of grocery in prior and to notify the user about the same so that he can take necessary precautions to prevent grocery spoilage.

Continuous analysis of temperature and humidity of the grocery is carried out by using DHT11 Temperature and Humidity sensor to monitor varying parameters of the grocery. ESP8266 Node MCU is used as the main controller of the system which is used to control the sensing action of the sensor. Data collected from the sensor is used to analyse the variations in the values of temperature and humidity when the grocery is fresh and when it is completely spoilt. The humidity and temperature data are sent to the cloud storage by using the Wi-Fi module which is inbuilt to the Node MCU. ThingSpeak cloud platform is set up for the storage purpose which is retrieved back to use it for predicting the spoilage of the grocery which is the main goal of the system. A prediction algorithm is used for this purpose which is basically a combination of machine learning and data mining approach for forecasting or predicting the future values based on some past set of values. The values of fresh grocery has been given as the input to prediction algorithm which is used to predict the future values of temperature and humidity. Predicted values obtained is compared with the spoilt values measured earlier to detect the spoilage of grocery. Predicted status of the grocery has been notified to the user through SMS.

**Full paper: International Journal of Scientific Research in Engineering and Management (IJSREM),DOI: 10.55041/IJSREM35693, Vol 8, Issue No 06, 2024, pp 1-3*

Smart Solutions for Safe and Convenient Home Gas Management: A Comprehensive Approach to LPG Cylinder Monitoring and Booking

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ABSTRACT

In today's fast-paced world, people often struggle to manage daily tasks, including household chores such as scheduling LPG cylinder deliveries and addressing emergencies like gas leaks or fires. Recognizing this challenge, there's a growing need to develop technological solutions. The Proposed work focuses on designing a system to detect gas leaks from cylinders. It utilizes a gas sensor that triggers a servo motor to shut off the gas regulator upon detecting any presence of gas leakage, while also sending a notification to the user via a GSM modem. Additionally, the system addresses the issue of irregular LPG cylinder supply by automatically placing an order when the cylinder's net weight drops to 16.5kg, ensuring a reserve of 2kg of gas until the new cylinder arrives. Other features include flame intensity control through precise timing of the burner using Arduino, as well as an automatic gas supply shutoff if inactive for an extended period. Implementing this system in households guarantees enhanced safety and convenience in various ways.

**Full paper: International Journal of Scientific Research in Engineering and Management (IJSREM) DOI: 10.55041/IJSREM35298, Vol 8, Issue No 06, 2024, pp 1-6*

VADATI: Sign to Speech Conversion Glove

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ABSTRACT

This project focuses on developing a glove designed to interpret sign language gestures and convert them into spoken words. Previous research in this area has led to the creation of various wearable devices using sensors and microcontrollers. The primary challenge addressed by this project is enhancing the accuracy and usability of the glove to include many hand signs. The methodology involves integrating flex sensors and an accelerometer with an Arduino microcontroller. The glove reads finger movements and hand orientations, translating these into speech using predefined algorithms. Future work will focus on expanding the vocabulary of recognized gestures and improving system robustness. Practical applications include educational tools, customer service enhancements, and broader accessibility in public spaces.

**Full paper: Third IEEE International Conference on Artificial Intelligence, Computational Electronics and Communication Systems (AICECS 2024) Manipal,12-14 December 2024.*

AI Physiotherapy Assistant for Breast Cancer Patients: Her Ally

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ABSTRACT

The AI-assisted physical therapy system aims to improve at-home rehabilitation for breast cancer patients. Using the MediaPipe Pose framework, it analyzes movements via webcam, correcting posture in real-time and providing personalized feedback through visual and audio cues. The system ensures exercises are done correctly, tracks progress, and counts repetitions, making physical therapy more effective and accessible. More general uses, such as adjusting to different patient requirements and interfacing with wearable technology, are also possible.

**Full paper: Third IEEE International Conference on Artificial Intelligence, Computational Electronics and Communication Systems (AICECS 2024) Manipal,12-14 December 2024.*

Hear Ally App for Enhancing Hearing Health through Mobile Solutions for Meniere's Disease

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ABSTRACT

Hearing loss, affecting over 20% of the population globally poses significant challenges compounded by conditions like Meniere's disease. This research introduces the “Hear Ally” mobile health application to support individuals with Meniere's-related hearing issues. Leveraging sound capture, and sound classification techniques, the app provides personalized vibrations to aid those with mild hearing loss. The study employs a mixed-methods approach involving experimental app development and observational user feedback. Methodologies encompass diverse sound databases and Mel Frequency Cepstral Coefficients for sound analysis. An optimum accuracy is obtained with SVM with radial basis function classifier. A critical exploration of mHealth app accuracy, reliability, and follow-up care accessibility is conducted. The Hear Ally app aims to integrate technology and healthcare to offer a supportive solution for Meniere's disease patients, though considerations include mobile technology dependence and disease variability. It contributes to advancing mobile health solutions for hearing-related conditions, with potential implications for improving the quality of life.

**Full paper 2024 International Conference on Innovation and Novelty in Engineering and Technology (INNOVA), DOI: 10.1109/INNOVA63080.2024.10847024, Vijayapura, 20-21 December 2024.*

Feature-Based Multimodal Registration Framework for Vertebral Pose Estimation

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ABSTRACT

Purpose -The reliable estimation of the vertebral body posture helps to aid a safe and efective spine surgery. The proposed work aims to present an MR to X-ray image registration to assess the 3D pose of the vertebral body during spine surgery. The 3D assessment of vertebral pose assists in analyzing the position and orientation of the vertebral body to provide information during various clinical diagnosis conditions such as curvature estimation and pedicle screw insertion surgery.

Methods The proposed feature-based registration framework extracted vertebral end plates to avoid the mismatch between the intensities of MR and X-ray images. Using the projection matrix, the segmented MRI is forward projected and then registered to the X-ray image using binary image matching similarity and the CMA-ES optimizer.

Results The proposed method estimated the vertebral pose by registering the simulated X-ray onto pre-operative MRI. To evaluate the efcacy of the proposed approach, a certain number of experiments are carried out on the simulated dataset.

Conclusion The proposed method is a fast and accurate registration method that can provide 3D information about the vertebral body. This 3D information is useful to improve accuracy during various clinical diagnoses.

**Full paper: European Spine Journal, https://doi.org/10.1007/s00586-023-08054-z, Vol 33,2024, pp 2251–2260.*

ELECTRICAL AND ELECTRONICS ENGINEERING

Novel Adaptive Learning Rate Back Propagation Neural Network-Based Online Rotor and Stator Resistance Estimator for Sensorless Induction Motor Drives

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ABSTRACT

With consideration of low cost due to the absence of permanent magnets, the field-oriented control (FOC)-based induction motor drives are the most suitable choice for industrial applications. The knowledge of machine parameters is essential for excellent dynamic response of the sensorless vector-controlled induction motor drives. Machine parameters do not last constantly during the operation. Both stator and rotor resistances vary with temperature due to the temperature coefficient of resistance of the material. The accurate online estimation of stator and rotor resistances is needed for the precise control of sensorless vector-controlled induction motor drives. An artificial neural network-based rotor and stator resistance estimator suitable for vector-controlled induction motor drives is proposed in this paper. For the online estimation of the rotor resistance, the rotor flux linkages obtained from the voltage model are compared with that estimated from the neural network model. The weights of the neural network are adjusted by back propagating the obtained error till the error is minimized. For the online stator resistance estimation, the *d–q* axes stator currents are compared with that obtained from the neural network model, and error is back propagated through adjusting the weights of the neural network till the error is minimized. The obtained weights after learning were used to estimate stator and rotor resistance values. The simulation results justify an adaptive learning rate with added momentum instead of a constant learning rate throughout the learning giving faster convergence of error and hence suitable for online estimation of stator and rotor resistances.

**Full paper: Advances in Communication and Applications, Lecture Notes in Electrical Engineering, DOI: https://doi.org/10.1007/978-981-99-7633-1_41,Springer, Vol 1105, Singapore 2024.*

Novel Advanced Artificial Neural Network-Based Online Stator and Rotor Resistance Estimator for Vector-Controlled Speed Sensorless Induction Motor Drives

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ABSTRACT

This paper presents a new approach for the online estimation of stator and rotor resistance of induction motors for speed sensorless vector-controlled drives, using feed-forward artificial neural networks with advanced adaptive learning rates. For the rotor resistance estimation, a neural network model based on rotor speed and stator currents is developed. The rotor flux linkages acquired from the voltage model are compared with the neural network model. The feed-forward neural network employs an adaptive learning rate as the function of the obtained error during training for quick convergence with minimal estimation error. A two-layered neural network model based on the stator voltage and current equations is developed for the stator resistance estimation. The d-q axes stator currents obtained from the developed model are compared with the acquired d-q axes stator currents. For the fast convergence with minimal estimation error, an adaptive learning rate as the function of error is adopted during training. Furthermore, the neural network estimates the induction motor's speed. The simulation and experimental results justify that the developed algorithms track variation in the resistances quickly and precisely along with the speed as compared with the conventional constant learning rate algorithm, leading to reliable operation of the drive.

**Full paper*: *Energies , DOI: https://doi.org/10.3390/en17092150, Vol 17, Issue No 9, 2024, pp 2150.*

DC Bias Impact Analysis on the Capability of Power Transformer and Failure Risks

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ABSTRACT

Significant transition towards low-carbon, renewable energy sources and technological adaptation is mandatory in the present scenario to address climate change and achieve a sustainable energy system. Aligned with the upgradation in technology, as the need for efficient and smart energy grows, power electronics are being extensively used in power systems. Various factors can affect the pervasive use of power electronics associated with power transformers, thereby introducing the DC bias in the system. DC bias in the transformer leads to a shift in operating point, a rise in excitation current and a generation of harmonics. This causes an increase in core losses and temperature, resulting in exceeding the thermal limits and leading to transformer failure. Consequently, there is an emergency need to understand the DC bias capability of power transformers that aims at optimal transformer selection without being overrated. This research employs Ansys maxwell software to model and simulate a 500 kVA, 11kV/420V three-phase power transformer. The experimental investigation is carried out through a scale-down value of a 5 kVA laboratory prototype. The research findings revealed a significant negative impact of DC bias on power transformer capabilities that could be detrimental to its performance, health and lifespan. The analysis results provide valuable insights for the design engineer during the initial stages of designing a high-performance, cost-effective transformer with a low failure rate.

**Full paper: Engineering Failure Analysis, DOI: https://doi.org/10.1016/j.engfailanal.2024.108537, Vol 163, Part B, 2024, pp 108537.*

DFIG Based Power Generation under Variable Wind Speed using Fuzzy Controller

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ABSTRACT

The utilization of fossil fuels peaked worldwide after the Industrial Revolution. Two significant issues have emerged in recent years: the depletion of fossil fuel reserves and concerns regarding energy security and global warming. In response, a strategic shift towards electricity generation using grid-connected wind systems has been proposed. Efficient power electronic converters with intelligent controllers are essential for harnessing wind power effectively. Fuzzy logic controllers (FLCs) have garnered attention for inverter controller design in wind power generation. Thus, an intelligent fuzzy logic controller is developed to optimize peak 10KW power generation from a wind-based Doubly Fed Induction Generator (DFIG) unit. Two fuzzy controllers are devised for the rotor current converter to regulate the direct axis (d-axis) and quadrature axis (q-axis) components of the rotor current, enabling control over the active and reactive power generated by the DFIG-based wind energy system. The proposed design is simulated using Matlab Simulink 2018b, and the system's performance is analyzed under various operating conditions. Finally, the system's effectiveness is evaluated against IEEE 1547 standards to demonstrate its performance

**Full paper: Asia Pacific Conference on Innovation in Technology (APCIT), DOI: 10.1109/APCIT62007.2024.10673421, Mysuru, 26-27 July 2024.*

Development of a Long-Term Solar PV Power Forecasting Model for Power System Planning

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ABSTRACT

Purpose This paper aims to Solar photovoltaic (PV) power can significantly impact the power system because of its intermittent nature. Hence, an accurate solar PV power forecasting model is required for appropriate power system planning.

Design/methodology/approach In this paper, a long short-term memory (LSTM)-based double deep Q-learning (DDQL) neural network (NN) is proposed for forecasting solar PV power indirectly over the long-term horizon. The past solar irradiance, temperature and wind speed are used for forecasting the solar PV power for a place using the proposed forecasting model.

Findings The LSTM-based DDQL NN reduces over- and underestimation and avoids gradient vanishing. Thus, the proposed model improves the forecasting accuracy of solar PV power using deep learning techniques (DLTs). In addition, the proposed model requires less training time and forecasts solar PV power with improved stability.

Originality/value The proposed model is trained and validated for several places with different climatic patterns and seasons. The proposed model is also tested for a place with a temperate climatic pattern by constructing an experimental solar PV system. The training, validation and testing results have confirmed the practicality of the proposed solar PV power forecasting model using LSTM-based DDQL NN.

**Full paper: World Journal of Engineering, DOI: https://doi.org/10.1108/WJE-09-2023-0407, Article in Press, 2024.*

Study for Reliability of Quasi Z Source Inverter in Stand Alone PV System with Battery

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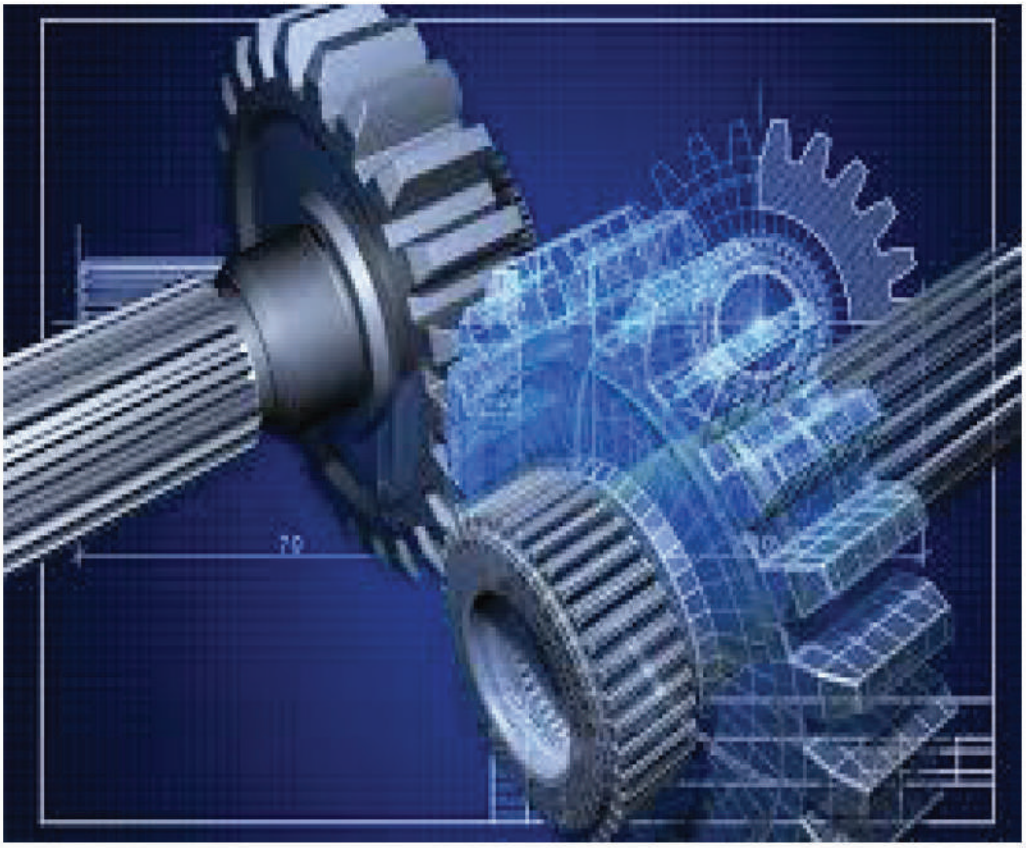
ABSTRACT

A standalone PV system is a better alternative in remote and places of frequent power failure. In order to practically implement a standalone PV system, performance analysis and reliability analysis of the system is important. In this paper reliability analysis for Quasi Z Source Inverter with a battery is compared with the existing topologies of stand-alone PV system. The existing topologies are DC SEPIC converter and DC boost converter. The charging and discharging of the battery is controlled by a bidirectional DC converter. A 3 KW single phase system is designed and implemented in MATLAB Simulink. The reliability of the entire system is assessed by Reliability Block Diagram method. Mean Time Between Failure of the entire system is derived and results are plotted for Quasi Z Source inverter, DC SEPIC converter and DC Boost converter considered with battery. Comparative reliability plot of the considered systems is shown for a time period of six years. The Total Harmonic Distortion of output voltage and the magnitude of output voltage for the cases considered is maintained within the standard limits.

**Full paper: Second International Conference on Smart Technologies for Power and Renewable Energy, DOI: 10.1109/SPECon61254.2024.10537502, Ernakulam, April 2024.*



MECHANICAL ENGINEERING

Integrating Real-World Applications into the Machine Design Course Through an Open-Ended Assignment – A Case Study

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ABSTRACT

This paper presents a case study in engineering education, focusing on enhancing conceptual understanding, realworld application, comprehension, teamwork, self-directed learning, and familiarity with design codes and standards. The study involves student analysis of artifact safety and optimization, engaging them in practical problem-solving. The outlined methodology covers artifact selection, analysis, and assessment of the assignment's impact. The findings exhibit improvements in knowledge acquisition, real-world relevance, teamwork, and self learning. Moreover, the study highlights the assignment's enhanced appeal and challenge compared to conventional assignments. Students express a preference for more such assignments over routine ones. The paper underscores experiential learning's significance in cultivating critical skills for modern engineering and advocates integrating practical applications into curricula for holistic skill development.

