A COMPENDIUM OF RESEARCH PUBLICATIONS 2022-2023

VOL - VI

ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution

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“

Research is seeing what
everybody else has seen
and thinking what
nobody else has thought.

Albert Szent-Györgyi

”

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Message

The Institutions of higher learning are not only crucibles of knowledge but also torchbearers of innovation. The Research Compendium, as an extension of our institutional commitment to excellence, serves as a testament to the breadth and depth of research emanating from our institution. The insights shared within these articles reflect not only the passion and dedication of our faculty and scholars but also the collaborative spirit that defines our academic community.

I am confident that the knowledge disseminated through this Compendium will inspire new avenues of research and contribute to the broader discourse in our respective fields.

May the Research Compendium continue to be a beacon of intellectual achievement and a testament to the vibrancy of our academic community.

I express my gratitude to the editorial team who are involved in bringing this Compendium to fruition. Your efforts have played a pivotal role in ensuring the quality and integrity of the research presented.

Rev. Fr Wilfred P. D'Souza
Director – SJEC

Message

I am delighted to announce the publication of "The Compendium of Research Publications" from St Joseph Engineering College, encompassing the years 2022 and 2023. Research stands as a pivotal force for the advancement of our nation. The inception of new ideas, whether theoretical or practical, guides our country toward progress. In Yuval Noah Harari's insightful work, "Sapiens: A Brief History of Humankind" the concept of the "discovery of ignorance" emphasizes that the unique cognitive ability of Homo sapiens extends beyond knowledge acquisition to the capacity to recognize and confront our ignorance.

This consciousness and acceptance of ignorance serve as crucial factors in the progression of human civilization, fostering flexibility and adaptability. When we acknowledge the imperfection of our knowledge, we open ourselves to change and innovation.

May this compendium serve as an inspiration for all of us to delve into, question, experiment, and adapt—ultimately contributing to the development of science and technology. Together, let us build a better institution, paving the way for a better nation.

I extend my warmest appreciation to our researchers who, through their unwavering dedication, have contributed to various esteemed publications, bringing prestige to SJEC.

My heartfelt congratulations go to the Librarian and her dedicated team for their efforts in making this achievement possible.

Rev. Fr Kenneth R. Crasta
Assistant Director – SJEC

Message

"Research means that you don't know, but are willing to find out"

- Charles F. Kettering

The recently compiled compendium of research publications stands as a testament to the high caliber of scholarship within our faculty. Their commitment to advancing knowledge and contributing to the academic community is truly commendable. Each publication reflects not only the depth of their expertise but also your passion for pushing the boundaries of research and innovation.

In a rapidly evolving academic landscape, their contributions play a pivotal role in establishing our institution as a center of excellence. The diverse range of topics covered in the compendium showcases the interdisciplinary nature of our faculty's research pursuits, fostering an environment where collaboration and knowledge-sharing thrive.

As we celebrate the achievements documented in this compendium, we encourage each of our faculty to continue their research endeavors. Their intellectual curiosity and pursuit of knowledge are the driving forces behind our institution's reputation for academic excellence. We firmly believe that the impact of their research extends beyond the confines of our campus, influencing and shaping the broader academic community.

Once again, congratulations to all the contributors on the outstanding work showcased in the compendium. The passion for research is both inspiring and pivotal to the growth and reputation of our institution.

The editors and committee concerned with the composition of this compendium have spared no efforts to bring out an excellent publication. Congratulations to them, too!

With Best Wishes,

Dr Rio D'Souza

Principal – SJEC

Message

The Compendium of Research Publications 2022-2023, Volume VI, is a testament to the relentless pursuit of knowledge and innovation that drives our institution forward. The Research Compendium is a physical illustration of the outstanding work carried out by our staff, researchers, and students, whose commitment and creativity continue to influence the community and the world significantly. Research papers are not just a formality; they represent the foundation of our academic endeavors and the main channel by which we disseminate our findings and knowledge to the larger scientific community and the general public. St Joseph Engineering College strives hard to provide all the necessary resources to conduct research and provides various supports to publish scholarly articles. I thank all the faculty, researchers, and students for your research and academic contributions and unwavering commitment to the success and reputation of our institute.

I congratulate the editorial team for bringing such a beautiful and comprehensive collection of research papers!

Dr Purushothama Chippar

Vice Principal – SJEC

Editorial

The spontaneous contributions from our faculty / students enabled us to bring out the Sixth Volume of the Compendium of Research Publications successfully. This volume of the Compendium consists of 189 research articles published during the year 2022 and 2023 by our faculty in scholarly National & International Journals, Conference Proceedings, Books and Book Chapters. Out of these 63% were published in International Journals, 29% in International Conferences and others in National Conferences, National Journals and 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-10	Sushanth H Gowda Joel D'mello Santhosh Poojary	Optimization of oil extraction from Scleropyrum pentandrum (Dennst)mabb seeds by surface response approach	YMER, 21(10), 2022, pp 1179-1186	95
IC-11	Swati Mathur Jiju Antony Olivia McDermott Shreeranga Bhat Raja Jayaraman Fabiane Letícia Lizarelli Ayon Chakraborty	Application of 7 quality control tools in higher education institutes	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	96
IC-12	Maryam Zulfiqar Shreeranga Bhat Mehran Doulatabadi Willem Salentijn Maher Maalouf Jiju Antony Vikas Swarnakar	Failure modes and effects analysis (FMEA) in the higher education: a pilot study on success and failure factors, benefits and challenges	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	97
IC-13	Neha Raval Jiju Antony Shreeranga Bhat Khimya Tinani Vikas Swarnakar Raja Jayaraman	Application of quality function deployment in higher education: a systematic literature review	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	98
IC-14	Michael Sony Jiju Antony Olivia McDermott Shreeranga Bhat Beth Cudney Maher Maalouf Raja Jayaraman	Design for six sigma in higher education: a literature review and future research agenda	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	99
IC-15	Mariam Ali Ramadan Maha Khalifa Al Dhaheri Maher Maalouf Jiju Antony Shreeranga Bhat E V Gigo	Application of six sigma methodology to enhance the productivity and performance of a hotel in the UAE	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	100
IC-16	Arshia Kaul Vasundhara Kaul Jiju Antony Shreeranga Bhat Raja Jayaraman	Education 4.0 - enhancing quality in higher education institutions: a systematic literature review	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	101
IC-17	Shreeranga Bhat Vinayambika S Bhat Gijo E V Jiju Antony	Streamlining the accreditation process: a lean thinking approach	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	102
IC-18	Filippos Delis Georgios Mavridoglou Maher Maalouf Shreeranga Bhat Stefanos Giakoumatos	Student dropout in the public vocational training institutes of Greece: a lean six sigma approach	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	103

IC-19	Souraj Salah Shreeranga Bhat Jiju Antony Maher Maalouf Gijo E V	Multiple case study analysis of six sigma for service quality enhancement	Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022	104
IJ-20	Ajay Noronha Shreeranga Bhat E V Gijo Jiju Antony Suma Bhat	Application of lean six sigma in conservative dentistry: an action research at an Indian dental college	The TQM Journal, 34(4), 2022, pp. 675-700	105
IJ-21	Pavana Kumara Bellairu Shreeranga Bhat E V Gijo Poornesh Mangalore	Multi-Response modelling and optimization of agave cantala natural fiber and multi-wall carbon nano tube reinforced polymer nanocomposite: application of mixture design	Fibers and Polymers, 23, 2022, pp 1089–1099	106
IJ-22	M Poornesh Shreeranga Bhat E V Gijo Pavana Kumara Bellairu	Multi-objective modelling and optimization of Al–Si–SiC composite material: a multi-disciplinary approach	Multiscale and Multidisciplinary Modeling, Experiments and Design , 5, 2022, pp 53–66	107
IJ-23	Venkatesh Babu K P Geethu Varghese Thadathil Varghese Joseph Purushothama Chippar	Optimization of graded catalyst layer to enhance uniformity of current density and performance of high temperature-polymer electrolyte membrane fuel cell	International Journal of Hydrogen Energy, 47(6), 19 2022, pp 4018-4032	108
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IJ-26	Shreeranga Bhat Jiju Antony Maher Maalouf Gijo E V Souraj Salah	Applications of six sigma for service quality enhancement in the UAE: a multiple case study analysis and lessons learned	International Journal of Lean Six Sigma, 14(7), 2023, pp 1492-1517	111
IJ-27	Sushanth H Gowda Joel Dmello Santhosh Poojary	Process optimization of scleropyrum pentandrum biodiesel production and study the effect of blends on CI engine characteristics for variation of engine parameters	Industrial Crops and Products, 194, 2023, pp 116306	112
IJ-28	Shreeranga Bhat Gijo E V Jiju Antony	Strategies for successful deployment and sustainment of lean six sigma in healthcare sector in india: a multi-level perspective	The TQM Journal, 35(2), 2023, pp 414-445	113
IJ-29	Shreeranga Bhat Jiju Antony Gijo E V Rajesh Koul Elizabeth A Cudney Ayon Chakraborty	A study on critical failure factors of design for six sigma in Indian companies: results from a pilot survey	The TQM Journal, 35(4),2023, pp 1072-1093	114
IJ-30	Mariam Ali Ramadan Maha Khalifa Al Dhaheri Maher Maalouf Jiju Antony Shreeranga Bhat Gijo E V	Application of six sigma methodology to enhance the productivity and performance of a hotel in the UAE	The TQM Journal, 35(2), 2023, pp 554-576	115
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IJ-34	Jiju Antony James Lancastle Olivia McDermott Shreeranga Bhat Ratri Parida Elizabeth A Cudney	An evaluation of lean and six sigma methodologies in the national health service	International Journal of Quality & Reliability Management, 40(1), 2023, pp 25-52.	119
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IJ-43	Rolvin D'Silva Feban D'Souza Darrel Pinto Clayton Tauro Preetham Saldanha Thirumaleshwara Bhat	Taguchi method to study the performance and emission characteristics of CI engine fuelled with blends of Jatropha biodiesel & titanium dioxide nanoadditive	Materials Today: Proceedings, 92(1), 2023, pp 202-208	128
IJ-44	Avil Allwyn Dsa Joseph Gonsalvis	Tribological aspects affecting surface durability of tooth-sum altered spur gears: a load sharing approach	Advances in Technology Innovation, (8)2, 2023, pp 81-99	129
IC-45	Chad Laux Stephen Elliot Gianna Lint Jiju Antony Michael Sony Shreeranga Bhat	Lean six sigma criticisms and gaps: a critical literature review	Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14th November 2023, Newcastle, United Kingdom, pp 94-106	130
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IC-48	Vikas Swarnakar Ali Al Owad Jiju Antony Olivia McDermott Michael Sony Shreeranga Bhat Salah Haridy	The impact of lean six sigma adoption on corporate performance: a longitudinal study	Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14th November 2023, United Kingdom, pp 643-661	133
IC-49	Shreeranga Bhat Jiju Antony Gijo E V Michael Sony Vikas Swarnakar Olivia Mc Dermott	A global study on critical failure factors of design for six sigma	Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14th November 2023, United Kingdom, pp 718-732	134
BC-50	K Raju Roshan Rajeshwar Tulaskar Canute Sherwin	Solar-powered pesticide-spraying RFID robot	Smart Village Infrastructure and Sustainable Rural Communities, GI Global Pub, June 2023, pp 283-307	135
IJ-51	Vikas Swarnakar Olivia McDermott Michael Sony Shreeranga Bhat Jiju Antony	Unveiling the path to sustainable quality 4.0 implementation in organisations: insights from an exploratory qualitative study	The TQM Journal, Article in press, 2023	136
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IJ-9	Vinish P Prakash Pinto Iqbal Thonse Hawaldar	Perceived idle wait and associated emotional discomfort: An analysis of retail waiting experience	Innovative Marketing, 18(1), 2022, pp 1-11	145
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IJ-17	Dharmananda M Anjali Ganesh Lakshmi H Harisha B S	A comparative study of investment preferences in public sector and private sector enterprises at Mangalore city	Journal of Survey in Fisheries Sciences, 10(1S), 2023, pp 4572-4577	153
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IJ-3	Athokpam Bikramjit Singh Rio D'Souza	A dynamic and effective load balancing method using horizontal virtual machine scaling	International Journal of Engineering Research in Electronics and Communication Engineering, 9(11), November 2022, pp 6-9	158
IJ-4	Gururaja S Roopamala T D	Automatic extraction of road from satellite imagery using graph-cut and neural network algorithms	Cyber psychology Behavior and Social Networking, 25(6), 2022	159
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IJ-8	Hareesh B Gururaja S Vasudeva	Application of remote sensing images in the image processing techniques: a review	International Research Journal of Management Science & Technology, 14(6), 2023, pp 206-213	163
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IJ-10	Hareesh B Vasudeva Sunith Kumar T	An analysis of image classification methods to detect agriculture change detection using remote sensing images	International Research Journal of Management Sociology & Humanity, 14(5), 2023, pp 457-465	165
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IJ-14	Hareesh B Vasudeva	An image pre-processing and classification application and the experimentation analysis of the agriculture change detection for the different lulc classes using remote sensing time series images	European Chemical Bulletin, 12(10), 2023, pp 367 - 381	169
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IJ-10	Venkatesh Babu Kashi Prahlad Geethu Varghese Thadathil Varghese Joseph Purushothama Chippar	Numerical modeling of novel cage-like cross-linked membranes for enhanced proton conductivity in a high temperature-polymer electrolyte membrane fuel cell	Journal of Applied Polymer Science and Engineering, 148(38), 2023, pp e54423	179
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IJ-1	L M Clavian K V Anil Kumar D Narayana Rao N K Shihab Ganesh Sanjeev P C Rajesh Kumar	Influence of structural and morphological features of zinc (ii)-tetraphenylporphyrin thin film on its third order optical nonlinearity at pico and nano second regimes	Journal of Luminescence, 246, 2022, pp 118835	181
IJ-2	Rajesh K Vincent Crasta Gananatha Shetty B Raghavendra Bairy Parutagouda S Patil	Effect of Tio_2/Zno nanofillers on structural, optical and nonlinear optical properties of PVA	Optical Materials, 145, 2023, pp 114481	182
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IJ-2	Prathima Shekara Jyothi Kudva Rajitha Sadashiva Damodara Naral Pramila Rita DSouza A Nithyananda Shetty	Pyrazoline derivative as corrosion inhibitor for mild steel in hydrochloric acid medium: experimental and theoretical approach	Chemistry Select, 8(21), 2023, pp 1-12	184
IJ-3	K Raviprabha Ramesh S Bhat Subrahmanya I Bhat P Nagaraj K Jyothi	Corrosion inhibition study of 6061 aluminium alloy in the presence of ethyl 5-methyl-1(4-nitrophenyl)-1H-1,2,3- triazole-4-carboxylate (NTE) in hydrochrloric acid	Heliyon, 9(5), 2023, pp 1-14	185
IJ-4	Sheetal Tresa Fernandes Jyothi Damodara Smitha Maria DSouza	Evaluation of 1,3-thizaole derivatives with pharmaceutical and chemical activity: a review	Heterocycles, 106(5), 2023, pp 819-839	186
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NC-2	Felcy Dsouza	Research Information Management System at St Joseph Engineering College: An Analysis	Proceedings of the 5th National Conference on Management of Modern Libraries on the Theme "User-Centric Library Systems and Services: Trends and Challenges" Manipal 3rd – 4th February 2023, pp 105-112	189

SUMMARY OF PUBLICATIONS 2022-2023

ARTICLES	CSE	ICBS	CIVIL	EC	EE	ME	MBA	MCA	BASIC SCIENCE	LIBRARY	TOTAL
IC	22	2	1	10	4	15	1	-	-	-	**55**
NC	-	-	-	-	-	-	-	-	-	**2**	**2**
IJ	1	2	11	20	2	35	16	14	18	-	**119**
NJ	-	-	-	-	-	-	2	-	-	-	**2**
BC	2	-	-	6	2	1	-	-	-	-	**11**
TOTAL	**25**	**4**	**12**	**36**	**8**	**51**	**19**	**14**	**18**	**2**	**189**

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

COMPUTER SCIENCE AND ENGINEERING

Application of Process Mining for Tuberculosis Testing Process

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ABSTRACT

The advent of Information technology has had a huge impact on interpretation of the vast knowledge of information available in the health care sector. The vast amount of data generated in this area needs to be appropriately stowed (cached) in order to conduct automated analysis. A huge amount of research data exists in varied areas of health care sector such as extraction and analysis of scanned images, implications of results of various investigations and the treatment process. One related area which lacks significant research is the laboratory testing process to diagnose any illness, which is a prime step to initiate and provide apt treatment. One such disease which has been the cause of considerable morbidity and mortality worldwide is Tuberculosis (TB). Our objective was to study the applicability of process mining to extract the trajectories of diagnostic tests performed for the conformance of Tuberculosis (TB) and to verify time conformance of such tests conducted with that as specified by regulatory bodies.

**Full paper: Proceedings of the IEEE 7th International Conference for Convergence in Technology (I2CT), DOI: 10.1109/I2CT54291.2022.9824769, Mumbai, 2022, pp 1-7*

AliExpress-A Collaborative Recommendation Algorithm

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ABSTRACT

The objective of using Recommender systems in e-commerce is to guide or assist a customer in his purchase by providing personalized suggestions through the large product assortments, and thus helping him in better decision making. We try to investigate the reason for item-based collaborative filtering technique being preferred over popularity-based recommendation system. In order to do so we developed a personalized collaborative recommendation system based on item-based and popularity-based techniques. Item-based collaborative filtering technique involved construction of a co-occurrence matrix to determine user-item interactions. Popularity-based recommendation system was developed to determine if popular features played an important role in consumers' purchasing decisions. From the results obtained, we inferred that item-similarity model provided a better performance as it had higher precision and recall values in comparison to the popularity model.

**Full paper: Proceedings of the IEEE International Conference on Smart Technologies and Systems for Next Generation Computing (ICSTSN), DOI:10.1109/ICSTSN53084.2022.9761290, Villupuram, 2022, pp 1-7*

AIOPs based Predictive Alerting for System Stability in IT Environment

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ABSTRACT

Many industries and organizations are moving away from legacy systems towards digital transformation to optimize their business processes. Artificial intelligence for IT operations (AIOps) plays a pivotal role in digital transformation. AIOps platforms utilize a large amount of data coupled with classical machine learning and cutting-edge analytic technologies. This will boost IT operations with proactive dynamic activities. The Micro Focus Operations Bridge (OpsBridge) monitors the health and performance of the systems in the infrastructure and applications across their IT environment and the hundreds of alerts are delivered to respective teams. These huge number of alerts create an alert noise. In this paper, we present an AIOps based automated predictive alerting system using logistic regression to monitor the system environment and reduce the alert noise. This predictive alerting will identify abnormalities in operational data and raise an alert on these abnormalities that could potentially impact an application or service.

**Full paper: Proceedings of International Conference on Innovative Trends in Information Technology (ICITIIT), DOI:10.1109/ICITIIT54346.2022.9744236, Kottayam, 2022, pp 1-7*

A Survey on Different Computer Vision Based Human Activity Recognition for Surveillance Applications

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ABSTRACT

Articulating an individual behavior analysis from a video stream is considered by most researchers. It has its own applications in the field of computer vision-based Human activity recognition (HAR). HAR is the most widely utilized service in many of the systems across surveillance systems, healthcare, online education, and many more areas. Nowadays equally there is also increased interest in the researchers across the HAR community for works to be considered when multiple faces have to be recognized and predict the activity. This paper details the contribution made by the researchers in this aspects recently and also paper gives a comprehensive analysis of the methods adopted and concludes by examining the accuracy of the various work contributed. At last, this paper additionally is given the future directions to deal with for this application.

Full paper: Proceedings of 6th International Conference on Computing Methodologies and Communication (ICCMC), DOI: 10.1109/ICCMC53470.2022.9753931, 29-31 March 2022, pp 1372-1376.

Developing an Autonomous Framework for Effective Detection of Intrusions

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ABSTRACT

With the growing popularity of internet, it becomes necessary to protect our systems from imminent security breaches. Apart from the traditional types of attacks, the systems are prone to more sophisticated attacks that originates from various malware systems. Latest developments in the area of intrusion detection systems (IDS) has brought tremendous improvement in detecting the attacks efficiently. But, very limited work has been done in the field of autonomous intrusion detection systems. The increased speed and complexity of attacks during recent years shows an acute necessity for a more intelligent and autonomous detection mechanism. The proposed IDS involves analyzing the activities of the system and detecting any suspicious behavior on the system. A hierarchical evolutionary model is used to build the autonomous intrusion detection system. A two-phase evolutionary based method is used in order to detect the intrusions effectively. The first phase generates a list of non-dominated solutions that is used in the second phase for classifying the new packets as normal or intrusive. Results obtained demonstrates very promising results compared to the already existing multiobjective algorithms.

**Full paper: Evolutionary Computing and Mobile Sustainable Networks. Lecture Notes on Data Engineering and Communications Technologies, https://doi.org/10.1007/978-981-16-9605-3_10., Vol 116, Springer, Singapore*

A Novel Approach for Classification of Online Product Reviews using various Machine Learning Techniques

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ABSTRACT

Sentiment Analysis is extensively used in different sectors like product analysis for identifying the customer needs. There are also examples where sentiment analysis concept is in action such in health care, Government sector, stock analysis. Customers share their genuine feedback about the products in online shopping sites. Also, it will be easy for the users to see the product review as well as the ratings given and then make a decision to buy the products. The purpose of sentiment classification is to analyze the written reviews of users and classify them into positive or negative opinions. It helps in identifying the issues with the product which in turn can be rectified. On the other hand, product reviews help customers to buy the product based on its review which would also help business owners to improvise. Text present in the product review is difficult to categorize sometimes. This can be achieved by using classification algorithms like Decision Tree, Random Forest, Naïve Bayes and Logistic Regression. There are multiple features available from which N-Gram and TF-IDF (Term Frequency-Inverse Document frequency) were used. With the results, it is evident that Random Forest performs better in TF-IDF and N-Gram approach for Electronics, Health and beauty and Clothing and accessories product type.

Full paper: Proceedings of 6th International Conference on Electronics, Communication and Aerospace Technology, DOI: 10.1109/ICECA55336.2022.10009447. Coimbatore, 2022, pp. 878-884

Aspect-based Sentiment Analysis of English and Hindi Opinionated Social Media Texts

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ABSTRACT

We present a lexicon-based approach for classifying opinionated social media texts in English and Hindi. The effect of conjunctions, degree modifiers, negations, emojis and emoticons in scoring the intensity of opinion expressed is further explored. Using a manually built Hindi polarity lexicon, we achieve an accuracy of 86.45% in classifying 2,717 Hindi reviews. A real-time analysis on YouTube reviews showed 86% accuracy for English review classification task.

Full paper: Proceedings 21st IEEE International Conference on Machine Learning and Applications (ICMLA), DOI: 10.1109/ICMLA55696.2022.00235, Publisher: IEEE, Nassau, Bahamas, 12-14 December 2022, pp 1498-1503

Analysis of Telecom Churn using Machine Learning Techniques

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ABSTRACT

Customers are the cornerstone of any company's success; thus, businesses understand how crucial it is to ensure their satisfaction. The telecommunications sector is developing quickly, and service providers are now more eager to expand their subscriber bases. Retaining existing customers has become a major issue to meet the need to survive in a competing economy. In this study, customer turnover is predicted using data from a telecoms business utilizing the survival analysis technique. This study will help telecom corporations better understand the risk and hazard of customer turnover by detecting which customers are likely to go and whether they will. Analysis of the telecommunications industry has revealed that it is significantly more immoderate to obtain a new client than to continue an existing one. Due to growing business competition, the importance of marketing techniques, and users' increasingly aware behaviours in recent years, customer turnover is a crucial issue and is examined one of the most important worries between enterprises. To address the churn problems resulting from the services they provide, the company must implement several ways. In the very dynamic and quickly evolving telecom market, customer attrition strategies are crucial. The process of switching telecom service providers happens because of the competitive firm's competitive rates, excellent services, or a variety of benefits it offers clients when they sign up. To anticipate customer loyalty and whether they would leave the company, information from the telecom business can be useful. To boost customer engagement and/or treatment resources as part of their churn reduction goals, telecom companies will benefit from the findings of this study.

**Full paper: Proceedings of International Conference on Artificial Intelligence and Data Engineering (AIDE), DOI: 10.1109/AIDE57180.2022.10060222, Publisher: IEEE, Karkala, 22-23 December 2022, pp 58-63*

Development of Big Data Anonymization Framework Using DNA Computing

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ABSTRACT

A widely used term; privacy-preserving data mining has a variety of applications that may theoretically be considered "privacy violating." The most important thing is to develop techniques that are trustworthy and likely to work without compromising security. The anonymization of structured data is the primary emphasis of traditional approaches, whereas unstructured and streaming data are the main topics of modern research. Another issue is the storing of enormous amounts of data. In this paper we propose a framework for anonymizing massive data while utilizing DNA computing, a future-proof storage method. Frist, we implement anonymization algorithms for structured and unstructured data by preserving privacy of sensitive information. Secondly, we implement DNA computing techniques to store and retrieve huge amount of published data in the DNA storage using Hadoop eco-system and MapReduce paradigm for data storage. Finally, we generate appropriate DNA flat file format of the anonymous data to store in the DNA storage. In the process of DNA computing, we develop genetic based algorithms to encode and decode the anonymous data to comply with the DNA sequence format. The artificially synthesized DNA sequence of digital data is so forth processed and stored into a DNA molecule and retrieved back on request.

**Full paper: Proceedings of International Conference on Artificial Intelligence and Data Engineering (AIDE), DOI: 10.1109/AIDE57180.2022.10059751, Publisher: IEEE, Karkala, 22-23 December 2022, pp 125-130*

RetroMailer- An Email Marketing Campaign using Amazon SES

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ABSTRACT

Businesses often need a cost-efficient way to market their brand to a wider audience. In the digital era, Marketing approaches and the technology adopted for the purpose have improved notably which can reach out to the masses faster than before. Various research techniques and experiments have been carried to improve customer experience and upsurge return on investment. One such technique, Email marketing has received lot of attention as it not only helps business applications to send bulk emails to subscribers but also helps in obtaining feedback which aids in better analysis of the customer behavior. Businesses need to track and optimize their campaign based on customers/subscriber's activity and the response received to the emails sent. In this paper, we aim to develop an inexpensive Email service RetroMailer using APIs provided by Amazon Simple Email Service, suitable for any business requiring a reliable and scalable way to send and receive emails, thus decreasing the overall cost of launching a successful campaign.

**Full paper: Proceedings of the 2nd IEEE International Conference on Smart Technologies and Systems for Next Generation Computing (ICSTSN), DOI: 10.1109/ICSTSN57873.2023.10151562, Villupuram, 2023, pp 1-6*

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 seeks 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: 2nd International Conference on Advances in Data-driven Computing and Intelligent Systems, BITS Pilani, Goa, 2023.*

Parallel Model to Detect Attacks Using Evolutionary Based Technique

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ABSTRACT

Evolutionary-based algorithms emerged due to their flexibility and effectiveness in solving different varieties of problems. Optimization-based techniques are used in finding solutions that involve multiple conflicting objectives. Parallel evolutionary-based algorithms are used to overcome the time-consuming job of finding solutions to these types of problems. In this paper, we present a parallel genetic programming-based model that runs parallelly and obtains solutions in a minimal amount of time. The model also allows the user to select the best set of objectives based on the requirements of the users. An island model is used which runs the operations on different islands parallelly. This not only decreases the execution time of the process but also increases the diversity of the population. The results obtained in different islands are fed to an ensemble classifier to get the required result. The model was trained and tested using the state-of-the-art ISCX-2012 and CICIDS2017 datasets. In our work, we have mainly focused on detecting the attacks in a system in a short duration of time. The model developed gave significant performance improvement compared to the results obtained using the normal CPU implementation.

**Full paper: Proceedings of 3rd International Conference on Advances in Computing, Communication, Embedded and Secure Systems, doi: 10.1109/ACCESS57397.2023.10200912, Kalady, Ernakulam, India, 2023, pp 291-296*

Real-Time Drowsiness Detection System Using Machine Learning

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ABSTRACT

Road transport is an essential component of human endeavors and activities. On the highway, there are an uncountable number of drivers at all hours of the day and night. Lack of sleep is a problem for people who drive long distances, such as taxi drivers, bus drivers, truck drivers, and anyone who travels long distances by car. The driver's lack of alertness is to blame for a significant portion of the automobile collisions that take place every day. The experience of sleepiness lowers a driver's level of alertness, which heightens the risk of being involved in an accident and makes driving more difficult. In this context, the utilization of new technologies in the design and construction of systems that are able to monitor drivers and to assess the amount of concentration that they are giving to the task of driving during the entirety of the driving process is essential. Therefore, in order to stop these incidents from happening, we are going to design a system with Python, OpenCV, and Keras that will notify the driver if he begins to feel tired. The proposed work goal is to develop a sleepiness detection system that can identify when a person's eyelids are closed for a few seconds at a time. When it determines that the driver is becoming sleepy, this system will sound an alarm. During the course of this work, we will be making use of OpenCV to collect the pictures that are captured by the camera. These images will then be fed into a Deep Learning model, which will determine if the person's eyes are "open" or "closed."

**Full paper: Proceedings of the International Conference on Advanced Communication and Intelligent Systems, https://doi.org/10.1007/978-3-031-45121-8_5, Warsaw Management University, Poland, June 16–17, 2023, pp. 49-58*

Enhanced Prediction of Heart Disease Using Machine Learning and Deep Learning

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ABSTRACT

The provision of medical care is an essential component of human existence. As a result of the vast amount of psychiatric data included within the healthcare industry, machine learning models were utilized in order to efficiently deliver conclusions regarding heart disease prediction. The adoption of methods derived from machine learning enables the reliable classification of individuals according to whether or not they are healthy. The framework used in this study can understand the basics of effectively evaluating a patient's risk profile from features of clinical data. The aforementioned model was developed by utilizing both machine learning and deep learning in tandem with one another. Heart disease is widely acknowledged as one of the primary contributors to death rates across the globe. Large amounts of clinical data are stored in the many biomedical instruments and computer systems that are found in hospitals. Therefore, having a solid understanding of the data around heart disease is quite crucial if one wishes to increase the accuracy of their predictions. There have been a lot of experimental evaluations of the performance of models that have been developed using classification algorithms and relevant features that have been selected using a variety of different approaches to feature selection. The exploratory investigation used a dataset on heart illness to test four different classification strategies. These strategies were random forest, support vector machine, k-nearest neighbor, and convolutional neural network. The accuracy of machine learning algorithms utilized in the proposed work is Support Vector Machine 85.18%, Random Forest 92.5%, K-NN 74.07% and Convolutional Neural Network 85.18%.

**Full paper: Proceedings of the International Conference on Advanced Communication and Intelligent Systems Second International Conference, https://doi.org/10.1007/978-3-031-45121-8_1, Warsaw, Poland, June 16–17, 2023, pp. 1–12*

Ancient Temple Pillar Segmentation Using a Fully Convolutional Neural Network Model

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ABSTRACT

The historical temples in India belonged to illustrious kingdoms that ruled for nearly a millennium. Their pillar style, sculpture, inbuilt, architecture, technique, vastness and magnitude have very awesome wonders of their own. Using useful information from the on-site diagnostic of the raw history of the pillar architecture, archaeologists can make decisions about many aspects of pillar handling and management techniques. Archaeologists can better understand old temples by segmenting the pillars, which is useful for future research like identification & classification of different types of pillars based on architecture, to know the original architecture adopted during the construction of temples by various dynasties, and this original architecture information guides the re-construction of temples. Because there are no reliable digital methods for automatic pillar segmentation, archaeologists must deal with a number of challenging issues. Due to irregularities in image acquisition, complex architectural designs, noise, time, and imaging distortions, automated pillar segmentation presents difficulties. In the literature, certain inaccurate statistical segmentation techniques for pillar segmentation have been suggested. For the auto-segmentation of pillars, we suggest a fully convolutional network(FCN) Model in this paper. The suggested technique reduces the unpredictability of picture noise and develops FCN models using images from our own generated dataset. Furthermore, optimal data augmentation and model hyperparametrization are shown to prevent overfitting for pillar area segmentation. With a recall/precision rate of 0.9698/0.9200, the proposed approach is examined on the test dataset. When compared to published algorithms in the literature segmentation challenge, the new method performs better, with a Dice correlation coefficient of 0.9284, than those algorithms.