**Full paper: Journal of Engineering Education Transformations, DOI: 10.16920/jeet/2024/v37is2/24135, Vol 37, Issue No 2, 2024, pp 879-886*

Investigating the Impact of Tio_2 Filler on Abrasive Wear Characteristics of Bamboo Fiber-Reinforced Epoxy Composites using the Taguchi Method

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ABSTRACT

Purpose-The purpose of this study is to investigate the impact of titanium oxide (TiO2) filler on the abrasive wear properties of bamboo fiber reinforced epoxy composites (BFRCs) using a Taguchi approach. The study aims to enhance the abrasive wear resistance of these composites by introducing TiO2 filler as a potential reinforcement, thus contributing to the development of sustainable and environmentallyfriendlymaterials.

Design/methodology/approach- This study focuses on the fabrication of epoxy/bamboo composites infused with TiO2 particles within the Wt.% range of 0–8 Wt.% using hand layup techniques. The resulting composites were subjected to wear testing according to ASTM G99-05 standards. Statistical analysis of the wear results was carried out using the Taguchi design of experiments (DOE). Additionally, an analysis of variance (ANOVA) was used to determine the influential control factors impacting the specific wear rate (SWR) and coefficient of friction (COF).

Findings-The study illuminates how integrating TiO2 filler enhances abrasive wear in epoxy/bamboo composites. Statistical analysis of SWR highlights abrasive grit size (grit) as the most influential factor, followed by normal load, Wt.% of TiO2 and sliding distance. Analysis of the COF identifies normal load as the primary influential factor, followed by grit, Wt.% of TiO2 and sliding distance. The Taguchi predictive model closely aligns with experimental results, validating its reliability. The morphological study revealed significant differences between the unfilled and TiO2-filled composites. The inclusion of TiO2 improved wear resistance, as evidenced by reduced sueface damage and wear debris.

Originality/value-This research paper aims to integrate TiO2 filler and bamboo fibers to create an innovative hybrid composite material. TiO2 micro and nanoparticles show promise as filler materials, contributing to improved tribological properties of epoxy composites. The utilization of Taguchi's DOE and ANOVA for statistical analysis provides valuable guidance for academic researchers and practitioners in optimizing control variables, especially in the context of natural fiber reinforced composites.

**Full paper: World Journal of Engineering, DOI: https://doi.org/10.1108/WJE-10-2023-0432, Article in press, 2024.*

Sustainable Development through Quality Management: A Multiple-Case Study Analysis of Triumphs, Trials and Tribulations

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ABSTRACT

Purpose – In a highly competitive and globalised era, agile organisations proactively steer towards sustainability. This situation persuaded the organisations to align Quality Management (QM) initiatives to achieve sustainable outcomes. This study aims to explore quality–sustainability linkage, explicitly focusing on attaining the prestigious IAQ Quality Sustainability Award. Further it investigates, the impact of QM as a strategy for promoting sustainability to meet sustainable development goals (SDGs).

Design/methodology/approach – Due to the lack of substantial literature connecting QM to sustainability, the current research adopted an explanatory multiple-case study. Six cases were purposively chosen for the study. Three cases of those who have achieved the prestigious IAQ Quality Sustainability Award and remaining have been selected that have fallen short of receiving the award. A detailed within-case and cross-case examinations involving six cases that reported their QM achievements aligned with SDGs.

Findings – The findings demonstrate the significant role of QM adoption in achieving positive results from the perspective of SDGs, such as reduced environmental impacts, improved operational efficiency and enhanced quality of life. Effective stakeholder collaboration, proficiency in analytical tools and strategic alignment with SDGs emerged as critical success factors. Conversely, weak linkage with sustainability and unclear approaches were crucial challenges in attaining the IAQ Quality Sustainability Award.

Research limitations/implications – This paper outlines essential commandments for organisations actively seeking to promote sustainability. It offers valuable insights for decision-makers, facilitating a profound understanding of the challenges and opportunities in pursuing sustainable performance.

Originality/value – The distinctive nature of this study lies in its dedicated exploration of the intricate relationship between QM deployment and its true impact on the achievement of the SDGs.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-12-2023-0424 ISSN 1754-2731, E-ISSN 1754-274X, Article Press, 2024.*

Application of Taguchi Design of Experiments in the Food Industry: A Systematic Literature Review

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ABSTRACT

The optimal utilization of available resources is critical for industrial experimentation. In addition, a structured approach with reliable and reproducible results and robust predictability is paramount to achieving profitability, waste reduction, and improvements in the food industry. The Taguchi design of experiments (DOE) is a practical approach that optimizes the critical characteristics using minimum time and resources – reviewing its application in the food sector assists in determining research gaps that could provide sustainable solutions to academia, industry, and policymakers. This research provides a systematic review of the literature on the Taguchi DOE application for the past two decades in the food industry. The systematic review considered articles published in peer-reviewed journals indexed in Scopus, Web of Science, and PubMed databases. The research categorized the relevant articles into three core themes and 31 sub-themes. This study identified only 31 relevant articles despite the significant advantages of applying the Taguchi DOE in the food industry. Most applications did not explore the true potential of the Taguchi DOE approach to obtain robust and scalable solutions. Also, the analysis determined that a structured approach is missing in most studies, with a lack of utilization of essential tools during the research.

**Full paper: Total Quality Management & Business Excellence,DOI: https://doi.org/10.1080/14783363.2024.2331758, Vol 35, Issue No 5-6, 2024, pp 687-713.*

Analysis of Lightweight Braking Material System for an ATV

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ABSTRACT

Abstract An all-terrain vehicle (ATV) was designed and manufactured to participate in the SAE Baja, India event, and in the present work, we have considered one subsystem, namely the braking system. The design of lightweight components helps optimize a system overall for greater efectiveness and efciency. It may then result in a decrease in the carbon footprint. The goal of the study was to explore the performance of a lightweight brake system for ATV applications using numerical methods. An optimized brake system for ATV car use was the focus of the study. Structural steels, i.e. SS410 and SS420, along with aluminium alloys were the materials used. The suggested ATV brake system was examined using the fnite element method (FEM). With a value of 297 MPa, the most optimized design showed the maximum stress. The most optimized brake lever, according to the stress–strain graph, has the greatest stress and highest strain value. However, aluminium alloy may be used to create the lightest component.

**Full paper: Journal of the Institution of Engineers(India) Series D, DOI: https://doi.org/10.1007/s40033-024-00698-5, 2024.*

Microstructural Features and Mechanical Properties of Spray -Formed Hypereutectic Al-Si-Ti Alloy

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ABSTRACT

In the present study, the effect of the addition of Ti on the microstructural and mechanical properties of hypereutectic (Al/15 wt. %Si) spray-formed (SF) alloys has been investigated and compared with as-cast (AC) alloys. Al/15Si and Al/15Si/2Ti alloys were synthesised by spray forming method. The microstructural features of the alloys were explored under an optical microscope, and a scanning electron microscope (SEM) and X-ray diffraction (XRD) analysis were carried out for phase identification. The phase analysis confirmed the presence of α-Al and Si phases in all the alloys, with additional peaks attributed to Al_3Ti and $AlSi_2Ti$ present in the Al/15Si/2Ti alloys. The microstructure of the SF1 alloy (Al/15Si) consisted of globular, fine Si phases (primary and eutectic) distributed homogeneously in the equiaxed Al matrix. The addition of Ti to the binary SF1 alloy led to the formation of an SF2 alloy (Al/15Si/2Ti) with a fine intermetallic phase of Al_3Ti and further spheroidisation of Si particles. The SF1 and SF2 alloys exhibited 30% and 40% greater microhardness, respectively, than did their corresponding AC alloys. With the addition of Ti, the ultimate tensile strength of the SF2 alloy increased by 19% compared to that of the SF1 alloy. Furthermore, a significant increase in yield strength and ductility was observed in the SF alloys compared to the AC alloys. Adding Ti to hypereutectic Al/15Si alloy via the spray-forming method provides a better alternative material for aerospace and automotive applications.

**Full paper: Advances in Materials and Processing Technologies, DOI: https://doi.org/10.1080/2374068X.2024.2342621, 2024, pp 1-18.*

Modeling and Analysis of Tio_2 Filler's Impact on Specific Wear Rate in Flax Fiber-Reinforced Epoxy Composite under Abrasive Wear using Taguchi Approach

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ABSTRACT

Purpose-This study explores how titanium oxide (TiO_2) filler influences the specific wear rate (SWR) in flax fiber-reinforced epoxy composites (FFRCs) through a Taguchi approach. It aims to boost abrasive wear resistance by incorporating TiO_2 filler, promoting sustainable and eco-friendly materials.

Design/methodology/approach-This study fabricates epoxy/flax composites with TiO_2 particles (0–8 wt%) using hand layup. Composites were tested for wear following American Society for Testing and Materials (ASTM) G99-05. Statistical analysis used Taguchi design of experiments (DOE), with ANOVA identifying key factors affecting SWR in abrasive sliding conditions.

Findings-The study illuminates how integrating TiO2 filler particles into epoxy/flax composites enhances abrasive wear properties. Statistical analysis of SWR highlights abrasive grit size (grit) as the most influential factor, followed by normal load, wt% of TiO_2 and sliding distance. Grit size has the highest effect at 43.78%, and wt% TiO_2 filler contributes 15.61% to SWR according to ANOVA. Notably, the Taguchi predictive model closely aligns with experimental results, validating its reliability.

Originality/value-This paper integrates TiO_2 filler and flax fibers to form a novel hybrid composite with enhanced tribological properties in epoxy composites. The use of Taguchi DOE and ANOVA offers valuable insights for optimizing control variables, particularly in natural fiber-reinforced composites (NFRCs).

**Full paper: Multidiscipline Modeling in Materials and Structures, DOI: https://doi.org/10.1108/MMMS-10-2023-0342, Vol 20, Issue No 3, 2024, pp 546-557.*

Enhancing Engineering Education through Mini Project-Based Learning in Computer Integrated Manufacturing Laboratory: A Student-Centric Approach

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ABSTRACT

In response to evolving engineering education, there is a growing focus on fostering students' practical skills. This study implemented a Mini Project Based Learning (MPBL) approach within the Computer Integrated Manufacturing (CIM) course. The tasks involved SOLIDWORKS modelling, writing CNC code using CADEM seeNC Turn software, and hands-on CNC machining by students. Quantifiable outcomes demonstrated the development of students' CNC expertise. Numerical evidence showcased a significant increase in academic performance, with the percentage of students scoring over 80 marks rising from 33.33% in the previous academic year (CAY-M1) to an impressive 45.83% in the current academic year (CAY), highlighting the positive impact of MPBL. MPBL improved comprehension and enhanced critical thinking, collaboration, creativity, and communication skills. Its integration in CIM sparked creative enthusiasm among students and educators. Effective evaluation tools played a pivotal role in elevating project results, ensuring a holistic learning experience that integrated theory and engineering design.

**Full paper: Innovations in Education and Teaching International, DOI: https://doi.org/10.1080/14703297.2024.2362260, 2024, pp 1-15.*

Effect of Bath Temperature on Electroplating of Nickel on a Copper Substrate

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ABSTRACT

Nickel electroplating is known to be industrially effective for enhancing various substrate properties. In the present work, nickel coatings were developed on copper substrates by electroplating using standard nickel plating solution at various electrolyte bath temperatures ranging from $40 \pm 2°C$ to $60 \pm 2°C$ in steps of 10°C. Energy dispersive spectroscopy (EDS), X-ray diffraction (XRD) and field emission scanning electron microscopy (FESEM) were used to study the composition, phase structure and morphology of the coatings. The coatings were also analysed for hardness and porosity, and process current efficiency was measured. The electrolyte bath temperature has a profound effect on the nature of the developed nickel coatings, and is observed to have an impact on the surface morphology, crystallographic direction, and hardness, as well as deposition current efficiency.

**Full paper: Transactions of the IMF, The International Journal of Surface Engineering and Coatings,DOI: https://doi.org/10.1080/00202967.2024.2353455, Vol 102, Issue No 4, 2024, pp 190-198.*

Enhancement of Tensile Strength of Coconut Shell Ash Reinforced Al-Si Alloys: A Novel Approach to Optimise Composition and Process Parameters Simultaneously

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ABSTRACT

The research presents a novel approach to develop high-strength functionally graded composite materials (FGCMs) by using recycled coconut shell ash (CSA) particles as reinforcement for a hypereutectic Al-Si alloy matrix. Using a centrifugal casting technique, test specimens are prepared for the study under ASTM standards. The optimal combination of materials to maximise the materials' overall tensile strength is obtained through the mixture methodology approach. The results show that CSA particles in the matrix material increase the tensile strength of the produced material. Process parameters, melting temperature and rotating speed were found to play a pivotal role in determining the tensile strength. A better tensile strength of the material is obtained when Al-Si = 90.5 wt%, CSA = 9.5 wt%, rotating speed = 800 RPM, and melting temperature = 800 °C; the proposed regression model developed has substantial predictability for tensile strength. This work presents a methodology for enhancing the tensile strength of FGCMs by optimising both the material composition and processing parameters. The achieved tensile strength of 197.4 MPa, at 800 RPM and 800 °C, for a concentration of 7.5 wt% CSA particles, makes these FGCMs suitable for use in multiple engineering sectors.

**Full paper: Processes, DOI: https://doi.org/10.3390/pr12071521, Vol 12, Issue No 7, 2024, pp 1521.*

Unveiling the Potential of FMEA in Higher Education: Pathway to Improved Risk Management and Quality

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ABSTRACT

Purpose -While educators impart FMEA instruction, its practical implementation within the educational sector remains limited. This study investigates the application of FMEA within higher education institutions. Implementing FMEA in these institutions is difficult due to statutory requirements, schedule restrictions, and stakeholder participation challenges. Moreover, higher education institutions struggle with preserving education quality, faculty training, and resource management, complicating organised methods such as FMEA.

Design/methodology/approach -This research conducted a global survey to identify the critical success factors, benefits, and common challenges in using FMEA in the higher education sector.

Findings -The outcomes highlighted that lack of awareness regarding the tools' benefits is the primary barrier to FMEA implementation. However, respondents perceive that FMEA can improve process reliability and quality in higher education institutions. Further, the analyses found that knowledge about the FMEA tools is the prime critical success factor, and the lack of time due to other priorities in the organisation is a significant challenge in tapping the potential of FMEA.

Research limitations/implications -A limitation of the study is the relatively low number of HEIs surveyed globally. Further, the study provides a broad perspective rather than a focused study on one HEI.

Practical implications -This study addresses this gap by exploring the potential benefits, challenges, and factors associated with the successful adoption of FMEA in academic settings. Using this information, HEIs can become more successful in applying FMEA.

Originality/value -This study is unique in its exploration of the application of FMEA with higher education institutions for service quality improvement.

**Full paper: The TQM Journal DOI: https://doi.org/10.1108/TQM-01-2024-0017, Article in Press, 2024.*

Analyzing the Impact of Tio2 Filler on the Wear Characteristics of Flax Fiber-Reinforced Epoxy Composite using the Taguchi Approach

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ABSTRACT

Purpose-This study aims to investigate the impact of titanium oxide (TiO2) filler on the coefficient of friction (COF) and specific wear rate (SWR) in flax fiber reinforced epoxy composites (FFRCs) under abrasive wear conditions utilizing the Taguchi approach. The primary objective is to enhance wear resistance and promote the development of sustainable materials for various applications.

Design/methodology/approach-Epoxy/flax composites with varying TiO2 filler content (0–8 wt%) are fabricated through the hand layup method. Subsequently, wear testing is conducted following ASTM G99-05 standards. The Taguchi design of experiments (DOE) and analysis of variance (ANOVA) are utilized for statistical analysis.

Findings-Results indicate a significant improvement in abrasive wear properties with the incorporation of TiO2 filler. The COF is found to be most influenced by the normal load (55.19%), followed by grit size, wt% TiO2 filler and sliding distance. SWR is found to be most influenced by the grit size (42.92%), followed by wt% TiO2, normal load and sliding distance. Notably, the Taguchi model aligns well with experimental results, demonstrating its efficacy in predicting the abrasive wear behavior of FFRCs.

Originality/value-This research introduces a novel hybrid composite that combines TiO2 filler and flax fibers, showcasing their potential to enhance the tribological properties of epoxy composites. The study offers valuable insights into optimizing abrasive wear test variables in natural fiber-reinforced composites using Taguchi DOE and ANOVA, crucial for improving the performance of sustainable materials in engineering applications.

**Full paper: World Journal of Engineering, DOI: https://doi.org/10.1108/WJE-05-2024-0310, Article in Press, 2024.*

Assessing Lean Six Sigma and Quality Performance Improvement in Italian Public Healthcare Organizations: A Validated Scale

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ABSTRACT

Purpose – This study aims to fully assess the readiness for Lean Six Sigma (LSS) and Quality Performance Improvement (QPI) in an Italian Public Healthcare ecosystem.

Design/methodology/approach – Drawing from previously established survey development and adaptation protocols, a replication study was carried out; Lean, Six Sigma and QPI were extracted and validated through confirmatory factor analysis in an Italian Public Healthcare setting, with a sample of health professionals from the Campania region.

Findings – This study reports the adaptation of an existing scale for measuring LSS and QPI in an Italian public healthcare organisation. This analysis extracts six conceptual domains and constitutes an original adaptation of an existing scale to assess the readiness to adopt Lean, Six Sigma and Quality Performance in Italian Public Health Organizations. The constructs show strong levels of internal consistency, as demonstrated by each item factor loading and each subscale reliability.

Practical implications – Managers, policymakers and academics can employ the proposed tool to assess the public healthcare ecosystem's capability to implement LSS initiatives and strategies to improve quality performance.