**Full paper: International Journal of Intelligent Systems and Applications in Engineering, ISSN:2147-6799, Vol.11, Issue No 3,2023, pp 1095–1105.*

Segmentation and Classification of Unharvested Arecanut Bunches Using Deep Learning

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ABSTRACT

One of the most profitable commercial palms in India is the arecanut. The market price of arecanuts, which is determined by the arecanut's maturity level, is the only factor that determines the profitability of arecanut plantation farmers. To reduce the financial loss of the farmer, knowing maturity level of the unharvested arecanut bunch is a tedious job due to lack of expertise. We presented an automated technique to determine the maturity level of the unharvested arecanut bunches in order to address this problem. The proposed method works on two phases: first, an optimized U-Net model was used for semantic segmentation of the arecanut bunch images then the classification of the segmented arecanut bunches was performed using transfer learning approach. Experiments were conducted on RGB and saturation channel of HSV color space images, and a comparative study of RGB and saturation channel of HSV color space is presented. Result of the experiments show that the segmentation and classification of the arecanut bunches from input image is efficient using RGB color space.

**Full paper: International Conference on Intelligent Systems in Computing and Communication, MITE-Badaga Mijar, Mangalore, 2023.*

Agriware: Crop Suggester System by Estimating the Soil Nutrient Indicators

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ABSTRACT

New perspectives on the agricultural sector in a changing world with the imple-mentation of modern technology need to be focused on the overall development of the country's economic growth. Countries like India, China, United States, Brazil, Russia, France, Mexico and Japan are the world's top agricultural producers. When it comes to cultivation, proper planning to select a crop and to improve its growth based on the soil type is one of the preliminary aspects of a perfect agriculturist. These depend on various parameters like soil type, soil properties, weather conditions and so on. The literature study showed that the researchers had done valuable work on soil classification considering the texture features. The current methods for soil classification and crop suggestion are manual, and prone to human errors leading to uncertain results. These manual methods were time-consuming and invasive. Observing these limitations, we have developed a new crop suggester system called "Agriware" using neural network techniques that helps the farmers in suggesting suitable crops. The system is built considering the soil type, climatic conditions and other specific parameters like rainfall, temperature, ph, humidity, nitrogen, and phosphorus and potassium content of the soil. The purpose of the model is to classify the soil type and suggest suitable crops using computer vision techniques focusing on different soil types and other specific parameters. The final output of the system suggests a crop or a list of crops that can be harvested, based on which the farmers can make a proper decision for the cultivation of crops. © 2024 selection and editorial matter, Nitin Mittal, Amit Kant Pandit, Mohamed Abouhawwash and Shubham Mahajan individual chapters.

**Full paper: Intelligent Systems and Applications in Computer Vision*, *Edited by Nithin Mittal & others, CRC press, 2023, pp 86 – 94*

An Investigation of Deep Neural Network based Techniques for Object Detection and Recognition Task in Computer Vision

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ABSTRACT

Detection of objects and its recognition in visual sequences are the two critical tasks in the computer vision field. Various real-time applications such as autonomous vehicles, face recognition, health-care systems and space exploration requires highly reliable and precise object detection models. Traditional object detection and recognition algorithms are based on hand crafted and are considered to be erroneous, time consuming and expensive leading to the significant reduction of accuracy rate for object detection in large datasets. Recently, large number of promising deep neural networks models have been emerged for facilitating automated and accurate detection of varying scale objects and its precise recognition across various computer vision applications. Several GPU based neural models thereby incorporating context-aware capabilities have shown effective performance, which overcomes the drawbacks of traditional techniques. This research study provides an investigation of several popular deep learning models that exists for accurate object detection in various forms of visual sequences. Varying scale objects are detected frequently available in popular MS COCO and PASCAL datasets and their performance are evaluated utilizing one stage Yolo family and two stage Faster RCNN deep learning object detectors. At the end of the study, several future research directions for object detection task are discussed.

**Full paper: Proceedings of the International Conference on Edge Computing and Applications, DOI: 10.1109/ICECAA58104.2023.10212307, IEEE, Namakkal, 19-21 July 2023, pp 385-390*

User Input Based Health Risk Assessment to Predict Diabetes, Obesity and Heart Risk factors

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ABSTRACT

Due to a shift in lifestyle, many young people are currently suffering from heart attacks, diabetes, and obesity. Because of work schedules, the sickness rate has grown since the covid epidemic. To stop this issue, early discovery is necessary. As a result, the constructed model will forecast the risk of obesity, diabetes, and heart attacks based on user input from their respective location. An individual's health risk assessment is very important in determining any health conditions that require urgent care. This makes it possible for someone to recognize potential health dangers and take the appropriate safety precautions. Thus, the goal of this proposed system is to develop a user-friendly Artificial Intelligence driven health risk assessment application that would give users a platform to do basic health risk assessments. Based on the user input, Machine Learning based health predictors generate the health analysis report and alert the user with proper guidance. K-Nearest Neighbor (KNN), Logistic Regression, Stochastic Gradient Boosting, Voting Ensemble and Decision Tree algorithms are used for accurate prediction of disease. The proposed application is cost effective since it uses a couple of features.

**Full paper: Second International Conference on Electrical, Electronics, Information and Communication Technologies, DOI: 10.1109/ICEEICT56924.2023.10157860, IEEE Xplore, Trichirappalli, 05-07 April 2023*

Performance Metrics Evaluation Towards the Effectiveness of Data Anonymization

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ABSTRACT

A supplementary method for ensuring that private data is inaccessible to outside parties is data anonymization. Anonymization might affect the outcomes of data mining procedures since it may make it more difficult for commonly used algorithms to analyze the data. This practical experience report compares the performance impact of current data anonymization algorithms to the suggested k-anonymization methods utilizing both original and anonymized data in order to assess the correctness and execution time. Through the use of kanonymization, l-diversity, t-closeness, and differential privacy techniques, a sample of genuine data produced by a healthcare facility was made anonymous. Contrary to predictions, the Hadoop framework was able to handle anonymization approaches, improving accuracy and performance while speeding up execution. These findings show that data anonymization techniques, when properly implemented through Hadoop ecosystems, can help to increase the effectiveness of data anonymization. Furthermore, the suggested method can produce the data anonymization with the necessary utility and protection trade-offs and with a performance scalable to large datasets.

Full paper: Proceedings of the 8th International Conference for Convergence in Technology, DOI: 10.1109/I2CT57861.2023.10126310, IEEE Xplore, Lonavla, 07-09 April 2023, pp 1-5

A Secure Platform for Storing, Generating and Verifying Degree Certificates using Block chain

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ABSTRACT

Humans deal with many document generation and verification processes in day–to–day life, such as academic certificates, land registries, vehicle registration, medical records, etc. Academic certificates play an essential role in graduates' lives, as it is the proof of completing a required educational qualification for applying jobs or higher education. The current era of technology is rapidly evolving every day, and as a result, the generation of fake certificates becomes easier. So the utmost priority is given to preserving these certificates and making them tamper-proof. There are various methods to secure these certificates. One such method involves a decentralized storage system which uses blockchain technology to generate and store the certificates. The Universities will add the student details on to the blockchain which generates the unique certification ID and transaction hash which cannot be easily tampered. Later the organization can verify the candidate who is seeking the job using these details. Hence blockchain technology can be used to to secure and standardize a digital certificate format, in which institutions and organizations can benefit by making the verification process faster and easier by eliminating the fake certificates.

**Full paper: Proceedings of the 7th International Conference on Trends in Electronics and Informatics (ICOEI), DOI: 10.1109/ICOEI56765.2023.10125598, IEEE, 11-13 April 2023, Tirunelveli, pp 532-536*

Multimodal Human Computer Interaction Using Hand Gestures and Speech

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ABSTRACT

The paper presents multimodal human-computer interaction using speech and gesture recognition to develop a system for mouse movement and operation. The approach allows users to perform mouse navigation and various mouse operations without the need for physical contact with the system. Splitting up the task of mouse navigation and operations with gesture and speech recognition respectively led to a user-friendly and seamless experience for the user. Since no physical contact is required between the user and the system, it could be used by doctors while performing surgery, mechanics while they are handling their instruments from a distance, and casual users if circumstance arise. Unlike a unimodal gesture recognition system the proposed multimodal system allows mouse pointer control using speech and employs gestures to perform mouse operations.

**Full paper: Proceedings of the 14th International Conference on Intelligent Human Computer Interaction, Tashkent, October 2022, through Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), Vol 13741, 2023, pp 63 – 74*

Real-Time Translation of Sign Language for Speech Impaired

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ABSTRACT

Sign language is a visual language that uses hand gestures, change of hand shape, and tracking information to express meaning, and is the main communication tool for people with hearing and language impairment. Given the barriers faced by speech-impaired individuals, this system introduced a tool that bridges communication gaps and supports better interactions. This work focuses on introducing a tool that should bridge the communication gap among speech impaired community. The work involves the development of a system that enables two-way conversation between people with speech disorders and noisy people. LSTM networks were studied and implemented for the classi cation of gesture data because of their ability to learn long-term dependencies. In real-time, the sign language gestures of speech-impaired individuals are fed to the system by the device s computer vision capabilities. These gestures are recognized using deep neural networks, while hand recognition is cracked with edge detection algorithms that interpret in both text and speech formats. The model is trained with the dataset that is collected using holistic key points from the video of the person which detects the pose, face and hand landmarks. These will convert speech to text and nally displays the relevant hand gestures. This model can predict with an accuracy of 90%, showing the feasibility of using LSTM-based neural networks for the purpose of sign language translation

**Full paper: Proceedings - 7th International Conference on Computing Methodologies and Communication, ICCMC, Erode, February 2023, pp 570 – 575*

Fine-Tuning of Multilingual Models for Sentiment Classification in Code-Mixed Indian Language Texts

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ABSTRACT

We use XLM (Cross-lingual Language Model), a transformer-based model, to perform sentiment analysis on Kannada-English code-mixed texts. The model was fine-tuned for sentiment analysis using the KanCMD dataset. We assessed the model's performance on English-only and Kannada-only scripts. Also, Malayalam and Tamil datasets were used to evaluate the model. Our work shows that transformer-based architectures for sequential classification tasks, at least for sentiment analysis, perform better than traditional machine learning solutions for code-mixed data. © 2023, The Author(s), under exclusive license to Springer Nature Switzerland AG.

**Full paper: 19th International Conference on Distributed Computing and Intelligent Technology, Bhubaneswar, 18 January 2023, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), DOI:10.1007/978-3-031-24848-1_16 Vol 13776, pp 224 – 239*

Knowledge-Based Scene Graph Generation in Medical Field

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ABSTRACT

This work aims to combine object detection and knowledge graphs to understand medical scenes. The rapid growth of the medical field has introduced various equipment types which makes scene analysis more crucial. By representing object detection results as a knowledge graph, one can derive conclusions and gain a clear understanding of the scene through scene graphs. While object detection identifies objects in images, it lacks the ability to utilize contextual information and visual reason. Therefore, knowledge-aware object detection becomes essential in allowing the integration of external knowledge graphs into object detection algorithms. Therefore, the work focuses on the medical field that combines object detection and object relationships to form a correlated understanding of the scene. Construct relationships between objects, generate scene graphs, and derive inferences to predict the overall scene understanding is achieved through the knowledge graph. The proposed work incorporates knowledge graphs in the medical domain that addresses the need for improved scene understanding in medical contexts.

**Full paper: Proceedings of the International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics, Discover, DOI:10.1109/DISCOVER58830.2023.10316715, Mangalore, 13-14 October 2023, pp 232 - 237*

INTELLIGENT COMPUTING & BUSINESS SYSTEMS

Enhanced Vehicle Plate Identification using YOLO

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ABSTRACT

In the urban areas, there is an increased demand for ownership of the vehicles which has led to a civic problem of traffic control and vehicle identification. For an organization/institution or any restricted areas, security is important and to enhance this security it is advisable to keep track of the vehicles entering. Hence vehicle number plate recognition plays an important role in solving these problems. It is an image processing technique that uses a number plate to identify the vehicle. In this approach, the image of the vehicle has been enhanced and threshold technique was applied for a better resolution. Our approach to license plate recognition is based on a Convolution Neural Network YOLO, holistically processes the whole image, avoiding segmentation of the license plate characters. This work aims to recognize license plate images automatically to fulfill the requirement for automation in surveillance of any highly restricted areas. The result shows the success rate of number plate recognition is 98.6% and 84.7% in vehicle number detection. This accuracy can be improved greatly by positioning the camera suitably to capture the best frame and using better image enhancing techniques

**Full paper: Proceedings of the International Conference on Automation, Computing and Renewable Systems (ICACRS-2022), DOI: 10.1109/ICACRS55517.2022.10029226, Pudukkottai, India 13-15 December 2022, pp 148-152.*

Company Analysis: Tata Consultancy Services

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ABSTRACT

An analytical report is prepared for TCS to evaluate its investment prospects. The SWOT and PESTEL analyses utilized to assess the internal and external factors having an influence on the firm are used to describe the current state of the company. The basic difficulties that TCS is experiencing might be identified thanks to these analyses. Additionally, it examines TCS' organizational structure and how it affects the company's domestic production operations. Regarding the capacity to both attract new clients and hold on to current ones,Based on our results, the research also included a prediction of where we believe TCS will be in the following few years. This forecast provides an overview of TCS' prospects in analysing its expected growth.

**Full paper: International Advanced Research Journal in Science, Engineering and Technology, ISSN (O) 2393-8021, ISSN (P) 2394-1588, DOI: 10.17148/IARJSET.2022.91108, Vol. 9, Issue 11, November 2022, pp 53-71.*

Artificial Intelligence based Smart Door with Face Mask Detection

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ABSTRACT

The main objective of the project is to develop a smart door that can accurately detect masks over the face in public areas such as airports, railway stations, malls etc., to curtail the spread of coronavirus and thereby contributing to public healthcare. Face mask detection is achieved using image processing to recognize whether the person is wearing a mask or not. The project is implemented using Raspberry Pi, tensor flow and OpenCV libraries of python programming language. The proposed technique efficiently handles the mask detection process in public places and if the image of the person is detected with a mask, the smart door will open automatically. The smart door restricts the entry for people without masks thereby breaking the chain of Covid-19. Manual detection of face masks is labor expensive, time consuming and inconsistent. Thus facial recognition technology gives the solution to be a replacement of manual work.

**Full paper: Second International conference on Data Analytics & Learning (ICDAL'22), Alvas Institute of Engineering & Technology, Moodbidri, 2023.*

Study on the Role of Artificial Intelligence and Block Chain in Segments of the Financial Sector

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ABSTRACT

Researchers have aimed at the question "Whether the demand for a growing financial sector is created by economic development that influences economic growth" for centuries. An economy section made up of firms and institutions that provide Financial Services (FS) to commercial and retail customers is termed the financial sector. A broad range of industries, namely banks, investment companies, insurance companies, and real estate firms is encompassed in this sector. The technology called Artificial Intelligence (AI) will transform the financial sector; thus, the chance for improved and more tailor-made services, cost reduction, and the enhancement of novel business systems will be offered. Block Chain (BC) is a technology that generates an impact in the financial industry by facilitating faster payments at lower fees than banks. With augmented security and efficiency, the BC could digitize the entire trade finance lifecycle. Thus, the financial sector, decentralized finance, the role of AI in enormous segments of decentralized finance, and the role of BC in various segments of Decentralized Finance (DeFI) are elucidated here. The AI application cases in the FSs industry are analysed in this paper from 2020 and the BC technologies in the financial sector (USD million) at a compound annual growth rate (CAGR) from 2015 to 2024.

**Full paper: Scope Journal, ISSN: 1177-5653, Vol 13, Issue No 01, April 2023, pp 314-329*


CIVIL ENGINEERING

Comparison of Soil Structure Interaction effect on Regular and Irregular Buildings with Soil Stratum

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ABSTRACT

The purpose of this work is to study the behavior of regular and irregular structures subjected to static loading considering the effect of 'Soil-Structure Interaction'. In this paper, displacements and differential settlements in buildings with Ground (G), (G+2) and (G+5) floors resting on soft and hard soil layers is presented. The study reflects that, the lateral deformations depend on soil conditions beneath and can not be ignored.

Full paper: International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056, Vol 9 Issue No 03, pp 1023-1030

On Post-Fire Bond Strength of Steel Rebar Embedded in Thermally-Damaged Concrete–A review

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ABSTRACT

This study summarizes the state-of-the-art research progress concerning the influence of high-temperature exposure on the residual bond strength of steel rebar. Also, an experimental database from the literature was collected and analyzed for use in fire safety management in concrete design codes and specifications for high important reinforced concrete (RC) structures, such as public health-care buildings, to reduce and mitigate the risk of thermal damages, especially in steel-congested areas. Different vital variables are debated in the present review, including concrete cover-to-rebar diameter ratio, rebar deformation, fiber addition, transverse confinement, aggregate type, concrete water-to-binder ratio, concrete type, cooling regime, thermal loading regime, and heating exposure time. The review shows that high-temperature exposure significantly reduces the residual bond strength. It is concluded that increasing concrete cover, the addition of fibers, considering transverse confinement, using deformed rebar instead of a plain one, using a concrete mixture with a lower value of w/c ratio, and air-cooling regime alleviate the detrimental influence of high-temperature exposure on the residual bond strength. Standing time can significantly recover the bond reduction as a healing period. Additionally, research gaps and the current conflicting results regarding some variables are drawn to be considered for future works.

**Full paper: Journal of Adhesion Science and Technology, ISSN No.1568-5616, https://doi.org/10.1080/01694243.2021.2025308, ,Vol 37, Issue No.3, pp 370-410*

Influence of Thermal Cycles and High-Temperature Exposures on the Residual Strength of Hybrid Steel/Glass Fiber-Reinforced Self-Consolidating Concrete

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ABSTRACT

Although using steel fiber has been efficiently studied to mitigate the thermal damages of concrete samples exposed to high-temperature exposure, however reducing the workability is the primary concern of researchers. Accordingly, the present study aims to investigate the effect of glass and hybrid steel/glass fibers on compensating the workability and improving the thermal resistance of SCC mixtures, which was not precisely investigated by the literature. SCC specimens with various types of fibers, different packing factors (1.12 & 1.14), different sand-to-all aggregate ratios (0.50 & 0.57), and SCC grades (M40 & M80) were considered in the present study. Also, two thermal damages of thermal cycles at 200 °C (1, 3, 14, and 28 cycles) and high-temperature exposure (200 °C, 400 °C, and 600 °C) were selected. Concrete resistivity, ultrasonic pulse velocity (UPV), and concrete compressive strength are the tests considered in the present study. Results indicate that hybrid steel/glass fiber-reinforced SCC specimens have considerably higher thermal resistance as compared to single steel and glass fiber-reinforced ones. Accordingly, using glass fiber in combination with steel fiber in SCC can considerably compensate for the workability reduction along with reducing strength loss due to thermal cycles and high-temperature exposure.

**Full paper: Structures, https://doi.org/10.1016/j.istruc.2023.06.096, Vol. 55, Issue No. 1, 2023, pp. 1532-1541*

Exploring the Potential Use of Incinerated Biomedical Waste Ash as an Eco-Friendly Solution in Concrete Composites: A Review

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ABSTRACT

Hospitals, health care, and research centres produce significant amounts of biomedical waste, which are hazardous to human health and the natural habitat. The scale of biomedical waste production has enormously escalated in recent decades. Incineration is an ideal solution to reduce the volume of waste while destroying dangerous microorganisms and minimizing the uncontrolled disposal of heavy metals. Incineration produces a residual solid material called biomedical waste ash (BMWA). Incinerated biomedical waste can reduce its environmental impact by being utilized in the construction sector. Numerous studies have shown the detrimental effects of BMWA addition to concrete, which impedes the use of BMWA in the construction industry. This manuscript reviewed the promising utilization of BMWA as a supplemental cementitious material in concrete. The focus is on presenting recent advancements in understanding the impact of the physical, chemical, and microstructural characteristics of BMWA on the properties of blended concrete. The effects of BMWA on the material properties, consistency, setting time, workability, strength, sorptivity, and chloride penetration of blended concrete are critically compared and analyzed. The leaching behaviour of BMWA was found to meet the standard leaching limits set by the US EPA (United States Environmental Protection Agency). The utilization of BMWA in volumes up to 5% for the cement replacement and 15% for the sand replacement can produce high-strength and durable concrete for greener and sustainable applications of BMWA in the construction sector. In addition, the review recommends a detailed framework for the utilization of BMWA to achieve cleaner production in the construction sector.

**Full paper: Construction and Building Materials, DOI:10.1016/j.conbuildmat.2023.131595, Vol 387, Issue No 131595, 17 July 2023, pp 1-19*

Numerical Analysis of Double Stack Blade Savonius Wind Turbine with Secondary Blades

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ABSTRACT

In this work, the performance of the Savonius vertical axis wind turbine with secondary blades was investigated numerically. The impacts of two geometric parameters of the secondary blades, including the height of secondary blades (h) and the distance between the main and the secondary blades (b) on the output torque were analyzed. Numerical simulations were performed by a commercial CFD code, ANSYS FLUENT 18.2. Numerical results show that employing secondary blades has a constructive impact on the output torque compared to the case without secondary blades. Moreover, the studied geometric parameters of the secondary blades have a significant impoact on the performance of the proposed turbine. It can be seen that by increasing the height of secondary blades, the angular position of the maximum torque is shifted. At b = 2.5 mm, the difference between the models is more comparable. Models h = 6 and 12 mm have the highest output torque, although with a slight difference between them. Model h = 12 mm has the highest output torque. At b = 7.5 mm, the difference between the models is more comparable than b = 2.5 mm. Model h = 12 mm has the highest output torque and models h = 3 and 6 mm are in the next levels. Obtained results in the second section demonstrate that by growing the distance between the secondary and the main blades, in the case of h = 3 mm, the produced torque declines. Furthermore, by increasing the distance between the secondary and the main blades from b = 0 mm to b = 2.5 mm and b = 7.5 mm, the amount of torque produced decreases by 17.33 and 26.66%, respectively. Moreover, by augmenting the distance between the secondary and main blades from b = 2.5 mm to b = 7.5 mm (200% growth), the produced torque decreases by 11.3%.

**Full paper: IOP Conference Series: Earth and Environmental Science, IOP Publishing., DOI: 10.1088/1755-1315/1149/1/012006, Vol. 1149, Issue No. 1, pp 012006*

Ultra-High-Performance Concrete as a Sustainable Structural Composite

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ABSTRACT

The phenomenal strides in the modifications and the use of supplementary cementitious materials in conjunction with superplasticizers and discrete fiber distributions in concrete made it possible to arrive at the structural material termed “ultra-high-performance concretes” (UHPC) or its extension “ultra-high performance fiber reinforced concretes” (UHPFRC). Its development heralded a new era, opening new vistas in structural configurations and forms that could be a serious contender to structural steel constructions. Primarily, the chemistry and physics of concrete constituents and mixture design philosophy have not changed much, though the intricacies that are often neglected were effectively corrected from time to time. The use of materials ranging from the conventional to nanoparticles that could exhibit superior pozzolanic activity along with microfibers resulted in strengths well beyond 200 MPa. This opens up several avenues in structural configurations that are of high strength and durability. However, this isn't a stipulation of replacing the present-day concrete in all structures with UHPC, but the key is to modulate the structural configurations to suit the needs of the particular application for ensuring sustainability in consonance with the capabilities of UHPC. The paper attempts to look at the possible avenues for such options in materials and structural forms to effectively assure sustainable construction alternates.

**Full paper: IOP Conference Series: Earth and Environmental Science, IOP Publishing., DOI 10.1088/1755-1315/1149/1/012002, Vol. 1149, Issue No. 1, 2023, pp 012002*

Numerical Investigation the Effects of Cone Diameters on the Flow Pattern and Separation Efficiency in A Cyclone Separator

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ABSTRACT

In this work, the impact of cone diameters on the flow field and separation efficiency in a cyclone separator is examined numerically employing Reynolds Stress Model for eight various geometries of cyclone separators. The motion of solid particle in the flow field is modelled utilizing the Eulerian-Lagrangian method. Three-dimensional simulation of the air flow with solid particles in the cyclone is carried out by a commercial computational fluid dynamics software, ANSYS Fluent 18.2. The outcomes depict that by augmenting the small cone diameter, the maximum tangential velocity, static pressure, and collection efficiency decrease, however, cut-off diameter rises. Moreover, the axial velocity has steady trend throughout the cyclone. In addition, according to the obtained results, increasing the large cone diameter causes an increase in the tangential velocity and static pressure and improves the collection efficiency. While, the higher large cone diameter, the lower cut-off diameter. Growing the cyclone's cone small diameter leads to a decrease in the collection efficiency. At a constant particle diameter, four microns, as the cone small diameter ratio augments by 150%, collection efficiency declines by about 10.42%. Augmentation the cyclone's cone small diameter causes an increase in the cutoff diameter. By increasing the cone small diameter by about 150%, the cut-off diameter value increases by about 75%. Furthermore, the collection efficiency rises by growing the cyclone's cone large diameter. At a constant particle diameter, four microns, as the cone large diameter augments by 50%, the collection efficiency increases by about 18.75%. Also, in all considered cone large diameter, the collection efficiency increases as the particle diameter rises. The cut-off diameter decreases by growing the cyclone's cone large diameter. By augmenting the cone large diameter by about 50%, the cut-off diameter value declines by about 57.69%.

**Full paper: IOP Conference Series: Earth and Environmental Science, IOP Publishing., DOI 10.1088/1755-1315/1149/1/012005, Vol. 1149, Issue No. 1,2023, pp 012005*

Potential Utilization of Regional Cashew Nutshell Ash Wastes as A Cementitious Replacement on the Performance and Environmental Impact of Eco-Friendly Mortar

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ABSTRACT

Globally, agro-waste ashes are increasing significantly due to the rapid implementation of biomass-based power plants. In the present trend, agro-wastes are disposed of in an unsustainable manner. The recycling of agro-waste has significantly contributed to sustainable goals. In the construction sector, it is possible to dispose of waste more efficiently. However, the efficiency of locally available agro-residual waste in cementitious composites is not well understood. In the present investigation, the practicability of using agro-residual ash obtained from the burning of cashew nutshells on the properties of eco-friendly blended cement paste and mortars is explored. Blended cement mixtures containing cashew nutshell ash (CNSA) were prepared at five replacement levels, 5, 10, 15, 20, and 25%, relative to the weight of the cement. To understand the characteristics of CNSA, microstructure investigations such as X-ray diffraction, thermogravimetric analysis (TGA), scanning electron microscopy, and energy-dispersive spectroscopy analyses were performed. Paste properties of CNSA-based cement are observed through consistency, setting time, mini-slump flow, and expansion tests. For the CNSA-based mortars flow table, compressive strength, ultrasonic pulse velocity (UPV), electrical resistivity (ER), water absorption, bulk density, and porosity tests were performed to understand its efficiency. The strength indices of mortars were used to quantify the pozzolanic effect of CNSA. With the incorporation of CNSA, water demand increased by 57%, initial and final setting time decreased by 90% and 83%, respectively. Results showed that CNSA-based mortars absorbed more water and had higher porosity, which reduced compressive strength, UPV, and ER values. CNSA blended mortar is more suitable for applications that do not require high compressive strength. Results indicated that the compressive strength, UPV, and ER are within the limit specified. Strength indices indicated that CNSA has a positive and negative pozzolanic effect during early and later ages, respectively. Further, the sustainable assessment showed that the introduction of CNSA in mortar could substantially reduce embodied carbon, embodied energy, and strength efficiency over the control mortar. The inadequate amount of SiO2, Fe2O3, and Al2O3 in CNSA makes it an unsuitable pozzolanic material. However, it can be utilized in smaller amounts as a fractional replacement of cement and is found to be promising for specific desired properties of cement as a cost-effective accelerator.

**Full paper: Journal of Building Engineering, https://doi.org/10.1016/j.jobe.2023.105941, Vol 66, Issue No 5, 2023, pp 105941*

Influence of GGBFS on Corrosion Resistance of Cementitious Composites Containing Graphene and Graphene Oxide

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ABSTRACT

Previous studies extensively focused on the mechanical characteristics of cementitious composites containing carbon-based nanomaterials. However, no specific research has concentrated on corrosion performance. Hence, the present study intends to experimentally determine the effect of graphene (G) and graphene oxide (GO) on the corrosion resistance of composites by conducting various tests, including accelerated corrosion, linear polarization, half-cell potential, and electrical resistivity tests. Two different dosages, 0.03% and 0.06%, are considered for nanomaterials. Ground granulated blast furnace slag (GGBFS) is also used to adjust the fresh properties of composites with different percentages (15%, 30%, and 45%). Results show the synergistic influence of nanomaterials (0.03%) and GGBFS (30%) as being at the root of a considerable increase in compressive strength. They also indicate that GO has a stronger synergy with GGBFS in improving compressive strength as compared to G. However, flexural test results show that G is more compatible with GGBFS due to the reinforcing effect in controlling crack width developed in bending. Further, the results strongly confirm that adding GGBFS in nanoconcrete significantly improves the corrosion resistance of composites. Moreover, among all mixtures, composite with 45% GGBFS and 0.03% GO shows the best performance against the corrosive environment, even for saltwater immersion.

**Full paper: Cement and Concrete Composites, https://doi.org/10.1016/j.cemconcomp.2022.104836, 135, 2023, pp 104836*

Seismic Response Analysis of RC Framed Buildings on Geo-Reinforced Soil

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ABSTRACT

Geotechnical seismic isolation is a recently emerged isolation technique to prevent the damaging effects of the earthquake on the building structures and nonstructural components. The study analyzes the effectiveness of different materials such as epoxy polystyrene, polyethylene foam, coir mat, rubber mat, and coir composites as a soil isolation medium to reduce the seismic energy transferred, thereby reducing the dynamic response of buildings under earthquake loads. Finite element analysis was carried out to evaluate the soil–structure interaction (SSI) effect in low-rise reinforced concrete structures with raft foundations subjected to various earthquake motions. Two kinds of soil, namely soft and stiff soil, were considered based on their flexibility to study dynamic soil–structure interaction effects. Roof acceleration and base shear of the building and contact pressure distribution and settlement at raft foundation–soil interface were the parameters evaluated for the different soil properties. The linear elastic behavior was assumed for the integrated building–foundation–soil system. This system was exposed to ground motions corresponding to scaled El Centro (1940) earthquake and simulated seismic excitation, which corresponds to the elastic design spectrum for Zone III as per the Indian standard code (IS 1893 (Part 1): 2016). The results indicate that the soil isolation provided by the high stiff polyethylene foam and coir mat substantially reduced the earthquake energy transmission to the superstructure. It is also observed that the seismic response of the buildings and raft is dependent on the flexibility of underlying soil. Seismic responses increase as the soil flexibility increases. Compared to stiff soil, the reinforced materials are very efficient in reducing seismic responses in soft soil.

**Full paper: Innovative Infrastructure Solutions, DOI:10.1007/s41062-023-01185-8, Vol 8, Issue No 8, 2023, pp 217*

A Comparative Study on Dynamic Response of Buildings Resting on Coir and Rubber Mat Reinforced Soil Bed

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ABSTRACT

Geotechnical seismic isolation has emerged as an efficient technique for mitigating the severe effects of earthquakes by providing smooth synthetic liners beneath foundations or between soil layers for dissipating seismic energy through sliding. This study investigates the efficacy of using a rubber mat and a natural coir mat as reinforcement materials within the soil to act as a seismic soil-isolation medium. A three-dimensional finite element simulation of five-story buildings resting on raft foundations in soft soil with and without the soil-isolation mechanism has been performed. The reinforced soil-structure system was exposed to two different earthquake motions, such as the ground motions corresponding to the elastic design spectrum for Zone III as per the Indian standard code (IS 1893 (Part 1): 2016) and the Northridge earthquake (1994). The proposed study deals with the analysis of dynamic responses of buildings when the soil is reinforced with a coir mat and rubber mat under earthquake motions. The findings show that the seismic responses of low-rise buildings are significantly reduced by a novel technique proposed in this work to reinforce the soil with isolation materials in their mat form to reduce the seismic responses under earthquake loads.

Full paper: IOP Conference Series: Earth and Environmental Science, IOP Publishing., DOI 10.1088/1755-1315/1149/1/012012, Vol 1149, Issue No 1, 2023, pp 012012

Influence of Ferrous Iron Addition on Silver Catalyzed Bioleaching of Copper from Chalcopyrite using an Isolated Acidithiobacillus Ferrooxidans Strain

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ABSTRACT

Shake flask studies on influence of initial ferrous iron on bioleaching of copper from chalcopyrite using novel isolated bacterial strain Acidithiobacillus ferrooxidans BMSNITK17 with and without addition of silver catalyst was conducted and reported. Non-catalysed bioleaching of copper yields about 0.9 g/L of with 16 g/L of initial ferrous iron concentration while Silver catalysed bioleaching of copper from chalcopyrite yields about 1.6 g/L of copper with initial ferrous iron concentration of 4 g/L. Variation of pH, ferrous and ferric iron during the study were recorded and discussed. This study confirms the influence of initial ferrous iron concentration on bioleaching of copper.

Full paper: Proceedings of the 14th International Conference on Advances in Computing, Control, and Telecommunication Technologies, Hyderabad, June 2023, pp 1082-1087

ELECTRONICS AND COMMUNICATION ENGINEERING

NavIC Driven Dynamic Ambulance Allocation and Tracking

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ABSTRACT

Emergency medical services provide urgent prehospital treatment, stabilization for serious illness, injuries and transport to definitive care. Private, public emergency vehicle administrations are working in more numbers today as an unavoidable service serving patients at critical moments. The process of calling, allocating an ambulance is multistep, time-consuming which increases the effective time in which a patient can receive medical aid. The paper discusses the use of NavIC-the Indian navigation technology. The ambulance allocation system uses NavIC tracking units to track ambulances. The unit constantly sends location data to the server and the database. The nearest ambulance having the shortest response time, computed using the distance matrix API is allocated to the user. The driver of the ambulance receives an SMS specifying the user location. The user gets information about the probable arrival time and prediction of the nearest hospital determined by the Haversine formula.

**Full paper: Proceedings of the IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS), DOI: 10.1109/SCEECS54111.2022.9740801, Bhopal, 2022, pp 1-6*

A Review on Techniques of Radiation Dose Reduction in Radiography

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ABSTRACT

This document gives an insight on the methods followed to decrease the radiation dose in radiography. Risk of developing cancer increases with frequent exposure to imaging diagnosing technologies like X-ray and CT scan. Risk is twice in case of pregnant women and in children. Thus, reducing the radiation dose plays a vital role in protecting the public health. Radiation dose can be controlled through hardware or software techniques. Different software algorithms are analyzed. Focus is to reduce the noise and enhance the clarity in image by using the reconstruction algorithms and filters, which in turn help the doctors to diagnose the patients with less radiation dosage.

**Full paper: Expert Clouds and Applications, Lecture Notes on Networks and Systems 209, https://doi.org/10.1007/978-981-16-2126-0_53, 2022, pp 681-694*

Constellation Shared Multiple Access- A NOMA Scheme for Increased User Capacity in 5G MMTC

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ABSTRACT

While the legacy cyclic prefix orthogonal frequency division multiple access is retained as the preferred multiple access scheme for 5G enhanced mobile broadband the research is now focussed on the multiple access schemes for massive machine type communication (mMTC) and ultra-reliable low latency communication. Though orthogonal multiple access schemes provide simple reception, they limit number of simultaneous user equipment as against the primary requirement of mMTC. On the other hand, the various non-orthogonal multiple access schemes which have been proposed so far as the likely solution, need complex successive interference cancellation receivers. So a simplified scheme named constellation shared multiple access is proposed here which substantially increases the number of simultaneous users to be served within a single resource block (RB) in LTE or 5G New Radio, thus aiding the massive connectivity requirement of mMTC. This is achieved by differentiating among the users in constellation domain. Moreover, the simple architecture compatible with 5G eMBB makes it a strong contender multiple access contender for 5G mMTC.

**Full paper: International Journal of Computer Networks & Communications, DOI: 10.5121/ijcnc.2022.14305, Vol 14, Issue No. 3, May 2022, pp 73-89*

Design and Implementation of Image Edge Detection Algorithm on FPGA

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ABSTRACT

Image processing is an important task in data processing systems for applications such as medical sectors, remote sensing, and microscopy tomography. Edge recognition is a sort of image division method that is used to simplify the image records so as to reduce the amount of data to be processed. Edges are considered the most important in image processing because they are used to characterize the boundaries of an image. The performance of the Canny edge recognition algorithm remarkably surpasses the present edge recognition technology in various computer visualization methods. The main drawback of using Canny edge boundary is that it consumes lot of period due to its complex computation. In order to tackle this problem a hybrid edge recognition method is proposed in block stage to locate edges with no loss. It employs the Sobel operator estimate method to calculate the value and direction of the gradient by substituting complex processes by hardware cost savings, traditional non-maximum suppression adaptive thresholding block organization, and conventional hysteresis thresholding. Pipeline was presented to lessen latency. The planned strategy is simulated using Xilinx ISE Design Suite14.2 running on a Xilinx Spartan-6 FPGA board. The synthesized architecture uses less hardware to detect edges and operates at maximum frequency of 935 MHz.

Full paper: International Journal of Circuits, Systems and Signal Processing, DOI:10.46300/9106.2022.16.78, Vol 16, 2022, pp 628-636

Optimization of Resource Allocation in Optical Networks

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ABSTRACT

Resource allocation in communication networks employs different algorithms to efficiently allocate several resources like time, bandwidth, so on as demanded by the user at the source requiring to establish communication with another user at the destination. The choice of a suitable resource allocation algorithm primarily influences the performance and capacity of a network, resource utilization. Since the resources are usually limited, effective utilization and allocation of resources becomes important. Optical network meets the requirements of applications requiring larger bandwidths in addition to numerous other merits. Wavelength division multiplexing (WDM) in optical networks is a technique that saves and hence provides higher bandwidths. The field of resource allocation is immensely growing and new algorithms are continuously evolving. Modifications of various optimization algorithms are being developed to provide a good, thereby optimal combination of route and wavelength. This paper presents an algorithm which is a modified version of genetic algorithm to allocate resources optimally. The proposed algorithm provides a solution to routing and wavelength assignment (RWA) problem in all optical WDM networks. The optimality of the path is decided on the basis of weights of links in the paths. The algorithm was simulated using MATLAB software. The simulation result shows a plot of blocking probability that is decreasing continuously and proves the algorithm to be good and comparable to the values obtained using genetic algorithm. It produces a good combination of route and wavelengths and hence proves to be an optimal solution for routing and wavelength assignment problem. This algorithm can be extended and further optimized for other communication networks. Various algorithms based on other optimization algorithms can be developed.

**Full paper: IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT), DOI: 10.1109/CONECCT55679.2022.9865692, IEEE, Bangalore, 08 to 10 July 2022*

Smart Street Lightning Using Solar Energy

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ABSTRACTS

Solar lamp is a lighting system which generally consists of solar panels to gather energy, rechargeable battery to store the charge, LEDs or halogen lamps to provide illumination. Solar controlled lamps produce no pollution unlike traditional sources of light. Most solar lamps turn ON or OFF based on external light conditions. In one of the existing projects, solar panels were the only source of energy for the battery which created an issue if the battery ran out of charge. This project nullifies this problem by introducing the main power grid as a backup in case of insufficient charge in the battery. In another existing project, the solar panel is directly connected to the LED which powers it. The problem with this concept is that the LEDs can only be switched on when the ambient sunlight shines on the solar panel. In the proposed system, the brightness of the street lights is kept at a dim state and the system increases the brightness of the LEDs in the presence of an object and they go to a default state after a certain delay. The proposed system is self-sufficient, eco-friendly, beneficial financially and is especially viable in countries with high levels of poverty and limited or no access to electricity. In the future, the proposed system can use a battery with higher storage capacity and more efficient solar panels. The proposed method can also include an automated self-cleaning apparatus for the solar panel.

Full paper: Advances in Intelligent Computing and Communication, Lecture Notes in Networks and Systems, DOI:10.1007/978-981-19-0825-5_39, 2022, pp 367-375

EMG-Based Arm Exoskeleton

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ABSTRACTS

Although the era of automation is slowly taking over, manual labor still has not lost its importance in the industrial sector. The demanding productivity leads to a lot of stress and strain on the muscles causing them to become weaker and thus eventually reducing mobility. Primary prevention is the best method. So, the exoskeleton plays a vital role, as it reduces the stress being concentrated on the arm muscle. The exoskeleton belongs to the branch of orthotics where an external brace or frame is used to provide support and strength to the bone and muscle area. The proposed project of implementing an EMG-based arm exoskeleton aims to reduce the stress and strain on muscles faced daily in industries. On accessing the various studies made by researchers, the gaps in implementation and noteworthy discoveries of a product have been designed keeping all of these aspects in mind. The exoskeleton would be powered with cost-effective pneumatic artificial muscles which are triggered by EMG signals from the muscles. The exoskeleton would concentrate the weight on the PAM muscles which would transfer the weight to the lower body using arm belts.

**Full paper: Advances in Intelligent Computing and Communication, Lecture Notes in Networks and Systems, DOI:10.1007/978-981-19-0825-5_59, 2022, pp 563–569*

Genome-Wide Methylome Pattern Predictive Network Analysis Reveal Mesenchymal Stem Cell's Propensity to Undergo Cardiovascular Lineage

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ABSTRACT

Mesenchymal stem cells (MSCs) differentiation toward cardiovascular lineage prediction using the global methylome profile will highlight its prospective utility in regenerative medicine. We examined the propensity prediction to cardiovascular lineage using 5-Aza, a well-known cardiac lineage inducer. The customized 180 K microarray was performed and further analysis of global differentially methylated regions by Ingenuity pathway analysis (IPA) in both MSCs and 5-AC-treated MSCs. The cluster enrichment tools sorted differentially enriched genes and further annotated to construct the interactive networks. Prediction analysis revealed pathways pertaining to the cardiovascular lineage found active in the native MSCs, suggesting its higher propensity to undergo cardiac, smooth muscle cell, and endothelial lineages in vitro. Interestingly, gene interaction network also proposed majorly stemness gene network *NANOG* and *KLF6*, cardiac-specific transcription factors *GATA4, NKX2.5*, and *TBX5* were upregulated in the native MSCs. Furthermore, the expression of cardiovascular lineage specific markers such as *Brachury, CD105, CD90, CD31*, *KDR* and various forms of *ACTIN* (cardiac, sarcomeric, smooth muscle) were validated in native MSCs using real time PCR and immunostaining and blotting analysis. In 5-AC-treated MSCs, mosaic interactive networks were observed to persuade towards osteogenesis and cardiac lineage, indicating that 5-AC treatment resulted in nonspecific lineage induction in MSCs, while MSCs by default have a higher propensity to undergo cardiovascular lineage.

**Full paper: 3 Biotech, DOI: 10.1007/s13205-021-03058-2, Vol 12, Issue No. 1, 2022, pp 1-12*

Narrow Band Internet of Things as Future Short Range Communication Tool

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ABSTRACT

The increase in need of connecting devices gave a path to the Internet of things (IoT). The heterogeneous nature of connecting with different devices through seamless connectivity aids IoT to connect and acquire needed information. The demand for machine-type communications (MTC) has provided way for modern algorithms, diverse services, technology to meet modern IoT needs. Cellular standards also creating a space to incorporate IoT along the sideline of regular network with low-power and long-range specifications. 3GPP release 13 introduced narrow band IoT (NB-IoT) along with LET-advance standard. In this paper, the state-of-the-art of the IoT application requirements in the 3GPP cellular-based low-power wide area solutions for massive to critical IoT is discussed. The need for changes in technology in occurrence to the sensor nodes and transmit information is also focused in this paper with SoC for NB-IoT.

**Full paper: Expert Clouds and Applications, Lecture Notes in Networks and Systems, DOI:10.1007/978-981-16-2126-0_18, Vol 2029, 2022, pp 207–214*

Lossless Compression of Hyperspectral Imagery by Assimilating Decorrelationand Pre-processing with Efficient Displaying Using Multiscale HDR Approach

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ABSTRACT

The instinctive essence of the Hyperspectral imagery cube is its immense information having bothspatial and spectral correlation. In the interest of reducing the storage and bandwidth requisites, an effective lossless Hyperspectral compression system is proposed. The imagery is enforced to pre-processing stage preceding decorrelation. Preprocessing stage comprises band normalization andband ordering techniques. A technique named Greedy heap sorting is addressed to sort the bands. The proposed plan accords with a Compression ratio (CR) of 8.12 and bits per pixel (bpp) of 1.67.The performance of the system is comparable to earlier algorithms for lossless Hyperspectral imagecompression concerning compression ratio and bpp. An experiment conducted on AVIRIS imagessubstantiates that the methodology presented surpasses the IP3-OBPS-BPS method by a percent-age increase of 116.44 in CR and a percentage decrease of 58.49 in bpp. The multiscale High DynamicRange (HDR) approach is used to project Hyperspectral images on devices with Low Dynamic Range(LDR) devices. The Bilateral filter is used for the decomposition of the image into multiple base layersand detail layer. The PSNR obtained is 37.4911 for the compressed HDR image, which signifies thebetter quality of the reconstructed image with a 4.8% compression ratio.

**Full paper: IETE Journal of Research, https://doi.org/10.1080/03772063.2022.2028581, 2022, pp 1-12*

A Comparison Between Power Spectral Density and Wavelet Transform for Eeg-Based Sleep Onset Detection

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ABSTRACT

In many neurological studies, the study on brain activity with respect to the continuous evaluation on the work of safe driving has received noticeable attention. The electroencephalogram (EEG) is a non-invasive physiological device that measures brain activity. Brain signals analyzed using electroencephalography can help in the prediction of the drowsiness in drivers. The proposed work is to establish a simple and precise sleep onset prediction method based on EEG signals acquired from a single-channel electrode. These EEG signals are processed using two different methods, fast Fourier transform and discrete wavelet transform. Distinct features are extracted from both processing methods separately and are used as training data set to train the classification models in MATLAB classification learner. A comparison has been made between the processing methods to evaluate which of the two methods give better accuracy. According to the obtained results, models trained using wavelet transform features gave an accuracy of 98%. Among the models trained, decision tree is the most accurate model having the fastest prediction speed, approximately up to 30,000 observations/second.

**Full paper: Information and Communication Technology for Competitive Strategies (ICTCS 2020), Lecture Notes in Networks and Systems,Vol 191, 2022, pp 537-545*

Subcarrier Filtering for Spectrally Efficient Multicarrier Modulation Schemes and Its Impact on PAPR: A Unified Approach

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ABSTRACT

Multicarrier modulation (MCM) based schemes have been a major contributing factor in revolutionizing cellular networks due to their ability to overcome fading. One of the popular scheme orthogonal frequency division multiple access (OFDMA), having been part of 4G, is also adapted as part of 5G enhanced mobile broadband (eMBB). Though it has several advantages, spectral efficiency (SE) and peak to average power ratio (PAPR) have been two major concerns which have attracted lot of attention resulting in proposals of several other MCM schemes. But most of these studies have treated the two issues independently. This paper in particular studies the subcarrier filtering approach to improve the spectral efficiency of MCM scheme and its impact on the overall PAPR of such schemes. The analysis shows that the PAPR improvement is also achieved by such filters meant for spectral confinement and the simulation results validate the same provoking a unified research direction less explored till now.

Full paper: International Journal of Electronics and Telecommunications, DOI:10.24425/ijet.2023.147702, Vol.69, Issue No 4, 2023, pp 785-791.

Low Complexity Physical Layer Security Approach for 5G Internet of Things

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ABSTRACT

Fifth-generation (5G) massive machine-type communication (mMTC) is expected to support the cellular adaptation of internet of things (IoT) applications for massive connectivity. Due to the massive access nature, IoT is prone to high interception probability and the use of conventional cryptographic techniques in these scenarios is not practical considering the limited computational capabilities of the IoT devices and their power budget. This calls for a lightweight physical layer security scheme which will provide security without much computational overhead and/or strengthen the existing security measures. Here a shift based physical layer security approach is proposed which will provide a low complexity security without much changes in baseline orthogonal frequency division multiple access (OFDMA) architecture as per the low power requirements of IoT by systematically rearranging the subcarriers. While the scheme is compatible with most fast Fourier transform (FFT) based waveform contenders which are being proposed in 5G especially in mMTC and ultra-reliable low latency communication (URLLC), it can also add an additional layer of security at physical layer to enhanced mobile broadband (eMBB).

**Full paper: International Journal of Electrical and Computer Engineering, ISSN: 2088-8708, DOI: http://doi.org/10.11591/ijece.v13i6.pp6466-6475, Vol.13, Issue No 6, 2023, pp 6466-6475.*

Early Detection of Brain Tumour in MRI Images Using Open by Reconstruction and Convolution Neural Networks

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ABSTRACT

Classification and detection of the brain tumour at early stages have always been a concern to reduce the mortality rate. Though the brain tumour detection is possible in Magnetic Resonance Imaging (MRI), the detailed detection of the tumour type has been a concern. This article proposed a comparatively efficient method to detect the dangerous malignant tumour and hence begin the treatment at an early stage. At first, MRI images are filtered by cascading mean, median and Weiner filter. Due to the high density and texture, skull tends to appear as a detected region, which is often mistaken as part of a tumour. The stripping of the skull is done to isolate the Region of Interest (ROI) of the brain from the background. Once an abnormality in the image is confirmed for a tumour, its' classification into Low-Grade Glioma (LGG) and High-Grade Glioma (HGG) are done using Open by Reconstruction followed by thresholding segmentation method & Convolution Neural Networks (CNNs). An accuracy of 92.3% is obtained by first CNN in classifying abnormal brain MRI with normal brain MRI. An accuracy of 98.4% is obtained by second CNN in distinguishing HGG with LGG.

**Full paper: Second International Conference on Electrical, Electronics, Information and Communication Technologies (ICEEICT), IEEE Xplore, Trichairapalli, 5-7, April 2023*

Feature-Based Registration Framework for Pedicle Screw Trajectory Registration Between Multimodal Images

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ABSTRACT

Pedicle screw placement for vertebral fixation is a complicated surgery for orthopaedic surgeons. The main challenge is to estimate the accurate trajectory's position to minimize postoperative complications related to pedicle screw placement. Different types of 3D to 2D registration techniques have been employed to avoid the misplacement of the screw during the surgery. However, these techniques cannot be applied directly to MR to X-ray registration due to differences in image intensity and tissue non-correspondence. To overcome these limitations, feature-based 3D to 2D registration technique was developed to map a trajectory position in the intraoperative X-ray image onto the pre-operative MR image. The registration framework validated by generating projection images that perfectly matched simulated X-ray images, then back-projecting the trajectory position on the preoperative MR image using the estimated transformation parameters. The accuracy of the registered trajectory is evaluated by measuring the displacement and directional errors between the registered and planned trajectory. The proposed method successfully registered the trajectory position in the simulated X-ray to pre-operative MR to estimate the trajectory position. A number of experiments are performed on the simulated dataset to assess the effectiveness of the proposed method. The Euclidean distance between the entry and end points and the directional error of the registered trajectory from the planned trajectory were below 1mm in AP, Lateral, and a combination of both planes. The mean trajectory length difference between the planned and registered trajectory was less than 1mm.

**Full paper: IEEE Access, ISSN: 2169-3536, DOI:10.1109/ACCESS.2023.3286531,Vol.11, Issue No 1, 2023, pp 59816 - 59826.*

Evaluating Similarity Measure for Multimodal 3D to 2D Registration

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ABSTRACT

The 3D to 2D registration technique in spine surgery is vital to aid surgeons in avoiding the wrong site surgery by estimating the vertebral pose. The vertebral poses are estimated by generating the spatial correspondence relationship between pre-operative MR with intraoperative x-ray images, then evaluated using a similarity measure. Different similarity measures are used in 3D to 2D registration techniques to assess the spatial correspondence between the pre-operative and intraoperative images. However, to evaluate the registration performance of the similarity measures, the proposed framework employs three different similarity measures: Binary Image Matching, Dice Coefficients, and Normalized Cross-correlation technique to compare the images based on pixel positions. The registration accuracy of the proposed similarity measures is compared based on the mean Target Registration Error, mean Iteration Times, and success rate. In the absence of simulated test images, the experiment is conducted on the simulated AP and Lateral test images. The experiment conducted on the simulated test images shows that all three similarity measures work well for the feature-based 3D to 2D registration in that BIM gives better results. The experiment also indicates high registration accuracy when the initial displacements are varied up to ±20 mm and $\pm 10^0$of the translational and rotational parameters, respectively, for three similarity measures.

**Full paper: Biomedical Physics & Engineering Express, ISSN: 2057-1976, DOI 10.1088/2057-1976/ace9e1, Vol.9, Issue No 5, 2023, pp 59816 - 59826.*

Design and Implementation of Traffic Monitoring for Indian Smart Cities

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ABSTRACT

Traffic monitoring is an essential component of smart city development in India. Indian cities face significant traffic congestion, which not only results in economic losses but also affects the quality of life of citizens and death of patients due to the late arrival to the hospitals. Therefore, smart traffic management systems have become a priority for Indian cities to enhance mobility, reduce congestion, and improve the safety of road users. There are several approaches that Indian cities can take to implement traffic monitoring systems. One of the most common approaches is the use of intelligent transportation systems (ITS) that incorporate advanced technologies such as real-time traffic monitoring, predictive analytics, and adaptive traffic signal control. In this article, Real-time traffic monitoring systems are discussed, which includes the use of sensors, cameras, and other monitoring devices to collect data on traffic flow, speed, and density. It provides a safe path for the Ambulance by making use of RFID Technology. Also IR sensors are used near school zones to reduce the accidents, while crossing the roads by alerting the driver to reduce the speed of the vehicle.

Full paper: 14th International Conference on Advances in Computing, Control, and Telecommunication Technologies, Hyderabad, June 15-16, 2023.

Smart Arecanut Pesticide Sprayer Bot

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ABSTRACT

Agriculture is a critical sector for the Indian economy. Areca nut is one of the major commercial crops in India, and operations like spraying pesticides and fertilizers can be harmful and tedious for farmers. The scarcity of labour in agriculture has become a major concern in recent years, particularly for areca nut cultivation. Areca nut trees require frequent climbing for tasks such as preventive spraying against fungal diseases and nut harvesting. In addition to disease, farmers must also contend with the health risks associated with pesticide exposure. This paper aims to design a user-friendly agriculture robot that can assist farmers in risky tasks, such as pesticide/fertilizer spraying. The proposed system involves the automation of farm activities, which can be controlled by the farmer using a joystick. It uses MY1016ZL high torque motor and Cytron Smart Drive MDDS30 Dual 30A Motor Driver to control the motor. A FlySky FS i6 transmitter and receiver combination is employed for controlling the robot. The robot frame is equipped with a nozzle attached to a rubber pipe, which is employed to spray pesticide during operations. The proposed solution serves as a dependable means of resolving the issue of labour shortage, ultimately leading to an improved quality and yield of the produce.

**Full paper: International Journal of Creative Research Thoughts, ISSN: 2320-2882, Vol 11, Issue No 6, June 2023, pp 1-4*

Jitter as a Quantitative Indicator of Dysphonia in Parkinson's Disease

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ABSTRACT

A non-invasive way of diagnosing Parkinson's disease from speech signals is presented in this paper. A variety of frequency, amplitude, harmonicity noise, and cepstral features are extracted from speech samples, resulting in a feature vector of 82 coefficients. k-nearest neighbours (k-NN) with k = 10 and artificial neural network (ANN) are applied to the dataset on individual and combined features to detect Parkinson's disease. The jitter feature obtained a maximum accuracy with both k-NN and ANN classifiers.k-NN outperformed ANN by obtaining a classification accuracy of 90% for jitter local features and 88.3% for combined features. The severity of the disease is assessed using multi-class classification, obtaining an overall accuracy of 83.6% and 82.4% for k-NN and ANN, respectively. The accuracy in detection is also verified on the dataset divided based on age and gender category. The results of the perceptual test proved that the predominant voice quality in Parkinson's disease is hoarse.

**Full paper: International Journal of Intelligent Systems Technologies and Applications, https://doi.org/10.1504/ijista.2023.131576, Vol. 21, Issue No. 2, 2023, pp 199-128*

Speech Emotion Recognition Using Deep Learning

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ABSTRACT

Speech emotion recognition has become a space-growing analysis domain in recent years. Unlike humans, machines lack the skills to understand and show emotions, however, human-machine interactions are often improved by automatic emotion recognition, thereby reducing the necessity of human intervention. An SER system is a group of techniques for classifying and processing speech signals in order to find any embedded emotions. In this work, the RAVDEES database for speech emotion recognition is selected from Kaggle. The MFCC feature is extracted. Deep learning algorithm, CNN is used which classifies the extracted relevant MFCC features of speech signals which are used and recognizes the emotion. The speech emotion recognition system eases the identification of the speaker's emotion and mental status. CNN model implemented in this work can recognize the emotional state of the speaker. The project achieved training accuracy of 96% and testing accuracy of 85%. This results in an accurate identification of the emotion.

**Full Paper: International Journal of Innovative Research in Technology, ISSN: 2349-6002, June 2023, Vol 10, Issue No 1, pp 1155-1161*

Rainfall Measurement and Prediction Using IOT and Artificial Intelligence

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ABSTRACT

Rain is an essential part of the water cycle that transfers water from the atmosphere to the surface, sustaining life. For many human activities, including irrigation management, hydrological monitoring, water resource management, and flood prevention, accurate rainfall data is crucial. Traditional approaches to monitoring rainfall data, however, can be inefficient and time- consuming. A reliable system for predicting rainfall is necessary because global climate change has also altered rainfall patterns. Effective sensors for measuring rainfall are rain gauges. However, it can be difficult to accurately predict when it will rain. Unexpected or significant rainfall can harm crops and property, which has an impact on the economy. Therefore, early warning systems and reducing risks to life and property, particularly in agriculture, depend on improved forecasting models. The goal of this project is to create a system for predicting rainfall using machine learning and artificial intelligence. The system aims to make machine learning techniques easy to use for non-experts in the field and to compare them. For increased accuracy, the project makes use of a sizable dataset of historical weather information. The system can forecast rainfall amounts and provide advance warnings to lower the risk of loss. Since the people of this country are primarily dependent on agriculture, this prediction system is crucial to managing agricultural farms and utilizing water resources efficiently.

**Full paper: International Journal of Creative Research Thoughts, ISSN: 2320-2882, Volume 11, Issue No 6 June 2023, pp 5-11*

Real Time Feedback System for Speech Dysfluency in Children

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ABSTRACT

Stuttering and Cluttering is a speech dysfluency disorder found in people which makes them to speak in a disordered way leading to prolongations, repetitions, pauses, and blocks. The main aim of this work is to develop a real time system that will help people with this disorder to improve their speech. The first phase of this work deals with the three methods that can treat the stutterers, i.e., delayed audi-tory feedback, frequency altered feedback, and metronome generation. The second phase deals with stuttered speech analysis to find the severity of stuttering using prolongation, repetition, and silence blocks. A model is developed using SoX audio processing toolbox. The processor used in the system is Raspberry Pi B. For the benefit of the user a GUI is implemented using Tkinter. A database is created with a given Kannada passage with 80 samples which includes both the stuttered and normal speech samples.

**Full paper: Smart Sensors Measurement and Instrumentation, Lecture Notes in Electrical Engineering, Chokkadi and R. Bandyopadhyay (eds.), DOI:10.1007/978-981-19-6913-3_5, 957, Springer Nature Singapore Pvt Ltd, 2023*

Smart Wheelchair for Locomotive Patients

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ABSTRACT

Designing equipment for individuals with special needs is challenging due to their unique clinical picture. This variability makes it difficult to develop new technologies that can meet everyone's specific needs effectively. Thus, the design of assistive devices for individuals with special needs requires careful consideration of each person's unique challenges and requirements, making it a complex and nuanced process. This project aims to help them maneuver without social assistance, designed for people who lost mobility due to brain injury or limb loss but retain speech. It enhances a powered wheelchair with advanced sensors to detect surroundings, critical for those with locomotive disorders. The intuitive display offers multiple modes, including Speech, Gesture, and Joystick, and the Arduino Mega processes user specifications to rotate the motors accordingly. The wheelchair includes a Battery Indicator and Ultrasonic sensors for obstacle detection, providing an extra layer of safety. This approach aims to develop reliable and efficient technology to significantly improve the mobility and independence of individuals with locomotive disabilities.

**Full paper: International Journal of Enhanced Research in Science, Technology & Engineering, ISSN: 2319-7463, DOI : https://doi.org/10.55948/IJERSTE.2023.0425, Vol. 12, Issue No 4, April 2023*

Design of Canonical Signed Digit Multiplier Using Spurious Power Suppression Technique Adder

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ABSTRACT

Reducing power consumption is a major challenge in developing integrated processors for smart portable devices. This is particularly important for extending battery life and ensuring extended usage of the device. However, some DSP processing applications involve complex algorithms that consume more power, which poses a significant challenge in designing DSP applications for VLSI circuits. To address this issue, low- power consumption methodologies are required. Although various strategies have been developed to reduce power consumption, they have not demonstrated a significant decrease in dynamic power consumption, which is the primary factor determining the total amount of power dissipation. The focus of this research is to develop a low-power multiplier using the spurious power suppression technique (SPST), a method that divides the arithmetic unit into the most significant part (MSP) and least significant part (LSP) and turns of the MSP when it is not required for computation. This approach reduces dynamic power and overall power consumption of the VLSI combinational circuit. The proposed system also utilizes canonical signed digit (CSD) representation to further reduce power usage. The system was designed using Cadence design suite, and the results showed a significant reduction of 35.8% in power consumption for a 32-bit SPST-enabled CSD multiplier. The proposed system's total power consumption is 0.561 mW. Additionally, the proposed system was used in a power and area-efficient 256-point FFT architecture, resulting in an 86.6% reduction in power consumption. This system is suitable for real-time applications such as systems that use orthogonal frequency division multiplexing.

**Full paper: Journal of Engineering and Applied Science, https://doi.org/10.1186/s44147-023-00254-0, Vol 70, Issue No. 86, 2023, pp 1-15*

Cooperative Online Workspace Allocation in the Presence of Obstacles for Multi-Robot Simultaneous Exploration and Coverage Path Planning Problem

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ABSTRACT

In this paper, a dynamic workspace allocation methodology for coverage path planning using multiple robots in the presence of obstacles is presented. The entire workspace is initially partitioned using the Manhattan Voronoi partitioning method, without considering the obstacles present, and the robots execute Multi-Robot Simultaneous Exploration and Coverage (MRSimExCoverage) using the Spanning Tree Coverage (STC) algorithm and cover the workspace. A dynamic workspace re-allocation strategy to optimize the area covered by each robot, whenever obstacles are detected, so as to avoid certain obstacle-induced coverage issues is studied. Simulation experiments within the Matlab/V-rep environment are used to demonstrate and validate the performance of the proposed algorithm. Though the authors used the STC algorithm for path planning for demonstration, any suitable coverage algorithm may be used.

**Full paper: International Journal of Control, Automation and Systems, nd Systems, ISSN 1598-6446, http://dx.doi.org/10.1007/s12555-022-0182-9,Vol 21, Issue No 7, 2023, pp 2338 - 2349*

Solar Powered Water Body Cleaning Robot

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ABSTRACT

Water acts as a great essential life source. It is a well-known fact that life began with water and the water cleanliness is a very important aspect of life to survive on earth. But, the by-products of science laid their monstrous footsteps as pollutants. Most of these pollutants are toxic and are adversely affecting the water resources like lakes, rivers etc, living organisms in the water, and all dependent organisms. Also due to carelessness in the use and maintenance of water bodies, millions of tons of plastics and other floating wastes are dumped into the water daily. So, we aim to design an IOT-enabled waterbody cleaning robot which will help in efficient waste management in water bodies. Thus, our intention is to remove waste that is created by the public using the public itself.

**Full paper: International Journal of Engineering Research & Technology, ISSN: 2278-0181, DOI: 10.17577/ICCIDT2K23-130, Volume 11, Issue 01, 2023, pp 1-8*

Automatic Grocery Vending System

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ABSTRACT

Automatic Grocery Distribution System plays an important role in controlling the malpractices of conventional systems by doing a sequence of tasks automatically with a faster operation rate. The main objective of the paper is to provide technology to prevent illegal usage, corruption and avoid overcrowding. The RFID card is provided to have a unique identity for the user. A webpage is designed to display the information of the user and the commodities. Since there is currently no technology available to automate the distribution of groceries, all operations must be carried out manually, which causes irregularities. The beneficiary, therefore, receives a partial sale of the commodities because of the offline maintenance of the documents of sale. Such a method will result in the misuse of undistributed goods for individual gain. All these practices prevent the beneficiaries from the allocated ratio.An RFID smart card-based system has been designed to address the existing challenges. All userscan be issued this card, which contains a unique ID. The beneficiary must swipe the RFID card against an RFID reader during the authentication process. The system will keep track of the beneficiary's existing subsidies, enabling the user to only purchase items that correspond to the database inventory. The centralized database is updated following each transaction by the beneficiary. With the implementation of this system, it is expected that all such misuse as cited above can be eliminated leading to the achievement of high-level accuracy. The system can be further improved by making the webpage available in regional languages.