**Full paper: The TQM Journal, DOI: https://doi.org/10.1108/TQM-10-2023-0350, Vol 36, Issue No 9, 2024, pp 392-412.*

Impact of Stacking Sequence on Mechanical and Dry Sliding Wear Properties of Bamboo and Flax Fiber Reinforced Hybrid Epoxy Composite Filled with Tio_2 Filler

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ABSTRACT

Purpose -This study examines how different stacking sequences of bamboo and flax fibers, treated with 5% aqueous sodium hydroxide (NaOH) and filled with 6wt% titanium oxide (TiO_2), affect the physical, mechanical and dry sliding wear resistance properties of a hybrid composite.

Design/methodology/approach-Composites with different fiber stacking arrangements were developed and tested per *American Society for Testing and Materials* (ASTM) standards to evaluate physical, mechanical and wear resistance properties, focusing on the impact of flax fiber mats at intermediate and outer layers.

Findings-The hybrid composite significantly outperformed composites reinforced solely with bamboo fibers, showing a 65.95% increase in tensile strength, a 53.29% boost in flexural strength and a 91.01% improvement in impact strength. The configuration with multiple layers of flax fiber mat at intermediate and outer levels also demonstrated superior wear resistance.

Originality/value-This study highlights the critical role of stacking order in optimizing the mechanical properties and wear resistance of hybrid composites. The findings provide valuable insights for the design and application of advanced composite materials, particularly in industries requiring high performance and durability.

**Full paper: Multidiscipline Modeling in Materials and Structures, DOI: https://doi.org/10.1108/MMMS-07-2024-0193, Vol 20, Issue No 6, 2024, pp 1180-1191.*

Effect of Coupled Microstructural Characteristics of Catalyst Layer on High Temperature: Proton Exchange Membrane Fuel Cell Performance

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ABSTRACT

The widespread adoption of High Temperature-Proton Exchange Membrane Fuel Cells (HT-PEMFC) in commercial applications is limited by their performance and durability compared to conventional energy sources. A key factor affecting these cells is the sluggish oxygen reduction reaction (ORR) at the cathode catalyst layer (CL). Optimizing the structural parameters of the cathode CL can enhance cell performance and longevity. Current research on these parameters is mostly descriptive, lacking numerical evidence to quantify their impact. This study develops a three-dimensional, non-isothermal HT-PEMFC numerical model to investigate the sensitivities of coupled structural parameters of the cathode CL, including Pt loading, CL thickness, and Pt particle diameter, at three levels. The orthogonal/Taguchi approach quantitatively assesses the impact of these parameters. The study reveals that Pt loading significantly affects cell voltage and cathode overpotential, while Pt diameter influences the homogeneity of overpotential distribution. The dominant impact of a single parameter decreases at higher current densities, necessitating careful analysis of trade-offs between different structural characteristics to maximize performance. These findings offer valuable insights for future experimental studies to enhance cell performance through adjustments to cathode catalyst characteristics.

**Full paper: Journal of The Electrochemical Society DOI 10.1149/1945-7111/ad86ee , Vol 171, Issue No 10, 2024, pp 104512*

Fabrication and Flow Simulation of a Choked Flow Converging Nozzle

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ABSTRACT

This paper describes about the design, fabrication and flow simulation of a choked flow nozzle which is used to supply constant mass flow rate to the air heater which can provide supersonic conditions for Supersonic Engine Test Facilities. The test facility is considered to be capable of delivering working gas at 5-20 kg/s flow rate, stagnation temperature at 800-2200 K and stagnation pressure at 8-40 bar to the inlet of combustion chamber of the engine for specified duration. The outlet condition for the choked nozzle is considered to be known and the required inlet pressure for the nozzle has to be found out. This converging nozzle should be capable of providing constant mass flow rate.

**Full paper: International Journal of Vehicle Structure & Systems, DOI: 10.4273/ijvss.16.3.08 Vol 16, Issue No 3, 2024, pp 356-359.*

A Study into the Themes of Quality Management: Early Findings from a Global Research Project and Agenda for Future Research

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ABSTRACT

Purpose-Quality management (QM) plays a pivotal role in driving organisational efforts to enhance operational efficiency and customer satisfaction. This study aims to explore the most important themes in QM over the past three decades, identifying and analysing the top ten key themes that have shaped the field during this period. This study, involving leading academics and industry practitioners, lays the groundwork for a three-to-four-year exploration of the most influential QM themes worldwide.

Design/methodology/approach -The authors conducted a comprehensive review of QM literature over the last three decades from top specialist journals on QM. This is followed by conducting a global pilot survey with leading academics and practitioners to pinpoint the top ten dominant themes of QM for organisations to leverage in gaining and maintaining a competitive edge.

Findings-The top ten themes of QM, as identified by authors through input from academics and practitioners worldwide, offer valuable insights for companies of all sizes and sectors. These themes serve as a guide for the successful and sustainable implementation of QM practices and continuous improvement strategies.

Research limitations/implications -Despite a limited sample size, the initial findings provide a glimpse into critical themes. Over the next three years, as the study progresses, we anticipate potential changes in the results. Notably, the comparison of themes between manufacturing and services as well as large and small enterprises, remains unexplored in the current investigation.

Originality/value-The authors of this study assert that their research will pave the way for future themes in the digitalization era. Moreover, this research stands out as one of the most exhaustive examinations from both academic and practitioner viewpoints, offering a unique perspective not commonly found in existing literature.

**Full paper: The TQM Journal,DOI: https://doi.org/10.1108/TQM-08-2024-0271, Article in press, 2024.*

Effect of Sintering Temperature on the Physical and Mechanical Characteristics of Fabricated ZrO_2–Cr–Ni–Ce–Y Composite

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ABSTRACT

The present study investigates the synthesis and characterization of a zirconium oxide (ZrO_2)-based metal composite doped with cerium (Ce) and yttrium (Y), using chromium (Cr) and nickel (Ni) as base metals. These constituents were selected for their superior mechanical properties and compatibility with the ceramic phase. High-purity powders were homogenized via high-energy ball milling, followed by cold pressing and sintering in a controlled atmosphere of hydrogen. The sintering process was conducted at temperatures ranging from 850 °C to 1350 °C to examine the evolution of microstructure, grain growth, and densification. Scanning electron microscopy (SEM) revealed a homogeneous distribution of phases, with distinct microstructural features attributed to each element at different sintering temperatures. The experimental results revealed that the composite's density was increased by 30% and porosity was reduced by 61% at a sintering temperature of 1350 °C. The hardness and flexural strength of composite were found to be 23% and 60% higher at 1350 °C, respectively, compared to that at 850 °C, suggesting enhanced mechanical properties due to cerium and yttrium reinforcement within matrix and efficient doping and phase transformation. Overall, incorporation of cerium and yttrium significantly improved mechanical behavior and phase stability of ZrO_2–Cr–Ni composite, highlighting its potential for advanced engineering applications.

**Full paper: Journal of Composites Science , DOI: https://doi.org/10.3390/jcs8110446, Vol 8, Issue No 11, 2024, pp 446.*

Effects of Magnesium Content and Age Hardening Parameters on the Hardness and Ultimate Tensile Strength of SiC-Reinforced Al-Si-Mg Composites

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ABSTRACT

This study investigates the effects of magnesium (Mg) content, silicon carbide (SiC) reinforcement, and aging temperature (AT) on the ultimate tensile strength (UTS) and Brinell hardness number (BHN) of eutectic Al-Si composites using a full factorial experimental approach. The analysis reveals that increasing Mg content from 0 wt% to 1.5 wt% significantly enhances UTS, likely due to solid solution strengthening and improved particle reinforcement. Similarly, a rise in SiC content up to 4 wt% leads to a notable increase in UTS, indicating effective matrix reinforcement. AT is crucial, with the highest UTS achieved at 100 °C; however, overaging at 200 °C results in reduced strength due to precipitate coarsening. Interaction plots demonstrate a synergistic effect between Mg and SiC, where higher levels of both contribute to a more substantial increase in UTS. The results also show that while both Mg and SiC improve UTS, their effects are optimized with appropriate aging conditions, although overaging diminishes these benefits. Analysis of variance (ANOVA) highlights that AT, Mg, and SiC each significantly impact UTS and BHN, with SiC having the greatest effect of 47.92% on hardness and AT having the greatest effect of 36.58% on the UTS. The interaction between SiC particles and AT is particularly influential on BHN. These findings emphasize the importance of carefully optimizing processing conditions to enhance the mechanical properties of eutectic Al-Si composites.

**Full paper: Journal of Composites Science. DOI: https://doi.org/10.3390/jcs9010005, Vol 9, Issue No 1 2024, pp 1-15.*

Transforming Ideas into Products: Project Based Learning in Prototyping, Fabrication, and Testing Course for First Year Engineering Students

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ABSTRACT

Skill development courses are crucial in engineering education, enabling students to tackle complex engineering tasks while enhancing critical thinking and adaptability to industry shifts. This study focuses on the Prototyping, Fabrication, and Testing course offered to first-year engineering students as part of mandatory skill development curriculum. After completing three cycles of the course, this research presents comprehensive insights on its implementation, including student feedback and challenges encountered. The course followed a project-based learning (PBL) methodology, providing students with practical skills in both basic and advanced manufacturing techniques essential for product development. Hands-on engagement with real-world projects fostered an immersive learning experience. The study covers the course design, implementation, and evaluation, with particular attention to student feedback. Results indicated high levels of student enthusiasm, active participation, and a positive reception to the integration of theory with practical learning. Students gained significant skills in manufacturing and product development, while appreciating the collaborative environment that nurtured teamwork, problem-solving, and creativity. This positive feedback underscores the PBL approach as an effective tool for engaging students and fostering essential engineering skills. Insights from this study will guide the future design and enhancement of similar courses.

**Full paper: International Journal of Mechanical Engineering Education, DOI: https://doi.org/10.1177/03064190241307026, 2024.*

Investigating the Impact of Catalyst Penetration into Gas Diffusion Layer on the Performance of High-Temperature Polymer Electrolyte Membrane Fuel Cells

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ABSTRACT

The catalyst fabrication method, cell assembly, and operating conditions in polymer electrolyte membrane fuel cells (PEMFC) impact the catalyst penetration into the gas diffusion layer (GDL), alter its porous structure, and, consequently, the overall cell performance. This study investigates the effect of the catalyst layer (CL) penetration thickness, catalyst loading amount, and cell compression during assembly on species and current distributions, and overall cell performance. GDLs with large penetration thickness show a substantial resistance to reactant and proton transport, particularly at high current densities resulting in a drop in the cell performance. For zero, 50%, and 100% penetrations, the average current densities at an operating voltage of 0.4 V are 0.8329, 0.7920, and 0.71112 A cm^{-2}, respectively. This indicates a performance loss of 5% and 15% for 50% and 100% penetrations in comparison to zero penetration. Higher catalyst loading results in greater penetration, negating the benefit of enhanced kinetics. Performance typically decreases by 3%–5% for 50% penetration and 12%–15% for 100% penetration when penetration levels increase for a certain Pt loading. An attempt is made to investigate the interplay between the effect of reactant and proton transport limitations on their distributions and cell performance. The combined effect of catalyst penetration and cell compression during the assembly has a crucial impact on cell performance with the starvation of reactants at high-density regions. The study highlights the necessity of optimizing the penetration thickness, catalyst loading, and cell assembly to achieve maximum cell performance.

**Full paper: Journal of the Electrochemical Society, DOI: 10.1149/1945-7111/ad27b0, Vol 171, Issue No 2, 2024*

Influence of Cu Addition on the Wear Behavior of a Eutectic Al–12.6Si Alloy Developed by the Spray Forming Method

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ABSTRACT

In the present study, the influence of the addition of copper (Cu) on the wear behavior of a Al-12.6Si eutectic alloy developed using the spray forming (SF) method was discussed, and the results were compared with those of as-cast (AC) alloys. The microstructural features of the alloys were examined using both optical and the scanning electron microscopy, and the chemical composition and phase identification were achieved by X-ray diffraction (XRD) analysis. The results revealed that the microstructure of binary the SF alloy consisted of fine primary and eutectic Si phases, evenly distributed in the equiaxed α-Al matrix, whereas the Cu-based SF ternary alloy consisted of uniformly distributed fine eutectic Si particulates and spherical-shaped θ-Al_2Cu precipitates, uniformly distributed in α-Al matrix. In contrast, the AC ternary (Al-12.6Si-2Cu) alloy consisted of unevenly dispersed eutectic Si needles and the coarse intermetallic compound θ-Al_2Cu in the α-Al matrix. The addition of Cu enhanced the micro hardness of the SF ternary alloy by 8, 34, and 41% compared to that of the SF binary, AC ternary, and binary alloys, respectively. The wear test was conducted using a pin-on-disc wear testing machine at different loads (10–40 N) and sliding velocities (1–3 ms^{-1}). The wear tests revealed that SF alloys exhibited an improved wear behavior in the entire applied load and sliding velocity range in comparison to that of the AC alloys. At a load of 40 N and a sliding velocity of 1 ms^{-1}, the wear rate of the SF2 alloy is 62, 47, and 23% lower than that of the AC1, AC2, and SF1 alloys, respectively. Similarly, at a sliding velocity of 3 ms^{-1}, the wear rate of the SF2 alloy is 52%, 42%, and 21% lower than that of the AC1, AC2, and SF1 alloys, respectively. The low wear rate in the SF2 alloy was due to the microstructural modification during spray forming, the precipitation of fine Al_2Cu intermetallic compounds, and increased solid solubility. The SF alloys show an increased transition from oxidative to abrasive wear, while the AC alloys demonstrate wear mechanisms that change from oxidative to abrasive, including delamination, with an increase in sliding velocity and load.

**Full paper: Journnals of Composite Science, DOI: https://doi.org/10.3390/jcs8030088, Vol 8, Issue No 3, 2024, pp 88.*

Contribution of MG Dissolution on the Age Hardening Characteristicsof Sic Reinforced Al-Si Alloy Composites

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ABSTRACT

Aluminium–Silicon (Al-Si) eutectic alloy matrix composites are widely used in engineeringapplication. However, it is a well-known fact that this material is not heat-treatable. In orderto take advantage of the improvement in the mechanical properties due to the heat treat-ment, it is essential to find a way to make the Al-Si composite heat treatable. The dissol-ution of magnesium in the matrix, makes the composite age-hardenable, showingimprovements in hardness and tensile strength properties according to changes in agingkinetics. This study analyses the peak aging kinetics on the hardness-related propertyimprovement according to the magnesium dissolution content in the matrix. Hence, thisresearch focuses on the role of aging treatment on the mechanical properties, especially thehardness of stir-cast Al-Si matrix Silicon Carbide (SiC) composites with up to 1.5 wt. % Mgintentionally dissolved in base alloy. Two aging temperatures (100 and 200 C) were pitchedinto the target peak hardness and peak-aged condition. A minor quantity of Mg dissolutionin the Al-Si matrix SiC composite has resulted in the improvement of hardness up to 24%,and age-hardening conditions contributeed up to a 40% increase in peak hardness.Similarly, the peak aged condition tensile strength shows an increase of up to 45% duringage hardening compared to the Mg-free as-cast composite

**Full paper: Cogent Engineering, DOI: https://doi.org/10.1080/23311916.2024.2396041, Vol 11, Issue No 1, 2024, pp 2396041.*

Fabrication and Mechanical Testing of Glass Fiber Reinforced Epoxy Matrix Composites Modified with Powdered Metallic Fillers

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ABSTRACT

Composite materials made up of polymer matrix reinforced with synthetic fibers have gained popularity of late owing to their enhanced mechanical properties. However, very little work is reported to date on metals being used as filler material. Research gaps were obtained pertaining to the use of metallic fillers in synthetic fiber reinforced polymer composites. This paper demonstrates an attempt to fabricate composites made of Epoxy polymer matrix and E-glass fiber reinforcement with Mild Steel in its powdered form as fillers. Composites are prepared in varying weight percentages of the filler in the order of 2 wt. %, 4 wt. % and 6 wt. %. Hand layup method is employed for fabricating these composites which are later subjected to compression. Further, the samples are machined according to ASTM D3039 standard for tensile test and ASTM D256 standard for Izod impact test. Hardness test is also performed using a Shore D Durometer and these properties are compared with the unfilled samples. The results indicated that the weight percentage of the filler clearly influenced the mechanical properties of the developed composites. This study also revealed that the hardness and tensile strength of these composites improved with the incorporation of fillers up to 2 wt. % whereas, the impact strength improved up to 4 wt. %. Thereafter, there was a decline in their impact and tensile properties. However, hardness marginally increased beyond 4 wt. %. This area is open for research with regard to their usability under tribological, high temperature or magnetic conditions.

**Full paper: Journal of Mines, Metals and Fuels, DOI: 10.18311/jmmf/2024/42139, Vol 72, Issue No 2, 2024, pp 103-109.*

Investigation of the Effect for a Higher Biodiesel Blend and Titanium Dioxide Nanoadditive on the Performance Parameters of CI Engine

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ABSTRACT

In this study, the performance parameters, emission, and combustion characteristics of a diesel powered engine are investigated to evaluate the effects of Titanium dioxide nanoparticles as nanoadditive in B30 blend of Pongamia Pinnata biodiesel. Nanoadditives were added to a B30 blend of biodiesel in concentrations of 25mg/L, 50mg/L, 75mg/L, and 100 mg/L. After sonication using probe sonicator the samples were tested in a Computerised CI engine test rig. An attempt is made to compare the results obtained from these blends with the results of the B20 blend. The results indicated that the use of nanoadditives in fuel lowers the smoke opacity up to 13.24%, lowers brake specific fuel consumption (BSFC) up to 7.4% for B30T75 compared to B30. The measured emission of NOx for B30T75 was found to be 2.91% greater than that of the B30 at maximum load condition. Unburnt hydrocarbon emissions reduced by 14.44% for B30T75 compared to B30 at maximum load. From the combustion analysis, it was found that the heat release rate was 5.4% higher for B30T75 nanofuel sample compared to that of B30 fuel sample. From the results, it can be concluded that B30T75 nanofuel sample has optimum increment in the overal engine performence and emissions among the fuel sample tested.