**Full paper: International Journal of Enhanced Research in Science, Technology & Engineering, DOI : https://doi.org/10.55948/IJERSTE.2023.0620, Vol 12, Issue No. 6, June 2023, pp 147-153*

Modified SSD Framework for On-Road Object Detection

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ABSTRACT

Real-time object recognition is critical to improving automobile automation features. This research presents a novel method for detecting on-road objects using a modified Single Shot MultiBox Detector (SSD) algorithm. The primary objective is to automate car headlamps in order to avoid accidents caused by blinding high beams from impending or past vehicles for which it is important to identify the vehicle. This study compares traditional object detection techniques (region-based and regression-based) with the modified SSD model in terms of Frames Per Second, Accuracy, mean Average Precision, Recall, F1 Score, and ROC-AUC. The improved SSD model displays significant speed improvements while keeping competitive metric values, making it suitable for high-speed vehicle applications. To assess the efficacy of the proposed technique, substantial statistical analyses have been performed. When compared to the three benchmark models, the findings indicate that the performance metrics for stated object classes are superior. The modified SSD model emerges as an efficient solution that offers substantial gains in operating speed, making it appropriate for vehicle detection and adaptive headlight systems.

**Full paper: International Conference on Intelligent Circuits and Systems (ICICS 2023), LPU, Punjab, October 12-13, 2023*

Multi Cost Function Fuzzy Stereo Matching Algorithm for Object Detection and Robot Motion Control

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ABSTRACT

Stereo matching algorithms work with multiple images of a scene, taken from two viewpoints, to generate depth information. Authors usually use a single matching function to generate similarity between corresponding regions in the images. In the present research, the authors have considered a combination of multiple data costs for disparity generation. Disparity maps generated from stereo images tend to have noisy sections. The presented research work is related to a methodology to refine such disparity maps such that they can be further processed to detect obstacle regions. A novel entropy based selective refinement (ESR) technique is proposed to refine the initial disparity map. The information from both the left disparity and right disparity maps are used for this refinement technique. For every disparity map, block wise entropy is calculated. The average entropy values of the corresponding positions in the disparity maps are compared. If the variation between these entropy values exceeds a threshold, then the corresponding disparity value is replaced with the mean disparity of the block with lower entropy. The results of this refinement are compared with similar methods and was observed to be better. Furthermore, in this research work, the v-disparity values are used to highlight the road surface in the disparity map. The regions belonging to the sky are removed through HSV based segmentation. The remaining regions which are our ROIs, are refined through a u - disparity area - based technique. Based on this, the closest obstacles are detected through the use of k -means segmentation. The segmented regions are further refined through a u-disparity image information - based technique and used as masks to highlight obstacle regions in the disparity maps. This information is used in conjunction with a kalman filter based path planning algorithm to guide a mobile robot from a source location to a destination location while also avoiding any obstacle detected in its path. A stereo camera setup was built and the performance of the algorithm on Local real - life images, captured through the cameras, was observed. The evaluation of the proposed methodologies was carried out using real life out door images obtained from KITTI dataset and images with radiometric variations from Middlebury stereo dataset.

**Full paper: Journal of Robotics and Control (JRC), ISSN: 2715-5072, DOI:10.18196/jrc.v 4i3.17041, Vol 4, Issue No 3, May 2023, pp 365-370*

Preliminary Design Analysis of Interplanetary Trajectories with Hohmann and Bi-Elliptic Manoeuvres

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ABSTRACT

The determination of a fitting orbit transfer technique is one of the paramount tasks in arranging a space travel mission. This paper aims to delve deeper into the two-basic impulse manoeuvres; the Hohmann Transfer, which is one of the most efficient manoeuvres for transferring between two circular orbits with different radii, and the Bi-Elliptic transfer, which in certain conditions has proven to yield results which can be more efficient compared to the Hohmann transfer. The authors were able to achieve this by exploring different scenarios in which Hohmann and Bi-Elliptic transfer may be used and comparing the obtained results with each other. A range is observed, which can be used as a rule of thumb to select the most appropriate transfer under the circumstances. An analysis of the advantages and disadvantages of each transfer is made, which further helps in understanding when, where and how to use them.

Full paper: Proceedings of the 2nd IEEE International Conference on Vision Towards Emerging Trends in Communication and Networking Technologies, Vellore, 05-06 May 2023, pp 1- 5

Performance analysis of Polar Codes in a Visible Light Communication System

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ABSTRACT

One of the vital entity of any communication systems is Channel coding, which leads to the design of high performance codes for future wireless systems having low complexity encoder and decoder design. These systems will have a requirement of operating in highly reliable conditions, maximum throughput, and low and high code rates and to work with short and long information messages. Polar codes are one of the promising error correcting channel codes that can be used in these situations to obtain maximum throughput and coding gain in a communication system because of their capacity approaching performance and finds interests in Satellite communication and 4G/5G services. These codes use the concept of channel polarization to be constructed. The work proposed in this paper focusses on the Bit Error Rate evaluation and analysis of the Polar codes using traditional approach and Deep learning approach. The feedforward deep learning networks using different activation functions were used for the Deep learning approach. The Successive Cancellation algorithm and its variant using List decoding were used as traditional decoding methodology. The results obtained using Deep learning approach were satisfactory and was matching as per the traditional decoding.

**Full paper: Proceedings of the 4th National Conference on Communication Systems (NCOCS 2022), Journal of Physics: Conference Series, IOP Publishing, doi:10.1088/1742-6596/2466/1/012006, Karaikal, 2023, pp 1-7*

Categorization & Classification of Acute & Chronic Leukaemia using Visual Geometry Group -16 Deep Convolutional Neural Network Architecture

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ABSTRACT

A significant issue in the field of disease diagnosis is the accurate differentiation of malignant leukocytes with minimal expense in the early stages of the disease. This is necessary for early detection and diagnosis of leukaemia. Although there is a lot of leukaemia, there is a dearth of flow cytometry tools, and the techniques used at laboratory diagnostic centers take a lot of time. The CNN-based architecture will be a promising solution for the same. In this, we have developed the VGG-16-based model for the detection of leukemia & achieved an accuracy of around 90%

**Full paper: Proceedings of the Fifth International Conference on Electrical, Computer and Communication Technologies (ICECCT), DOI: 10.1109/ICECCT56650.2023.10179851, Tamilnadu , 22-24 February, 2023, pp 1-6*

An Approach for Radiation Dose Reduction in Computerized Tomography

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ABSTRACT

Minimization of radiation dose plays an important role in human wellbeing. Excess of radiation dose leads to cancer. Radiation greatly affects young children less than 10 years of age as their life span is longer. Radiation can be reduced by hardware and/or by software techniques. Hardware methods deal with variation of parameters such as tube voltage, tube current, exposure time, focal distance and filter type. Software techniques include image processing methods. The originally acquired X-ray images may be contaminated with noise due to the fact of instability in the case of sensors, electrical power or X-ray source, that is responsible for the degradation of the image attributes. An enhanced image denoising algorithm has been proposed which decreases Gaussian noise combined with salt and pepper noise that retains most information particulars

**Full paper: International Journal of Electrical and Computer Engineering (IJECE), ISSN: 2088-8708, DOI:10.11591/ijece.v13i1.pp1169-1179, Vol. 13, Issue No. 1, February 2023, pp 1169~1179*

A Machine Learning Approach in Predictive Maintenance in the IoT Enabled Industry 4.0

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ABSTRACT

Predictive maintenance using machine learning is a powerful technique for industries seeking to enhance their operations with minimize downtime. In an IoT-enabled Industry 4.0 environment, this approach can be taken to a new level by leveraging the vast amounts of data generated by connected devices. To implement a machine learning methodology to projecting conservation in an Industry 4.0 environment, several key steps need to be taken. First, data from IoT devices across the industrial ecosystem should be collected and centralized in a data lake or similar storage system. This data should include information on equipment health, sensor readings, and other relevant metrics. Next, the data should be preprocessed and transformed to ensure its quality and consistency. This may involve cleaning, normalization, and feature engineering to create relevant variables for use in machine learning models. Once the data has been preprocessed, a range of machine learning models can be trained on it to predict equipment failures or other maintenance issues. This may involve ongoing tuning and optimization of model hyperparameters or retraining the models on new data as it becomes available. Finally, the predictions generated by the machine learning models should be integrated into a broader maintenance management system to enable timely action. This may include triggering maintenance requests, generating work orders, or even automating maintenance tasks through the use of robots or other industrial automation technologies. By implementing a machine learning method to projecting preservation in an IoT-enabled Industry 4.0 environment, industries can optimize their operations, minimize downtime, and improve overall equipment effectiveness.

**Full paper: Proceedings of the 4th International Conference on Smart Electronics and Communication (ICOSEC), IEEE, DOI: 10.1109/ICOSEC58147.2023.10276226, Trichy, 16 October 2023, pp 418-42*

Advances in Microneedles-Based Drug Delivery System on Promoting Wound Healing

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ABSTRACT

The most popular methods for applying drugs transdermally are transdermal patches, topical creams, and injectable hypodermic needles. Most therapeutic treatments are less effective because fewer molecules reach the site of action due to the skin's stratum corneum acting as a barrier for the molecules. Microneedles, a novel method of drug delivery, assists in improving this route of administration by avoiding the drawbacks of previous formulations. Microneedle offers benefits in the treatment aspects via noninvasive, painless administration, which is advantageous due to increased patient compliance compared to the other transdermal mode of administration. The significance of the microneedle array mainly targets the skin epidermal layer to provide direct transfer of medication into the bloodstream without the intervention of a barrier. In this review, wound healing is one of the challenging aspects for treatment purposes. The wounded region of the skin increases the secretion of several inflammatory mediators, and in the presence of bacterial contaminants, it inhibits the healing mechanism. The bacterial film over the wounded region blocks the entry of active drugs into the wounded bed, where microneedle offers a significant effect over other conventional techniques. Microneedles are fabricated into different types: solid, dissolving, hydrogel, coated, and hollow. The basic composition and fabricated procedures of microneedles vary depending on their use. Various microneedle patches are manufactured in wound healing strategies, and researchers closely monitor and examine their effects. This review provides a brief overview of how microneedle can be used as an alternate treatment approach to improve and enhance the existing healing mechanism of wounds of various types.

**Full paper: Journal of Drug Delivery Science and Technology, https://doi.org/10.1016/j.jddst.2023.105163,Vol 90, December 2023, pp 105163*

Solar Panel with Graphene Nanoribbon Interconnect

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ABSTRACT

with the advent of new materials having tunable properties and technological improvement, the renewable energy sector has become competitive with conventional sources in both cost and efficiency. Here we propose a photovoltaic structure with graphene nanoribbon (GNR) interconnect to improve the overall efficiency of solar cells. The characteristics of the structure are analyzed using the Nano tool. The GNR interconnect conductance is studied by varying the dimension of the graphene layer.

**Full paper:14th International Conference on Computing Communication and Networking Technologies, ICCCNT, Delhi, 6-8 July 2023*

ELECTRICAL AND ELECTRONICS ENGINEERING

Performance Investigation Distribution STATCOM in Distribution System

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ABSTRACT

Employment of non-linear loads has raised considerably in current trend of power distribution system. Power quality of system reduces because of such an8ticipated loads. Hence, Distribution Static Compensator (Distribution STATCOM), which is a customized power device connected in shunt is utilized to improve and enhance performance of the distribution system. Distribution STATCOM is used to minimize distortions or undesired outcomes and to support sustained voltage at terminals. It also persists voltage and current shape.

Full paper: 2nd International Conference on Frontiers in Engineering Science and Technology, Bangalore, 27-28 May 2022

Estimation of SOC for Real Time EV Drive Cycle using Kalman Filter and Coulomb Counting

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ABSTRACT

Research and development to determine State of Charge(SoC) has taken a new turn ever since the electric vehicle technology has entered the market. The current SoC determination methods employed gives us results that are far from perfect, so a lot of new technologies and methods have emerged which allows us to determine the SoC of a battery with lesser errors compared to the previous ones, yet there is a lot of space for improvement. The Battery Management Systems in electric vehicle domain mostly employ the Coulomb counting method of estimation to determine the state of charge and the subsequent range of the vehicle. Kalman filter is a method which can give better estimates of a state and in energy storage systems that of SoC. In recent Battery Management Systems, the Kalman Filter is proposed to estimate SoC with better accuracy. This paper compares the use of Coulomb counting and Kalman filter techniques to estimate State of Charge of EV battery for the Mangaluru drive cycle. The Mangaluru drive cycle is transient and gives better estimate of SoC in comparison with Standard drive cycles for Mangaluru region. The Kalman filter technique was found to be more accurate compared to coulomb counting method due to the inclusion of uncertainties in measurement of current and voltage in the simulation model. Set with the same initial conditions, coulomb counting estimated the end state to be around 81% while Kalman filter around 71%. The Kalman filter gave an RMS error of 2.5067% which was obtained by comparing the model output.

**Full paper: 2nd International Conference on Intelligent Technologies (CONIT), DOI: 10.1109/CONIT55038.2022.9848066, Hubli, 2022, pp 1-6*

Reliability Analysis of Single Phase Quazi Z Source Inverter for Standalone Photovoltaic System

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ABSTRACT

Quazi Z source inverter has an advantage that it can boost or buck voltage to be given to an inverter. Operation of a QZSI is similar to a Z source inverter (ZSI). A conventional photovoltaic application uses a two-stage topology of boost converter and an inverter. A QZSI can be replaced for a two-stage topology to serve the purpose. A 3 KW single phase QZSI is designed and simulated for a standalone photovoltaic system in this paper. The results for total harmonic distortion (THD) of output voltage and mean time between failure (MTBF) of the overall system is compared with a conventional ZSI and two-stage topology for the same rating. MTBF of the overall system is computed using reliability block diagram method. Reliability curve is also plotted for all the three considered topologies.

Full paper: Bulletin of Electrical Engineering and Informatics, ISSN: 2302-9285, DOI: 10.11591/eei.v11i6.4101, Vol 11, Issue No 6, 2022, pp 3023-3032

Machine Learning Model for Glare Prediction in Offices with Simple Architectural Features

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ABSTRACT

Daylight glare index (DGI), daylight glare probability (DGP) and glare-sensation (GS) predictive models are the widely used glare indices for the assessment of occupant visual comfort in daylit spaces. This paper presents the development and implementation of Machine Learning models to predict these glare indices. The training and validation data sets were collected from sensors incorporated in the test room with motorized Venetian Blinds and dimmable LED luminaires. Predictor and response data were obtained from conventional sensors, digital cameras, and the EVALGLARE Software. The regression models predict DGI and DGP, whereas the classification model predicts GS. In addition to standard statistical error evaluation metrics, the hypothesis test assesses the performance of regression/classification models. The results reveal that Ensemble Tree (ET) models are highly accurate at predicting glare indices. The proposed technique attempts to simplify the existing traditional Glare Index(GI) estimation method. The combination of real-time daylight glare prediction and suitable window shading control increases occupant visual comfort. A high dynamic image-based system is employed to verify the measurements made using traditional sensors.

**Full paper: Journal of Green Building, https://doi.org/10.3992/jgb.17.4.79, Vol 17, Issue No 4, 2022, pp 79–97*

A Performance Improvement in Home Automation through Uncontaminated Energy Interfaced with Multi-Dimensional Machine Learning Approach

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ABSTRACT

The Management of devices often used in current homes is designed in terms of automation. This means that the energy and power required for the operation of that particular type of device will be calculated and supplied accordingly. It does not take place through human activities in any way. These operations, which take place entirely automatically, take up a lot of energy in some places. Thus there is not enough energy available to operate other devices. A machine learning method is proposed here to deal with this effectively. It records the nature of the machine and the energy and power required for it in advance in the database. It will provide the energy it needs based on those records. Then check the machine module again. If there is too much energy, it will do it to another machine and so on. This reduces energy consumption by up to 70% and reduces power consumption by 62%. Furthermore, the results of the study clearly show that the energy utilization is 97% due to the use of this method.

**Full paper: Proceedings of the International Conference on Edge Computing and Applications, (ICECAA 2022 DOI: 10.1109/ICECAA55415.2022.9936441, ISBN: 978-1-6654-8232-5, Tamilnadu, 13-15 October 2022, pp 1411-1415*

4 - Electrical Properties of Polymer Nanocomposites

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ABSTRACT

The utilization of green system engineering approaches to achieve biodegradable, eco-friendly, and high-value materials from enduring cellulosic biomass can share the viability of forthcoming bio refineries. We studied the possibility of sugarcane bagasse as cellulosic biomass to recover Nano cellulose from chemical treatment and mechanical milling process. Polymer-based nanocomposites dielectric exhibit a vast possibility in high voltage wires for their apparent enhancements to the electrical characteristics. In the current investigation, the nanocomposites consist of epoxy polymer, sugarcane Nano cellulose, and aluminium silicon carbide (Al-SiC) nanoparticles are investigated using an ultra-sonication-assisted wet layup technique. The appearance of Al-SiC nanoparticles enhances the dielectric characteristics such as the inhibition of space charge and direct current breakdown strength. The thermally stimulated current and electrical conductivity properties signify the deep captures in the laminate increment evident. The dielectric permittivity of chemically treated sugarcane Nano cellulose fiber and Al-SiC-reinforced epoxy hybrid nanocomposites was five times higher than the untreated ones. Our method offers a hasty technique to produce a lower dielectric loss factor and a higher dielectric constant of sugarcane Nano cellulose and Al-SiC-reinforced polymer nanocomposites using the manufacturing of Al-SiC-encapsulated epoxy microspheres.

**Full paper: Advanced Polymer Nanocomposites: Science, Technology and Applications, https://doi.org/10.1016/B978-0-12-824492-0.00006-4, 2022, pp 73-90*

Smart Grid in Indian Scenario

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ABSTRACT

The environmental impact of the continuous usage of fossil fuel-based power sources and policies of reducing carbon-dioxide emissions has made renewable energy source-based power sources find potential applications in the field of power generation. The high penetration of Distributed Generation (DG) makes the distribution system active and it can function as a micro-grid and presently they are transforming into smart grids and smart cities all over the world. As of now, the power network structure is a centralized power generation. Smart grid (SG), the new facet of power infrastructure, facilitates the decentralization of power generation. The smart grid has shown its capability to satisfy power availability, reliability, quality, economic operation, efficiency, safety, security, and other important parameters alongside environmental issues. India has an installed capacity of quite 280 GW and has opted for a smart grid to satisfy the power deficiency, green energy challenges, and other challenges of the country. The concept of the smart grid, its technologies, challenges, and difficulties in implementation are discussed in detail on several platforms. With the approval of the Indian Government, fourteen smart grid pilot programs are being developed across the country. Under such circumstances, a techno-economic analysis of smart grid pilot programs becomes very essential. A study has been administered on the Puducherry smart grid pilot program, jointly developed by Power Grid Corporation of India Ltd (PGCIL) and Puducherry Electricity Department (PED), to understand its techno-economic aspects. The pilot program has completed its interim stage and is working with good power quality. Rooftop solar PV systems with net metering facilities were also installed during this pilot program to show-case the integration of renewable energy. For effective planning, it's essential to know the positive and negative aspects of the SG technologies. Implementation of any technology reflects in terms of investment sought and its success is measured by profit gained by both investor and therefore the society.

**Full paper: Smart Grids and Microgrids: Technology Evolution, Book Editor(s):Prajof Prabhakaran, Umashankar Subramaniam, S. Mohan Krishna, J. L. Febin Daya, P. V. Brijesh, Chapter 8, 2022, pp 175-194*

Drowsiness Sensing System for Driver Safety

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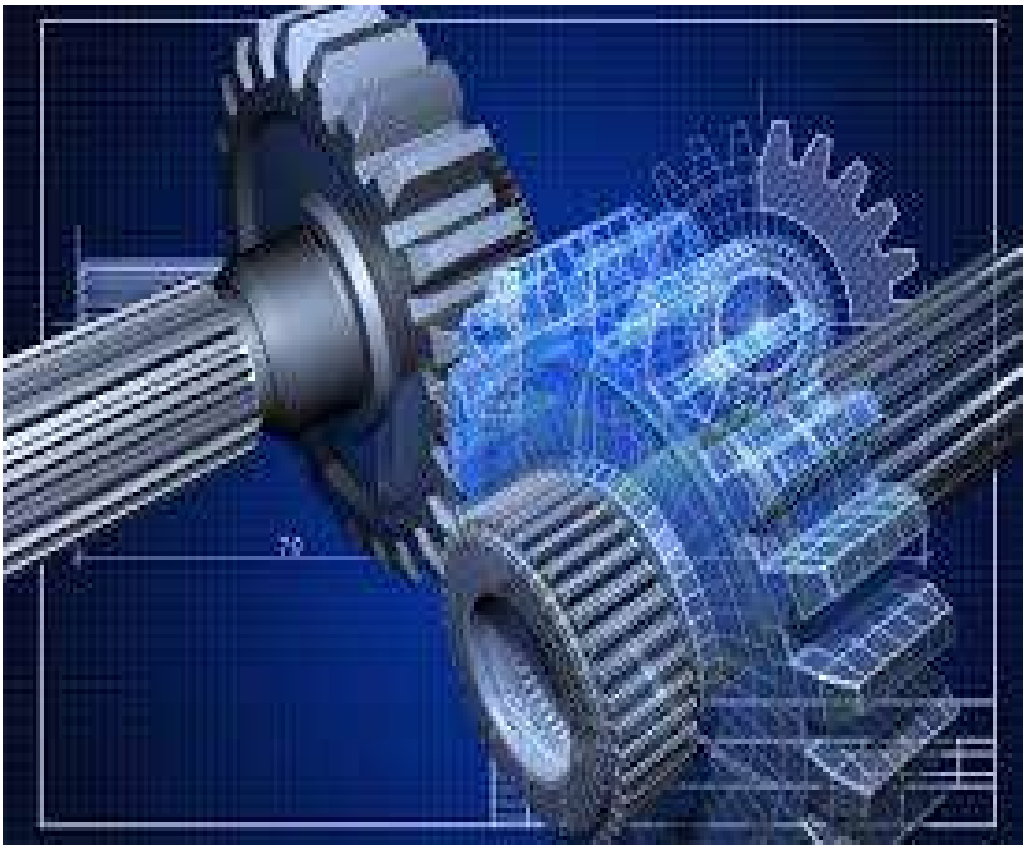
ABSTRACT

When the excitation transformer in a hydropower plant is influenced by dc bias, the performance of the transformer suffers from nonlinearly inferior operation, resulting in compromised transformer health and a reduced life span. This paper emphasizes a simple yet powerful modeling and electromagnetic analysis of a dc-biased excitation transformer used in a hydropower plant. The three-dimensional modeling of the excitation transformer was carried out using the transformer constructional details and analyzed using Ansys Maxwell. The finite element method was used to analyze a three-phase 500 KVA excitation transformer. The impact on the excitation transformer was investigated for varying levels of dc bias with different excitations. The simulation results include various plots of variables and the loss characteristics. This research provides new insight on the importance of accurately calculating the losses of an excitation transformer under dc bias during the design stage. The main contribution of this research is a simple approach for performing the electrical and magnetic analysis of a dc-biased excitation transformer, which could be helpful for designers in determining the effects of various variables and can be adequately addressed during the designing stage.

**Full paper: Proceedings of the International Conference on Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA), DOI:10.1109/ACCTHPA57160.2023.10083366, Ernakulam, India, 2023, pp. 1-3*



MECHANICAL ENGINEERING

Multi-Response Modelling and Optimisation of Mechanical Properties of Al-Si Alloy Using Mixture Design of Experiment Approach

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ABSTRACT

The research aims to produce, model, and optimise the mechanical properties of novel composite material through a structured multidisciplinary approach. The primary objective is to combine materials science, mechanical engineering, and statistical concepts to ensure Design for Manufacturability (DFM) from the industrial perspective. More specifically, the article is intended to determine the optimal mixture components and predictive model of Al-Si alloy with Al2O3 by accommodating multi-responses that enable DFM. The study adopted ASTM standards to prepare and test the novel composite material. Additionally, the Mixture Design of Experiment (DOE) approach was used to design the experimentation and subsequent analysis. In addition, microstructural images, Cox Response Trace plot, and Response Optimiser plot are effectively utilised to draw robust inferences. For multi-response modelling and optimisation, the composite material's mechanical properties, like impact strength, hardness, density, and tensile strength, are considered. The study determines that innovative composite material will yield better results when Al-Alloy is 94.65 wt% and Al2O3 is 5.35 wt% from a multi-responses perspective. Further, it provides predictive models with a high level of predictability. Besides, the research shows that novel composite material has better mechanical properties from a practical perspective. The article not only provides the mechanical properties of a new class of material but also shows the effective utilisation of material science and statistical concepts to develop the novel material in a structured manner. This composite material can be used as a replacement for various parts of automobiles and aircraft. Additionally, researchers can use the article's modelling and optimisation approach as a paradigm to create durable composite materials.

**Full paper: Processes, https://doi.org/10.3390/ pr10112246, Vol 10, Issue No 11, 2022, pp 2246.*

Lean Six Sigma in Healthcare: A Systematic Literature Review on Motivations and Benefits

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ABSTRACT

While Lean Six Sigma (LSS) has been applied extensively in healthcare organisations, there has been limited research on the trends of LSS application in healthcare in recent years. This paper aims to present the key motivations and benefits of LSS in healthcare with a view to highlighting the types of problems that LSS in healthcare can aid in solving. The authors used a systematic literature review (SLR) approach to achieving the article's purpose. Peer-reviewed journal articles published between 2011 and 2021 are considered to achieve the study objectives. The systematic review helped the authors to identify the evolution, benefits, and motivations for LSS in healthcare. This work includes directions for managers and healthcare professionals in healthcare organisations to embark on a focused LSS journey aligned with the strategic objectives. This study is perhaps one of the most comprehensive SLRs covering a vital agenda of LSS in healthcare. This study provides all the deliverables of LSS for its successful deployment in healthcare.

**Full paper: Processes, https://doi.org/10.3390/pr10101910, Vol. 10, Issue No 10, 2022, pp 1910*

Lean Six Sigma in Healthcare: A Systematic Literature Review on Challenges, Organisational Readiness and Critical Success Factors

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ABSTRACT

Lean Six Sigma (LSS) has been applied in many healthcare organisations, but there has been limited research on the evolution of LSS application in healthcare. This paper aims to present the challenges, critical success factors (CSFs), readiness factors and most common tools and techniques used for LSS deployment in healthcare. A systematic literature review (SLR) was utilised to research the study objectives. Peer-reviewed literature over a 16-year period was studied to understand the deliverables of LSS. The SLR process identified relevant articles and screened a final selection for those under study. The systematic literature review helped the authors to identify the challenges and tools/techniques used for LSS in healthcare. Several CSFs and readiness factors for LSS deployment in healthcare are also presented. This work informs healthcare managers and professionals on the important factors for successful LSS deployment before embarking on the LSS journey. In addition, this work is a valuable resource for healthcare LSS practitioners and academic researchers to learn about, investigate and deploy LSS in the healthcare sector. This study is one of the most comprehensive SLRs covering the importance and specificity of understanding challenges, CSFs and organisational readiness for LSS in healthcare. This study provides knowledge of the successful deployment of LSS in healthcare.

**Full paper: Processes, https://doi.org/10.3390/pr10101945, Vol 10, Issue No 10, 2022, pp 1945*

Benefits, Challenges, Critical Success Factors and Motivations of Quality 4.0 – A Qualitative Global Study

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ABSTRACT

Purpose – Quality 4.0 (Q4.0) is nascent, but many organisations have started their journeys on Q4.0. This study seeks to investigate the real-time organisational benefits and motivations for deploying Q4.0 and understand current Q4.0 initiatives along with the skills, challenges, and critical success factors required to implement Q4.0.

Design/methodology/approach – A qualitative interview approach was utilised by interviewing a global panel of senior management, and operational excellence professionals from leading companies deploying Q4.0.

Findings – This study provides a theoretical base for the organisational adoption of Q4.0 and understanding the benefits, challenges, critical success factors, motivations, and skillsets required. The challenges to Q4.0 identified include gaining management commitment to invest in technology and guide the organisational strategy to

implement Q4.0. The skillset required for Q4.0 includes data science, data analysis, and knowledge of Industry 4.0 technology in order adapt to the increased world of digitalisation and smart factories.

Research limitations – Most of the interviewees who participated in this study represent four continents. There is an opportunity for a detailed longitudinal study, analysis, and case studies in individual organisations.

Originality/value – This is the first global study on Q4.0 that captures the viewpoints of senior management professionals deploying Q4.0.

**Full Paper: Total Quality Management, https://doi.org/10.1080/14783363.2022.2113737, Vol 34, Issue No 7, 2022, pp 827-846*

Design and Fabrication of Arduino-Based Automated Cradle Rocking and Moisture Detection Mechanism

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ABSTRACT

A new, inexpensive domestic electronic cradle that can compete with current imported, expensive models has been a long-time need. This study describes the design and implementation of a new indigenous lowcost E-Baby Cradle that swings automatically when the baby cries. The cry analyzing system recognizes the sound of a baby's cry and swings the cradle appropriately until the baby stops crying. According to the user's needs, the cradle's speed can be adjusted. The cradle also has an integrated alarm that signals two situations: First, when the mattress is wet, which is a crucial factor in maintaining the baby's hygienic state; second, when the infant continues to cry for a prolonged period, which suggests that the baby requires attention. This method enables nurses and parents to care for infants without having to physically touch them.

**Full Paper: Journal of Mechatronics and Robotics, DOI: 10.3844/jmrsp.2022.79.83, Vol 6, Issue No1, 2022, pp 79-83*

Integrated Effect of Flow Field Misalignment and Gas Diffusion Layer Compression/Intrusion on High Temperature – Polymer Electrolyte Membrane Fuel Cell Performance

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ABSTRACT

Misalignment in the flow field plates of High-Temperature Polymer Electrolyte Membrane Fuel Cell (HT-PEMFC) due to manufacturing tolerances, assembly process, or unavoidable vibration during the cell operation is contemplated its performance and durability. This study investigates the effect of flow field plate misalignment and its concomitant impact with varying the clamping pressures on HT- PEMFC operation. The study considers six degrees of cathode flow field misalignment, varying from 0% to 100% with respect to the anode flow field. Clamping pressures ranging from 1 to 2 MPa are applied to the various cases of misalignment to study their effect on GDL deformation and intrusion into the channels. The structural analysis shows that as the misalignment increases from 0 to 100%, the GDL compression increases from 26.72% to 37.75% for 1 MPa, 40.07% to 56.63% for 1.5 MPa, and 53.43% to 75.51% for 2 MPa, owing to the increase in compression approximately by 41% from their base cases and it is also crucial to note that GDL compression exaggerates at higher clamping pressures. The misalignment results in the sagging of Membrane Electrode Assembly (MEA), and the amplitude of wave nature is proportional to the degree of misalignment and clamping pressure, indicating the misalignment is the sole factor for structural changes. As a result, considerable variance in current distribution and average value is observed, i.e., at operating voltage 0.5 V, the current density drops from 4472.7 to 4264.4, 4420.7 to 4211.8, and 4374.1 to 4161.3 A m^{-2} from cases 1 to 6 for clamping pressures 1, 1.5, and 2 MPa, respectively, resulting in a 4.7% loss in performance. According to the observations, a misalignment of 60% is tolerable, with minimal performance loss and negligible non-uniformity in cell distributions.

**Full Paper: Journal of The Electrochemical Society, DOI: 10.1149/1945-7111/aca834, Vol 169, Issue No 12,2022, pp 124508*

Combined Effect of Channel to Rib Width Ratio and Gas Diffusion Layer Deformation on High Temperature E Polymer Electrolyte Membrane Fuel Cell Performance

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ABSTRACT

The present study investigates the combined influence of Channel to Rib Width (CRW) ratio and clamping pressure on the structure and performance of High Temperature-Polymer Electrolyte Membrane Fuel Cell (HT-PEMFC) using a three-dimensional numerical model developed previously. It also considers the impact of interfacial contact resistance between the Gas Diffusion Layer (GDL) and Bipolar Plate (BPP). The structural analysis of the single straight channel HT-PEMFC geometry shows that the von-Mises stress greatly increases in the GDL under the ribs as the CRW ratio increases resulting in considerably high deformation. The cell performance analysis depicts the significance of ohmic resistance and concentration polarization for different CRW ratios, particularly at higher operating cur- rent densities. However, in low to medium current density regions, the CRW ratio has little influence on cell performance. A substantial impact on the species, over potential, and current distributions is observed. The findings also reveal that the CRW ratio significantly affects the temperature distribution in the cell.

**Full Paper: International Journal of Hydrogen Energy, https://doi.org/10.1016/j.ijhydene.2022.07.178, Vol 47, Issue No 77, 2022, pp 33014-33026*

Effect of Water Absorption on the Mechanical Properties of Alkaline Treated Bamboo and Flax Fiber Reinforced Epoxy Composites

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ABSTRACT

Untreated and alkaline treated bamboo and flax fiber reinforced epoxy composites are processed using a hand layup process. The effect of alkaline treatment on the mechanical properties of the composites has been analysed. Alkaline treatment of the fiber has enhanced the mechanical properties of the developed composites. Composite reinforced with 5 % NaOH treated fiber show better performance when compared with untreated fiber reinforced composites. Alkaline treatment of the bamboo and flax fiber with 5 % NaOH has improved the hardness by 3.57 and 2.43 %, tensile strength by 47 and 20.72 % and flexural strength by 7.36 and 13.85 % in bamboo and flax fiber reinforced composites, respectively. The increase in the percentage NaOH in the alkaline treatment of the fibers resulted in weakening of fiber resulting in a drop in the properties of the developed composites. Water absorption tests of the developed composites were conducted as per ASTM D570 by immersion in distilled water at room temperature. The influence of water absorption on mechanical properties of developed composites is also examined. The quantity of water absorption and diffusion coefficient are reduced with alkaline treatment of fiber. Mechanical properties of the composite were found to decrease by the water absorption, which can be controlled by alkaline treatment of fiber and thereby reducing water absorption rate and improve the mechanical properties of the composites.

**Full Paper: Trends in Sciences, https://doi.org/10.48048/tis.2022.5779, Vol 19, Issue No 18, 2022, pp 5779.*

Performance Study of Using Preheated Biodiesel in a Diesel Engine

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ABSTRACT

The use of biodiesel in blended mode is holding a more significant potential in making diesel engines environment-friendly. Published work specifies an optimum blend of biodiesel with diesel oil as B20. Further, the literature indicates that preheating biodiesel in the temperature range between 60°C to 120°C helps to increase the blend percentage up to 50%. In this experiment an effort has been made to use 100% Waste cooking oil methyl ester (WCME) biodieselby employing two stage heating in the temperature range from 100°C to 250°C. In the first stage the heater is immersed in fuel tank that heats biodiesel up to 70ºC that lowers the viscosity and eases pumping. In the second syage, an electric preheater is installed along the highpressure fuel line for achieving higher temperatures. The performance and emission results are encouraging and indicates that Brake Specific Fuel Consumption decreases by 5.4%, Brake Thermal Efficiency increases by 6.15%, Carbon Monoxide (CO) and unburnt hydrocarbon (HC) emissions fall by 38% and 25.5%, respectively. NOx has increased marginally by 4-6%.

**Full Paper: Journal of Mechanical Engineering and Sciences (JMES), ISSN: 2289-4659 e-ISSN: 2231-8380, DOI: https://doi.org/10.15282/jmes.16.2.2022.01.0697, Vol.16, Issue No 2, pp 8820–8828*

Optimization of Oil Extraction from Scleropyrum Pentandrum (Dennst.) Mabb Seeds by Surface Response Approach

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ABSTARCT

Scleropyrum pentandrum (Dennst.) Mabb tree grown in India local fields facilitates diet, and medicinal benefits for humans as well as animals. This work is through the interest given to extract the oil from Scleropyrum pentandrum (Dennst.), the feedstock grown in those trees. Solvent extraction method being employed as it demonstrates to be efficient and straightforward for researchers to have the oil obtained from vegetative feedstock. Response surface methodology (RSM) approach in Box-Behnken model being effective which is used to enhance the oil yield contemplating the factors solvent/seed ratio 1, 1.25 and 1.5ml/gm. The extraction temperature 60 ^{o}C to 70^{o}C, at interval of 5°C. the extraction performed with I hour interval starting from 3hours to 5hours range. The research revealed optimum yield of 61.64% at temperature level of 66.4646 °C, 4.4141-hour extraction time at solvent/seed ratio of 1.3182 ml/g through RSM tool.

Full Paper: YMER, Vol 21, Issue No 10, October 2022, pp 1179-1186

Application of 7 Quality Control Tools in Higher Education Institutes

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ABSTARCT

Purpose: The primary purpose of this study is to revisit Ishikawa's statement that "95% of problems in processes can be accomplished using the original 7 Quality Control (QC) tools". The paper critically investigates the validity of this statement in higher education institutions (HEIs).

Design/methodology/approach: An online survey instrument was developed, and as this is a global study, survey participants were contacted via social networks such as LinkedIn. Target respondents were HEIs educators or professionals knowledgeable about the 7 QC tools promulgated by Dr Ishikawa. The professionals who work in administrative sectors, such as libraries, information technology, and human resources, were included in the study. Our study also included several academics who teach the 7 basic QC tools. The survey link was sent to over 200 educators, professionals, and 76 complete responses were obtained.

Findings: The primary finding of this study shows that the diffusion of seven QC tools is not widespread in the context of HEIs. Less than 8% of the respondents believe that more than 90% of process problems can be solved by applying the 7 QC tools. These numbers show that modern-quality problems may need more than the 7 basic QC basic tools, and there may be a need to revisit the role and contribution of these tools to solve problems in the higher education sector. Tools such as the Pareto chart and the Cause & Effect diagram have been widely used in the context of HEIs.

Research limitations/implications: The exploratory study provides an initial understanding of the 7 QC tools application in HEIs, their benefits, challenges, and critical success factors, which can act as guidelines for implementation in HEIs. Surveys alone cannot provide deeper insights into the status of the application of seven QC tools in HEIs. Therefore, qualitative studies in the form of semi-structured interviews should be carried out in the future.

Originality/value: This article contributes with an exploratory empirical study on the extent of using 7 QC tools in the university processes. The authors claim that this is the first empirical study looking into using the seven QC tools in the higher education sector.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, Abu Dhabi, UAE, 15th & 16th November 2022*

Failure Modes and Effects Analysis (FMEA) in the Higher Education: A pilot study on success and failure factors, benefits and challenges

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ABSTARCT

Purpose: The Failure Modes and Effects Analysis (FMEA) method is a step-by-step quality approach, widely used in different industries for identifying all possible failures that are extensively used throughout the operations of aeronautical, automotive, software, food services, healthcare, manufacturing, and assembly process and many other industries around the world. FMEA aims to improve the quality measures and sustain the best practices within the industry. The purpose of this study is to shed light on common challenges/issues in the use of FMEA as well as the main benefits of the Higher Education (HE).

Design/Methodology/Approach: A global pilot study has been conducted to identify the key critical success factors, benefits, and common challenges in HES. Using a structured pilot survey, the data has been collected from various global academicians and practitioners serving in different Higher Educations (HE) and consultancies. A mixed methodology (qualitative and quantitative) was adopted as an effective method to get answers to the research questions.

Findings: The outcomes highlighted the critical failure factors that affected the implementation of FMEA in selected domains of HE. Lack of awareness and adequate training on FMEA tools was one of the failures and barriers to the effective use of FMEA. Improved process quality and reliability have been reported as the prominent benefits of the FMEA tool. Management commitment is the most critical success factor for FMEA application within an organization.

Research limitations/Implications: The pilot survey study was carried out in different countries around the globe, but the number of respondents is limited. Future studies should include a higher number of respondents for better generalization.

Originality/Value: This pilot survey study systematically explores critical success factors, critical failure factors, benefits, and challenges of FMEA in higher education to create the path to developing a structured roadmap that strengthens the service quality of the HE.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE 2022*

Application of Quality Function Deployment in Higher Education: A Systematic Literature Review

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ABSTRACT

Purpose: Quality Function Deployment (QFD) is a vital quality management tool used to define and prioritize the voice of the customer (VOC) and provides a framework to convert customer requirements into expected product or service characteristics. This study explores different dimensions of QFD applied in the higher education sector.

Design/methodology/approach: This research is based on the systematic literature review (SLR) of articles from the leading journals listed in Quartile 3 (Q3) category and above based on SCImago journal classification.

Findings: This review identified several research gaps concerning the application of QFD in higher education (HE) sector in discrete phases instead of considering it as a holistic process. The outcome of this study reveals that the QFD was applied predominantly in conventional courses of academic programs, while a rare application is found in professional development programs. The majority of literature discussed about stakeholders (students, professors and employers) needs, and indicated negligence focus on other stakeholders (alumni, administrative staff, management, government, etc.) Further, very few studies explored the role of QFD in the accreditation process within the HE.

Originality/value: This is the first SLR that identifies the research gaps and explored the use of QFD in different segments of HE, thus, we propose a road map for embedding Operational Excellence (OPEX) tools and techniques for the higher education sector.

Keywords: Quality Function Deployment (QFD), Quality Management, Higher Education, Design for Six Sigma, Operational Excellence, Systematic Literature Review.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Design for Six Sigma in Higher Education: A Literature Review and Future Research Agenda

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ABSTRACT

Purpose: Design for Six Sigma (DFSS) is a powerful methodology adopted by many organisations, however its use in education sector is limited. This study aims to investigate (i) the extent of the application of DFSS in the higher education sector? ii) The future research direction in the field of DFSS in higher education.

Methodology: This study uses a systematic literature review (SLR) and bibliometric analysis to examine the extent of the application of DFSS in Higher Education (HE). To maintain the quality of studies reviewed, this research used the databases Scopus and Web of Science. We excluded articles from conference proceedings, book chapters and other sources to maintain the quality of the review. The analysis of the six most frequently used tools of DFSS was carried out.

Finding: Although DFSS is taught in Engineering and Management schools, the authors could find just a handful of papers on the applications of DFSS in HE settings. The study finds QFD is the most widely DFSS tool in curriculum review, quality assurance, improving education service quality, improving customer satisfaction, and designing education infrastructure in education. The second widely used tool in DFSS is Kano model in education. Kano model used in improving student satisfaction, service quality, blended learning, and QFD. There were few applications of TRIZ in higher education. Similarly, few articles surfaced on DOE in conservative dentistry, student engagement, remote laboratories, flipped classroom design, and teaching effectiveness. The tools DFMEA, and Pugh Matrix were also hardly used.

Limitation: The study only included articles in English language and hence other language articles were excluded.

Research Implications: This study adds to the body of knowledge of DFSS by reporting the status and future trends of DFSS in the context of HE sectors. Moreover, this article tries to remove the common myth that DFSS is confined to manufacturing and has little or no role in the university processes.

Originality: The originality of this research lies in the fact that DFSS can play a role in any sector, including HE. However, more research needs to be carried out to understand the fundamental challenges from cultural and leadership perspectives so that this powerful methodology can be introduced to improve the efficiency and effectiveness of HE processes.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Application of Six Sigma Methodology to Enhance the Productivity and Performance of a Hotel in the UAE

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ABSTRACT

Purpose: The purpose of the study is to assess, based on employees' perceptions, how Lean public service organizations are in Greece nowadays, where a financial crisis dominates.

Design/methodology/approach: A questionnaire survey was published online inviting employees of Greek public organizations to assess the degree of Lean adoption by their organizations, specified on the basis of general principles. Three hundred and fifty-nine employees completed the structured questionnaire. Descriptive statistics, T-test and ANOVA were applied for data analysis.

Findings: According to the perceptions of employees, the Greek public organizations adopt the Lean principles to a high extent. However, there is room for further improvement in the degree to which Lean is adopted. Statistically significant differences are observed in the perceptions of groups of employees with regard to the degree of adoption of Lean principles by the public organizations.

Research limitations/implications: The data collected which suggests subjective rather than objective business evidence and the small sample of the Greek public servants participating in the research study, comprise its main limitations.

Practical implications: By determining the strong and weak points of the adoption of Lean principles by Greek public organizations, suitable managerial initiatives can be undertaken by these organizations to fully adopt Lean, reduce waste and cost and overcome the crisis.

Originality/value: This is the first study which provides insights, based on employees' perceptions, into the adoption of Lean by the Greek public sector in a period of economic downturn.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Education 4.0 - Enhancing Quality in Higher Education Institutions: A Systematic Literature Review

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ABSTRACT

Purpose: This paper systematically reviews academic research in the emerging area of Education 4.0 (E 4.0) and its adoption in the higher education sector. E 4.0plays a vital role to accelerate the pace of Industry 4.0 (I 4.0) adoption. Knowledge of I 4.0 technology will be increasingly critical for future careers. Therefore, implementing and adopting E 4.0in Higher Education Institutions (HEIs) is necessary. Thus, this research aims to review the literature on E 4.0 and its adoption in HEIs to understand the benefits, challenges, critical success factors, type of I 4.0 technology used and research gap.

Methodology: A systematic literature review (SLR) was carried out to assess the extent of the adoption of E 4.0 in HEIs based on journal papers from databases including Scopus, Web of Science, and Emerald Insight between 2018 to 2021.

Findings: The study reveals how various I 4.0 technologies such as AI, blockchains, big data and related have impacted the education system and influence the development of future skills among students in HEI. Researchers have also highlighted the need for a strong focus on human factors such as communication in I 4.0 era. Further, the technology-enabled education system has pushed for on-demand lifelong learning, ensuring that the workforce is prepared for the I 4.0 era.

Practical implications: With the education system having to align itself to the requirements of I 4.0, this paper highlights the critical attributes of E 4.0 in HEIs. The research focuses on enthusing the stakeholders in the education system at the HEIs to invest the resources required for the development of E 4.0 and, in turn, preparing the future workforce.

Research Implications: This research will support the development of the education system in a technology-enabled environment providing opportunities for project-based learning, collaborative teaching-learning, and upskilling of hard and soft skills.

Limitations: The current study only focuses on E 4.0 in the HEIs and does not include school education.

Originality/ value: The current research is based on a review of literature, allowing researchers to understand the gaps in the present literature that can evolve into future research themes.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Streamlining the Accreditation Process: A Lean Thinking Approach

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ABSTRACT

Purpose: Accreditation is the quality assurance mechanism of a program by an external agency based on an impartial assessment of the attainment of specific requirements against well-defined criteria. Streamlining and sustaining quality assurance initiatives in an educational setup demands the adoption of corporate best practices. Lean Thinking is one approach adopted by the industry to ensure productivity, performance, and sustainment of new initiatives. Thus, this research intends to study the scope of the Lean Thinking approach and explore its Critical Success Factors (CSFs) of deployment in the Indian higher education system to harmonize the accreditation process.

Design/methodology/approach: The research reported in this paper is based on the Action Research (AR) methodology carried out using the Lean Thinking PDCA (Plan-Do-Check-Act) approach and its application in enhancing the system by reducing the cycle time of the accreditation process. The AR methodology is a variant of the case study research methodology, wherein the researcher is not an independent observer but a participant in the process. Lean tools such as Waste Audit, Idea Mapping, RACI (Responsible-Accountable-Consult-Inform) matrix, and Value Stream Mapping (VSM) are effectively utilized to successfully deploy the project and ascertain the answers to the Research Questions (RQs).

Findings: The project assisted in reducing the cycle time of the process from 231 to 52 days by eliminative Non-Value-Added (NVA) activity. Also, it ascertains 15 CSFs while streamlining the process at three levels: top management, middle management, and implementation.

Originality/value: The case study provides the step-by-step approach, and best practices followed to streamline the accreditation process, which will benefit other institutions for quality assurance. The study is helpful to academicians, researchers, practitioners, and policymakers seeking to streamline the accreditation process at different levels based on a lean thinking approach.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Student Dropout in the Public Vocational Training Institutes of Greece: A Lean Six Sigma approach

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ABSTRACT

Purpose: In this paper, the authors focus on the investigation of dropout in Greek Public Vocational and Training Institutes (PVTIs), a practically unexplored field, towards an attempt to propose solutions for reduction of dropout.

Design/methodology/approach: A literature review has been conducted with insight to the research of dropout in Higher Education mainly and especially in Vocational Education and Training. Key aspects of the phenomenon are discussed, emphasizing to the quite diversified definition of the phenomenon and the need of defining dropout concerning PVTIs.

Findings: Based on the literature review student dropout phenomenon in Greek PVTIs seems to be unexplored field, where different approaches to the problem lead to different results. The proposed roadmap, using the Lean Six Sigma framework will be a useful contribution to the investigation of the different dimensions of student dropout and subsequently policies to reduce it.

Originality/value: A practically unexplored field is revealed and special aspects of dropout occurring in PVITs are discussed

Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022

Multiple Case Study Analysis of Six Sigma for Service Quality Enhancement

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ABSTRACT

Purpose: The article aims to unearth the essential components of Six Sigma for successful deployment and sustainment of service quality in four different organizations in the UAE (United Arab Emirates). More specifically, the article is intended to determine the VOC (Voice of Customer), KPIs (Key Performance Indicators), CTQ (Critical-to-Quality), Readiness factors, and CSFs (Critical Success Factors) of the project.

Design/methodology/approach: An exploratory research methodology with multiple case study analyses was adopted to determine the answers to the research objectives. Four case studies from different service processes of four companies were analyzed. The case studies were collated from these companies via a case study protocol with pre-defined criteria.

Findings: The analysis shows that service operation improvement projects are primarily dependent on the voice of the internal customer, with Return on Investment (ROI) in savings as the KPI of the process. Most organizations prefer cycle time and errors as the CTQs in the Six Sigma projects. Even novice users can apply the Six Sigma methodology effectively with external experts' assistance, mentoring, and interventions. Across the case studies, it is observed that the projects were successfully deployed due to the support of top management leadership, effective communication and cross-functional teams.

Originality/value: The study results might help the policymakers, and key decision-makers in UAE and other countries understand the effectiveness of Six Sigma in service quality improvement with its essential factors for the deployment.

**Full Paper: Sixth International Conference on Lean Six Sigma for Higher Education, 15th & 16th November, Abu Dhabi, UAE, 2022*

Application of Lean Six Sigma in Conservative Dentistry: An Action Research at an Indian Dental College

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ABSTRACT

Purpose – The article evaluates the obstacles, lessons learned and managerial implications of deploying Lean Six Sigma (LSS) in a dental college hospital in India. Design/methodology/approach – The work adopts the action research (AR) methodology to establish a case study, which is carried out using the LSS define–measure–analyze–improve–control (DAMIC) approach in a dental college. It uses LSS tools to enhance the productivity and performance of the Conservative Dentistry Department of a dental college and to unravel the obstacles and success factors in applying it to the education and healthcare sector together. Findings –The root cause for high turn-around time (TAT) is ascertained using LSS tools and techniques. The effective deployment of the solutions to the root causes of variation assists the dental college to reduce the TAT of the Conservative Dentistry process from an average of 63.9 min–36.5 min (i.e. 42.9% improvement), and the process Standard Deviation (SD) was reduced from 2.63 to 2 min. This, in turn, raises the sigma level from 0.48 to 3.23, a noteworthy successful story for this dental college. Research limitations/implications – While the results and recommendations of this research are focused on a single case study, it is to be noted that the case study is carried out with new users of LSS tools and techniques, especially with the assistance of interns. This indicates the applicability of LSS in dental colleges; thus, the adopted modality can be further refined to fit India's education and hospital sector together. Originality/value – This article explains the implementation of LSS from an aspiring user viewpoint to assist dental colleges and policymakers in improving competitiveness. In addition, the medical education sector can introduce an LSS course in the existing programme to leverage the potential of this methodology to bring synergy and collaborative research between data-based thinking and the medical field based on the findings of this study. The most important contribution of this article is the illustration of the design of experiments (DOE) in the dental college process.

**Full Paper: The TQM Journal, https://doi.org/10.1108/TQM-03-2021-0078, Vol 34, Issue No 4, 2022, pp. 675-700*

Multi-Response Modelling and Optimization of Agave Cantala Natural Fiber and Multi-Wall Carbon Nano Tube Reinforced Polymer Nanocomposite: Application of Mixture Design

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ABSTRACT

The article intends to obtain an environment friendly, low-cost natural fiber (Agave Cantala Fiber) and Multi-walled carbon nanotube (MWCNT) composite by the experimental design approach. More specifically, study is associated with multi-response modelling and optimization of a novel composite material for cleaner manufacturing. The Mixture Design technique is adopted to ensure the mixture components' multi-response optimization, namely, MWCNT, Cantala fibers, and Epoxy resin. The tensile, flexural, and impact strength of the novel composite material are considered for optimization. The experiments are planned as per the mixture design, and the data is collected on all these responses. The Cox Response Trace plot, Pareto Chart for Standardized Effects, Overlaid Contour plot, and Response Optimizer plot are effectively used to develop predictive models and to identify an optimum combination of the mixture for all the responses. The findings will assist in developing an optimal combination of component mixtures and a predictive model for composite material through the structured and robust statistical methodology. This material will assist in cleaner and greener manufacturing of composite materials, while the approach adopted will help researchers as a template for robust composite material development.

Full Paper: Fibers and Polymers, DOI 10.1007/s12221-022-4213-1, Vol 23, 2022, pp 1089–1099

Multi-Objective Modelling and Optimization of Al–Si–Sic Composite Material: A Multi-Disciplinary Approach

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ABSTRACT

The article aims to produce a new class of composite material having a high strength-to-weight ratio using Al–Si alloy and SiC particles. Explicitly, the key objective of this study is associated with multi-objective modelling and optimization of a novel composite material for automobile sectors. The study is based on a structured multi-disciplinary approach by involving the principles and techniques of mechanical engineering, materials engineering, and inferential statistics. More specifically, the mixture design technique from the design of experiment toolbox is employed to ensure multi-objective optimization of the mixture components, namely, Al–Si alloy and SiC particles. The composite material is prepared using the stir casting technique with varying weight percentages of the reinforcing particles. The mechanical properties such as hardness, tensile strength, density, and impact strength of the novel composite material are studied and considered for modelling and optimization. The study assisted in developing an optimal combination of component mixtures and a predictive model to produce a composite material having higher strength through structured engineering and robust statistical methodology. The researchers can follow the modelling and optimization approach adopted in the article as a template for robust composite material development.

**Full Paper: Multiscale and Multidisciplinary Modelling, Experiments and Design, DOI:10.1007/s41939-021-00105-6, Vol 5, 2022, pp 53–66*

Optimization of Graded Catalyst Layer to Enhance Uniformity of Current Density and Performance of High Temperature-Polymer Electrolyte Membrane Fuel Cell

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ABSTRACT

The optimal use of catalyst materials is essential to improve the performance, durability and reduce the overall cost of the fuel cell. The present study is related to spatial distributions of current and over potential for various graded catalyst structures in a high temperature-polymer electrolyte membrane fuel cell (HT-PEMFC). The effect of catalyst gradient across the catalytic layer (CL) thickness and along the channel and their combination on cell performance and catalyst utilization is investigated. The graded catalytic structure comprises two, three, or multiple layers of catalyst distribution. For a total cathode catalyst loading of 0.35 mg/cm^2, higher loading near the membrane presents improved cell performance and catalyst utilization due to reduced limitations caused by oxygen and ion diffusions. However, non-uniformity in the current distribution is significantly increased. The increase in the catalyst loading along the reactant flow provides a substantially uniform current density but lower cell performance. The synergy of varying catalytic profiles across the CL thickness and along the cathode flow direction is investigated. The results emphasize the importance of a rational design of cathode structure and mathematical functions as a strategic tool for functional grading of a CL towards improved uniform current distribution and catalyst utilization.

Full Paper: International Journal of Hydrogen Energy, https://doi.org/10.1016/j.ijhydene.2021.11.006, Vol 47, Issue No 6, 19 January 2022, pp 4018-4032

Enhancing the Tensile Strength of SiC Reinforced Aluminium-Based Functionally Graded Structure through the Mixture Design Approach

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ABSTRACT

Purpose

This article aims to study the tensile properties of a functionally graded composite structure with Al–18wt%Si alloy as the matrix material and silicon carbide (SiC) particles as the reinforcing element. More specifically, the study's primary objective is to optimize the composition of the material elements using a robust statistical approach.

Design/methodology/approach

In this research, the composite material is fabricated using a combination of stir casting and the centrifugal casting technique. Moreover, the test specimen required to study the tensile strength are prepared according to the ASTM (American Society for Testing and Materials) standards. Eventually, optimal composition to maximize the tensile property of the material is determined using the mixture design approach.

Findings

The investigation results imply that the addition of the SiC plays a crucial role in increasing the tensile strength of the composite. The optical microstructural images of the composite show the adequate distribution of the reinforcing particles with the matrix. The proposed regression model shows better predictability of tensile strength. In addition, the methodology aids in optimizing the mixture component values to maximize the tensile strength of the produced functionally graded composite structure.

Originality/value

Little work has been reported so far where a hypereutectic Al–Si alloy is considered the matrix material to produce the composite structure. The article attempts to make a composite structure by using a combination of stir casting and centrifugal casting. Furthermore, it employs the mixture design to optimize the composition and predict the model of the study, which is one of a kind in the field of material science.

**Full Paper: International Journal of Structural Integrity, https://doi.org/10.1108/IJSI-07-2021-0067, ISSN: 1757-9864, Vol 13, Issue 1, 12 January 2022, pp 150-163*

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 rotor system, 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, 2022, pp 1-16

Applications of Six Sigma for Service Quality Enhancement in the UAE: A Multiple Case Study Analysis and Lessons Learned

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ABSTRACT

Purpose: This paper aims to unearth the essential components of Six Sigma for successful deployment and sustainment of service quality in four different organizations in the United Arab Emirates (UAE). More specifically, the paper is intended to determine the motivation to apply Six Sigma, Voice of Customer, Key Performance Indicators (KPIs), Critical-to-Quality (CTQ), readiness factors, Critical Success Factors, sustainment measures, tools and techniques used, challenges/barriers and performance impact on the company.

Design/methodology/approach: An exploratory research methodology with multiple case study analyses was adopted to determine the answers to the research objectives. Four case studies from different service processes of four companies were analyzed. The case studies were collated from these companies via a case study protocol with pre-defined criteria.

Findings: The analysis shows that service operation improvement projects are primarily dependent on the voice of the internal customer, with return on investment in savings as the KPI of the process. Most organizations prefer cycle time and errors as the CTQs in the Six Sigma projects. Even novice users can effectively apply the Six Sigma methodology with external experts' assistance, mentoring and interventions. Across the case studies, it is observed that the projects were successfully deployed due to the support of top management leadership, effective communication and cross-functional teams. Employee resistance to change is the common barrier observed during the case study analysis. Eventually, in all the four case studies, Six Sigma is executed with standard tools and techniques within the define, measure, analyze, improve, control (DMAIC) approach.

Research limitations/implications: The present study's findings cannot be generalized due to the limited number of case study analyses in different ecosystems in the UAE. The authors would like to analyse and report more case studies in service quality improvement through the Six Sigma methodology to comprehend and develop a generic roadmap for the deployment of Six Sigma in the UAE service industry.

Practical implications: The study's findings provide insights into commonalities and differences between the essential factors of Six Sigma deployment and sustainability in UAE companies.

Originality/value: The study results might help the policymakers and key decision makers in UAE and other countries understand the effectiveness of Six Sigma in service quality improvement with its essential factors for deployment.

**Full paper: International Journal of Lean Six Sigma, https://doi.org/10.1108/IJLSS-06-2022-0144, Vol. 14, Issue No. 7, 2023, pp. 1492-1517.*

Process Optimization of Scleropyrum Pentandrum Biodiesel Production and Study the Effect of Blends on CI Engine Characteristics for Variation of Engine Parameters

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ABSTRACT

Intense and continuous research from past decade efforts on biodiesel yield. Adding to this presently the Indian government has taken measures to introduce the biodiesel blends in transport sector which is attracting more research in biofuel's field. This research article presents the influence of injection pressure, injection timing and compression ratio for different blend variation on performance, combustion, and emissions characteristics of diesel engine. The biodiesel yielded from Scleropyrum pentandrum seeds is subsequently optimized through response surface methodology (RSM). The optimized parameter levels temperature 65 °C, catalyst amount 1% (w/v oil), reaction time 91 min and methanol to oil ratio 37% (v/v oil) yielded biodiesel of 92.9%. B5(95% diesel + 5% biodiesel), B10(90% diesel + 10% biodiesel), B20(80% diesel + 20% biodiesel) & B30(70% diesel + 30% biodiesel) were four blends opted to study fuel characteristics on CI engine with variation of injection pressure, compression ratio and injection timing. The performance study reported higher brake specific fuel consumption and lower brake thermal efficiency in B5, B10, B20 & B30 blends in comparison to diesel. The carbon monoxide, unburnt hydrocarbons and Smoke emissions were comparatively less and same was true for rise in injection pressure to 220 & 240 bar from 200 bar. The increase of compression ratio to 20:1 and injection timing to 25.5°BTDC facilitated in control of carbon monoxide, unburnt hydrocarbons, and Smoke emissions other than NOx. The B20 blend with injection pressure 220 bar and maintaining the compression ratio and injection timing to standard setting is suggested to be the feasible blend considering the performance and emissions.

**Full paper: Industrial Crops and Products, https://doi.org/10.1016/j.indcrop.2023.116306 Vol.194, April 2023, 116306*

Strategies for Successful Deployment and Sustainment of Lean Six Sigma in Healthcare Sector in India: A Multi-Level Perspective

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ABSTRACT

Purpose: This study aims to present Lean Six Sigma (LSS) deployment and sustainment strategies for the healthcare sector from a multi-level perspective. The objective is to present LSS implementation insights to enable policymakers, practitioners and academicians to test and develop an LSS framework for healthcare sectors.

Design/methodology/approach: The strategies identified are the result of a multi-method research design involving literature review, action research (AR) and Delphi study. Further, the AR portion of the study involved more than 10 years of projects focused on the deployment of LSS in the healthcare sector.

Findings: The strategies include a holistic view from the multi-level perspective, considering the Top Management Level, Middle Management Level and Operational Level. The authors ascertained 27 strategies across the three levels of organizational structure for the effective deployment of LSS. Further, the authors present a customized LSS "pocket guide" from the healthcare perspective for quick reference.

Research limitations/implications: The strategies delineated in this study are based on the Indian healthcare section only; thus, further research in additional geographic contexts is needed. Also, further research is necessary to provide additional empirical validation of the effects of the identified strategies on LSS program outcomes and to verify that the strategies operate at the proposed organizational levels. Future research should also focus on identifying the interrelationships between strategies within and across levels, developing a "road map" for LSS implementation in hospitals and designing the LSS curriculum for medical schools and other medical training programs.

Practical implications: Observations of this study can contribute to developing a holistic framework for successful LSS implementation in the healthcare sector for academicians, practitioners and policymakers. This, in turn, ensures an enhanced value proposition, improved quality of life and reduced healthcare operational costs. Thus, it ensures a win-win situation among all the stakeholders of the healthcare sector.

Originality/value: The strategies put forth will enable the LSS researchers, academicians and, more particularly, practitioners to delve deeper into specific enablers and safeguard the LSS deployment from backlash. The research has two significant benefits. Firstly, it enhances the understanding of LSS from the healthcare perspective. Secondly, it provides direction for future studies with specific components for hospitals' LSS framework, which can be further tested, refined and improved.

**Full paper: The TQM Journal, DOI: 10.1108/TQM-10-2021-0302, Vol. 35, Issue No. 2, 2023, pp. 414-445.*

A Study on Critical Failure Factors of Design for Six Sigma in Indian Companies: Results from a Pilot Survey

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ABSTRACT

Purpose: While Six Sigma (SS) has been deployed effectively in Indian manufacturing and service sectors as a process improvement methodology, the implementation of Design for Six Sigma (DFSS) for robust product and service development has not shown noticeable results. Therefore, this article aims to determine the critical failure factors (CFFs) of DFSS in the Indian context.

Design/methodology/approach: The paper presents the results of a pilot survey on the CFFs of DFSS in Indian companies. The survey participants were specialists in DFSS who have been involved in DFSS projects in their past and present companies. Moreover, the pilot study participants were DFSS Champions, Master Black Belts, Black Belts and Green Belts from the manufacturing and service sectors.

Findings: Company-wide applications of DFSS are very limited in India. Most of the DFSS project failures are reported in the Analyse phase of the project. The results indicated that all 18 CFFs used in the survey have a significant impact on project failures. Also, it was determined that all CFFs are positively correlated with each other. Further, a strong correlation was observed between the voice of the customer (VOC) and project selection and prioritisation. In addition, effective training showed a strong correlation with the right selection of tools.

Research limitations/implications: The pilot survey was based on a limited sample size. Moreover, the study is confined to only the Indian context and data were collected through the authors' networks. However, respondents were proficient, certified and involved in DFSS project deployment in the manufacturing and service sectors. Therefore, the study's findings are useful and meaningful to draw robust inferences.