**Full paper: AIP Conference Proccedings, DOI:https://doi.org/10.1063/5.0196128, Vol 3060, 2024, pp 030004.*

Towards a Design Science Research (DSR) Methodology for Operational Excellence (Opex) Initiatives

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ABSTRACT

Purpose Design science research (DSR) is a structured approach for solving complex ill-structured problems in organizations through the development of an artefact followed by its validation. This paper aims to evaluate existing DSR methodology and propose specific accents to promote DSR for environmental, social and governance (ESG)-oriented operational excellence (OPEX) initiatives within organizations.

Design/methodology/approach This commentary paper is based on an abductive reasoning approach to evaluate and understand DSR and assess its effectiveness for developing solutions to typical ESG-oriented OPEX-based problems within organizations.

Findings Existing literature on DSR is reviewed, after which it is evaluated on its ability to contribute to the implementation of sustainable solutions for ESG-oriented OPEX-based problems. Based on the review, specific DSR methodological accents are proposed for the development of ESG-oriented OPEX-based solutions in organizations.

Research limitations/implications This conceptual paper contributes to the conceptual understanding of the applicability, limitations and contextual preconditions for applying DSR. This paper proposes an explicit and, in some ways, alternative view on DSR research for OPEX researchers to apply and further the body of knowledge on matters of sustainability (ESG) in operations management.

Practical implications Currently, there is limited understanding and application of the DSR methodology for OPEX-based problem-solving initiatives, as appears in the scant literature on DSR applied for the implementation of OPEX based initiatives for ESG purposes. This paper aims to challenge and provide accents for DSR applied to OPEX-related problems by means of a DSR framework and thereby promotes intervention-based studies among researchers.

Originality/value The proposed step-by-step methodology contains novel elements and is expected to be of help for OPEX-oriented academicians and practitioners in implementing DSR methodology for practical related problems which need research interventions from academics from Higher Education Institutions.

**Full paper: The TQM Journal.* DOI: *https://doi.org/10.1108/TQM-01-2023-0017, Vol 36, Issue No 8, 2024, pp 2383-2397.*

Heat Transfer Characteristics of Multiple Jet Impingements Using Graphene Nanofluid For Automobile Industry Application

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ABSTRACT

The framework experimentally investigates the application of graphene water Nano fluid nozzles for liquid jet cooling, particularly for internal combustion engine piston cooling. It also explores cooling effectiveness on flat and uneven surfaces (copper, steel, Inconel) with varying thicknesses. Turbulent liquid jets impinge on heated surfaces under constant heat flux using nozzles of different diameters to ensure fully developed flow. Graphene nanofluid concentrations of 0.1%, 0.15%, and 0.2% are compared to water. The impact is analysed for multiple jet arrangements, flow rates, and impingement distances on heat transfer using a combined experimental and numerical approach and findings reveal that higher jet Reynolds numbers, temperature rises, and smaller nozzle-to-plate distances enhance heat transfer. Nanofluid concentration significantly improves heat transfer compared to water, with a maximum increase of 50% at 0.2% concentration. These results inform the optimization of cooling strategies for automotive components, aiding engineers in designing efficient thermal management systems for heat-sensitive vehicle parts.

*****_Full paper: Thermal Science and Engineering Progress, https://doi.org/10.1016/j.tsep.2024.102993, Vol 55, October 2024, pp 102993_

Quality Management as a Means For Micro-Level Sustainability Development in Organizations

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ABSTRACT

Purpose The use of quality management (QM) to achieve the United Nations Sustainable Development Goals (UNSDGs) is a topic of growing interest in academia and industry. The IAQ (International Academy for Quality) established Quality Sustainability Award in 2020, a testament to this growing interest. This study aims to investigate how QM philosophies, methodologies and tools can be used to achieve sustainable development in organizations.

Design/methodology/approach Five large manufacturing organizations – three from India and two from China – who reported their achievements about using QM in achieving Sustainable Development Goals (SDGs) were studied using multiple sources of data collection. A detailed within-case and cross-case analysis were conducted to unearth this linkage's practical and theoretical aspects.

Findings The study finds that QM methodologies effectively met the five organizations' UNSDGs. These organizations successfully used OPEX (Operational Excellence) methodologies such as Lean, Kaizen and Six Sigma to meet UNSDGs 7, 11, 12 and 13. Moreover, UNSG 12 (Responsible Consumption and Production) is the most targeted goal across the case studies. A cross-case analysis revealed that the most frequently used quality tools were Design of Experiments (DoE), Measurement Systems Analysis (MSA), C&E analysis and Inferential statistics, among other essential tools.

Research limitations/implications The study's sample size was limited to large-scale manufacturing organizations in the two most populous countries in the world. This may limit the study's generalizability to other countries, continents, or micro-, small- and medium-sized enterprises (SMEs). Additionally, the study's conclusions would be strengthened if tested as hypotheses in a follow-up survey.

Practical implications This practical paper provides case studies on how to use QM to impact SDGs. It offers both descriptive and prescriptive solutions for practitioners. The study highlights the importance of using essential QM tools in a structured and systematic manner, with effective teams, to meet the SDGs of organizations.

Social implications The study shows how QM can be used to impact UNSDGs, and this is very important because the UNSDGs are a set of global objectives that aim to address a wide range of social and environmental issues. This study could motivate organizations to achieve the UNSDGs using essential QM tools and make the world a better place for the present and future generations.

Originality/value This case study is the first to investigate at a micro-level how QM can impact UNSDGs using live examples. It uses data from the IAQ to demonstrate how QM can be integrated into UNSDGs to ensure sustainable manufacturing.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-06-2023-0198, Vol 36, Issue No. 8, pp 2260 - 2280*

Critical Failure Factors for Quality 4.0: an exploratory qualitative study

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ABSTRACT

Purpose This study aims to investigate the adoption of Quality 4.0 (Q4.0) and assess the critical failure factors (CFFs) for its implementation and how its failure is measured**.**

Design/methodology/approach A qualitative study based on in-depth interviews with quality managers and executives was conducted to establish the CFFs for Q4.0.

Findings The significant CFFs highlighted were resistance to change and a lack of understanding of the concept of Q4.0. There was also a complete lack of access to or availability of training around Q4.0.

Research limitations/implications The study enhances the body of literature on Q4.0 and is one of the first research studies to provide insight into the CFFs of Q4.0.

Practical implications Based on the discussions with experts in the area of quality in various large and small organizations, one can understand the types of Q4.0 initiatives and the CFFs of Q4.0. By identifying the CFFs, one can establish the steps for improvements for organizations worldwide if they want to implement Q4.0 in the future on the competitive global stage.

Originality/value The concept of Q4.0 is at the very nascent stage, and thus, the CFFs have not been found in the extant literature. As a result, the article aids businesses in understanding possible problems that might derail their Q4.0 activities.

**Full paper: International Journal of Quality & Reliability Management, https://doi.org/10.1108/IJQRM-07-2023-0240, Vol 41, Issue No. 4, pp 1044 - 1062*

Optimization of Dry Sliding Wear Performance of TiO_2 Filled Bamboo and Flax Fiber Reinforced Epoxy Composites using Taguchi Approach

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ABSTRACT

Purpose This paper aims to report the effect of titanium oxide (TiO_2) particles on the specific wear rate (SWR) of alkaline treated bamboo and flax fiber-reinforced composites (FRCs) under dry sliding condition by using a robust statistical method.

Design/methodology/approach In this research, the epoxy/bamboo and epoxy/flax composites filled with 0–8 Wt.% TiO_2 particles have been fabricated using simple hand layup techniques, and wear testing of the composite was done in accordance with the ASTM G99-05 standard. The Taguchi design of experiments (DOE) was used to conduct a statistical analysis of experimental wear results. An analysis of variance (ANOVA) was conducted to identify significant control factors affecting SWR under dry sliding conditions. Taguchi prediction model is also developed to verify the correlation between the test parameters and performance output.

Findings The research study reveals that TiO_2 filler particles in the epoxy/bamboo and epoxy/flax composite will improve the tribological properties of the developed composites. Statistical analysis of SWR concludes that normal load is the most influencing factor, followed by sliding distance, Wt.% TiO2 filler and sliding velocity. ANOVA concludes that normal load has the maximum effect of 31.92% and 35.77% and Wt.% of TiO2 filler has the effect of 17.33% and 16.98%, respectively, on the SWR of bamboo and flax FRCs. A fairly good agreement between the Taguchi predictive model and experimental results is obtained.

Originality/value This research paper attempts to include both TiO_2 filler and bamboo/flax fibers to develop a novel hybrid composite material. TiO_2 micro and nanoparticles are promising filler materials, it helps to enhance the mechanical and tribological properties of the epoxy composites. Taguchi DOE and ANOVA used for statistical analysis serve as guidelines for academicians and practitioners on how to best optimize the control variable with particular reference to natural FRCs.

**Full paper: World Journal of Engineering*, https://doi.org/10.1108/WJE-01-2023-0008, *Vol 21, Issue No. 5, pp 882 – 893.*

Leveraging Lean Six Sigma Principles in an Indian Tertiary Care Hospital: a case study

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ABSTRACT

Purpose Workflow optimisation is crucial for establishing a viable acute stroke (AS) intervention programme in a large tertiary care centre. This study aims to utilise Lean Six Sigma (LSS) principles to enhance the hospital's workflow.

Design/methodology/approach The Action Research methodology was used to implement the project and develop the case study. The study took place in a large tertiary care academic hospital in India. The Define-Measure-Analyse-Improve-Control approach optimised the workflow within 6 months. Lean tools such as value stream mapping (VSM), waste audits and Gemba were utilised to identify issues involving various stakeholders in the workflow. Sigma-level calculations were used to compare baseline, improvement and sustainment status. Additionally, statistical techniques were effectively employed to draw meaningful inferences.

Findings LSS tools and techniques can be effectively utilised in large tertiary care hospitals to optimise workflow through a structured approach. Sigma ratings of the processes showed substantial improvement, resulting in a five-fold increase in clinical outcomes. Specifically, there was a 43% improvement in outcome for patients who underwent acute stroke revascularisation. However, certain sigma ratings deteriorated during the control and extended control (sustainment) phases. This indicates that ensuring the sustainability of quality control interventions in healthcare is challenging and requires continuous auditing.

Research limitations/implications The article presents a single case study deployed in a hospital in India. Thus, the generalisation of outcomes has a significant limitation. Also, the study encounters the challenge of not having a parallel control group, which is a common limitation in quality improvement studies in healthcare. Many studies in healthcare quality improvement, including this one, are limited by minimal data on long-term follow-up and the sustainability of achieved results.

Originality/value This study pioneers the integration of LSS methodologies in a large Indian tertiary care hospital, specifically targeting AS intervention. It represents the first LSS case study applied in the stroke department of any hospital in India. Whilst most case studies discuss only the positive aspects, this article fills a critical gap by unearthing the challenges of applying LSS in a complex healthcare setting, offering insights into sustainable quality improvement and operational efficiency. This case study contributes to the theoretical understanding of LSS in healthcare. It showcases its real-world impact on patient outcomes and process optimisation.

**Full paper: International Journal of Quality & Reliability Management, https://doi.org/10.1108/IJQRM-01-2024-0025, Vol 42, Issue No. 2, pp 600 – 630.*

Dynamic Performance and Stability Characteristics of a Multi Pad Externally Adjustable Fluid Film Bearing

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ABSTRACT

Due to the recent advances in the development of smart rotating machineries, there is a high demand for automated support bearings with efficient integrated control systems. Existing research studies have indicated that high-end performance can be attained from automated bearings through effective control and modification of the bearing performance parameters. In this study, an innovative journal bearing geometry with multi-control operations is presented. The four controllable bearing pads enclosed in the bearing casing have a novel feature to translate radially and undergo controlled tilt motions. The multi-control bearing system with radial and tilt pad motions will significantly influence the stability responses of the rotorsystem, which is theoretically analysed in this study. To predict the variation in film thickness for varied pad adjustments, a modified film thickness equation is incorporated in the linearised perturbed model for dynamic analysis. A notable variation in dynamic coefficients and stability parameters are observed for negative radial adjustment and tilt angles. Results indicate that negatively adjusted radial and pad tilt motion can generate improved stability margins at higher eccentricities. Data generated on stability margins at specific pad adjustments will be helpful while developing the control system for the actuation mechanism in the experimental setup.

**Full paper: Australian Journal of Mechanical Engineering, https://doi.org/10.1080/14484846.2022.2068749 , Vol 22, Issue No. 1, 2024, pp .133-148*

Unlocking the Potential: Empirical Analysis of Enablers, Barriers, Benefits and Technologies for Integrating Industry 4.0 and Lean Six Sigma in Manufacturing Organisations

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ABSTRACT

Purpose The integration of Lean Six Sigma (LSS) and Industry 4.0 (I4.0) is in the nascent stage and promises to achieve new optimums in operational excellence. This study aims to empirically examine the enablers, barriers, benefits and application of I4.0 technologies in LSS and I4.0 integration**.**

Design/methodology/approach A pilot survey was chosen as an appropriate methodology, as LSS and I4.0 integration is still budding. The survey targeted senior quality management professionals, quality managers, team leaders, LSS Black Belts and operations managers to collect the relevant research data. The questionnaire was sent to 200 respondents and received 53 valid responses.

Findings This study reveals that "top management support" is an essential enabler for LSS and I4.0 integration. The most significant barrier was "poor understanding of data analysis" and "lack of top management support". The findings further illustrated that LSS and I4.0 integration resulted in greater efficiency, lower operational costs, improved productivity, improved customer satisfaction and improved quality. Regarding I4.0 technology integration at different phases of LSS, the authors noticed that big data analytics and artificial intelligence (AI) are the most prominent technologies used in all phases of LSS implementation.

Research limitations/implications One of the limitations of this study is the sample size. LSS and I4.0 are emerging concepts; hence, obtaining a larger sample size is difficult. In addition, the study used non-parametric tests to analyse the data. Therefore, future studies should be conducted with large sample sizes across different continents and countries to understand differences in the key findings.

Practical implications The outcomes of this study can be useful for organisational managers to understand the enablers and barriers before integrating LSS and I4.0 for adoption in their organisations. Secondly, it helps to convince top management and human resource personnel by providing a list of benefits of LSS and I4.0 integration. Finally, it can help decision-makers understand which I4.0 technologies can be used in different stages of LSS methodology.

Originality/value LSS and I4.0 integration was studied at a conceptual level. This is the first empirical study targeted toward understanding the LSS and I4.0 integration. In addition, this study investigates the application of widely used I4.0 technologies in different phases of LSS.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-05-2023-0130, Vol 36, Issue No. 8, pp 2360 -2382.*

Adolescent Identity Search Algorithm with Optimised Video-Based Activity Classification using Hierarchical Auto-Associative Polynomial Convolutional Neural Network

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ABSTRACT

In this manuscript, video-based activity classification using hierarchical auto-associative polynomial convolutional neural network (V-AC-HA-APCNN) optimised with adolescent identity search algorithm is proposed. Initially, the input action data are taken from Weizmann action dataset. The input data is pre-processed with the help of trilateral filter. Then these pre-processed data are given to force-invariant improved feature extraction (FII-FE) approaches for extracting the necessary features of the video data. These extracted features are given to hierarchical auto-associative polynomial convolutional neural network (HA-APCNN) for classifying the human activities such as walk, run, bend, and skip. Adolescent identity search algorithm (AISA) is considered to enhance the HA-APCNN weight parameters. The performance of the proposed V-AC-HA-APCNN approach attains 32.3%, 56.6%, and 65.5% higher accuracy, and 34.4%, 43.2%, and 32.1% higher ROC compared with existing methods. The intention of this paper is to examine the deep learning methods for the classifications of video-based anomalous activity and focused on anomaly classification.

**Full paper: International Journal of Ad Hoc and Ubiquitous Computing, https://doi.org/10.1504/ijahuc.2024.137601, Vol 45, Issue No. 4, pp 254 - 265.*

DOE Coupled MLP-ANN for Optimization of Thrust Force and Torque Duringdrilling of CCFRP Composite Laminates

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ABSTRACT

Advancements in technology and the compulsion to use environment-friendly materialshave been challenging tasks for researchers for the past two decades. Researchers havebeen focusing on the utilization of plant fibers to produce good quality fiber-reinforcedpolymer/polyester composites for automobile, structural, and building applications.Researchers have been looking for high-quality and cost-effective drilling processes. The pri-mary goal of this study is to identify optimal drilling conditions for CCFRP composite lami-nates, affecting thrust force and torque. This is achieved by manipulating drilling processvariables using Taguchi's Design of Experiments (TDOE), Analysis of variance (ANOVA),Response Surface Methodology (RSM), Desirability Function Analysis (DFA) and ArtificialNeural Network (ANN). From the results, it was observed that the spindle speed of2000 rpm, feed of 15 mm/min, point angle of 90, fiber length of 6 mm, fiber volume of30%, and fiber diameter of 7 microns gave the optimum results for obtaining minimumthrust force and torque. Further RSM revealed that an increase in fiber vol % and a decreasein spindle speed resulted in an increase in thrust force and torque. From DFA optimizationresults, the minimum thrust force of 24.0042 N and minimum torque of 0.8001 N-m wasobtained. Finally, the experimental values of thrust force and torque were compared withthe corresponding values predicted by the MLP-ANN model. The average error percentagefor thrust force and torque was 1.75% and 6.56% respectively

**Full paper: Cogent Engineering, DOI: https://doi.org/10.1080/23311916.2024.2319397, Vol 11, Issue No 1, 2024, pp 2319397*

Effect of Tio_2 Filler on Mechanical and Tribological Properties of Owen Bamboo Fiber Reinforced Epoxy Composite

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ABSTRACT

Purpose- This paper aims to report the effect of titanium oxide (TiO_2) particles on the physical, mechanical, tribological and water resistance properties of 5% NaOH-treated bamboo fiber–reinforced composites.