Originality/value: To the best of the authors' knowledge, this is the first empirical study conducted in the Indian context to identify the reasons for DFSS project failures. The study's findings can aid academicians and practitioners in comprehending and critically examining the CFFs of DFSS before executing a project. Moreover, the research outcome motivates policymakers to create an ecosystem to effectively adopt DFSS for start-ups and micro, small and medium enterprises (MSME) to ensure a circular economy and support the “Atmanirbhar Bharat” initiative.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-03-2022-0103, Vol. 35 Issue No. 4, 2023, pp. 1072-1093.*

Application of Six Sigma Methodology to Enhance the Productivity and Performance of a Hotel in the UAE

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ABSTRACT

Purpose: This paper aims to unearth the essential components of Six Sigma for successful deployment and sustainment of service quality in four different organizations in the United Arab Emirates (UAE). More specifically, the paper is intended to determine the motivation to apply Six Sigma, Voice of Customer, Key Performance Indicators (KPIs), Critical-to-Quality (CTQ), readiness factors, Critical Success Factors, sustainment measures, tools and techniques used, challenges/barriers and performance impact on the company.

Design/methodology/approach: An exploratory research methodology with multiple case study analyses was adopted to determine the answers to the research objectives. Four case studies from different service processes of four companies were analyzed. The case studies were collated from these companies via a case study protocol with pre-defined criteria.

Findings: The analysis shows that service operation improvement projects are primarily dependent on the voice of the internal customer, with return on investment in savings as the KPI of the process. Most organizations prefer cycle time and errors as the CTQs in the Six Sigma projects. Even novice users can effectively apply the Six Sigma methodology with external experts' assistance, mentoring and interventions. Across the case studies, it is observed that the projects were successfully deployed due to the support of top management leadership, effective communication and cross-functional teams. Employee resistance to change is the common barrier observed during the case study analysis. Eventually, in all the four case studies, Six Sigma is executed with standard tools and techniques within the define, measure, analyze, improve, control (DMAIC) approach.

Research limitations/implications: The present study's findings cannot be generalized due to the limited number of case study analyses in different ecosystems in the UAE. The authors would like to analyse and report more case studies in service quality improvement through the Six Sigma methodology to comprehend and develop a generic roadmap for the deployment of Six Sigma in the UAE service industry.

Practical implications: The study's findings provide insights into commonalities and differences between the essential factors of Six Sigma deployment and sustainability in UAE companies.

Originality/value: The study results might help the policymakers and key decision makers in UAE and other countries understand the effectiveness of Six Sigma in service quality improvement with its essential factors for deployment.

**Full paper: The TQM Journal, DOI:10.1108/TQM-11-2021-0325, Vol.35, Issue No.2, 2023, pp.554-576.*

An Empirical Study into the Use of 7 Quality Control Tools in Higher Education Institutions (HEIs)

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ABSTRACT

Purpose: The main purpose of this study is to revisit Ishikawa's statement: "95% of problems in processes can be accomplished using the original 7 Quality Control (QC) tools". The paper critically investigates the validity of this statement in higher education institutions (HEIs). It involves analysis of the usage of the 7 QC tools and identifying the barriers, benefits, challenges and critical success factors (CSFs) for the application of the 7 QC tools in a HEI setting.

Design/methodology/approach: An online survey instrument was developed, and as this is a global study, survey participants were contacted via social networks such as LinkedIn. Target respondents were HEIs educators or professionals who are knowledgeable about the 7 QC tools promulgated by Dr Ishikawa. Professionals who work in administrative sectors, such as libraries, information technology and human resources were included in the study. A number of academics who teach the 7 basic tools of QC were also included in the study. The survey link was sent to over 200 educators and professionals and 76 complete responses were obtained.

Findings: The primary finding of this study shows that the diffusion of seven QC tools is not widespread in the context of HEIs. Less than 8% of the respondents believe that more than 90% of process problems can be solved by applying the 7 QC tools. These numbers show that modern-quality problems may need more than the 7 basic QC basic tools and there may be a need to revisit the role and contribution of these tools to solve problems in the higher education sector. Tools such as Pareto chart and cause and effect diagram have been widely used in the context of HEIs. The most important barriers highlighted are related to the lack of knowledge about the benefits and about how and when to apply these tools. Among the challenges are the "lack of knowledge of the tools and their applications" and "lack of training in the use of the tools". The main benefits mentioned by the respondents were "the identification of areas for improvement, problem definition, measurement, and analysis". According to this study, the most important factors critical for the success of the initiative were "management support", "widespread training" and "having a continuous improvement program in place".

Research limitations/implications: The exploratory study provides an initial understanding about the 7 QC tools application in HEIs, and their benefits, challenges and critical success factors, which can act as guidelines for implementation in HEIs. Surveys alone cannot provide deeper insights into the status of the application of 7 QC tools in HEIs, and therefore qualitative studies in the form of semi-structured interviews should be carried out in the future.

Originality/value: This article contributes with an exploratory empirical study on the extent of the use of 7 QC tools in the university processes. The authors claim that this is the first empirical study looking into the use of the 7 QC tools in the university sector.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-07-2022-0222, Vol. 35, Issue No. 7, 2023, pp 1777-1798.*

A Global Study on Applicability of ISO 18404:2015 for SMEs: An Exploratory Qualitative Study

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ABSTRACT

Purpose: ISO 18404:2015 standard defines the proficiencies to the attainment of distinct competency levels with either Lean Manufacturing or Six Sigma or separately combined strategy Lean Six Sigma (LSS). The purpose of this paper is to perform a detailed investigation of the applicability of current LSS competency standard in SMEs and examine the need for further improvement.

Design/methodology/approach: A qualitative-based semi-structured interview method was utilized globally by interviewing a group of LSS professionals with knowledge about the LSS implementation working in different leading organizations. All participants were asked to review the standard before the interview process to ensure that they are familiar with the standard.

Findings: The results reveal that the current ISO 18404:2015 standard does not fit SMEs to implement the LSS approach as it has several shortfalls that need to be fixed before its adoption or an urgent need to develop a more customized LSS standard for SMEs. The outcome further helps organizations understand theoretical knowledge about ISO 18404:2015, its role in operational excellence implementation, pros, cons, critical success factors and required changes for further improvement within the standard.

Research limitations/implications: There were very limited baseline studies in the literature. A mixed method strategy that includes qualitative and quantitative data would yield better data so that more robust outcomes can be derived from the research.

Originality/value: To the best of authors' knowledge, this is the first empirical research on the applicability of ISO 18404:2015 for SMEs, which encapsulate opinions of LSS professionals working in several SMEs.

**Full paper: The TQM Journal, https://doi.org/10.1108/TQM-08-2022-0276 Vol. 35, Issue No. 7, 2023, pp 1917-1934.*

Performance and Service Quality Enhancement in a Healthcare Setting Through Lean Six Sigma Strategy

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ABSTRACT

Purpose: The article intended to excavate the Lean Six Sigma (LSS) deployment challenges, Critical Success Factors (CSF), tools and techniques, and managerial implications in an Indian healthcare setting.

Design/methodology/approach: The article illustrates a case study established using Action Research (AR) approach. Further, the case study is based on the Define, Measure, Analyze, Improve, Control (DMAIC) phases of LSS. The performance and service quality of the Endodontics department of a dental college attached to a hospital is enhanced and sustained through the LSS strategy.

Findings: The processing time of Root Canal treatment is reduced by determining the root causes for delay and implementing sustainable solutions. The structured deployment of the LSS strategy helped the Endodontics department to reduce the processing time from an average of 116 min–84 min. Thus, the process's sigma level is enhanced from 0.06 to 4.17 and assisted in sustaining the results.

Research limitations/implications: The case study's findings are based on the single AR carried out at an Endodontics department of a dental college hospital based on LSS strategies. Even though this study's results cannot be generalized, the deliverables of the case study can be used to develop the LSS roadmap for the dental colleges to enhance the service quality and safety of the patients.

Originality/value: The article provides step-by-step details for implementing LSS in dental college hospitals with critical analysis based on robust statistical tools and techniques. The case study provides evidence of the adoption of LSS in medical college education and provides the confidence to adopt the same through novice users. The study's findings may persuade the policymakers to add LSS in the medical education curriculum to reinforce safety and reduce errors in the healthcare system.

**Full paper: International Journal of Quality & Reliability Management, DOI: 10.1108/IJQRM-07-2021-0226, Vol. 40, Issue No. 2, 2023, pp. 365-390.*

An Evaluation of Lean and Six Sigma Methodologies in the National Health Service

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ABSTRACT

Purpose: The purpose of this paper is to conduct an empirical study derived from the previous literature from the perspective of benefits, tools and techniques, continuous improvement (CI) and quality improvement (QI) methodologies and critical failure factors (CFFs) of Lean and Six Sigma (SS) in the national health service (NHS).

Design/methodology/approach: A literature review was carried out to identify previous findings, empirical data and critical variables concerning Lean and SS in healthcare for over ten years. Second, primary research in quantitative surveys and qualitative interviews was carried out with 110 participants who have experience using Lean and SS in the NHS.

Findings: Lean and SS have evolved into common practices within the NHS and now have an established list of tools and techniques frequently employed by staff. Lean and SS are considered robust CI methodologies capable of effectively delivering extensive benefits across many different categories. The NHS must overcome a sizable amount of highly important CFFs and divided organizational culture.

Originality/value: This paper has developed the most extensive empirical study ever produced on Lean and SS in the NHS and has expanded on previous works to create new and updated research. The findings produced in this paper will assist NHS medical directors and practitioners in obtaining up-to-date insight into Lean and SS status in the NHS. The paper will also guide the NHS to critically evaluate their current CI strategy to ensure long-term sustainability and deliver improved levels of service to patients.

**Full paper: International Journal of Quality & Reliability Management, DOI: 10.1108/IJQRM-05-2021-0140, Vol. 40, Issue No. 1, 2023, pp 25-52.*

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. ahead-of-print No. ahead-of-print. Article in press, 2023*

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, https://doi.org/10.1108/TQM-01-2023-0017, Article in press, 2023*

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, Article in press, 2023*

Designing Multivariable PI Controller with Multi-Response Optimization for a Pilot Plant Binary Distillation Column: A Robust Design Approach

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ABSTRACT

Purpose: The purpose of this paper is to propose and validate a robust industrial control system. The aim is to design a Multivariable Proportional Integral controller that accommodates multiple responses while considering the process's control and noise parameters. In addition, this paper intended to develop a multidisciplinary approach by combining computational science, control engineering and statistical methodologies to ensure a resilient process with the best use of available resources.

Design/methodology/approach: Taguchi's robust design methodology and multi-response optimisation approaches are adopted to meet the research aims. Two-Input-Two-Output transfer function model of the distillation column system is investigated. In designing the control system, the Steady State Gain Matrix and process factors such as time constant (t) and time delay (?) are also used. The unique methodology is implemented and validated using the pilot plant's distillation column. To determine the robustness of the proposed control system, a simulation study, statistical analysis and real-time experimentation are conducted. In addition, the outcomes are compared to different control algorithms.

Findings: Research indicates that integral control parameters (Ki) affect outputs substantially more than proportional control parameters (Kp). The results of this paper show that control and noise parameters must be considered to make the control system robust. In addition, Taguchi's approach, in conjunction with multi-response optimisation, ensures robust controller design with optimal use of resources. Eventually, this research shows that the best outcomes for all the performance indices are achieved when Kp11 = 1.6859, Kp12 = −2.061, Kp21 = 3.1846, Kp22 = −1.2176, Ki11 = 1.0628, Ki12 = −1.2989, Ki21 = 2.454 and Ki22 = −0.7676.

Originality/value: This paper provides a step-by-step strategy for designing and validating a multi-response control system that accommodates controllable and uncontrollable parameters (noise parameters). The methodology can be used in any industrial Multi-Input-Multi-Output system to ensure process robustness. In addition, this paper proposes a multidisciplinary approach to industrial controller design that academics and industry can refine and improve.

**Full paper: Journal of Engineering, Design and Technology, https://doi.org/10.1108/JEDT-12-2022-0616, Article in press, 2023*

Effect of TiO2 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 (TiO2) 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/TiO2 hybrid composite filled with 0–8 Wt.% TiO2 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 TiO2 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.% TiO2 particles-filled composite. The highest flexural properties were found at a lower TiO2 fraction of 2 Wt.%. Adding TiO2 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 TiO2 filler was beneficial in improving the wear performance of the composite.

Originality/value: This research paper attempts to include both TiO2 filler and bamboo fibers to develop a novel composite material. TiO2 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 TiO2 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 Article in press, 2023*

Optimization of Dry Sliding Wear Performance of TiO2 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 (TiO2) 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.% TiO2 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 TiO2 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 TiO2 filler and bamboo/flax fibers to develop a novel hybrid composite material. TiO2 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, Article in press, 2023*

Investigation on the Effect of Nickel and Nickel-Chromium Alloy Pulse Current Plating on Copper Substrate

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ABSTRACT

In the present study, nanocrystalline nickel (Ni) and nickel-chromium (Ni-Cr) alloy coatings were developed on copper (Cu) substrate using pulse current. The pulse current parameters include a cycle time of 240 milliseconds at a duty cycle of 0.5 and 4.17 Hz frequency. The surface morphology, texture, hardness, scratch resistance and porosity were investigated for different coatings developed by pulse plating. Energy Dispersive Spectroscopy (EDS) analysis revealed good quality Ni and Ni-Cr alloy coatings developed on the copper substrate. The peak current of the pulse has been observed to have an impact on the coating weight and thickness. The micrographs of the coatings explored under Field Emission Scanning Electron Microscopy (FESEM), depict uniform coatings consisting of fine primary and coarse secondary granules of Ni and Cr. The hard primary and secondary Ni granules deposited on the surface of Cu increase its hardness, corrosion and wear resistance. Further, it was observed that the Ni-Cr alloy plated samples are harder and less porous in nature compared to Ni plated samples.

**Full paper: Transactions of the IMF, DOI: 10.1080/00202967.2023.2208437, VOL. 101, Issue No. 4, 2023, p189–195.*

A Novel Design of Internal Heat Exchangers in Metal Hydride System for Hydrogen Storage

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ABSTRACT

Performance of the metal hydride system depends on effective heat transfer systems. A numerical model of the $LaNi_5$ metal hydride reactor is developed having two different concepts such as compartmentation and embossment. Compartmentation has an advantage when the metal bed is having larger volume. Splitting the volume into number of parts showed better performance than the a single large volume. Around 33% improvement is observed when the volume is split and stacked. Embossment can give the benefit of heat transfer by both fluid and heat plate. Various design of embossed heat exchangers such as pin, parallel, vertical serpentine, and horizontal serpentine is modeled and compared with the helical coil heat exchanger. Vertical serpentine embossed plate heat exchanger gave optimum performance than the other configurations. More uniformity is observed when using an embossed heat exchanger due to the availability of wider area for heat extraction. This study shows the design optimization and performance analysis of the two different design concepts which can be employed in the metal hydride systems.

**Full paper: Proceedings of the 2nd International Conference on Future Technologies on Manufacturing, Automation, Design and Energy, Lecture Notes in Mechanical Engineering, Karaikal, 2023, pp 661-669*

Taguchi Method to Study the Performance and Emission Characteristics of CI Engine Fuelled with Blends of Jatropha Biodiesel & Titanium Dioxide Nanoadditive

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ABSTRACT

In this research paper a study is done on the performance and emission characteristics of CI engine when it is fuelled with Jatropha biodiesel having Titanium dioxide nanoadditives. Biodiesel is obtained through transesterification from Jatropha oil. TiO_2 nanoparticles are used as nanoadditives through sonication process. Biodiesel blend, compression ratio and nanoadditive concentration are chosen as the parameters to be studied. Taguchi analysis is used to reduce the experimentation work. The combination of parameters to be experimented is obtained from the Minitab software. It is observed that fuel samples with B20 blend and at18:1 compression ratio give out better performance and emission characteristcs. The effect of nanoadditive is significant when the concentration is 75 mg/l compared to other blends tested.

**Full paper: Materials Today: Proceedings, https://doi.org/10.1016/j.matpr.2023.04.340, Vol. 92, Issue No. 1, 2023, pp. 202-208*

Tribological Aspects Affecting Surface Durability of Tooth-Sum Altered Spur Gears: A Load Sharing Approach

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ABSTRACT

The performance of tooth-sum altered (ATS) gears is determined by the factors influenced by their profile geometry. This study aims to explore the influence of gear geometry modification on tribological aspects that affect surface wear in ATS spur gears. A computer code is developed to simulate surface wear numerically, using Archard's wear model, Greenwood-Williamson micro-asperity contact model, and Johnson's load-sharing approach. The outcomes of the study indicate that the low contact ratio ATS gears promote the formation of thick oil film owing to reduced specific sliding and increased speed. However, high contact ratio ATS gears create unfavorable operating conditions resulting in extreme boundary lubrication. The effectiveness of lubricant oil film in reducing wear in ATS gears is associated with its modified profile, sliding velocities, load bearing, operating temperature, and oil viscosity.

**Full paper: Advances in Technology Innovation, DOI: https://doi.org/10.46604/aiti.2023.9562 Vol. 8, Issue No. 2, 2023, pp. 81-99*

Lean Six Sigma Criticisms and Gaps: A Critical Literature Review

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ABSTRACT

Purpose: This study aims to investigate current criticisms of Lean Six Sigma (LSS) and identify the future research directions to mitigate the criticism; a new model that is more networked and responsive to outside influences. Organizations are increasingly working in a world that is becoming more interdependent, and connected, by the rise of AI, environmental concerns, and human dignity movements. These external factors increasingly influence production environments. Quality 5.0 is a concept of how quality can contribute. But these movements are limited in the literature. The research question this study seeks to answer is how does LSS change in reaction to more complex, unstructured problems, in a more interconnected environment, increasingly acknowledged by Quality 5.0.

Study design/methodology/approach: This paper employs a critical literature review (CR) methodology to gather a comprehensive collection of studies that identify current LSS weaknesses and criticisms and proposes a model for how LSS could change in reaction to more complex, unstructured problems, in a more interconnected environment.

Findings: Controlled environments where LSS has been applied are increasingly impacted by externalities, factors that are not incorporated into a managed process, such as environmental, social, or economic. A new approach is proposed to recognize less structured, interconnected problems.

Research limitations/implications: This study relies on the current literature and limited to a descriptive study. There may be an oversight of relevant studies, based upon the CR. The implications could include a recognition of networked quality as a concept.

Originality/value: This paper contributes to the existing literature by addressing a gap of how LSS could change and address external factors that are increasingly impacting production environments, such as social, environmental, and economic. (Quality for social good i.e 5.0)

Research Keywords: Lean Six Sigma, criticism, critical failure factors, weaknesses, future, Quality 5.

*Full paper: *Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14 November 2023, Newcastle, United Kingdom, pp 94-106*

Exploring the Lean Six Sigma 4.0 Skills and Competencies: A Pilot Survey

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ABSTRACT

Purpose: Industry 4.0 integrates digital technologies into manufacturing and service industries, requiring different workforce skills. Lean Six Sigma (LSS) focuses on process improvement and variability reduction, but traditional curricula lack digitalization tools. New curricula are needed to integrate I4.0 competencies. Few studies on LSS 4.0 exist, so this paper aims to redefine I4.0 skillsets.

Design/methodology/approach: The paper presents the results of a pilot survey on the LSS 4.0 skills and competencies required in the digital era. The survey participants were specialists in LSS and I4.0 who have been involved in LSS projects in their past and present companies. Moreover, the pilot study participants were LSS Champions, Master Black Belts and Black Belts from the manufacturing and service sectors. The 27 experts participated in the survey to categorise the skills and competencies that should be strengthened or implemented in LSS training programs.

Findings: The survey results indicated that all 39 skills and competencies are essential for LSS 4.0. However, participants classifications classified skills into multiple categories. Also, it is ascertained that soft skill Leadership and data skill Data Management are paramount for the LSS 4.0. Participants perceived that Remote and Flexible working skills are the least important.

Theoretical implications: The identified skills and competencies aid in integrating I4.0 and LSS, enabling a structured strategy and utilizing employees for competitive advantage. This study contributes to standardization of LSS 4.0 skills and global certification standards.

Research Limitations/ Implications: The pilot survey consisted of limited participants. Despite this, it showed proficient LSS deployment among participants, urging academicians to collaborate with practitioners and quality consortiums to develop a comprehensive LSS 4.0 curriculum. This will help define certification performance indicators (PIs), standardize training, and produce well-trained professionals.

Originality: The study comprehensively reviewed skills and competencies and differentiated between these two deliverables. Further, the article provides a research gap in LSS 4.0 to develop a curriculum with hard and soft skills. To the best of our knowledge, this is the first study to critically analyse and categorise the skills and competencies of LSS 4.0.

**Full paper: Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14 November 2023 Newcastle, United Kingdom, pp 107-136*

Operational Excellence not a Magic Bullet: Analysis of its Key Criticisms

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ABSTRACT

Purpose: Operational Excellence (OPEX) is not a magic bullet and hence there will be criticisms. The purpose of this paper is to investigate what are key criticisms of OPEX and explore the relationship of these criticisms and establish a ranking among them.

Methodology: The study first uses a literature review to collate 15 key criticisms of OPEX. Subsequently, Multi-Criteria Decision Making DEMATAL analysis is used to find the interrelationship among these criticisms and also rank the same.

Findings: The criticisms were classified into cause-and-effect groups. The top most casual group criticism is inadequate training and certification frameworks. In terms of effect group, the top criticism was over-reliance on experts. Overall, cultural resistance to OPEX was found to be the most important criticism and customer myopia was the least important criticism of OPEX

Implications: Organizations while implementing OPEX can first focus on the overall causal group criticisms in the following order Inadequate Training and certification frameworks, Lack of a standardised implementation framework, Overemphasis on Metrics, Too much focus on efficiency, Too much rigid methdology, Inadequate Focus on Employee wellbeing, Lack of Innovation. A strategy should be devised for handling each of these criticisms so that the effect group can be impacted.

Limitation: This is an exploratory study of the OpEx criticisms. We used experts from manufacturing and service sectors. However, future studies can explore criticisms in each sector, according to size of the organization and across different cultures.

Originality value: This study contributes original insights by compiling and analysing 15 criticisms related to OPEX, shedding light on their interconnectedness, and providing a novel ranking of these criticisms.

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The Impact of Lean Six Sigma Adoption on Corporate Performance: A Longitudinal study

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ABSTRACT

Purpose: The objective of this study is to investigate the effects of adopting Lean Six Sigma (LSS) on corporate performance. Despite the existence of extensive knowledge and evidence highlighting the benefits of LSS adoption, there is a remarkable lack of comprehensive study on these effects. This study extends past studies by utilizing a diverse sample of 10 LSS organizations representing various industries or organizations' characteristics. It employs rigorously designed control groups to assure the validity of comparisons and findings while examining the effects of LSS adoption on corporate performance over a five-year timespan.

Design/Methodology/Approach: The study employs the event study methodology to conduct the investigation. The five-year period consists of two years preceding adoption, the adoption year, and two years following adoption. Several performance measures including Return on sales (ROS), Return on assets (ROA), Profit per employee (PPE), Asset turnover ratio (ATR), and Sales per employee ratio are utilized to assess the effects of LSS adoption on corporate performance.

Findings/Outcomes: The findings of this study indicate that adopting LSS positively impacts corporate performance, primarily by enhancing employee, sales, and operating income performance efficiency.

Research Limitations/Implications: The study acknowledges certain limitations, including the use of collected data and the focus on a specific time frame. Future research could explore additional performance measures and consider other factors that may affect the relationship between LSS adoption and corporate performance.

Practical Implications: Organizations considering the LSS adoption could refer to the outcomes of this study and use the relevant metrics to assess their corporate performance.

Social Implications: The study's findings have social implications as they contribute to the understanding of how LSS adoption can positively influence corporate performance. By optimizing employee deployment, sales, and operating income organizations can potentially achieve higher productivity, leading to economic growth and job creation.

Originality/Value: The present research adds to the literature by providing systematic and rigorous research on the effect of LSS adoption on corporate performance.

**Full paper: Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14 November 2023, Newcastle, United Kingdom, pp 643-661*

A Global Study on Critical Failure Factors of Design for Six Sigma

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ABSTRACT

Purpose: Although Six Sigma (SS) has been successfully implemented as a process improvement approach globally, Design for Six Sigma (DFSS) has not produced appreciable outcomes regarding robust product and service development. As such, this paper aims to identify the CFFs of DFSS from a global perspective.

Design/methodology/approach: This study reports the findings of a worldwide survey of DFSS CFFs. Respondents were DFSS experts who had worked on DFSS projects at their current or previous employers. The survey also included manufacturing and service industry DFSS Champions, Master Black Belts, Black Belts, and Green Belts.

Findings: A dearth of DFSS implementations at the corporate level worldwide exists. This article provides a comprehensive examination of DFSS project failures at various stages. All the CFFs examined had a statistically significant effect on project failures. It was also shown that there is a positive correlation between all CFFs.

Research limitations/implications: The survey's sample size was small due to the limited applicability of the DFSS approach and qualified professionals. Data was gathered via the authors' personal and professional connections, and most of the questions were closed-ended. However, those who responded were DFSS experts who had deployed projects in the industrial sectors. As a result, we may confidently make strong judgments based on the study's results.

Originality/value: This is the first worldwide empirical research to investigate the causes of failed DFSS projects. Researchers and professionals may use the study's results to better understand and evaluate the DFSS CFFs before implementing a project. In addition, the findings encourage policymakers to facilitate the successful adoption of DFSS to guarantee a circular economy and promote sustainable products and services.

**Full paper: Proceedings of the Ninth International Conference on Lean Six Sigma, 13-14 November 2023, Newcastle, United Kingdom, pp 718-732*

Solar-Powered Pesticide-Spraying RFID Robot

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ABSTRACT

In this chapter, a solar powered pesticide-spraying RFID robot has been designed and developed for its use in different types of fruits and vegetable fields. The robot is equipped with DC motors, DC pump, a solar panel, and an ultrasonic sensor. The robot's navigation has been automated using RFID (radio frequency identification) technology. An ultrasonic sensor is used for sensing any obstacle in the path of the robot's navigation. A solar panel of 30W is used for charging the batteries that are used for driving the DC motors and the DC pump. The wheels of the robot are powered by DC motors, and the DC pump is used for spraying pesticides through the nozzles. The height of the nozzles can be varied depending on the size of the crop. The robot has been designed for spraying pesticides automatically thereby controlling pests, improving productivity, and reducing the health hazards of farmers posed by pesticides.

**Full paper: Smart Village Infrastructure and Sustainable Rural Communities, DOI: 10.4018/978-1-6684-6418-2.ch016, IGI Global Pub, June 2023, p 283-307.*

Unveiling The Path to Sustainable Quality 4.0 Implementation in Organisations: Insights from an Exploratory Qualitative Study

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ABSTRACT

Purpose: This study investigates the challenges and opportunities that organisations face in implementing Quality 4.0 as an approach to quality management and investigate the current state of Quality 4.0 implementation. Design/methodology/approach: This study uses a qualitative research methodology to interview senior managers from globally based manufacturing and service industries. Findings: The study explicates that most organisations implemented Quality 4.0 to improve their flexibility, efficiency, transparency and productivity while focusing on improving service quality, customer satisfaction and reducing cost. In terms of sustainability of Quality 4.0 the key factors found were a consistent effort from the top management, continuous training to employees, building leadership quality and creating a habit of using Quality 4.0. Practical implications: The findings of this study offer useful guidance to organisations desirous of implementing Quality 4.0. In addition, the findings have identified key sustainability factors, helping organisations ensure a successful implementation and long-term returns from Quality 4.0. Originality/value: The findings of this study contribute to the body of knowledge related to Quality 4.0 and help organisations in their digital transformation journey. In addition, it is one of the first studies to investigate the key factors for Quality 4.0 sustainability

**Full paper: The TQM Journal, DOI:10.1108/TQM-07-2023-0201, Vol. ahead-of-print, Issue No. ahead-of-print. Article in press, 2023*

DEPARTMENT OF BUSINESS ADMINISTRATION

Impact of Capital Structure on Financial Performance: A Study with reference to Select New Generation Banks of India

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ABSTRACT

An optimal capital structure is one that minimizes the cost of company's funds while maximizing the capital gains attributable to shareholders. The study analyses the impact of capital structure on financial performance of ten Indian new generation banks for the period 2016 to 2020. It is observed from the study that net interest margin has significant positive correlation on net profit, return on asset, return on equity and return on capital employed. Further debt to equity, debt to total asset, loan to deposit and total debt to capital has significant impact on net profit, net interest margin, return on asset and return on equity.

**Full paper: Anveshna, ISSN: 2249 1449, Vol.12, Issue No 1, January- June 2022, pp 10-17.*

Holiday Effect and Stock Returns: Evidence from Stock Exchanges of Gulf Cooperation Council

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ABSTRACT

One of the prominent types of calendar anomalies includes holiday effects, where stocks show abnormally higher mean returns on the days prior to holidays in comparison to other trading days. The current study investigates the existence of holiday effects in the stock exchanges of the Gulf Co-operation Council, namely, Kuwait, Bahrain, Qatar, Oman, Saudi Arabia, and the United Arab Emirates for the period between January 2009 and December 2020. The national holidays that are considered for the study are New Year's Day, Mawlid al-Nabi (Prophet birthday), Eid-Al-Isra Wal Miraj, Eid-Al-Fitr, National Day, Hegire Day (Islamic New Year), and Christmas Day. The study employs descriptive statistics and the non-parametric Mann–Whitney U test. The findings of the study disclosed the significant pre-holiday mean returns for ADSMI, BHSEASI, DFMGI, MSM30, TASI and FTDKUW, whereas significant post-holiday mean returns were found only in MSM30 and TASI. The study provided evidence for the presence of a calendar anomaly like holiday effects in the major indices of the Gulf Co-operation Council and proved the market was not in an efficient form during the study period.

**Full paper: International Journal of Financial Studies, DOI:10.3390/ijfs10040103, Vol.10, Issue No 103, 2022, pp 1-9*

Will Mergers and Acquisition Vacillate the Performance of Banks? A Case Study of Public Sector Banks in India

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ABSTRACT

The recent change that the banking sector sees is the mergers and acquisitions occurring among the public sector banks. Merger and acquisition in the banking sector are part of the reform strategies to improve financial stability and gain smooth operational flow and synergy advantages. The research focused on the aspects of the banks' profitability, solvency, investment, and liquidity in the pre-and post-merger period. The research attempted to understand the varied reasons behind their mergers, acquisition, and success rate. The main objective was to understand the impact of synergy on the performance and profitability of banks. It was an exploratory research to understand the various objectives of mergers and to map the outcome of those objectives. The analysis was done through ratio analysis and paired t-test to gauge the impact of the pre-and post-merger scenario. The results find that the merger and acquisition are a positive move for some banks. However, there are certain banks which are coping at a slow pace with the synergy. The research also discovers that the synergy amongst the banks reacts in a varied way based on the objective of the mergers. The results indicate that the banks cope with the merger and acquisition at a varied pace due to various factors like Non-Performing Asset (NPA), debts, assets, and market share variabilities amongst the banks. The recent pandemic that the world faces can also be considered a factor for slower coping.

**Full paper: Binus Business Review, DOI:10.21512/bbr.v13i2.7928, Vol 13, Issue No 2, July 2022, pp 191−202*

Assessing the Financial Soundness of the Indian Banks in the Growing Era of Disruptive Technologies

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ABSTRACT

One of the most significant sectors that contributes to economic growth is the banking sector. This is because financing is important to all firms and is primarily provided by banking institutions. Indian banking sector has been a greater pillar of support in the development of the entire economy but the recent changes in macroeconomic factors like covid- 19, growing inflation, political factors and economical changes has impacted in a greater margin to the performance of the banking sector. The present study focuses on measuring the financial soundness of the selected banks by using the Altman's Z- score model. It is an attempt to understand the financial stability of the banks in terms of bankruptcy position. The study uncovers that the majority of the selected banks have been impacted drastically due to the macroeconomic and structural changes like recent mergers in the public sector banks. The result indicates that the banks are in distress zone and need to strategize their future operations in order yield better results. The paper also discusses some of the prominent Technology trends to disrupt banking & financial services.