Design/methodology/approach-In this research, the epoxy/bamboo/TiO_2 hybrid composite filled with 0–8 Wt.% TiO_2 particles has been fabricated using simple hand layup techniques, and testing of the developed composite was done in accordance with the American Society for Testing and Materials (ASTM) standard.

Findings -The results of this study indicate that the addition of TiO_2 particles improved the mechanical properties of the developed epoxy/bamboo composites. Tensile properties were found to be maximum for 6 Wt.%, and impact strength was found to be maximum for 8 Wt.% TiO_2 particles-filled composite. The highest flexural properties were found at a lower TiO_2 fraction of 2 Wt.%. Adding TiO_2 filler helped to reduce the water absorption rate. The studies related to the wear and friction behavior of the composite under dry and abrasive wear conditions reveal that TiO_2 filler was beneficial in improving the wear performance of the composite.

Originality/value -This research paper attempts to include both TiO_2 filler and bamboo fibers to develop a novel composite material. TiO_2 micro and nanoparticles are promising filler materials; it helps to enhance the mechanical and tribological properties of the epoxy composites and in literature, there is not much work reported, where TiO_2 is used as a filler material with bamboo fiber–reinforced epoxy composites.

**Full paper: World Journal of Engineering, https://doi.org/10.1108/WJE-12-2022-0495, Vol 21, Issue No 4, pp 781-792.*

Enhancing Mechanical Properties of Ti-64 Alloy through ECAE: Lubricant Optimization, Microstructural Evolution and Optimal Process Parameters

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ABSTRACT

This study explores the application of Equal Channel Angular Extrusion (ECAE) in enhancing the microstructural and mechanical properties of Ti-64 alloy. Finite Element (FE) analysis validates experimental outcomes, revealing a significant reduction in grain size, improved strength, and hardness. Microstructural analysis indicates dynamic recrystallization, transforming larger alpha (α) grains into smaller ones. Tensile testing demonstrates increased yield and ultimate strength in ECAE-treated specimens due to decreased grain size and heightened dislocation density. Lubricant optimization achieves low friction coefficients (0.02 and 0.04), reinforcing ECAE effectiveness. FE simulations and ANOVA analysis identify influential factors, leading to optimal parameter combinations. Isothermal ECAE successfully reduces grain size, resulting in substantial improvements in yield strength, ultimate strength, and hardness. These findings highlight ECAE's efficacy in enhancing the mechanical properties of Ti-64 alloy, with specific applications in biomaterials, particularly dental implants and bone support, as well as aerospace fasteners, where Ti-64 contributes to increased fuel efficiency, reduced emissions, and enhanced structural integrity.

**Full paper: International Journal on Interactive Design and Manufacturing, https://doi.org/10.1007/s12008-024-01803-4, 2024, pp 1-18.*

Effect of Buoyancy Force in Phase Change Material-Based Metal Hydride Reactor

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ABSTRACT

In Phase Change Material (PCM) simulations, buoyancy force is used to capture the melting contour. However, for the sake of simplicity, most of the PCM-based Metal Hydride (MH) simulations have ignored the influence of buoyancy in PCM which is crucial in analyzing the heat flow within PCM. This study incorporates the buoyancy term in mathematical models to capture the contour of a melted PCM and also its heat transfer capacity during the hydrogen absorption process. A PCM model with buoyancy force is validated against the experimental values and applied to the MH-PCM models. Incorporating the buoyancy force improves the heat transfer rate in the PCM during melting which benefits in better heat removal from the MH bed. Two designs of MH-PCM models having PCM placed in ring-type and tube-type configurations are discussed. Further, the design optimization in ring-type models was done by changing the PCM-MH volume and sandwiching ratios.

**Full paper: Journal of Thermal Science and Engineering Applications, https://doi.org/10.1115/1.4065188, Vol 16, Issue No 6, pp 061007(10 pages).*

Arduino-Based Robotic Arm for Farm Security in Rural Areas

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ABSTRACT

Guarding farms and ranches during the night has become a major challenge for farmers in rural areas. Thieves and wild animal attacks are the major threats. Technology has played a crucial role in developing machines to substitute for human labour. A trending topic which is of interest among agriculturalists is smart farming, which aims at improving the quality and quantity of agricultural production. To accomplish this, the farm needs to be made more intelligent by using detection technologies. As a part of smart farming, there is a need to design an integrated farm security system including sensors and control systems to monitor and provide a form of surveillance around the farm. The study shows the need for an efficient and effective farm security system. This chapter discusses different technologies used for farming, and providing security to farm land, particularly those that are based on the Internet of Things (IoT), information and communication technology (ICT) and GPS, followed by the design of a robotic manipulator/arm with a camera to watch over the farm. The robotic arm is designed to provide a robust control system to monitor a farm using camera, sensors, servo motors and alarm systems. The robotic arm is designed with two rotary joints and an end effector. The rotary motion is provided by servomotors. The system is controlled by the Arduino platform that receives and communicates to and from the user's mobile application through wireless controlling signals. The efficiency and effectiveness of the system is determined by conducting tests on all sensors and servo motors used in the system. This work is a sincere effort to design an efficient farm security system, which is cost effective and precise. The current challenges faced by farmers and agriculturalists for dealing with security issues with farm land is taken into consideration for developing the present sustainable IoT-based sensors and communication module for farm security.

**Full paper: Mathematical Models Using Artificial Intelligence for Surveillance Systems, https://doi.org/10.1002/9781394200733.ch10, Book Editor(s):Padmesh Tripathi, Mritunjay Rai, Nitendra Kumar, Santosh Kumar, 2024, pp 215-240*

DEPARTMENT OF BUSINESS ADMINISTRATION

Influence of Psychological Biases on Investing Choices among Individual Investors in Mangalore City, Karnataka

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ABSTRACT

Over the last two decades, there has been a significant uptick in the study of "behavioral finance," which focuses on the psychological effects of financial choices made by individual investors. Such decisions can significantly impact the market, the individual, and the economy. The current research delves into the various psychological elements that influence individuals while investing in the state of Karnataka, specifically in Mangalore. A quantitative study was conducted to analyse the psychology of individual investors in Mangalore City, Karnataka. The data was collected from a sample of 203 investors in Karnataka (Mangalore City) through a structured questionnaire. The study utilized multiple regression analysis using SPSS to determine the relationship between the variables. The study indicates that overconfidence, herding, and regret aversion have a positive effect on investment decisions, while representative bias has a negative effect. However, no relationship was found with mental accounting biases. There is a dearth of research on behavioural finance in the southern part of India. This paper fills the gap by analysing psychological biases in the Indian Individual investor

**Full paper: Journal of Propulsion Technology ISSN: 1001-4055 Vol 45, Issue No 1,2024, pp 1310-1321.*

Comparing the Performance of GARCH Family Models in Capturing Stock Market Volatility in India

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ABSTRACT

In recent times, the prediction of stock market volatility has emerged as a central focus in the domain of financial econometrics. This paper presents an empirical analysis aimed at modelling the volatility of the Indian stock market, particularly focusing on the NSE NIFTY 50, by utilizing various GARCH models. The investigation explores the volatility of stock returns, considering the daily closing prices, and examines the influence of two external factors: Crude oil prices and the INR/USD exchange rate. The inquiry employs data encompassing the period from January 1, 2012, to December 31, 2022, for all three variables. The manuscript delves into an array of univariate GARCH models, encompassing both symmetric and asymmetric models, and assesses their performance by utilizing metrics such as the Akaike Information Criterion, Schwartz Bayesian Information Criterion, and Log Likelihood. To assess the predictive accuracy of these models, statistical error measures such as Mean Squared Error, Root Mean Squared Error, and Mean Absolute Error are employed. The findings strongly suggest that the EGARCH model is the most effective in predicting the variations of the NIFTY index. Furthermore, the research highlights the significant impact of exchange rates and crude oil prices in relation to the volatility of the stock market in India.

**Full paper: Shanlax International Journal of Management, DOI: https://doi.org/10.34293/management.v11i3.7033, Vol 11, Issue No 3, January 2024, pp 11.20.*

Short-Term Performance of Indian Initial Public Offerings (IPOs)

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ABSTRACT

The pricing of IPO's in the short-term has been analyzed by several theoretical and empirical studies referring to the world's major stock markets. Studies have also observed that IPOs cause increase in price considerably on the first day of trading and provide huge returns to investors who buy at the initial offer price and sell immediately in the secondary market. This research presents the results of the analysis related to the short-term performance of the Indian IPOs under study. Event study methodology is used to analyze the short term performance of IPOs from January 2016 to December 2022 issued in Bombay Stock Exchange (BSE), India. The average positive return on the listing day is 18.5 percent which indicates that the IPOs are underpriced

**Full paper: Shanlax International Journal of Management,* DOI: *https://doi.org/10.34293/management.v11i3.6896. Vol 11, Issue No 3, January 2024, pp 21-25.*

Venture Capital: A Next Generation Financing in India

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ABSTRACT

Venture capital (VC) has emerged as a pivotal component in the financing ecosystem of India, driving innovation and entrepreneurship in the country. This chapter explores the transformative role of venture capital in India, examining its impact on the startup ecosystem, emerging trends, and future prospects. The Indian venture capital landscape has evolved significantly, characterized by increasing investments, a burgeoning startup culture, and supportive regulatory frameworks. Key factors driving this evolution include a large and young demographic, rapid technological advancements, and a growing appetite for entrepreneurial risktaking.

**Full paper: Research and Reviews in Literature, Social Sciences, Education, Commerce and Management, ISBN: 978-93-95847-20-9, Vol I, First Edition: February, 2024*

Impact of Emotional Intelligence on Organizational Citizenship Behaviour of Employees Working in Select Service Sector in Mangalore

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ABSTRACT

Emotions displayed by individuals has a significant role in our lives and are increasingly being accepted as a critical element in today's world. Emotional Intelligence (EI) is a concept that is gaining importance in organizations, as it is believed that human relations and activities related to it are influenced by factors related to emotions as compared to rational. EI is the ability to understand one's emotions and inspire, influence, and understand others' emotions. It is significant in the organization because it helps in improving your interpersonal relationships, both personally and professionally. When employees notice that their organization appreciates and provides support for them, there is a greater chance that they will participate in Organizational Citizenship Behavior (OCB), which can contribute to a more positive work environment and increased productivity. OCB is a commitment towards an organization by an employee that is not associated with their regular employment contract. This study analyzes various emotions that prevail within an organization during an employee's term of employment, which measures parameters such as selfawareness, self-regulation, empathy, motivation and social skills. The study surveyed 181 employees of select service sectors including IT, Banking, Hospitality, Healthcare & Teaching working in Mangalore region. The study focusses on to find out how Emotional Intelligence affects Organizational Citizenship Behaviour of employees. Regression analysis results that self-regulation and motivation (Elements of Emotional Intelligence) predicts OCB significantly whereas Self-awareness, Empathy and Social skills are not. With the intension to find out important dimensions of OCB and EI, factor analysis is used resulting with each showing two dimensions. Employees were more inclined to use their discretion in ways that benefited the company if they had greater levels of emotional intelligence. This indicates that encouraging and improving emotional intelligence can be a useful tactic for advan cing OCB inside the company.

**Full paper: Journal of Tianjin University Science and Technology, DOI:10.5281/zenodo.10947465, Vol 57, Issue No 4, 2024, pp 218-231.*

An Empirical Study of a Train of Causativeness from Financial Stability to Financial Inclusion

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ABSTRACT

As part of the overall goals for economic and financial growth, developing nations are working to promote financial inclusion, or increased access to financial services for low-income families and businesses. This prompts the query of whether, generally speaking, financial stability and financial inclusion are alternatives or complements. Do efforts to enhance financial inclusion tend to improve or worsen financial stability, in other words? Financial inclusion may have both beneficial and negative effects on financial stability, according to a number of studies, although there haven't been many empirical investigations of this link. This is due in part to the dearth and relative youth of the statistics on financial inclusion. By evaluating the impact of several financial inclusion measures (along with certain control variables) on various financial stability metrics, such as bank non-performing loans and bank Z-scores, this study adds to the body of knowledge on the issue. We find modest evidence that more lending to small and medium-sized businesses (SMEs) promotes financial stability, primarily by lowering the number of non-performing loans (NPLs) and the likelihood that financial institutions would default. This indicates that governmental initiatives to promote financial inclusion—at least among SMEs—would also have the unintended consequence of promoting financial stability

**Full paper: Journal of Tianjin University Science and Technology, DOI: 10.5281/zenodo.10947392, Vol 57 Issue No 04, 2024, pp 187-192.*

A Study on the Role of HRMS in Talent Management and Retention in Current Context

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ABSTRACT

This theoretical research paper delves into the critical role of Human Resource Management Systems (HRMS) in talent management and retention, examining how HRMS tools enhance the identification, development, and retention of top talent through a combination of automated processes, advanced data analytics, and strategic workforce planning, thereby improving organizational performance by enabling more effective talent acquisition strategies, personalized employee development programs, and predictive analytics that anticipate turnover risks and optimize retention efforts; this study also explores the integration of HRMS with broader organizational strategies, the impact of HRMS on employee engagement and job satisfaction, and the role of HRMS in fostering a culture of continuous learning and development, while addressing the potential challenges associated with HRMS implementation, such as data privacy concerns, the complexity of system integration, and the need for ongoing updates to ensure alignment with evolving workforce dynamics and regulatory requirements, ultimately arguing that the successful deployment of HRMS can lead to a more agile, responsive, and competitive organization by leveraging technology to create a more dynamic and resilient talent management ecosystem.

**Full paper: International Journal of Research Publication and Reviews DOI: https://doi.org/10.55248/gengpi.5.0624.1506, Vol 5, Issue No 6, June 2024, pp 2541-2548*

Unveiling the Entrepreneurial Mindset: Exploring Orientation and Intentions Among Students of Prominent Engineering Disciplines

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ABSTRACT

The advent of Industry 4.0 presents a spectrum of challenges for entrepreneurs in India, demanding specific skills and resources. Within this transformative landscape, engineering disciplines assume a pivotal role in navigating the complexities of the new industrial revolution yet pose challenges in instilling entrepreneurial skills. While univer-sities are recognised for fostering entrepreneurial skills, a gap persists in comprehending students' intentions to pursue entrepreneurship after completing their studies, especially within technical education systems. This emphasises the necessity for a comprehensive examination of variations in entrepreneurial orientation among diverse engineering disciplines. The study employed cross-sectional research and surveyed 370 final-year engineering students from leading engineering colleges in Karnataka, India. The data analysis included Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM). The findings demonstrate a significant propensity for entrepreneurship among engineering students, highlighting attributes such as innovativeness,

risk-taking, and proactiveness. However, contrary to expectations, the study does not discern distinct entrepreneurial orientations across different engineering disciplines. Importantly, it unveils that college education has minimal influence on students' entrepreneurial intentions

**Full paper: Journal of Innovation and Entrepreneurship, DOI: https://doi.org/10.1186/s13731-024-00390-8, Vol 13, Issue No 33, 2024, pp 1-26.*

Navigating Waiting Situations at Retail Checkouts: Associated Emotional Discomfort and its Impact on Shopping Satisfaction

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ABSTRACT

Waiting is a ubiquitous constituent of many purchase situations. This research investigates the emotional discomfort experienced by customers visiting retail stores in India throughout the checkout process, focusing on three distinct phases: before joining the queue, while waiting, and during billing. The study examines the circumstances and underlying factors that lead to emotional discomfort among customers while they wait at the checkout counter. A cross-sectional survey involving 385 participants was undertaken to evaluate perceptions related to the waiting experience. Structural Equation Modeling (SEM) was utilized to validate the conceptual model. The study uncovers diverse contributors to emotional discomfort during queueing, such as extended wait times, physical constraints, and perceived time prolongation, highlighting the multifaceted nature of this experience. Notably, the absence of a significant link between emotional discomfort and overall satisfaction implies that, while emotional discomfort is a factor, other elements such as pricing, promotions, and product offerings may exert a more significant influence on customers' comprehensive satisfaction assessments. The research makes a significant contribution by shedding light on the challenges associated with prolonged waiting times at checkout counters in multi-brand food and grocery retailers. The results provide valuable insights into the emotional experiences of customers during waits and their impact on overall shopping satisfaction.

**Full paper: Management and Marketing, DOI: https://doi.org/10.2478/mmcks-2024-0012 Vol 19, Issue No 2, 2024, pp 256-274.*

Adaptive Filter for Reducing False Positives in Face Recognition from Image and Video Input

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ABSTRACT

In recent years, significant progress has been made in Face Recognition (FR) systems, finding diverse applications such as security, authentication, surveillance, and user convenience. Despitethese advancements, a persistent challenge in FR systems is the occurrence of false positives, where individuals are mistakenly identified as matches. This issue can lead to security breaches, privacy concerns, and user dissatisfaction. Researchers are actively developing deep-learning-based algorithms to enhance FR systems by addressing false positive (FP) rates. This paper introducesan innovative approach to tackle false positives in real-time face recognition systemsthatoperateon image streams using a filtering method. Instead of treating every identification as a match, our method dynamically filters false positive results using a larger database containing recent and necessary face images. This filtering technique significantly decreases the number of false positive cases, resulting in a more accurate and reliable face recognition system. The experimental results presented in this paper illustrate the effectiveness of our approach in reducing false positives across various challenging scenarios. By adapting to the specific context in which face recognition is applied, our method achieves a noteworthy reduction in false positives while maintaining a high level of accuracy and efficiency. In summary, mitigating false positives in face recognition stands as a crucial stride in unlocking the complete potential of this technology, simultaneously addressing apprehensions regarding its potential misuse. Our innovative false positive filtering approach presents a promising resolution to this challenge, laying the foundation for the development of more secure and reliable face recognition systems across diverse domains.