**Full paper: Proceedings of the International Conference ERMA-2022 on Transforming Business Practices through Disruptive Technologies, Nitte Meenakshi institute of technology, Nitte, 2022*

Using Econometric Models to Manage the Price Risk of Cocoa Beans: A Case from India

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ABSTRACT

This study aims at developing econometric models to manage the price risk of Dry and Wet Cocoa beans with the help of ARIMA (Autoregressive Integrated Moving Average) and VAR (Vector Auto Regressive). The monthly price of Cocoa beans is collected for the period starting from April 2009 to March 2020 from the office of CAMPCO Limited, Mangalore, and the ICE Cocoa futures price from the website of investing.com. The augmented dickey fuller test is used to test the stationarity of the series. The ACF and PACF correlograms are used to identify the tentative ARIMA model. Akaike information criterion (AIC) and Schwarz criterion (SBIC), Sigma square, and adjusted *R*2 are used to decide on the optional AR and MA terms for the models. Durbin–Watson statistics and correlograms of the residuals are used to decide on the model's goodness of fit. Identified optimal models were ARIMA (1, 1, 0) for the Dry Cocoa beans price series and ARIMA (1, 1, 2) for the Wet Cocoa beans price series. The multivariate VAR (1) model found that the US and London Cocoa futures prices traded on the ICE platform will influence the price of Dry Cocoa in India. This study will be helpful to forecast the price of Cocoa beans to manage the price risk, precisely for Cocoa traders, Chocolate manufacturers, Cocoa growers, and the government for planning and decision-making purposes.

Full paper: Risks, https://doi.org/10.3390/risks10060115, Vol 10, Issue No 115, 2022, pp 1-18

Consequences of Retail Checkout Crowding on Perceived Emotional Discomfort and Switching Intentions

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ABSTRACT

The waiting line is an essential element in the consumer's assessment of the overall shopping experience. Perceived idle time while waiting in the queue exaggerates the negative response to wait duration and affects the overall customer satisfaction. The store employees find it hard to muddle through peak hours and deal with the demand for a speedy process. The inefficient queuing system can lead to productivity and monetary losses from an operational outlook. This study explores the determinants of emotional discomfort encountered by customers waiting at the retail checkout. The study pursues a descriptive research design and is cross-sectional. Survey research was employed to ascertain customers' perceptions of their wait experience. The sample consisted of 385 respondents visiting the target organised outlets located in various localities in Bengaluru. Pearson correlation, multiple regression analysis, and SEM are applied to examine the data. Regardless of their age and gender, respondents experienced emotional discomfort at the retail checkout. Various situations while waiting in the queue appeared to influence the emotional discomfort significantly. This study suggests that while waiting in the queue at the retail checkout, situational factors influence emotional discomfort and subsequently persuade store switching intentions. The findings of this study are pertinent to retail outlets selling diverse merchandise and having situations requiring waiting. The study concludes that emotional discomfort is predominant during the checkout process in Indian retail outlets.

**Full paper: International Journal of Innovative Research and Scientific Studies, https://ssrn.com/abstract=4132871, Vol 5, Issue No 2, 2022, pp 134-144*

Framework for Identification of Curriculum Gaps: A Systematic Approach

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ABSTRACT

With the rapidly evolving technology, academics and curriculum developers experience criticism for the curriculum being outdated or unable to meet industry requirements. Additionally, the stakeholders involved in curriculum development have divergent views. Therefore, the challenges lie with academicians imparting the necessary skills and preparing the students to be industry-ready. This study takes a closer investigation of the predecessors of the curriculum gap and classifies it into preceding gaps, viz. information gap, benchmarking gap, perception gap, and learning gap. Prior research has focused on overcoming the curriculum gap, while the current study attempts to propose a framework for methodically identifying the curriculum gap. The paper follows online desk research. The framework is developed based on the multidisciplinary literature and thus provide a comprehensive view of the curriculum gap. Hence the study relies heavily on secondary sources of data. The framework transpired from the literature survey of engineering, management, accounting, nursing, and medical sciences disciplines. It, therefore, lacked affiliation to a specific field of study. Also, the stakeholder's role in the framework may not be appropriate in all contexts as their functions vary within a subject domain and may not exist in some cases. A systematic investigation of the curriculum gap will emphasise the shortcomings in the curriculum, which will assist the faculty in moulding their subject to meet the expectations of stakeholders. The proposed framework aims to expedite the collaboration between the stakeholders and develop a shared vision among all affected. Furthermore, the framework presented benefits academics and curriculum developers by bettering the courses offered and bridging the academia-industry skills gap.

**Full paper: Journal of Engineering Education Transformations, https://ssrn.com/abstract=4014916, Vol 35, Issue No 1,2022, pp 61-68*

Coping Emotional Discomfort at Retail Checkout: Potential Distractions and Implications

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ABSTRACT

Retail customers often wait to complete their purchases during the checkout process. Prior research suggests that long checkout lines and service delays negatively affect customers' evaluation of store services. The present study investigates the potential customer and in-store distractions and their implication for emotional discomfort due to crowding stress. This study employed a cross-sectional research design and surveyed 385 respondents visiting the target retail outlets in Bengaluru, India. Correlation analysis explored the relationship between self-distraction, in-store distractions, and emotional discomfort. The study found that self-distraction negatively correlates with discomfort while in the queue ($r = –0.119$) and discomfort during the billing ($r = –0.119$). In contrast, in-store distractions ($r = –0.161$) and video displays near the checkout area ($r = 0.116$) effectively reduce emotional discomfort while in the queue. Additionally, point-of-purchase (POP) display ($r = –0.265$) and availability of refreshments near the billing counter ($r = –0.175$) are effective in reducing emotional discomfort during the billing. This study thus offers viable and affordable methods of improving the customer's waiting experience while contributing to store profits.

**Full paper: Innovative Marketing, https://ssrn.com/abstract=4227908, Vol 18, Issue No 30, 2022, pp 159-169.*

Perceived Idle Wait and Associated Emotional Discomfort: An Analysis of Retail Waiting Experience

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ABSTRACT

Waiting involves both cognition and emotions. It has a bearing on the overall perception of retail service quality. The advancement in retailing has triggered scholarly conversations on the psychological impact of waiting at the retail checkout. Prior studies confirm customers being deeply involved in the passage of time and time estimation during the entire waiting period. This study investigates the customer idle time and its implication on emotional discomfort resulting from crowding stress. The study employed confirmatory sampling wherein specific sample elements are chosen since they are the key respondents to confirm hypotheses being tested. Accordingly, 385 respondents (shoppers) visiting the leading organized retailers located in major localities in Bengaluru were approached. The responses were analyzed using a Chi-squared test and Pearson correlation. The outcome reveals that irrespective of age and gender, customers visiting the offline retail outlets experience emotional discomfort. The young customers aged 18-30 dislike waiting in the queue at the checkout compared to older customers. In contrast, gender did not affect the inclination to wait. The idleness during the checkout waits causes emotional discomfort on most occasions. The findings supplement the growing research in psychology on the actual and perceived consumption of time, focusing on idleness. The study concludes that customers desire to avert an unproductive use of time, thus lowering their emotional discomfort.

**Full paper: Innovative Marketing, DOI:10.21511/im.18(1).2022.01, Vol 18, Issue No 1, 2022, pp 1-11.*

Crude Oil Futures to Manage the Price Risk of Textile Equities: An Empirical Evidence from India

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ABSTRACT

The textile sector in India is the oldest manufacturing sector. As the raw materials for this sector are sourced from the petrochemical industries, the earnings of Indian textile companies are dependent on the crude oil price. The crude price in the international market has become more volatile and hence, the equity price of Indian textile companies has become more volatile. This study aims to develop two price risk management strategies for Indian textile equities. Using the vector autoregressive (VAR) model, a price forecast model, further the possibility of cross hedge for textile equities with the help of crude futures is examined using the Granger causality test and Pearson correlation statistics. The results of the study showed that crude futures price in India is one of the price determinants of textile industry stock prices.

**Full paper: Industria Textila, DOI:10.35530/IT.073.04.202177, Vol 73, Issue No 1, 2022, pp 438-446*

Investigating the Nexus Between Crude Oil Price and Stock Prices of Oil Exploration Companies

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ABSTRACT

In emerging economies, examining the linkage between different markets has become crucial. We have examined the linkage between crude oil and Indian oil exploration companies' equity prices. The augmented Dickey-Fuller method is used to test the stationarity of the series. The Granger causality test, Vector autoregression (VAR) and correlation methodologies are used to examine the causality between the markets. The p-values of Granger causality tests are <0.05, which confirms that the crude oil price causes the price movements of Indian oil exploration equities. The VAR (2) model confirmed that the prices of HOCE, OIL and ONGC follow the first and second lag, Reliance and PETRONET equities follow the first lag of International crude price. The impulse response function shows a positive response of Indian oil exploration equity returns for the positive shocks of crude oil return. The findings of this study may help the traders and investors in the equity market, energy equity investors.

Full paper: International Journal of Energy Economics and Policy, DOI:https://doi.org/10.32479/ijeep.13070, Vol 12, Issue No 4, 2022, pp 40-47.

Investigating the Impact of Normal and Abnormal Loss Factors in Garment Industry: A Case Study Based on a Jeans Manufacturer in India

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ABSTRACT

This study aimed to analyse the normal and abnormal loss of a jeans manufacturing company in India. Personal interview and observation method are used in this study. Abnormal loss in quantity and rupee value is computed for 40 days of production based on the observed data. Mean abnormal losses are computed and one sample t-test is applied to test the hypotheses that the mean abnormal loss is not equal to zero. The study revealed that a normal loss of 3 to 5% is expected in any garment manufacturing company due to loss during the cutting and shrinkage process. The p-values of one sample t-test were less than 0.05 for all the tested hypotheses, hence, all the null hypotheses (H01 to H05 mean abnormal losses equal to zero) were rejected. Further, it was found that fabric is the big contributor in terms of abnormal loss. Hence, proper training for workers and recruiting of trained workers are advised to reduce abnormal losses.

**Full paper: Industria Textila, DOI:10.35530/IT.073.05.202188, Vol 73, Issue No 5, 2022, pp 560-563*

Decoding Customer Concerns about Embracing Electric Cars in India: Analysis of Audience Sentiments on YouTube Auto vlogs

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ABSTRACT

The issue of climate change presents a global challenge, with transportation contributing significantly to carbon emissions. Transitioning to electric vehicles (EVs) is a crucial solution for emission mitigation. In India, initiatives like the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME II) aim to achieve a substantial market share of EVs by 2030. While the electric two-wheeler market has seen success, larger vehicle adoption faces economic and charging infrastructure challenges. This study analyses audience comments on YouTube auto vlogs to understand customer concerns about EV adoption in India. The analysis of 1598 comments reveals apprehensions regarding range, charging infrastructure, and battery life. Negative sentiments encompass high costs, battery reliability, resale value, and limited service centres, while positive sentiments express interest in EVs for their environmental benefits, cost-efficiency, advanced technology, and government incentives. The research highlights consumer scepticism alongside an optimistic group seeing EVs as the future of the automotive industry in India.

**Full paper: Shanlax International Journal of Arts, Science and Humanities, https://ssrn.com/abstract=4593155, E-ISSN: 2582-0397, Vol. 11, Issue no. 2, 2023, pp. 1–8*

Medical Tourism Awareness and its Potential to Excel in Developing Cities: A Case Study of Mangalore City

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ABSTRACT

Medical Tourism, a sector still in the infancy stage in India, forms a part of the global Medical Tourism corridor and is acknowledged in the itinerary of any medical tourist. This paper intends to explore the scope of Medical Tourism in the developing cities of India. It aims to investigate the reasons for low medical tourism penetration despite possessing all the competitive advantages vital for a medical tourism destination. A survey conducted at 21 hospitals in Mangalore uncovered the extent of awareness among healthcare workers and initiatives taken by the healthcare industry to outperform this sector. Simple random sampling was employed to arrive at the sample size and the Chi-square test was applied to analyze the data. The findings reveal promotion as a crucial element for awareness creation and show a clear linkage between awareness and the potential of Medical Tourism. The paper presents healthcare practitioners and tour operators with an insight into Medical Tourism in developing cities like Mangalore and the effective strategies imperative to excel in this sector. This study evaluates if developing cities of India have the potential to be promoted as Medical Tourism hubs reaping benefits to the economy of India.

**Full paper: Atna Journal of Tourism Studies, DOI:https://doi.org/10.12727/ajts.29.1, ISSN: 0975-3281, Vol 18, Issue No 1, 2023, pp. 1-26.*

Assessing the Financial soundness of the Indian banks: A Study with Reference to Selected Public Sector and Private Sector Banks

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ABSTRACT

One of the most significant sectors that lead to economic growth is the banking sector. This is because financing is important to all firms and is primarily provided by banking institutions. The Indian banking industry has historically served as a more important pillar of support for the growth of the entire economy, but recent changes in macroeconomic factors like COVID-19, rising inflation, political factors, and economic changes have had a greater impact on the banking industry's performance. Using Altman's Z-score model, the current study aims to comprehend the financial stability of the chosen financial institutions. In terms of their insolvency status, banks 'financial stability is being attempted to be understood. The study uncovers that the majority of the selected banks have been impacted drastically due to macroeconomic and structural changes like recent mergers in the public sector banks. The result indicates that the banks are in a distress zone and need to strategize their future operations in order to yield better results. The study also highlights the prominent technological trends impacting the banking sector.

**Full paper: BOHR International Journal of Advances in Management Research, DOI:10.54646/bijamr.2023.25, 2023, Vol. 2, Issue No. 1, pp 107–112.*

Make in India Initiative; Boon to Reduce Lobbies with Respect to Defence and Aerospace Manufacturing Technologies

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ABSTRACT

Make in India initiative in defence and aerospace is one of the most ambitious projects in India it has created a significant impact on the social–economic, political and technological factors of the country. The public might have heard several controversies and scams about defence deals some horrific to inspiring stories in defense and aerospace sector. The beauty of this initiative is that every patriotic individual who wants his/her country to be self-reliant in Technology has different views on this projects. The current study tries to shed light on various problems and lobbies in defence deals and also tries to understand breakthroughs of Technology in defence products from the Indian private and public sectors "Make in India" promotes employment opportunities and skill development in the defence and aerospace sector. Through semantic foreign direct investment in defence technologies helps to have good diplomatic and economic relations with other countries

**Full paper: BOHR International Journal of Computer Science, DOI: 10.54646/bijcs.2023.25, Vol.2, Issue No 01, 2023, pp 41–46.*

A Comparative Study of Investment Preferences in Public Sector and Private Sector Enterprises at Mangalore City

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ABSTRACT

Investment behaviour is based on uncertainty about the future and is thus risky. News and rumours and speed and availability of information play important roles in investment markets. Risk propensity, risk preference, and attitude are the major concepts and explanations of investment behaviour. The researcher has used stratified sampling by choosing respondents from junior level, middle level, and senior level management of life insurance and manufacturing industries. A sample size of 342 was chosen for the study. It is noted from the research that the working people used to save and invest from their current earnings to educate their children, marriage, buy a new car and construct a house. It was suggested that in the current situation, they should also save for their retirement life.

**Full paper: Journal of Survey in Fisheries Sciences, https://doi.org/10.17762/sfs.v10i1S.1462, ISSN: 2368-7487, Vol 10, Issue No. 1S, 2023, pp 4572-4577.*

ARIMA model to forecast the RSS-1 rubber price in India: A Case Study for Textile Industry

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ABSTRACT

Various rubber products are used in the textile industry. Due to increased foreign supply and synthetic rubber production, the price of natural Rubber in India has become more volatile. This paper aims to develop an appropriate model to predict the weekly price using the Box Jenkins methodology. The weekly price for Indian RSS-1 Rubber for the sample period from January 2002 to December 2019 has been collected from the official website of the Indian Rubber Board. ACF and PACF correlograms check the series stationarity and identify the model parameters. A model with the maximum number of significant coefficients, lowest volatility, lowest Akaike's information criterion (AIC), lowest Schwarz criterion and highest Adjusted R-squared is tentatively selected as the appropriate model and for the same model diagnostic check is carried out. An appropriate model to forecast the weekly price for the RSS-1 variety of Rubber is ARIMA (1, 1, 4).

**Full paper: Industria Textila, DOI: 10.35530/IT.074.02.2022132ISSN: 12225347, Vol 74, Issue No 2, 2023, pp 238-245*

Routing TQM through HR strategies to achieve organizational effectiveness: the mediating role of HR outcomes in India

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ABSTRACT

Purpose – The present research focuses on improving the awareness related to soft total quality management (TQM) practices by looking from the viewpoint of strategic human resources (HR). In addition, it is intended to reflect on the resulting soft TQM-HR outcomes and determine the mediating effect between soft TQM-HR strategies and organizational effectiveness (OE).

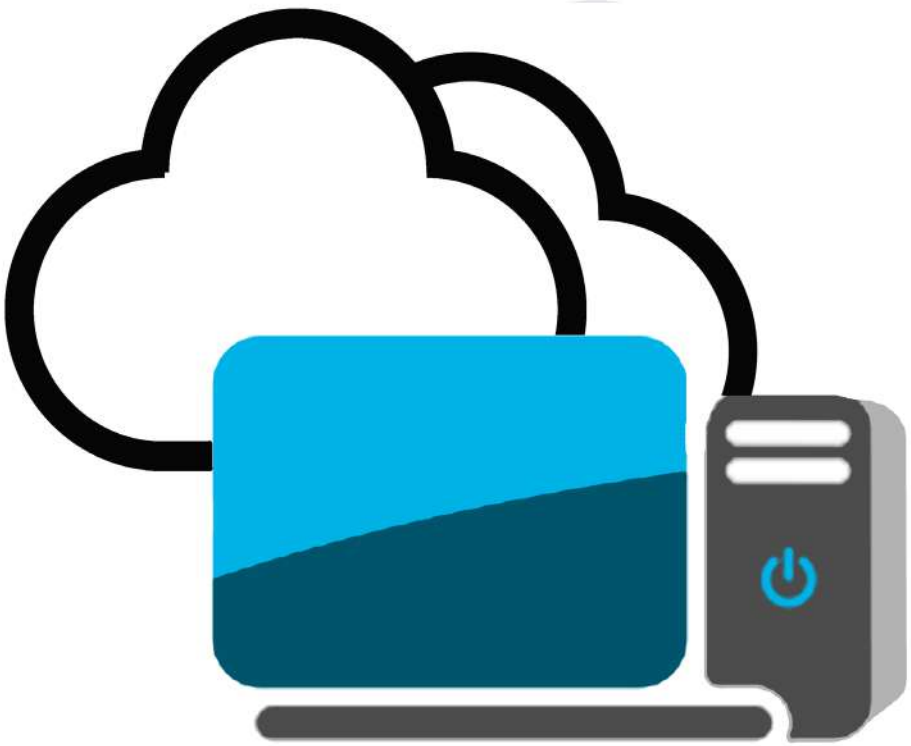
Design/methodology/approach – An exploratory research methodology with an online survey technique was adopted for the study. Three hundred and three managerial-level personnel from nine large Indian manufacturing organizations participated in the research. A theoretical model is projected and verified using correlation and mediation analysis.

Findings – The results show that commitment, reduced turnover intentions and satisfaction levels of employees mediate the relationship between resources, development and retention strategies and OE. However, the retention strategy has the strongest association with the OE of the three strategies. Also, of the three HR outcomes, satisfaction was strongly associated with OE. The analysis proved that the proposed model is an acceptable fit.

Practical implications – Implementing HR-related TQM strategies will likely impact OE since it elicits positive HR outcomes such as commitment, reduced turnover intention and satisfaction. Recognizing human resources as a unique strategic asset will help HR managers devise adequate resourcing, development and retention strategies instrumental in executing TQM.

Originality/value – The present micro study is unique in scrutinizing the influence of soft TQM-HR practices on organizational effectiveness by analysing the mediating effects of commitment, reduced turnover intention and satisfaction in Indian large-scale manufacturing organizations. The study is unique since no literature deciphers the linkages between HR strategies and organizational effectiveness in the Indian manufacturing sector.

**Full paper: The TQM Journal, DOI 10.1108/TQM-05-2023-0138, Vol. ahead-of-print No. ahead-of-print. Article in press, 2023*



MASTER OF COMPUTER APPLICATIONS

Application of Remote Sensing Techniques to Detect Roads and its Neighbourhood by Using Graph-Based Algorithms

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ABSTRACT

The application of remote sensing techniques is widely used in the analysis of remote sensing objects. The extraction and analysis of roads using this technique provide efficient data for the stakeholders which can be utilized in various occasions. The road structures are always incubated with rich neighbouring objects. The extraction and the segregation of these neighbourhood objects is a challenging task. The rich set of image processing algorithms provides a flexible extraction of road and its neighbourhood. This paper proposes a graph technique to extract the road and its neighbourhood. The graph cut algorithm is applied to 4 sets of image datasets. The datasets are taken at different intervals. The paper is aimed at detecting the road and its neighbourhood. The segmentation accuracy in detecting roads and its neighbourhood is also discussed in the article.

**Full paper: International Journal of Advanced Trends in Computer Science and Engineering, t https://doi.org/10.30534/ijatcse/2022/061142022Vol. 11, Issue No 4, July - August 2022, pp 173 - 178*

A Hybrid Approach of Load Balancing in Cloud Computing by Optimization of Metaheuristic Techniques: An Execution Assessment

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ABSTRACT

In recent days, cloud computing has become one of the most encouraging area for technical development. Cloud computing is reflected as the paramount in information technologies and it serves the delivery of services to the user via web/Internet depending on the request from the user and also based on the instant payments method. Main challenges and important aspect for research in this area is load balancing. Load balancing is the most important factor for good system performance as well as for the stability and reliability of the system. Therefore, it is very essential to have an effective load balancing techniques for user request scheduling based on services request parameter. Here we focus on a hybrid method of load balancing through metaheuristic techniques (IPSO & Firefly) so that available resources can be effectively used thereby reducing response time, waiting time, at the same time keeping the system stable and reliable.

**Full paper: International Journal of Engineering Research in Electronics and Communication Engineering(IJERECE) Vol 9, Issue No. 11, November 2022, pp 10-23*

A Dynamic and Effective Load Balancing Method using Horizontal Virtual Machine Scaling

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ABSTRACT

The infrastructure, software, or platform made available over a network is known as cloud computing. Utilizing virtualization techniques to effectively manage and create virtual machines is the expected norm for cloud computing. Recently, user demand for various services has been expanding dramatically in the field of cloud computing in direct proportion to the number of users. As a result, load balancing has become one of the most sought-after study fields for effectively managing the demand for resources. In this area of work, many algorithms have already been suggested. In this research, we suggest and put into practice two ways for balancing the load of virtual machines.

Full paper: International Journal of Engineering Research in Electronics and Communication Engineering, Vol 9, Issue No. 11, November 2022, pp 6-9.

Automatic Extraction of Road from Satellite Imagery Using Graph-Cut and Neural Network Algorithms

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ABSTRACT

In remote sensing image analysis, object detection has recently attracted a lot of interest. Object recognition in remote sensing photos is challenging due to the complex backgrounds, vertical perspectives, and varying target types and sizes. For the same reasons, roads are crucial features to identify and extract from a satellite picture. The use of roads in GIS is crucial. Roads are crucial pieces of infrastructure in metropolitan settings, linking various parts of the city together. The study of how to spot and extract roads from satellite and aerial imagery is becoming more and more popular. To improve transportation, navigation, autonomous vehicles, geo-data updates, land analysis, and city planning, road networks are essential. It is important to inspect the condition of the road after a natural disaster. Manually assessing the condition of a road's pavement is a time-consuming and error-prone process. Geographical information systems (GIS) and intelligent transportation systems (ITS) might benefit from a novel approach to road network using high resolution remote sensing imagery (ITS). Improvements in remote sensing technology have made it possible to get high-resolution satellite images of roads with increasing ease. There are two stages to remote sensing road recognition: detection and extraction. To that end, we will use high-resolution satellite images and a deep learning and machine learning-based approach to locate and extract roads. Keywords: Neural Network, Graph-cut, Satellite image, machine learning, Segmentation

**Full paper: Cyberpsychology, Behavior, and Social Networking, Mary Ann Liebert, Inc. DOI: 10.1198/cyber.2022.29345.editorial, Vol 25, Issue No 6, 2022*

Energy-Efficient Clustering and Routing Algorithm Using Hybrid Fuzzy with Grey Wolf Optimization in Wireless Sensor Networks

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ABSTRACT

Wireless networking is popular due to the "3 any" concept: anyone, anytime, anywhere. Wireless communication technology advancements have covered the opportunities for sustainable development of low-power, low-cost, multipurpose sensor nodes in wireless sensor networks. In sensor networks, the network layer handles routing problems. Since radio transmission requires a significant amount of energy, it is essential to investigate power efficiency and optimization. As a result, the conservation of energy is a critical concern in wireless sensor networks. Recent research is focused on developing routing algorithms that use less amount of energy during communication, thereby prolonging the network's life. Wireless sensor networks with energy recovery nodes use nodes that can extract energy from their environment. The fuzzy-GWO method and the energy-saving routing algorithm are proposed and analyzed in this research work. For simulation, the MATLAB 2021b working environment is used. The LEACH, HEED, MBC, FRLDG protocols, along with the proposed protocol F-GWO, are compared. From the obtained results, it is found that the network lifetime is increased by 20%, 14.8%, 12.5%, and 3.8%, respectively. In addition, the proposed method has a 37.5%, 33.3%, 16.6%, and 6.25% reduction in average energy consumption when compared with the conventional algorithms. According to the experimental data obtained through simulation, the proposed F-GWO algorithm outperforms the LEACH, HEED, MBC, and FRLDG in network lifetime, packet delivery ratio, throughput, bit error rate (BER), buffer occupancy, time analysis, and end-to-end delay.

**Full paper: Security and Communication Networks, Hindawi, https://doi.org/10.1155/2022/9846601, 6(Article ID 9846601), 2022, pp 1-12*

Wearable Sensor-Based Edge Computing Framework for Cardiac Arrhythmia Detection and Acute Stroke Prediction

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ABSTRACT

Internet of Things-based smart healthcare systems have gained attention in recent years for improving healthcare services and reducing data management costs. However, there is a requirement for improving the smart healthcare system in terms of speed, accuracy, and cost. An intelligent and secure edge-computing framework with wearable devices and sensors is proposed for cardiac arrhythmia detection and acute stroke prediction. Latency reduction is highly essential in real-time continuous assessment, and classification accuracy has to be improved for acute stroke prediction. In this paper, pre-processing and deep learning-based assessment is performed in the edge-computing layer, and decisions are communicated instantly to the individuals. In this work, acute stroke prediction is performed by a deep learning model using heart rate variability features and physiological data. Classification accuracy is improved in this approach when compared to other machine learning approaches. Cloud servers are utilized for storing the healthcare data of individuals for further analysis. Analyzed data from these servers are shared with hospitals, healthcare centers, family members, and physicians. The proposed edge computing with wearable sensors approach outperforms existing smart healthcare-based approaches in terms of execution speed, latency time, and power consumption. The deep learning method combined with DWT performs better than other similar approaches in the assessment of cardiac arrhythmia and acute stroke prediction. The proposed classifier achieves a sensitivity of 99.4%, specificity of 99.1%, and accuracy of 99.3% when compared with other similar approaches.

**Full paper: Hindawi Journal of Sensors, https://doi.org/10.1155/2023/3082870, Article ID 3082870, 2023, pp 1-9*

A study on the Landsat Band Combination in LULC classification to map the Forest, Settlements, Road, and agriculture extents

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ABSTRACT

The Landsat series of remote sensing images provides various bands of information which are having rich special data. These raw images need to be processed to fix the point of interest. The classification techniques use these bands to locate the extent of the geographical area. Each satellite comes with extensive band information and locates the objects in different patterns. This paper aims to analyze different band combinations for the mapping of agriculture and deforestation. Each classification algorithm for each band combination generates varied samples. The accuracy of these samples is wired based on the band combinations used. The band combination, classification algorithms and the tools used also affect the classification accuracy.

**Full paper: International Research Journal of Management Sociology & Humanity, Vol 14, Issue No 6, 2023, pp 408–415*

Application of Remote Sensing Images in the Image Processing Techniques: A Review

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ABSTRACT

The strength of computational efficiency and a strong foundation of mathematical applications and sophisticated tools made data analysis easier and more accurate, resulting in remote sensing applications becoming more popular than traditional analysis. Because of the easy availability of data, the majority of remote sensing applications are currently primarily focused on the research fields of reputable institutions and government organizations. Agriculture mapping, forest deterioration, crop insurance management, loan approval in cooperative societies, and drinking water supply management, road network quality assessment are only a few of the societal applications that have been created, mostly in government organizations. The accuracy of these applications is dependent on the quality of the remote data used in the work. It is important to use relevant data from the available remote sensing repository. This paper presents different types of remote sensing data that can be used for the LULC classification. This paper also explores the relevant algorithms and tools that can be used for classification.

**Full paper: International Research Journal of Management Science & Technology, Vol 14, Issue No 6, 2023, pp 206-213*

An experimentation analysis on Image Pre-Processing Technique for Land Use Analysis of a plantation crop

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ABSTRACT

The physical features of the objects retrieved from a satellite image may not be interpreted directly. It must be processed and if required need some pixel corrections, in order to remove the inherited error during the image-capturing process. The basic method is based on the RGB characteristics of the image. The reflectance characteristics for these values require the best combination to find the labels. This paper shows the possible RGB characteristics generated using the MATLAB tool.

**Full paper: International Research Journal of Commerce Arts and Science, Vol 14, Issue No 6, 2023, pp 194-198*

An Analysis of Image Classification Methods to Detect Agriculture Change Detection Using Remote Sensing Images

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ABSTRACT

The change detection for agricultural land requires a given sample's most accurate categorization result. It is common to compare multiple remotely sensed data classification techniques. Several aspects must be considered while selecting a classification algorithm, including the data set, the problem context, and the objective. This paper aims in finding the best spatial resolution required for the classification and the range of temporal behaviors. The method of classification and training samples are also considerable factors. A review of different remote sensing classification algorithms discussed in the article strengthens the decision of classification method for agriculture and deforestation decision.

**Full paper: International Research Journal of Management Sociology & Humanity, Vol 14, Issue No 5, 2023, pp 457-465*

Image Enhancement of Remote Sensing Images to Analyse the Digital Change Detection of Time Series Images Specific to the Agriculture Change Detection, Road, and Settlements

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ABSTRACT

Image enhancement is a key issue for any remote sensing images in digital change detection. Land use/land cover categories were identified using a combination of image processing, image enhancement, and image classification. Post-classification comparisons were used to identify changes using vegetation indexes. This paper aims to apply different enhancement techniques for remote sensing and GIS operations to detect land use/land cover changes for the forest, agriculture and road network.

Full paper: International Research Journal of Management Science & Technology, Vol 14, Issue No 5, 2023, pp 126-130

Analysis of deforestation using NBR index in the Western Ghats of Karnataka

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ABSTRACT

Globalization directly affected land use and the first environmental disorder because of this deforestation. Deforestation further decreases the traditional agriculture pattern and increases plantation agriculture. The effect of change in the agriculture pattern leads to various imbalances in nature as well as in society. This study aims to find the deforestation change in the western ghats of south India. The NBR vegetation index was compared with the NDVI to analyze the amount of deforestation and its accuracy.

**Full paper: International Research Journal of Commerce Arts and Science, DOI: https://doi.org/10.32804/CASIRJ, Vol 14 Issue 5, 2023, pp 390-395*

The Reliability Analysis of the Change Detection for the Agriculture Crops, Settlements and Roads Using Remote-Sensing Images

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ABSTRACT

The accuracy assessment in the land classification validates the land class categories. The objects in the classified images may reflect some of the unnecessary objects. The validation of the objects needs to be done using accuracy assessment indexes. The kappa coefficient is one of the most used techniques in recent days to analyze the accuracy of the generated image. The error rates generated define the object identification accuracy. This study is carried out to find the accuracy assessment of each land class for the two years, including settlements and roads.