**Full paper: Journal of Hunan University Natural Sciences, DOI:10.5281/zenodo.14598174, Vol 61, Issue No 9, 2024.*

Cross-Border Linkages Between the Global Rubber Spot and Futures Markets

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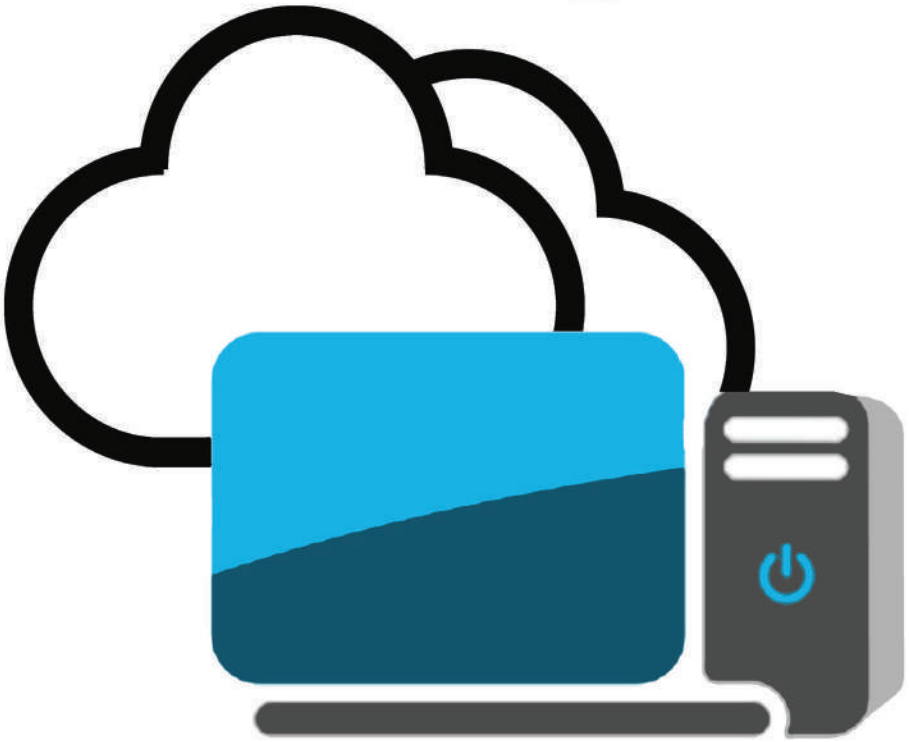
ABSTRACT

This paper investigates the linkage between the spot and futures markets of rubber globally. The daily spot price data of rubber in India, Malaysia and Thailand from 4th January 2016 to 2nd November 2022 have been collected from the website of the Association of Natural Rubber Producing Countries (ANRPC); for the same period, the rubber future daily price has been collected from the website of investing.com. The correlation, the Granger causality test, the Johansen cointegration test and the Vector error correction models (VECM) have been applied to test the linkages. The results of the Granger causality and the correlation coefficients revealed the causality between global spot and futures markets for rubber. Johansen's cointegration results justify using VECM; the error correction terms revealed that the correction to the long-term equilibrium would be adjusted in the spot price series. The price of SRU and STF rubber futures traded at Singapore Exchange (SGX) lead the spot price of rubber in India, Malaysia, and Thailand. The study outcomes would help the stakeholders of the rubber industry globally Classification-JEL:

**Full paper: Regional and Sectoral Economic Studies, Euro-American Association of Economic Development, Vol 24, Issue No 2, 2024, pp 159-174.*



MASTER OF COMPUTER APPLICATIONS

Security Establishment using Deep Convolutional Network Model in Cyber-Physical Systems

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ABSTRACT

This study develops an active security control strategy for Cyber-Physical Systems (CPSs) that are subject to attacks known as Denial-of-Service (DoS), which can target both channels from the controller to the actuator and from the controller to the sensor. Due to attack cost restrictions, the linked channels are subject to a limit on the number of continuous DoS attacks. A proactive security control method is then developed to combat two-channel DoS attacks, depending on a method for identifying IoT intrusions. Using the CICIDS dataset for attack detection, we examined the effectiveness of the Deep Convolutional Network Model (DCNM), a suggested deep learning model. The addressed CPS can be asymptotically stable against DoS assaults under the security controller's active security control technique without sacrificing control performance. Recent tests and simulations show how effective the security control strategy is active. The proposed model gives better trade-off compared to existing approaches like Deep Belief Networks (DBN), Recurrent Neural Networks (RNN), Support Vector Machines (SVM), Supervised Neural Networks (SNN) and Feed Forward Neural Networks (FNN). The proposed model gives 99.3%, 99.5%, 99.5%, 99.6%, 99%, 98.9%, 99% accuracy with normal attack detection, botnet attack detection, Brute force attack detection, DoS attack detection, Infiltration attack detection, Portscan attack detection and web attack detection respectively.

**Full Paper:Multimed Tools Applications, DOI: https://doi.org/10.1007/s11042-024-18535-y, Vol 83, 2024, pp 76201–76221.*

Dynamic Task Offloading for Resource Allocation and Privacy-Preserving Framework in Kubeedge-Based Edge Computing using Machine Learning

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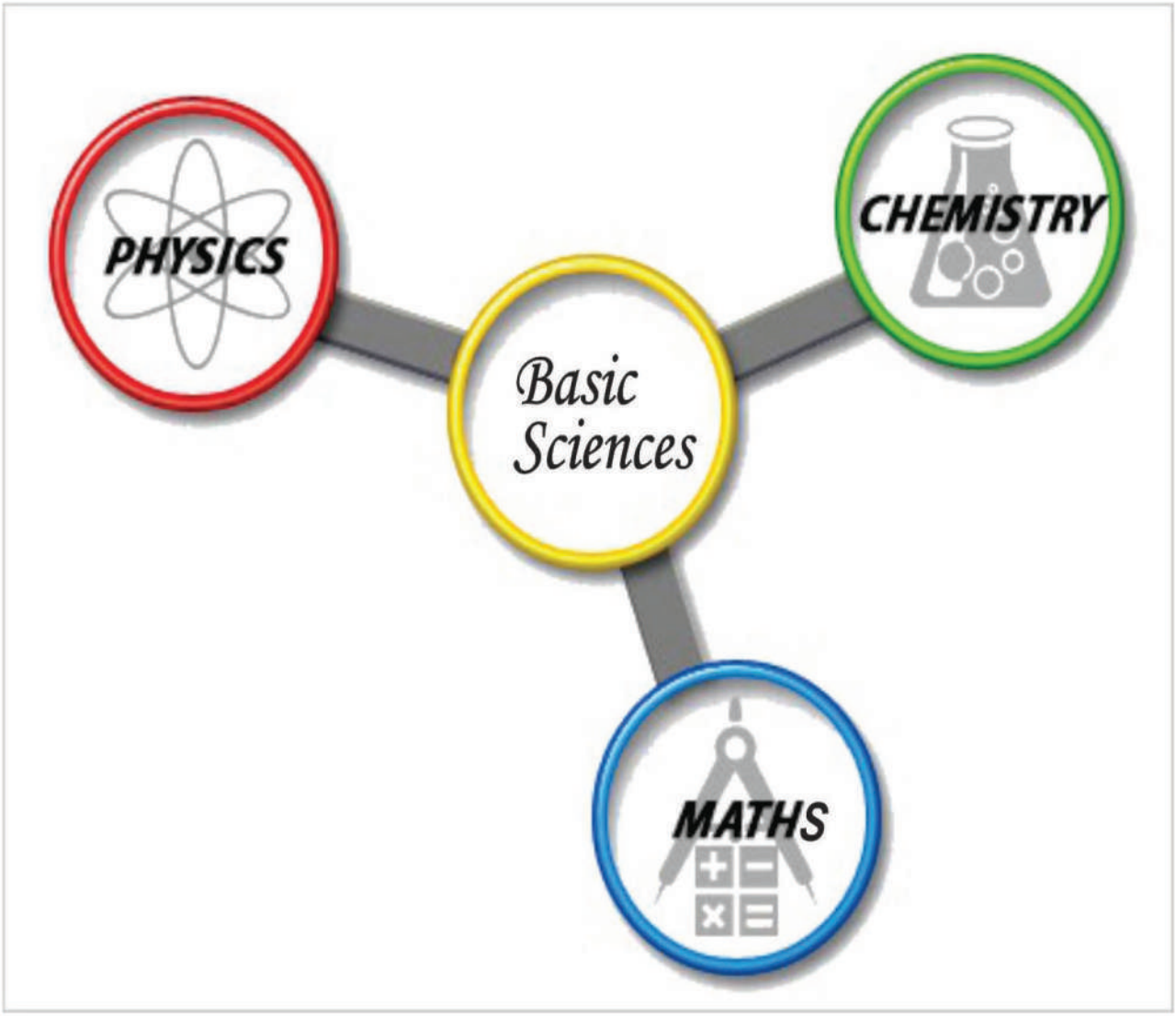
ABSTRACT

KubeEdge is an open-source system extending native containerized application orchestration and device management to hosts at the edge. One of the main disadvantages of edge computing is the lack of an effective resource allocation and privacy-preserving framework. The objective of this study dynamic task offloading is an important concept in resource allocation and privacy-preserving framework in Kubeedge-based edge computing using machine learning. This research focuses on enhancing the efficiency and security of edge computing within the framework of IoT devices within a KubeEdge cluster. It begins by gathering crucial data on computational power, memory, and network bandwidth from IoT devices, which is essential for informed decision-making. The study evaluates KubeEdge in terms of computational resource distribution and delay, introducing a privacy-preserving multi-layer Blockchain-enabled data aggregation mechanism. This approach ensures efficient data storage with adaptable and reliable data access control. The research addresses privacy concerns in IoT applications, balancing information loss and disclosure risk, and highlights the impact of forwarding traffic on cluster throughput and service delays in edge computing environments. Dynamic resource allocation algorithms are employed, considering profiling data and machine learning models for real-time task offloading decisions, guaranteeing sufficient allocated resources. A Multi-Agent Collaborative-Reinforcement Learning with Salp Swarm Algorithm is proposed for resource allocation in the edge computing environment, enhancing resource efficiency and secrecy performance. Blockchain ensures secure and transparent transactions, reinforcing trust in the dynamic edge environment. Reinforcement learning optimizes task offloading decisions, adapting to changing conditions. Auction games introduce a competitive mechanism, enhancing efficiency in resource allocation. When combined, they create a robust framework where blockchain guarantees data integrity, reinforcement learning optimizes resource usage, and auction games introduce a fair and efficient task allocation mechanism, ensuring both performance and privacy in computing environments. Furthermore, a Partitioning-Dynamic Collaborative energy-aware task offloading scheme is developed to securely offload tasks while preserving data privacy, enhancing trust computing and task offloading capabilities. The study also proposes a Hybrid Greedy Randomized Adaptive Stackelberg-Auction Game Approach to optimize offloading performance, reduce information loss, and decrease time consumption. This comprehensive framework includes task scheduling to reduce energy consumption, enhance privacy, and security, and reduce latency. The proposed work is analysed based on the Matlab software, and it shows a higher edge offloading rate and lower resource consumption for massive task scenarios in the edge network. Continuous performance evaluation of resource utilization, response time, and privacy protection further improves offloading decision accuracy over time.

**Full paper:Cluster Computing, DOI: https://doi.org/10.1007/s10586-024-04573-6, Vol 27, 2024, pp 9415-9431.*


PHYSICS
CHEMISTRY
Basic Sciences
MATHS

The C-prime Fuzzy Graph of a Nearring with Respect to a Level Ideal

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ABSTRACT

In this paper, we introduce a c-prime fuzzy graph of a nearring with respect to a level ideal of a fuzzy ideal. We find a relation between properties of the fuzzy ideal and properties of the fuzzy graph. We introduce ideal symmetry of the fuzzy graph and obtain conditions under which the graph is ideal symmetric. We find a relation between nearring homomorphisms and graph homomorphisms. We investigate conditions required for the homomorphic image of a c-prime fuzzy ideal to be a c-prime fuzzy ideal.

**Full paper: Palestine Journal of Mathematics, Vol 13, Special Issue III, 2024, pp 230–242.*

Graph of a Rough Approximation Set

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ABSTRACT

In this paper, we introduce, graph of lower and upper approximation of a non empty subset of a nearring with respect to an ideal. We relate the properties of these graphs with properties of ideals. We study the relationship between the connectivity of the graph and properties of the approximation set. We obtain the properties of these graphs under nearring homomorphism.

Full paper: Palestine Journal of Mathematics, Vol 13, Special Issue III, 2024, pp 194–209.

A Construction of a Lattice by Substitution Sum of a Lattice and Boolean Algebra

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ABSTRACT

Formal Concept Analysis (FCA) is an applied branch of lattice theory, widely used in computer science that derives implicit relationships between objects described through a set of attributes on the one hand and these attributes on the other. Any finite lattice can be generated by a formal concept, which can be obtained from the formal context of objects and attributes. In this paper, given a finite lattice L with |(L)| = |(L)| = n where n is the number of atoms in the Boolean lattice Bn, we construct a formal context obtained by substitution sum L L ∅ Bn and study the structural properties of the lattice BS(L) generated by the above substitution sum. Interestingly, the lattice L and the Boolean lattice Bn remain as separate entities in the lattice BS(L). Further, we have proved that the lattice BS(L) is complemented.

Full paper: Palestine Journal of Mathematics, Vol 13, Special Issue III, 2024, pp 148–153.

Line Graph Associated with C Prime Graph of a Near Ring

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ABSTRACT

In this paper we introduce a line graph of c-prime graph of a near- ring N with respect to an ideal I denoted by L(Cr{IV)). We find properties of this graph. We find diameter, girth and obtain conditions for L{Cr{N}) is a complete graph. We find interrelation between L(G1(N)), L(Ct(N)). We prove that near- ring homomorphism between two nearrings is a graph homomorphism between corresponding o-prime line graphs.

**Full paper: Proceedings of the Jangjeon Mathematical Society, Vol 27, No 4, 2024, pp 605-614*

A Novel Evaluation on the Impact of Modern Pedagogical Tools for Improving the Learning Outcomes of Engineering Mathematics.

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ABSTRACT

The proposed research investigates the impact of modern pedagogical tools on improving the learning outcomes in the field of mathematics in engineering. The educational methodologies tend to provide transformative shift that leads to the need for efficient exploration in specialized academic contexts. The proposed work utilizes a mixed-method approach that combines quantitative assessments and qualitative analyses to evaluate the impact of modern pedagogical tools extensively. Tools such as interactive simulations, online platforms, and multimedia resources seek to integrate the curriculum involved in traditional engineering mathematics. The research study investigates the exploration of the dynamic learning process of student engagement in various learning styles. To improve mathematical proficiency in students the proposed study utilizes Quantitative measures and encompasses pre- and post-assessments. Furthermore, the research utilizes statistics derived from digital technologies to discover interaction patterns and pinpoint specific areas of difficulty or achievement. In this study, in-depth interviews and surveys to capture students' perceptions, preferences, and experiences with the modern pedagogical tools in engineering mathematics by using Qualitative aspects. The findings of the study demonstrate the positive correlation between the incorporation of modern tools and enhanced learning results. These tools with the nature of interaction and visual appear to improve conceptual understanding and problem-solving skills. The students prioritize the flexibility and accessibility afforded by digital resources. The implications of this suggested framework extends beyond the immediate context of engineering mathematics, providing insights into the broader integration of technology in STEM education. Understanding the efficacy of contemporary pedagogical tools becomes crucial for creating a dynamic and engaging learning environment that meets modern education's expectations as educational landscapes change.

**Full paper:Proceedings of the International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI 2024), DOI: 10.1109/ACCAI61061.2024.10601972, Chennai, 9 to 10 May 2024, pp 1-6.*

Representation of a Lattice by a Graph with Respect to an Ideal and its Characterization

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ABSTRACT

In this paper a graph of s finite lattice L with respect to an ideal 1 is defined and is denoted by Gr{L). We demonstrate essential findings that connect ideals and graph representations. Furthermore, we explore the construction of the incidence matrix P for Gr{(L) and utilize it as a context table to derive the corresponding Concept Lattice Lp. In doing so, we uncover intriguing relationships between G;(L) and Lp. The results obtained in this study offer valuable insights into the interactions between finite lattices, their graph representations, and the significance of prime ideals. The implications of ‘these findings can have applications in various domains, such as lattice theory and graph theory.

**Full paper: Proceedings of the Jangjeon Mathematical Society, DOI:http://dx.doi.org/10.17777/pjms2024.27.4.585, Vol 27, No 4, 2024, pp. 585-592*

Lattice CST(L1) Obtained by the Substitution Sum in Formal Context

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ABSTRACT

Formal Concept Analysis (FCA) is an applied branch of Lattice theory, widely used in computer science, which derives implicit relationships between objects described through a set of attributes on one hand and these attributes on the other. Any finite lattice can be represented by a formal concept, which can be obtained from the formal context of ob- jects and attributes. Let T be a (0, 1) sublattice of a lattice L_1. In this paper, a concept lattice $CS_T(L_1)$ is constructed by the substitution- sum in the formal context, where T is a formal context of a (0, 1) sublattice of the lattice L_1. The structural properties of the concept lattice are studied and a characterization for the meet and join irreducible elements of $CS_T(L_1)$ is given. Further, some congruence relations are defined on the lattice $CST(L_1)$.

**Full paper: Journal of Computational Analysis and Applications, DOI:10.53555/jocaaa.v33i4.552, Vol 33, No 4, 2024.*

Eye-Tracking in Education: Analysing the relationship between Student's performance and Videonystagmography Report

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ABSTRACT

An investigation of the relationship between eye movements and students' academic performance was performed in this study. The aim of the article is to discuss the possible contribution of eye-tracking devices to the field of educational practices. The study emphasizes assessing whether there is a correlation between the students' performance scores and videonystagmography (VNG) recorded data in the students of two groups of different levels. The students were categorized as high, and low performers based on their internal assessment test marks. An average of six theory subjects were considered. The analysis of student's subject marks scored in their continuous assessment and VNG data was carried out. The VNG data included the saccades, smooth pursuit, and optokinetic tests. Thirty-six students (aged: 19-20 years) participated in the individual recording. It was found that there was a significant difference between the saccade latency in VNG data of high and low-performer students. The study shows that the eye-tracking recorded data can be a possible contributor to the assessment and interpretation of the student's engagement in the learning process.

**Full paper: Proceedings of the International Conference on New Frontiers in Communication, Automation, Management and Security (ICCAMS), DOI: 10.1109/ICCAMS60113.2023. 10526051, Date Added to IEEE Xplore: 15 May 2024, Bangalore, pp 1-6.*

An Estimation of Cordial Label-Based Topological Indices via QSPR Analysis for Heart Attack Medication Treatment Heart Attack Medication Treatment

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ABSTRACT

An index of topology is a numerical value. Utilizing a chemical substance's molecular structure, we can theoretically derive the attributes of a graph and determine its topology. Myocardial infarctions, commonly referred to as heart attacks, are exceedingly common worldwide. In this paper, we are going to investigate and analyze the chemical structures of anti-heart attack drugs and compare correlation coefficients derived from a linear regression analysis by using cordial label-based topological indices by QSPR model. In this, the data analysis of several properties such as boiling point, flash point, enthalpy, molar refraction, molar volume, and surface tension indicates a strong correlation with topological indices, indicating the significance of all computations. Additionally, a comparison of topological indices based on cordial labelling with those derived from a degree-based approach is provided. Furthermore, exponential, and logarithmic regression models are presented for reference

**Full paper: African Journal of Biological Sciences, ISSN: 2663-2187, https://doi.org/10.48047/AFJBS.6.Si4.2024.247-268, Vol 6, Issue No. 4, 2024, pp 248-268*

Investigating the Characteristics of Anti-Malarial Drugs by Cordial Label-Based Topological Indices

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ABSTRACT

In QSPR/QSAR analysis, topological indices are widely used for quantitatively characterizing chemical compounds. These analyses are used to study the compounds' physicochemical characteristics as well as their topological indices. Drugs' physicochemical and biological characteristics can be ascertained with the help of molecular descriptors, which have grown in the past several years. The main objective of this work is to investigate the characteristics of anti-malarial drugs using a theoretical framework. Cordial label-based topological indices is a new method we have presented to examine the structures of anti-malarial medications. With the aid of SPSS, the present study employs linear and quadratic regression methods to determine the quantitative structure property relationship (QSPR) by using topological indices (TI) to investigate anti-malarial drugs, namely doxycycline, amodiaquine, piperaquine, lumiefantrine, primaquine, atovaquone, pyrimethamine, and chloroquine. Seven physicochemical characteristics of anti-malaria drugs, including the boiling point, flash point, enthalpy, molar refractivity, molar volume, polarizability, and complexity, are analyzed using cordial label-based topological indices. For these prescription medications, we calculate the topological descriptors that correspond to their limiting behaviors. Additionally, the QSPR models in this work employ these TIs to estimate certain physicochemical characteristics of the medications. There is a correlation between these indicators and anti-malarial activity, and their relationship works really well for other compound series. The creation and synthesis of innovative anti-malarial drugs may be significantly aided by TIs.

**Full paper: African Journal of Biomedical Research, DOI: 10.53555/AJBR.v27i3S.3149, Vol 27, No 3S, 2024, pp 4271-4283*

QSPR Analysis on Bone Marrow Cancer Medications Via Topological Indices and Regression Model

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ABSTRACT

A topological index is a number that describes the topology of a network by using a chemical substance's molecular structure to fictitiously acquire its properties. This study examines and analyses the chemical structures of bone marrow cancer medicines using a cordial label-based topological index. Many features of bone marrow treatments, such as polar surface, boiling point, polarizability, enthalpy, molar refractivity, surface tension, Log P, and molar volume, have been statistically analysed. These results indicate a high link with topological indices, indicating the significance of these calculations. There is a direct association between the molecular descriptors and all positive correlation values. The properties of the bone marrow cancer medications calculated using a mathematical approach are superior compared to the experimental values of the bone marrow cancer medications obtained through costly and time consuming laboratory testing. Chemical structure is viewed as a network in which the elements are viewed as vertices and the boundaries between them as edges. Furthermore, the topological indices with and without hydrogen atoms are considered. In addition to observing that molar refractivity and polarizability exhibit the same correlations in the correlation coefficient and R-squared values in both hydrogen atoms and without hydrogen atoms, we also found that incorporating hydrogen atom analysis is more significant. The physical characteristics of chemical compounds used to treat bone marrow cancer are significantly associated with the aforementioned topological indices, as demonstrated by the QSPR analysis of these indices.

**Full paper: African Journal of Biomedical Research, DOI: 10.53555/AJBR.v27i1S.1199, Vol 27, No 1S, 2024.*

Enhanced Optical Third-Harmonic Generation in Phase-Engineered Nanostructured Zn1−Xcdxs Thin Films for Optoelectronic Device Applications

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ABSTRACT

A polycrystalline nanostructured thin film of zinc cadmium sulfide was meticulously fabricated on a glass substrate using the thermal evaporation method physical vapor deposition within a vacuum chamber. Different doping concentrations were introduced by varying the cadmium (Cd) content, resulting in Zn1-xCdxS films with Cd concentrations ranging from x = 0.00–0.20 wt %. The impact of Cd doping on the third-order nonlinear optical (TONLO) properties of these films was thoroughly studied using the Z-scan method, employing a diode-pumped solid-state continuous-wave laser. To gain insight into the structural characteristics, the Zn1-xCdxS thin films underwent analysis through x-ray diffraction. Optical studies confirmed the tunability of the optical band gap (Eg) in the Zn1-xCdxS films, ranging from 3.88 eV for undoped ZnS to 2.80 eV for the film fabricated with 20 wt. % of Cd-content. This significant reduction in 'Eg' renders the films highly suitable for use as absorbing layers in applications such as solar cells and optoelectronics. Surface morphology analysis, performed via field emission scanning electron microscopy, revealed noticeable alterations with increased Cd doping. Significantly, the doped films exhibited a substantial redshift in the band edge and an increase in transmittance within the visible and near-infrared regions. The investigation of TONLO properties, including the nonlinear absorption coefficient (β), nonlinear refractive index (n2) and susceptibility χ(3), yielded values ranging from 3.15 × 10−3 to 8.16 × 10−3 (cm W−1), 1.65 × 10−8 to 7.45 x 10–8 (cm2 W−1), and 3.12 × 10−5 to 7.86 × 10−5 (esu), respectively. These results indicate the presence of self-defocusing nonlinearity in the films. Overall, the outcomes underscore the potential of Cd-doped ZnS nanostructures in modifying surface morphology and enhancing NLO characteristics. Zn1-xCdxS thin films exhibit promise for applications in nonlinear optical devices, as evidenced by these encouraging findings.

**Full paper: Journal of Physics D: Applied Physics, doi:10.1088/1361-6463/ad1edd, Vol 57, Issue No 16, 2024, pp 165102.*

Comprehensive Analysis on the Z-Scan Response of Thermally Evaporated CuTPP Thin Films in Terms of H Aggregation and Charge Transfer Dynamics

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ABSTRACT

Nonlinear absorption (NLA) and nonlinear refraction (NLR) properties of the Cu(II) 5, 10, 15, 20-tetraphenyl-21H, 23H-porphine (CuTPP) thin film at 532 nm are investigated by using Z-scan technique with a laser of pulse width, τ = 6 ns and 30 ps. Powder XRD study of the CuTPP thin film reveals the nanocrystalline structure of the material embedded in an amorphous background. AFM and FESEM images depict a uniform, densely packed thin film with an RMS value of 14.69 nm. A characteristic broad blue-shifted Soret absorption band with davydov splitting in the UV–visible spectrum and stacking of particles illustrated in the AFM image highlights the formation of H-aggregates. Emission peaks at 651 and 711 nm are attributed to de-excitation from 2T1 and 4T1 tripmultiplet states to the ground state. In the 30 ps pulse regime, the NLA dynamics is influenced by saturation of tripmultiplet states and the band filling effect, resulting in the nonlinear saturation absorption phenomenon. However, NLA at 6 ns pulse duration is influenced by the excited-state absorption of triplet states, resulting in the reverse saturable absorption phenomenon. Closed-aperture Z-scan depicts self-focusing nonlinearity ($\Delta n > 0$) in the picosecond regime. In the nanosecond regime, the CuTPP thin film depicts a positive NLR at a lower intensity, and at a higher intensity, it shows a self-defocusing ($\Delta n < 0$) NLR nature. The presence of the Cu2+ ion in the porphyrin structure results in inception of the charge transfer (CT) state and leads to distinctive ultrafast relaxation dynamics from the 2S2 state, thereby resulting in exclusive nonlinear optical (NLO) properties. Van der Waals interaction through π-stacking along with high electron exchange between Cu and porphyrin results in enhanced NLO coefficient values. This highlights the prominence of the CuTPP thin-film derivative for new-generation optical devices.

**Full paper: The Journal of Physical Chemistry C: Physical Properties of Materials and Interfaces, Vol 128, Issue No 8, 2024, pp 3460-3472*

Nonlinear Properties of PMMA Composite Thin Films

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ABSTRACT

The optical properties of thin films composed of TPP-infused PMMA were investigated using the z-scan technique. These films, ranging in thickness from 200 to 400 nm, were prepared using spin-coating. Despite varying concentrations of TPP in the PMMA matrix, the UV-visible absorption spectrum displayed no shifts in absorption wavelength. However, the composite films demonstrated robust nonlinear absorption (NLA) and nonlinear refraction (NLR) coefficients, ran
ging from 10-6 to 10-5 m/W and 10-13 to 10-12 m2/W, respectively. Notably, the third-order nonlinear susceptibility, (3), increased with higher TPP concentrations. These findings suggest the potential of these TPP-incorporated PMMA spin-coated thin films for the fabrication of nonlinear optical devices.

**Full paper: Science and Technology - Recent Updates and Future Prospects, Edited by Khalil Kaasmi, https://doi.org/10.9734/bpi/strufp/v5/845, Vol. 5, 2024 , pp 70-77*

Synthesis and Characterization of CdS and ZnS Nanostructured Thin Films for Opto-electronic Energy Applications

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ABSTRACT

Thin Film Nanomaterials: Synthesis, Properties and Innovative Energy Applications provides a comprehensive overview of the synthesis, properties, and cutting-edge applications of thin film nanomaterials. Each chapter explores different aspects of thin film synthesis and its application in energy devices, showcasing different metal-based and carbon nanomaterials. The book begins with a discussion on the synthesis and characterization of cadmium and zinc sulphide thin films for opto-electronics energy devices. Subsequent chapters delve into critical reviews of CIGS thin film nanomaterials, deposition techniques for metal oxide nanocomposite films, and nanostructured TiO2@carbon films for photocatalytic applications. Bandgap engineering, optical properties of composite films, and recent advancements in metal oxide thin films are also covered. Additionally, the synthesis and characteristics of iron oxide films for solar cell and green energy storage applications are discussed. Chapters on challenges and future prospects of CNT-based cathode emitters and advanced characterizations of nanocrystalline ferrimagnetic thin films provide valuable insights into emerging technologies. This book is an essential resource for professors, scientists, engineers, research scholars, postdocs, and undergraduate/graduate students seeking to explore the forefront of nanomaterials and their applications in energy systems.

**Full paper: Thin Film Nanomaterials: Synthesis, Properties and Innovative Energy Applications DOI: 10.2174/9789815256086124010004, pp 1-35*

Dielectric, Photoluminescence, Thermal and Mechanical Properties of CuO Nanoparticles Filled Polyvinyl Alcohol/Polyvinyl Pyrrolidone Blends for High Frequency Device Applications

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ABSTRACT

This study involves synthesizing blends of polyvinyl alcohol (PVA) and polyvinylpyrrolidone (PVP) in 1:1 ratio using solution casting technique. The blends were then mixed with different concentrations of copper oxide (CuO) nanofiller, ranging from 0 to 16 wt% (0, 2, 4, 8, 12, and 16 wt%). Fourier transform infrared spectra and x-ray diffraction studies provide evidence of the structural modifications occurring within nanocomposites. Fluorescence spectroscopy revealed that the highest photoluminescence intensity occurred at a concentration of 8 wt% CuO in the blend which specifies that this particular concentration of nanofillers had a substantial impact on luminescence properties of the material. The morphology and texture of film's surface was examined by means of atomic force microscopy. The dielectric plot demonstrated that dielectric constant of the film increased up to a CuO filler concentration of 12 wt%. This indicates that there is an optimal concentration of CuO nanofillers that enhances dielectric properties of the material. The mechanical studies carried out using universal Testing Machine reveals enhancement in the mechanical properties after the addition of nanofillers. The promising characteristics of these nanocomposites are suitable for high-frequency device applications and optical sensing applications.

**Full paper: ECS Journal of Solid state science Technology, 10.1149/2162-8777/ad9402, Vol 11, pp 113014.*

Corrosion Mitigation of Mild Steel by N-Substituted Sulfonamide Derivative: Experimental and Theoretical Evaluation

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ABSTRACT

Mild steel is extensively used in the construction and petrochemical industry which is constantly subjected to an adverse corrosive environment that tends to decline its lifespan. This work aims to explore the potential of corrosion mitigation on mild steel by N-(pyridin-2-yl)-4- [(quinazoline-4-yl)amino]benzene-1-sulfonamide (NPS) in 1 M HCl. The experimental evaluation was done by electrochemical, SEM and EDS techniques. The mitigatory effect increased with inhibitor concentration for a temperature variation of 303 K to 323 K. The thermodynamic parameters are reviewed and the adsorption study of NPS is confirmed with Langmuir adsorption isotherm. Quantum chemical calculations at the B3LYP/6-311+G(d, p) basis sets level was evaluated on NPS to understand the influence of molecular structure in its mitigatory efficiency. The experimental and theoretical evaluation affirms the corrosion mitigation by NPS to be in good accord.

**Full paper: Fourth International Conference of Advancement in Research & Development (ICARD 2024), Department of Commerce, Indira Priyadarshini Govt. Degree College for Women, Autonomous, Nampally, Hyderabad, Telagan, India & RSP Conference Hub, Coimbatore, Tamil Nadu, 30th and 31st January 2024*

Investigation of Corrosion Inhibition of Mild Steel in Hydrochloric Acid by Pyrazoline Derivative using Experimental and Computational Approaches

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ABSTRACT

A new compound N-methyl-3,5-diphenyl-4,5-dihydro- 1H-pyrazole-1-carbothioamide (NDDP) was synthesized and analyzed using FTIR, 1HNMR, and mass spectrometry. The electrochemical impedance spectroscopy and potentiodynamic polarization techniques were utilised to assess the effectiveness of NDDP as a corrosion inhibitor for mild steel. The study found that the corrosion inhibition increased as the concentration of NDDP increased, while it decreased with an increase in temperature. The highest inhibition efficiency of 82.28% was reported at a temperature of 303 K with a concentration of 50 ppm of NDDP. Statistical thermodynamic calculations were done to determine activation and adsorption parameters. Surface investigation of the metal in the presence of NDDP was conducted using SEM, AFM, and EDX techniques. Quantum chemical computations confirmed the superior anticorrosive properties of NDDP as demonstrated by electrochemical studies.

**Full paper: Fourth International Conference of Advancement in Research & Development (ICARD 2024), Department of Commerce, Indira Priyadarshini Govt. Degree College for Women, Autonomous, Nampally, Hyderabad, Telagan, India & RSP Conference Hub, Coimbatore, Tamil Nadu, 30th and 31st January 2024*

Structural Hybrids of Sulfonamide and Thiazole Moieties: Synthesis, Characterization, Evaluation of Antimicrobial Activity and Theoretical Studies

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ABSTRACT

The present study aimed to design a series of sulfonamide-fused thiazole hybrids. Three compounds were synthesized and characterized by UV-Vis, LCMS, 1H, and 13C NMR spectroscopy. These compounds were evaluated for their antibacterial activity against K.pneumoniae, E. coli, B. subtilis, and S. aureus, antitubercular activity against the M.tuberculosis strain. Compound 5 exhibited good antibacterial activity with a minimum inhibitory concentration (MIC) of 1.0 mg/ml. Compound 5 was also resistant to M. tuberculosis at (MIC) 25.0 µg/mL. In addition, quantum chemical calculations and molecular docking results supported the mode of action for the observed biological activity. The present research provides empirical and theoretical insights to design new thiazole analogs for further development as potential drug candidates.

**Full paper: Fourth International Conference of Advancement in Research & Development (ICARD 2024), Department of Commerce, Indira Priyadarshini Govt. Degree College for Women, Autonomous, Nampally, Hyderabad, Telagan, India & RSP Conference Hub, Coimbatore, Tamil Nadu, 30th and 31st January 2024*

Quinazoline Scaffold: Synthesis, Characterization, and Biological Evaluation through the integration of Computational Approaches

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ABSTRACT

This investigation focuses on the examination of a novel compound, 4-[(7-chloroquinazolin-4-yl)amino]-N-(pyrimidin-2-yl)benzene-1-sulfonamide (CBS), encompassing its synthesis and characterization through FT-IR, ^{1}H , ^{13}C NMR and mass spectral analyses, alongside its diverse biological activities. CBS demonstrated notable efficacy against M. tuberculosis, with a MIC of 1.6 µg/ml, showcasing its promising role as a valuable antituberculosis agent in combating this resilient pathogen. Additionally, CBS exhibited significant antimicrobial activity, with an MIC of 12.5 µg/ml against the bacterial strain P. aeruginosa, underscoring its potential in addressing antimicrobial-resistant pathogens. Molecular docking and quantum chemical calculations provided insights into CBS's interactions with target proteins and its structural properties, enhancing our understanding of its biological effects. ADME predictions evaluated its pharmacokinetics, further supporting its candidacy as a potential drug delivery agent.

**Full paper: Fourth International Conference of Advancement in Research & Development (ICARD 2024), Department of Commerce, Indira Priyadarshini Govt. Degree College for Women, Autonomous, Nampally, Hyderabad, Telagan, India & RSP Conference Hub, Coimbatore, Tamil Nadu, 30th and 31st January 2024*

Experimental and Theoretical Approach for the Corrosion Deceleration of Mild Steel in Hydrochloric Acid Medium by Two Sulfonamide Derivatives

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ABSTRACT

In the pursuit to find corrosion inhibitors of superior efficacy, N-(pyrimidin-2-yl)-4-[(quinazoline-4-yl)amino]benzene-1-sulfonamide (PQS) and N-(4-methylpyrimidin-2-yl)-4-[(quinazoline-4-yl)amino]benzene-1-sulfonamide (MQS) are the two new sulfonamides employed, which have decelerating effect on mild steel (MS) corrosion in a medium 0.5 M HCl and were found to have an efficiency of 98.7 % and 96.8 % respectively (303 K for 40 ppm concentration) deliberated through the electrochemical techniques (PDP and EIS). The inhibitory efficacy relies on the temperature of the solution and inhibitor concentration. PQS had greater stability than MQS at higher temperatures which is indicative in the obtained experimental data. The relative adsorption process was in consonance with the Langmuir adsorption isotherm. The SEM, EDS, FT-IR, and AFM analysis validated PQS and MQS to form a barrier on MS, opposing corrosion. The potential energy surfaces (PES) scan and a theoretical study for PQS and MQS were probed employing density functional theory (DFT) at B3LYP/6-311+G(d, p) basis set level that explicated the formation of a complex between the sulfonamides and MS. The corrosion inhibition efficiency of PQS and MQS inferred from experimental and theoretical data comply, making them credible corrosion inhibitors.

**Full paper: ChemistrySelect, DOI: https://doi.org/10.1002/slct.202304886, Vol 9, Issue no 11, 2024, pp 1-18.*

Sulfonamide fused Thiazole Hybrids: Antibacterial, AntitubercularActivities and Quantum Chemical Insights

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ABSTRACT

The present study aimed to design a novel sulfonamide- fused thiazole, compound (1) was synthesized and characterized by UV-Vis, LCMS, 1 H, and 13 C NMR spectroscopy. Compound (1) was evaluated for its antibacterial activity against K. pneumoniae, E. coli, B. subtilis and S. aureus by disc diffusion method. Compound (1) was also screened for its antitubercular activity against the M. tuberculosis strain. The compound exhibited minimum inhibitory concentrations (MIC) of 1.0 mg/ml and 25.0 μg/mL for antibacterial and antitubercular activities, respectively. Quantum chemical calculations and molecular docking studies further elucidated the mode of action underlying the observed biological activities. Compound (1) demonstrated strong binding affinity to target proteins, making it a promising candidate for further drug development, supported by favourable pharmacokinetic properties and toxicity profiles. This research offers both empirical and theoretical insights for designing a new thiazole analogue with potential therapeutic applications**.**

**Full paper: International Conference on Advancements in Science, Engineering and Management (ICASEM) 2024, Vidya Vihar Institute of Technology, Purnea, Bihar, RSP Conference Hub, Coimbatore, 30th and 31st May 2024*

Synthesis, Characterization, and Biological Analysis of Quinazoline Scaffols Enhanced by Computational Techniques

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ABSTRACT

This study focuses on the examination of a novel compound, 4-[(7-chloroquinazolin-4-yl)amino]-N-(pyrimidin-2-yl)benzene-1-sulfonamide (CPS), encompassing its synthesis and characterization through FT-IR, ^{1}H NMR , ^{13}C NMR and mass spectral analyses, alongside its diverse biological activities. CPS demonstrated notable efficacy against *M. tuberculosis*, with a MIC of 1.6 µg/ml, showcasing its promising role as a valuable antituberculosis agent in combating this resilient pathogen. Additionally, CPS exhibited significant antimicrobial activity, with an MIC of 12.5 µg/ml against the bacterial strain *P. aeruginosa*, underscoring its potential in addressing antimicrobial-resistant pathogens. Molecular docking and quantum chemical calculations provided insights into CPS's interactions with target proteins and its structural properties, enhancing our understanding of its biological effects. ADME predictions evaluated its pharmacokinetics, further supporting its candidacy as a potential drug delivery agent.

**Full paper: International Conference on Advancements in Science, Engineering and Management (ICASEM) 2024, Vidya Vihar Institute of Technology, Purnea, Bihar, India, RSP Conference Hub, Coimbatore, 30th and 31st May 2024*

The Corrosion Behaviour of a Pyrazoline Derivative on Mild Steel in Hydrochloric Acid Medium: Electrochemical and Quantum Chemical Investigation

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ABSTRACT

A new pyrazoline derivative, N-methyl-5-(4-methylphenyl)-3-phenyl-4,5-dihydro-1H-pyrazole-1-carbothioamide (MPPC) was synthesized. The corrosion inhibition ability of MPPC for mild steel in 0.5 M HCl was analyzed by electrochemical impedance spectroscopic and potentiodynamic polarization techniques. The corrosion inhibition efficiency of 96% was reported at 50 ppm of MPPC concentration at 303 K. Activation parameters and thermodynamic calculations were performed to understand the corrosion inhibition process by MPPC. The theoretical predictions were executed by density functional theory using Gaussian 16 software. The surface analysis studies were carried out by scanning electron microscopy, EDX, and AFM studies. The experimental results, theoretical calculations, and surface studies confirm MPPC as one of the promising inhibitors for mild steel corrosion.

**Full paper: Recent Advances in Electrochemical Science and Technology(ICWEC 2023), Springer Proceedings in Materials (SPM), Vol 47, 11th August 2024, pp 163 - 174*

Synthesis, Characterization, Antimicrobial and DFT Studies of Novel Quinolino-Pyrazole Derivatives

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ABSTRACT

Synthesis of novel (E)-N-(4-(substituted) benzylidene)-6-substituted- 1H-pyrazolo[3,4-b] quinoline-1-carbothioamides/carboxamides was achieved by the condensation of 6-substituted-1H-pyrazolo[3,4-b] quinoline-1-carbothioamides/ carboxamides with substituted benzaldehydes in alcoholic medium in the presence of acetic acid. The structures of synthesized compounds are assigned on the basis of FT IR, ^{1}H NMR, ^{13}C NMR and Mass Spectral data. The compounds are subjected for their antibacterial, antifungal and DFT studies. Compounds, (E)-6-chloro-N-(4-(dimethylamino) benzylidene)-1H-pyrazolo[3,4-b]quinoline-1-carbothioamide **(5 b)**, (E)-6-chloro-N-(4-(dimethylamino)benzylidene)-1H-pyrazolo[3,4-b]quinoline-1-carboxamide **(5 f)**, and (E)-6-chloro-N-(4-hydroxybenzylidene)-1H-pyrazolo[3,4-b]quinoline-1-carboxamide **(5 j)** possessed pronounced antibacterial and antifungal activities due to their chemical structure.

**Full paper: ChemistrySelect, DOI: https://doi.org/10.1002/slct.202401166, Vol 10, Issue No 20, 2024, pp 1-5*

Synthesis, Characterization, and Evaluation of Pyrimidinone-Linked Thiazoles: DFT Analysis, Molecular Docking, Corrosion Inhibition, And Bioactivity Studies

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ABSTRACT

The paper describes the construction of a new series of pyrimidinone-linked thiazole derivatives through bromination of the initial Biginelli reaction product followed by the Hantzsch thiazole synthesis route. Various analytical techniques, including FT-IR, ^{1}H NMR, ^{13}C NMR, and LCMS analysis, were employed to confirm the formation of the products. The synthesized compounds were primarily evaluated for their antibacterial activity, with a specific focus on their IC_{50} values. Compound **4c** demonstrated the most potent efficacy, displaying MIC and MBC values that varied from 0.23 to 0.71 mg/mL and 0.46–0.95 mg/mL, respectively. The anti-inflammatory potential was also observed in analogs **4a** and **4c** with marked activity in the 33.2–82.9 μM concentration range. Moreover, compounds **4a**, and **4c** demonstrated strong antioxidant effects, as reflected by their excellent IC_{50} values of **38.6**–**43.5** μM respectively. DFT investigation showed that *B. cereus* was more susceptible, and *E. coli* was more resistant, with chloro-substituted compounds exhibiting potential reactivity. Some molecules with chloro-substituents showed promising results in density functional theory when compared to other substituents. In addition, the molecules underwent a corrosion study and demonstrated a high level of inhibition efficiency (**4c**) in comparison to other molecules. Further *in silico* studies of the synthesized thiazoles confirmed the good interactions with the target.

**Full paper: Heliyon, DOI: https://doi.org/10.1016/j.heliyon.2024.e39421, Vol 10, Issue No 20, 2024, pp 1-14*

CENTRAL LIBRARY

Awareness and Adoption of AI Technologies in the Libraries of Karnataka

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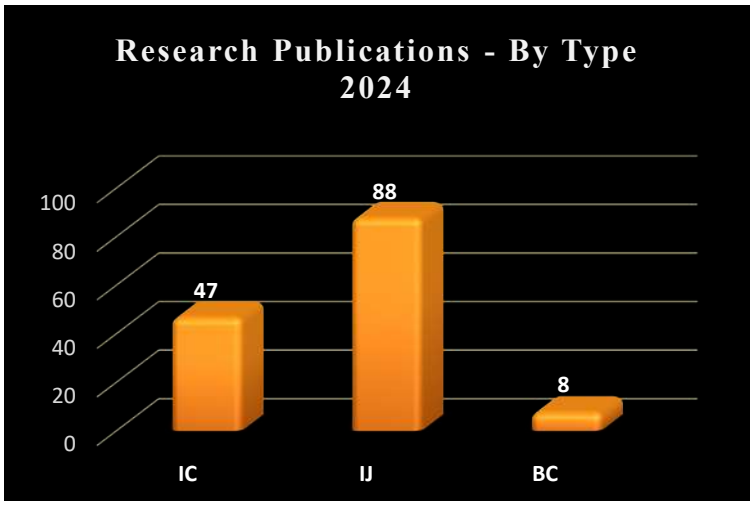
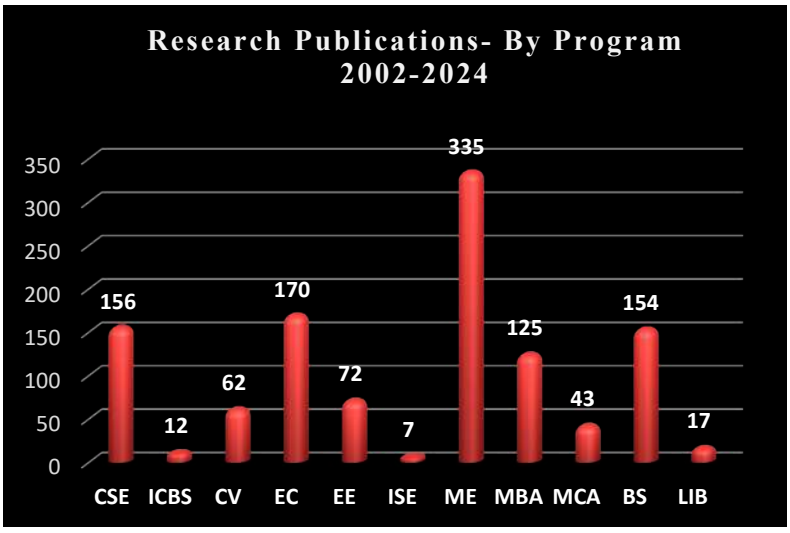
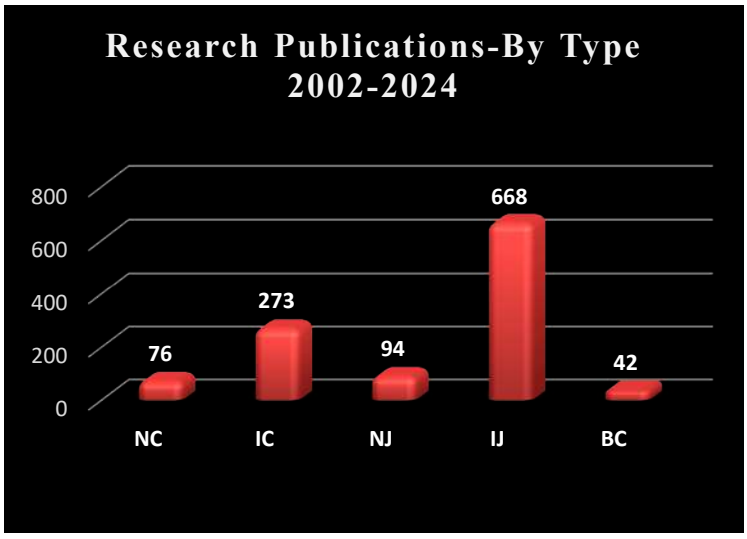
ABSTRACT

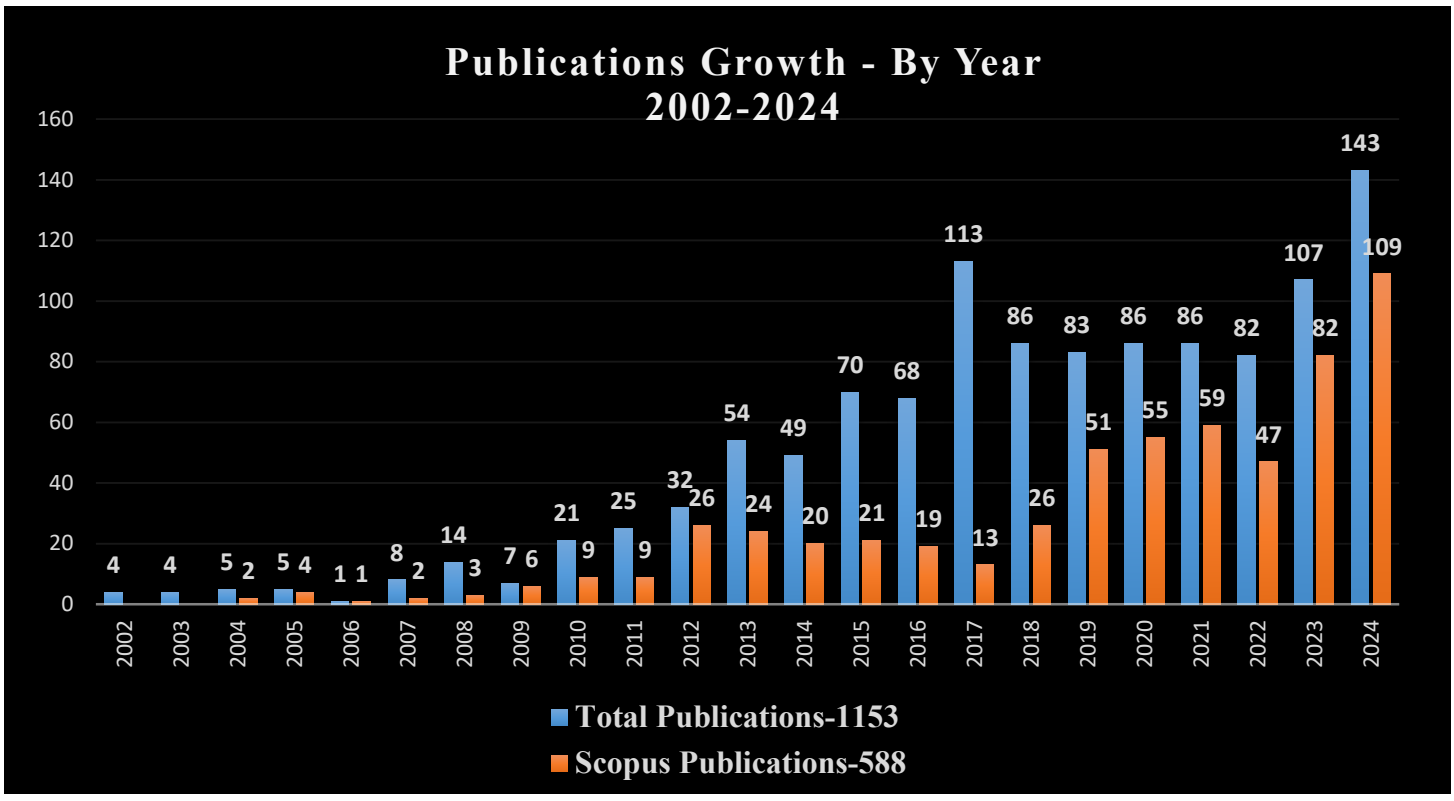
This study aims to determine the awareness and adoption of Artificial Intelligence (AI) technologies in the respondent libraries of Karnataka based on demographic variables such as gender, age, academic status, and professional experience. This study employed a survey research method to evaluate the awareness and adoption of AI technologies among the respondent library professionals in Karnataka. The study employed a stratified random sampling method to select a sample of 120 respondents from a diverse population, encompassing library professionals across multiple institution types including engineering colleges, medical colleges, and degree colleges. The Chi-square test was used to analyze the data. The study revealed that there is a statistically significant difference in the awareness and adoption of AI technologies based on the factor of gender. Whereas there no significant relationship exists between the degree of awareness and adoption of AI technologies based on factors such as age, academic ranking, and professional experience. AI-powered plagiarism detection, grammar checking, and ChatGPT are the most popularly employed AI technologies among the respondents. The respondents are of the perception that AI will support Librarians and not replace them.

**Full paper: Proceedings of the International Conference on Intelligent Libraries, Vol 2, Bangalore, 2024, pp 30-34*









IC–International Conference, **NC**- National Conference, **IJ**- International Journal, **NJ**- National Journal, **BC**- Book Chapter

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