Full paper: International Research Journal of Science Engineering and Technology, Vol 13, Issue No 1, 2023, pp 122-126

An Image Pre-Processing and Classification Application and the Experimentation Analysis of the Agriculture Change Detection for the Different Lulc Classes Using Remote Sensing Time Series Images

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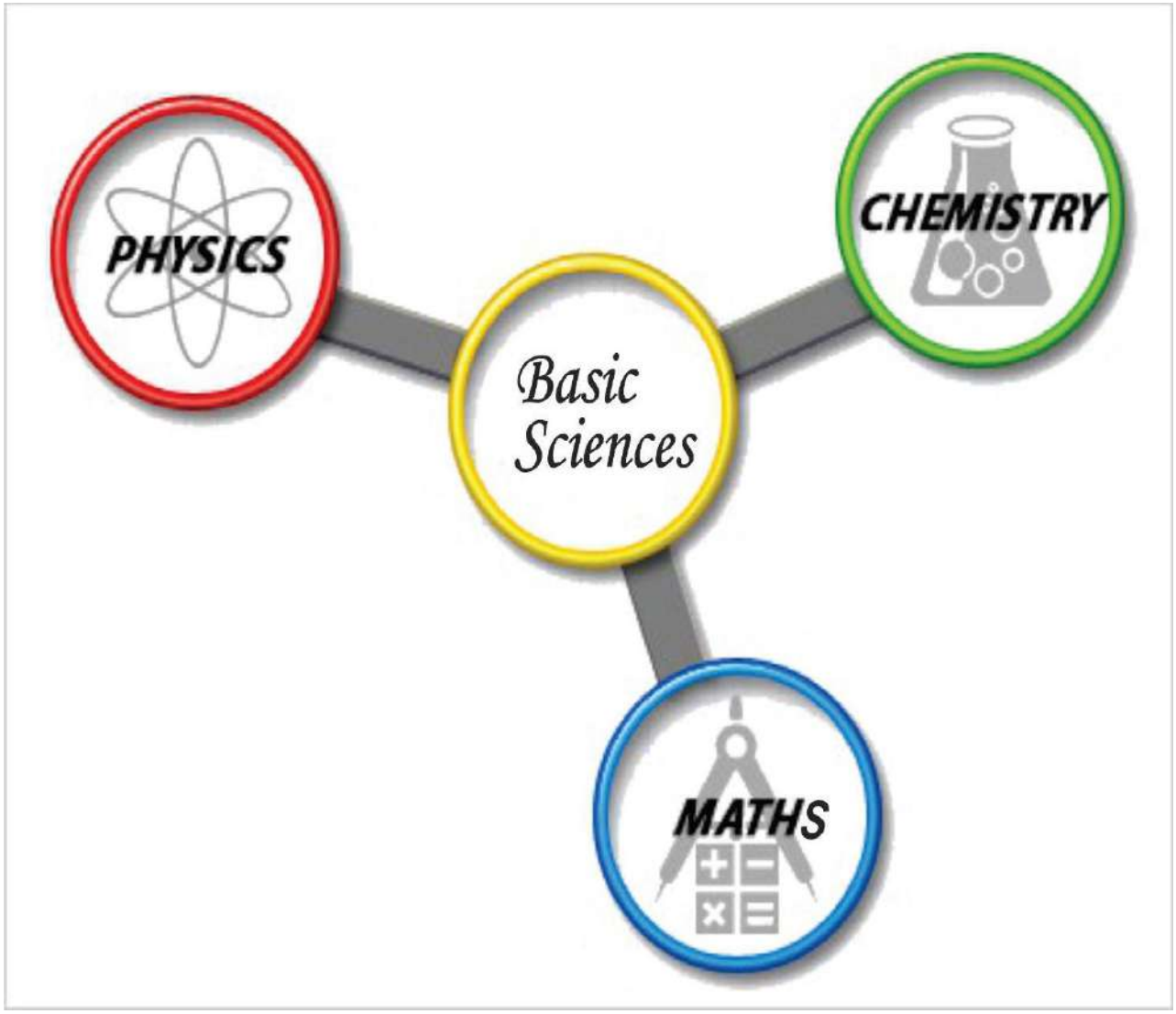
ABSTRACT

Detecting changes in land use and land cover (LULC) using remote sensing data is an essential source of information for many decision support systems like land conservation, sustainable development, water resource management, etc. All these systems are well resourced with the help of extracted and analysed data produced from land use and land cover change detection. This study aims to determine land use and land cover changes in the western Ghat basins. The proposed study is to find the change in agriculture patterns over the years using various segmentation and LULC classification techniques. The remote sensing data which is to be used for the classification required to be pre-processed. The study elaborates the analysis of different image pre-processing, segmentation and classification algorithms to analyse the dominance of the commercial plantation crops over the food-related crop culture.

Full paper: European Chemical Bulletin, DOI: 10.48047/ecb/2023.12.si10.0039, Vol 12, Issue No10, 2023, pp 367 - 381


PHYSICS
CHEMISTRY
Basic Sciences
MATHS

Relation Between Graph of a Lattice with Respect to its Ideals and Corresponding Adjacency Matrix

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ABSTRACT

Let L be an finite lattice with | L |= n. In this paper, we considered graph of L with respect to an ideal I, denoted by GI(L). Let An be the adjacency matrix of $G_I(L)$. We studied the relation between $G_I(L)$ and its adjacency matrix An. Infact, we proved that,

(a) GI(L) is a complete graph if and only if I = L or I = L − {1}.

(b) If ∀x, y ∈ L with x∧y ∈ I then the corresponding adjacency matrix of $G_I(L)$ is a Boolean Matrix Bn.

Further, we obtained generalized formula to find determinant of An and bound for degree of any element in GI(L). Also we established the relations connecting $G_I(L)$ with respect to graph homomorphism and Cartesian product of two graphs.

Full paper: International Journal of Applied and Computational Mathematics, DOI:10.1007/s40819-022-01414-1, Vol 8, Issue No 4, 2022, pp 199.

Properties of the Formal Context of Orthomodular Lattices

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ABSTRACT

Let L be a finite Orthomodular Lattice and T be the Formal Context of L. Then, considering T as a binary symmetric matrix, we find the determinant of the formal context of the atomic amalgam Bn + Bm of two Boolean algebras Bn and Bm consisting of n and m atoms, respectively using the Schur complement formula [8]. We present the proofs of some preliminary results on the determinant of the Boolean algebra Bn context table and the characteristic Bn polynomial. These preliminary results are used in many applications in graph theory.

*Full paper: *Advances in Mathematics: Scientific Journal, https://doi.org/10.37418/amsj.11.10.8, Vol 11, Issue No 10, 2022, pp 915-924*

Lattices and the Formal Context Obtained by Substitution Sum

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ABSTRACT

In Formal Context Analysis (FCA), various lattices can be constructed using different context constructions, one of them being the substitution sum. In this paper, two types of lattices are obtained by substitution sum and their properties have been explored.

1. Let CS(L1) be the set of all Convex Sublattices of the lattice L1 which are nonempty. It is known that CS(L1) can be ordered in such a way that the lattice CS(L1) becomes a sublattice of L1×L1. The properties of CS(L1) are already known. We have proved that the formal context of CS(L1), that is, K1(CS(L1)) is obtained by the substitution sum. This paper gives a characterization of CS(L1), which helps construct the lattice CS(L1).

2. Let L1 be a lattice with more than one atom. We have constructed a new lattice T S(L1) and proved that the formal context of T S(L1) that is K2(TS(L1)) is obtained by the substitution sum. Further, some properties of T S(L1) have been explored.

**Full paper: Annals of Mathematics and Computer Science, ISSN: 2789-7206, Vol 7, 2022, pp 12-24*

Set Valued Homeomorphisms using Ideal of a Ring and Rough Approximations

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ABSTRACT

In this paper, using an ideal of an algebraic structure ring (R) we generate a set valued homomorphism on that algebraic structure R. We define rough approximations in R using this set valued homomorphism. We find approximations of subring and ideal of R using this set valued homomorphism. We find rough approximations of different ideals of the ring R. We find properties of this homomorphism with for different nonempty subsets of R.

Full Paper: International Journal of Applied Engineering Research, ISSN 0973-4562, Vol 17, Issue No 2, 2022, pp. 148-151

Approximation in a Nearring Using an Equivalence Relation with Thresholds

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ABSTRACT

In this paper, we define an equivalence relation using level set of an i-v L-fuzzy ideal of nearing N. We use this equivalence relation to define upper and lower approximation of nonempty subset of the nearing N. We study properties of these approximations. We find relation between approximations in different cases.

**Full Paper: Journal of Progress in Engineering and Physical Science, doi:10.56397/JPEPS.2022.12.01, ISSN 2709-40, Vol 1, Issue No 2, 2022, pp 1-5*

Weighted Lavrentiev Regularization Method for Ill-Posed Equations: Finite Dimensional Realization

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ABSTRACT

In this paper, we study weighted Lavrentiev regularization method for illposed operator equations in the finite dimensional subspaces of a Hilbert space. Using general Holder type source condition we obtain an optimal order error estimate. Adaptive parameter choice strategy proposed by Pereverzev and Schock (2005) is used for choosing the regularization parameter. We applied the proposed method to an academic example to test the validity of theoretical result.

**Full Paper: Nonlinear Convex Analysis and Optimization Vol. 1, Issue No. 2, 2022, pp. 201–210*

Equiprime Fuzzy Graph of a Nearring with Respect to a Level Ideal

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ABSTRACT

In this paper, we introduce an equiprime fuzzy graph of a nearring with respect to the level ideal of a fuzzy ideal. We interrelate graph theoretical properties of the graph and ideal theoretical properties of nearring. We show that the properties like vertex cut, connectedness of the graph depend on the properties of the fuzzy ideal. We define ideal symmetry of the graph and find conditions for the graph to be ideal symmetric. If the fuzzy ideal is equiprime then we show that the level set induces a fuzzy clique. We find conditions required for the level set to be the vertex cover of the graph. We find interrelation between equiprime fuzzy graph and fuzzy graph of nearring with respect to level ideal. We study properties of the graph under neaaring homomorphism. We prove that the connectedness of the graph in homomorphic image depends on properties of ideal. We obtain conditions required for homomorphic image of an equiprime fuzzy ideal to be an equiprime fuzzy ideal.

**Full paper: Matematicki Vesnik, DOI: 10.57016/MV-ZUXV384, Vol. 75, Issue No 4, 2023, pp 247-264.*

An efficient user interface design for LMS application using graph based approaches

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ABSTRACT

Graph theory and computer applications can be applied to solve various real object problems and it provides a variety of quantitative and qualitative usability measures that can be used for effective interface design for any computer applications. This study is focused on the designing of user friendly user interfaces for learning management systems. The effect of covid application popularized the use of computer systems especially in the field of education. All stakeholders of the education sector nowadays are addicted to using LMS. The proposed system describes the challenges in the current system and the effective user interface for a LMS.

**Full paper: Integrated Research Journal of Management, Science and Innovation, ISSN: 2582 5445, Vol 10, Issue No 1, 2023, pp 46-51.*

Impacts of Pore Scale Gas Diffusion Layer Deformation on PEMFC Performance at Sub Zero Operation

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ABSTRACT

Understanding the effect of clamping pressure on the cold start performance of a polymer electrolyte membrane fuel cell (PEMFC) by considering inhomogeneous compression and intrusion of gas diffusion layers (GDLs) is crucial. In the present study, a three-dimensional model has been adopted to assess the transport phenomena of PEMFC by incorporating the deformed GDLs, which were not considered in the previous PEMFC cold start investigations. A non-linear correlation between contact resistance and clamping pressure is considered in the present unsteady PEMFC model, which would improve the accuracy and practicality of the simulation. A detailed study on the distributions of oxygen, current density, and ice accumulation at two different start-up temperatures (-20℃ and -30℃) under various clamping pressures is carried out. The numerical findings amply indicate the impracticality of considering uncompressed GDL in cold start simulations with its factitious overestimation of the cell performance. The findings in this study illustrate the relation between the clamping pressure and cold start temperature. For both −30℃ and −20℃, the uncompressed case gives the highest performance, and with 2 MPa, the cell shuts down sooner than 0.5 MPa and 1 MPa. This study will guide the stack assembly process in practical application.

Full Paper: Journal of The Electrochemical Society, IOP Publishing, DOI 10.1149/1945-7111/ad08ee, Vol 170, Issue No 10, 2023, pp 11457

Numerical Modeling of Novel Cage-Like Cross-Linked Membranes for Enhanced Proton Conductivity in a High Temperature-Polymer Electrolyte Membrane Fuel Cell

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ABSTRACT

Phosphoric acid (PA)-doped polybenzimidazole (PBI) membranes have encountered several problems associated with high cost, chemical instability, poor solubility in organic solvents, and higher doping level which results in poor mechanical properties and faster degradation of the membrane. Alternative membranes with high proton conductivity and mechanical strength for high-temperature applications are of great interest, one such membrane being cPBI-IL X. The cage-like cross-linked structure of these membranes shows a dual proton transport path due to which proton conductivity is elevated. The ionic liquid content of these membranes improves the PA absorbing capability and shortens the proton transfer path. These membranes exhibit the highest proton conductivity of 13.3 S/m and better durability compared to existing PBI Membranes. A mathematical model is developed and validated versus published experimental results to account for the proton conductivity of these membranes. The developed model is further investigated for a detailed understanding of polarization phenomena and species distribution.

**Full paper: Journal of Applied Polymer Science and Engineering, DOI:10.1002/app.54423, ISSN No 0021-8995, Vol 148, Issue No 38, 2023, pp e54423*

Sensitivity Analysis of Operational Parameters of a High Temperature-Proton Exchange Membrane Fuel Cell

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ABSTRACT

The lack of widespread commercialization of High-Temperature Proton Exchange Membrane Fuel Cells (HT-PEMFC) is primarily due to their poor performance and durability. Various factors impact the performance of fuel cells, one such crucial factor being the operational parameters. Suitable operating conditions not only enhance the output cell performance but also extend a fuel cell's life. Current research on the impact of operational factors on HT-PEMFC performance is largely qualitative in nature, with no quantitative indication of affecting the sensitivity of these parameters. In the present work, a three-dimensional, non-isothermal HT-PEMFC model developed earlier is used to investigate the influential sensitivities of five crucial operating parameters, each with four different levels, and is analyzed quantitatively using six evaluation indexes. The orthogonal/Taguchi method L16(45) is implemented to investigate the impact of operating parameters quantitatively. Further, the effect of each operating parameter on evaluation indexes under different operational current density regimes is investigated. The findings show that, of the parameters chosen, the working temperature and cathode pressure are the most sensitive to cell voltage and cathode overpotential distribution under all operating current density regimes. The findings would provide more precise recommendations for experimental research targeted at improving cell performance by optimizing operational parameters.

**Full paper: Journal of the Electrochemical Society, DOI:10.1149/1945-7111/ad0ff8, Vol 170, Issue No 12, 2023, pp 124513*

Influence of Structural and Morphological Features of Zinc (II)-Tetraphenylporphyrin Thin Film on its Third Order Optical Nonlinearity at Pico and Nano Second Regimes

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ABSTRACT

Implications of laser pulse width on the third-order nonlinear optical properties of Zinc(II) 5, 10, 15, 20-Tetraphenyl-21H, 23H-Porphine (ZnTPP) thin films is investigated. Thin films of ZnTPP are developed on glass substrate by means of thermal vapor deposition technique. X-ray diffraction analysis illustrates polycrystalline nature of these films. Atomic force microscopy and field emission scanning electron microscope images confirm the homogeneous film surface with mean surface roughness value of 8.45 nm. UV–Visible absorption spectrum depicts signature peaks attributable to π-π* orbital transitions. Photoluminescence spectrum illustrates fluorescence emission in the wavelength range of 590 nm–650 nm from S1 state. Nonlinear optical investigations are carried out using single-beam Z-scan technique. ZnTPP thin-film at pico-second regime depicts saturable nonlinear absorption nature, attributable to the collective effect of singlet excited state absorption and filling effect of localized defect states. Whereas, at nanosecond timescale the film exhibits reverse saturable nonlinear absorption, sensitive to triplet excited state absorption. Closed aperture Z-scan measurements at pico and nano second regime highlight self-defocusing optical nonlinearity. Enhanced nonlinear optical coefficient (βeff and n2) values are strongly influenced by the heavy zinc metal ion and modified excited state dynamics due to the strong intermolecular interactions through J-aggregation.

**Full paper: Journal of Luminescence, ISSN 0022-2313, https://doi.org/10.1016/j.jlumin. 2022.118835, Vol 246, 2022, pp 118835*

Effect of Tio_2/Zno Nanofillers On Structural, Optical and Nonlinear Optical Properties of PVA

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ABSTRACT

Polyvinyl alcohol (PVA)/(x)Titanium dioxide (TiO_2) (15-x) Zinc oxide (ZnO) nanocomposites for x = 0, 1, 5, 7.5, 10, 14 and 15 wt% concentration was prepared using solution casting method with the help of an ultrasonicator. The XRD spectra of films validate the formation of nanocomposites, as evidenced by the presence of peaks corresponding to both PVA and TiO_2/ZnO nanoparticles. FTIR spectroscopy reveals the formulation of complexes between the PVA main chain and nano fillers. The homogeneous distribution of nano fillers in PVA nanocomposites was observed using SEM and EDAX. The optical studies conducted using an ultraviolet–visible spectrometer reveals that PVA/(x)TiO_2(15-x) ZnO shows minimum energy gap of 2.66 eV at x = 15 wt%. The photoluminescence measurements carried out at an excitation wavelength of 370 nm using spectrophotometer exhibits unique strong emission band at 680 nm in the visible region for all the films. The open aperture (OA) Z-scan traces of PVA-filled TiO_2–ZnO nanocomposites at various filling levels were explored by means of Z-scan technique with DPSS continuous wave laser at 532 nm wavelength and 200 mW output power reveals that the absorption coefficient (β) of PVA nanofilms rises from 3.19×10^{-5} cm/W (for pure) to 1.17×10^{-3} cm/W (for x = 14 wt %) with rise in filling level. The closed-aperture (CA) z-scan analysis gives the nature of third order nonlinear refractive index (NRI) (n_2) of PVA nanofilms. The value of nonlinear refractive index (NRI) increases from -1.57×10^{-9}cm^2/W (pure PVA) to -3.24×10^{-8} cm^2/W for x = 14 wt% filling level. The observed enhancement in Nonlinear absorption (NLA) coefficient (β), NRI (n_2) and third order nonlinear susceptibility (χ^3) of prepared nanocomposites is due to added nanofillers to the PVA matrix. The improved third order nonlinear optical properties make these PVA nanocomposites as good candidates for optical switching device and optoelectronic device applications.

**Full paper: Optical Materials, ISSN 0925-3467, https://doi.org/10.1016/j.optmat.2023.114481, Vol 145, 2023, pp 114481*

Investigation of the Inhibition Effect of Newly Synthesized Pyrazoline Derivative on Mild Steel in Hydrochloric Acid Medium by Experimental and Theoretical Approach

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ABSTRACT

The novel pyrazoline derivative 5-[5-(4-bromophenyl)1-1(pyridine-2-yl)-4-5-dihydro-14-pyrazol-3-yl]-2-methoxy pyridine (BPPM) was synthesized the spectral analysis has been carried out using 1HNMR, 13CNMR, and FT-IR spectra. The evaluation of the inhibition effect of BPPM on the corrosion of mild steel in 0.5M HCl solution has been carried out by Tafel polarization and electrochemical impedance spectroscopy techniques with the variation of its concentration from10ppm to 40ppm at the temperature range from 303K to 323K. The inhibitor exhibited maximum corrosion inhibition efficiency of 97.5% in Tafel studies and 96.5% in electrochemical impedance studies at 303K for 40 ppm concentration. The change in the free energy of the adsorption process was found to be approximately 40kJ/mol which shows a mixed type of adsorption process. The theoretical analysis of the inhibition effect was performed with quantum chemical calculations using density functional theory (DFT) which proved the ability of protonated form of BPPM to interact with the vacant d-orbital of iron to arrest the rate of corrosion. The scanning electron microscopy with EDX studies and UV-Visible spectroscopy study confirmed the formation of the metal-BPPM complex. The experimental and theoretical data proved BPPM as a potent corrosion inhibitor at a considerably low concentration exceeding not more than 40ppm.

**Full paper: Chemical data Collection, https://doi.org/10.1016/j.cdc.2021.100808, ISSN: 2405-8300, Vol.37, 2022, pp 100808.*

Pyrazoline Derivative as Corrosion Inhibitor for Mild Steel in Hydrochloric Acid Medium: Experimental and Theoretical Approach

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ABSTRACT

A new pyrazoline derivative, 1-[5-(4-bromophenyl)-3-(6-methoxypyridine-3-yl)-4-5-dihydro-1H-pyrazol-1-yl]-ethane-1-one (BMDP) was synthesised using chalcone derivative. The FTIR, 1 HNMR, and mass spectral analysis were performed to validate the synthesised compound. The electrochemical impedance spectroscopy and potentiodynamic polarization techniques were performed to evaluate BMDP as a corrosion inhibitor for mild steel. The corrosion inhibition was observed to rise with an increase in BMDP concentration and decline with an increase in temperature. The maximum inhibition efficiency of 91.1% was reported at 303 K in 40 ppm of BMDP concentration. Activation and adsorption parameters were found with statistical thermodynamic calculations. The surface investigation of the metal surface was performed by SEM, AFM and EDX techniques. UV-visible spectroscopy was used to realise the inhibitor-metal complex formation. The quantum chemical computations were performed by density functional theory using Gaussian 16 software, and the theoretical calculations confirm the outstanding anticorrosive property of BMDP at the diminutive level as analysed in electrochemical studies.

**Full paper: Chemistry Select, https://doi.org/10.1002/slct.202300448, ISSN: 23656549, Vol.8, Issue No 21, 2023, pp.1-12.*

Corrosion Inhibition Study of 6061 Aluminium Alloy in the Presence of Ethyl 5-Methyl-1(4-Nitrophenyl)-1H-1,2,3- Triazole-4-Carboxylate (NTE) in Hydrochrloric Acid

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ABSTRACT

The inhibitory effect of an ethyl 5-methyl-1-(4-nitrophenyl)-1H-1,2,3-triazole-4-carboxylate (NTE) was investigated on the corrosion of Al (AA6061) alloy at different temperatures (303–333 K) by Electrochemical impedance spectroscopy (EIS), Potentiodynamic polarization (PDP), and weight loss techniques. It was found that NTE molecules protect the aluminium against corrosion and its ability increases with increasing concentrations, and temperature resulting in better inhibitory performance. At all concentrations and temperature ranges, NTE exhibited mixed inhibitor action and complied with the Langmuir isotherm. At 100 ppm and 333 K, NTE demonstrated the highest inhibition efficiency (94%). The EIS results and the PDP results had a good level of concordance. A suitable mechanism for the corrosion prevention of AA6061 alloy was proposed. Atomic force microscopy (AFM) and scanning electron microscopy (SEM) was used to confirm the adsorption of an inhibitor onto the aluminium alloy surface. The electrochemical results were validated by morphological examination, which demonstrated that NTE prevents uniform corrosion of aluminium alloy in acid chloride solutions. The activation energy and thermodynamic parameters were computed, and the results were discussed.

**Full paper: Heliyon, https://doi.org/10.1016/j.heliyon.2023.e16036, ISSN: 2405-8440, Vol.9, Issue No 5, 2023, pp. 1-14.*

Evaluation of 1,3-Thiazole Derivatives with Pharmaceutical and Chemical Activity: A Review

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ABSTRACT

1,3-thiazole is one of the most adaptable scaffolds for heterocyclic compounds. In recent years, thiazole has attracted focus in organic and medicinal chemistry due to its improved effectiveness and significant biological activities. Numerous reviews have reported on the synthesis and pharmacological activities of thiazoles. However, synthesis, pharmaceutical, and chemical applications have not been completely reviewed. The present review focuses on recent work on the synthesis, pharmaceutical and chemical applications of substituted thiazoles. This review discusses the most recent advancements in thiazole-based compounds and emphasizes the importance of design, drug discovery, and the use of thiazole in chemical applications. Additionally, this article is aimed to aid researchers in identifying potential future avenues for the creation of more effective thiazoles.

**Full paper: Heterocycles, DOI:10.3987/rev-23-1003, ISSN: 1881-0942, Vol.106, Issue No 5, 2023, pp. 819-839.*

Biosynthesis of Phyto Functionalised Cerium Oxide Nanoparrticles Mediated from Scoparia Dulsis L. For Appraisal of Anticancer Potential Against Adenocarcinomic Lung Cancer Cells and Paracetamol Sensing Potentiality

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ABSTRACT

This research work aims at the eco-friendly preparation of cerium oxide nanoparticles (CeSD NPs) utilizing the natural extract of Scoparia dulsis L. An attempt was made to analyze the influence of the fuel load on the size, shape, and optical properties of the nanoparticles. The p-XRD studies revealed the controlled formation of NPs with a size not more than 12.74 nm. The surface area studies appraise the mesoporous nature of the synthesized ceria particles, with the maximum specific surface area of 36.06 m^2g^{-1}. The nano-regime CeO_2 nanoparticles had a definite impact on biomedical and electrochemical studies. The CeSD NPs with minuscule size (10.69 nm) manifested promising antioxidant and human RBC protection activity. The antioxidant properties were evaluated using % DPPH inhibition with of maximum of 83.38. The stabilization of RBC's by CeSD NPs was maximum at 94.97%. However, the CeSD NPs with apparent size (12.74 nm) that utilized greater volume fuel (25 mL) had noticeable results on adenocarcinomic lung (A549) cancer cell viability and antidiabetic study which was maximum of 70.16% at concentration 500 µg/mL. A satisfactory antibacterial application was proffered against chosen bacterial strains. The smallest size CeO_2 NPs exhibited the best proton diffusion coefficient (8.16×10^{-6} cm^2s^{-1}), and the capacitance values of the CeSD NPs are near in all samples (~ 1.17 to 2.00 F) manifest their compact nano-regime sizes. The paracetamol drug was chosen as analyte to appreciating the superlative efficiency for sensing paracetamol drug with the lowest detection limit.

**Full paper: Environmental Science and Pollution Research, doi: 10.1007/s11356-022-23500-z, Vol 30, Issue No 7, 2023, pp 18901–18920.*

CENTRAL LIBRARY

Awareness and Use of Open Educational Resources: A study

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ABSTRACT

Understanding the awareness and use of Open Educational Resources (OER) among the stakeholders of academic libraries is a vital step to support the growth of OER initiatives at the educational institutions. The faculty and students' perceptions of OER often influence their interest in adopting open educational practices and their willingness to seek support from library professionals. To explore the awareness and the utilization of OERs among the faculty and students at St Joseph Engineering College (SJEC), Mangaluru, Karnataka, the author employed a survey to discover the responses to fulfill the study objectives. A total of 250 questionnaires were distributed among the faculty and students and 174 responses which amounts to 69.6% were received. The study found that 46 (26.44%) respondents use open educational resource daily, 38 (21.84%) respondents use open educational resource weekly, 81(46.55%) respondents open educational resources twice in a week, 9 (5.17%) respondents use open educational resource monthly. The main purpose of using OERs is to enable online education and its ease of use. The study investigated that, the faculty and students who are aware of the OERs through library support services and institutional OERs initiatives are utilizing it more effectively regardless of their prior experience in using electronic resources. Based on the study, it is suggested that academic libraries and faculty should help in promoting the awareness, so that the students fully utilize the OERs freely available online.

**Full paper: Proceedings of the National Conference on Open Scholarship and Libraries, https://digitalcommons.unl.edu/libphilprac/6570, ISBN 978-81-949096-4-4, VTU Belagavi, on 6th -7th January 2022, pp 127-137*

Research Information Management System at St. Joseph Engineering College: An Analysis

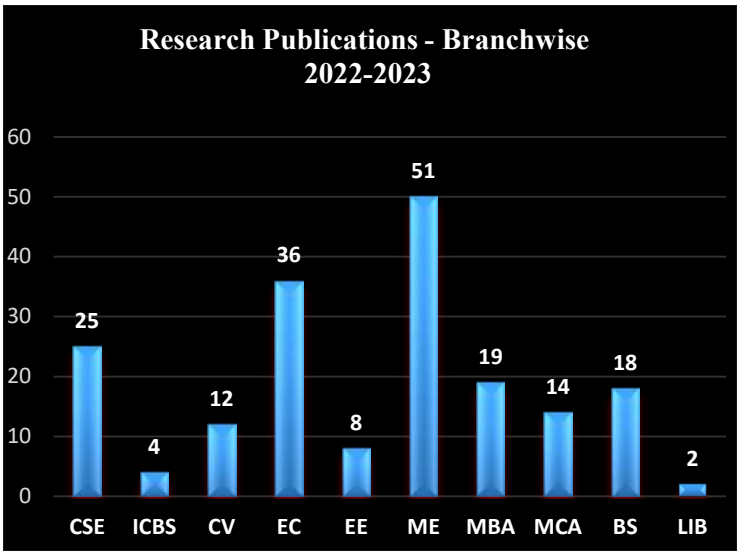
Felcy D'Souza

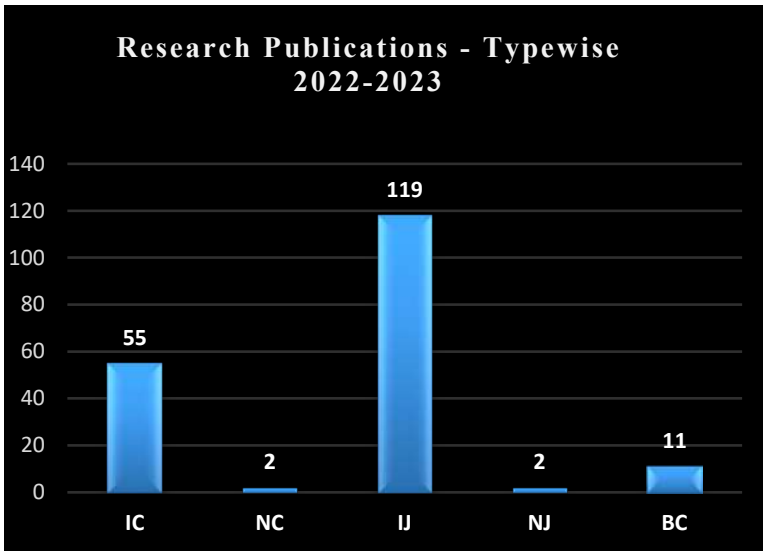
Librarian, St Joseph Engineering College, Mangaluru

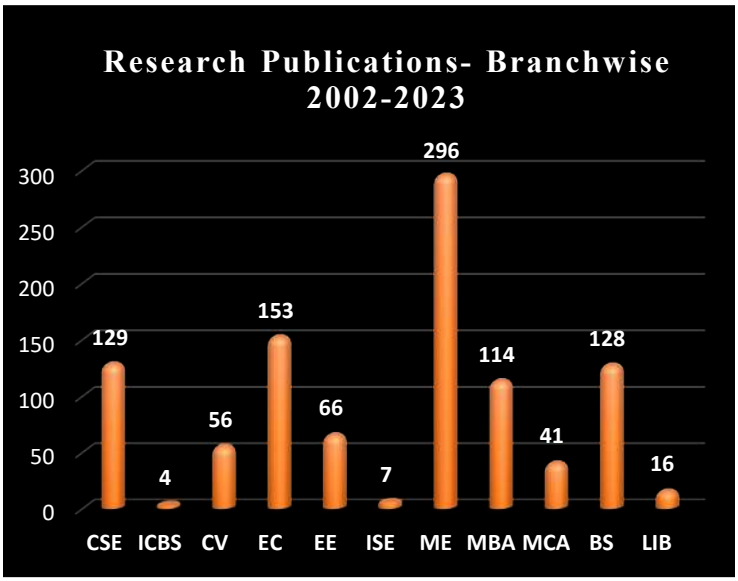
ABSTRACT

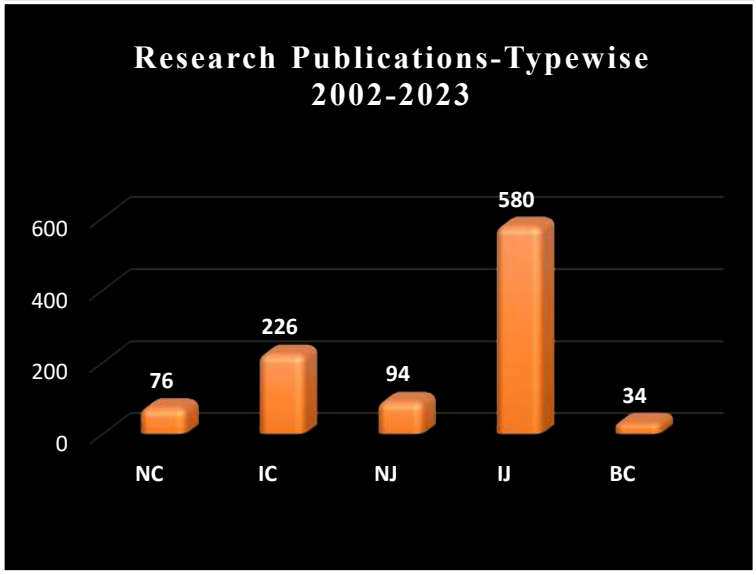
The data for this study has been retrieved from the St Joseph Engineering College (SJEC), Mangaluru website https:// sjec.irins.org/ and analysed to achieve the objectives of the study. It has been found that, as of date, 151 faculty members from SJEC published 773 publications and 4 patents. These publications have received 2751 citations and an h-index of 25 under Scopus. The majority, 61.7%, of the publications were published in reputed journals. The Department of Mechanical Engineering is leading with 217 (28.07%) publications and an h-index of 17. The Department of Physics has received the highest 1034 (26.72%) citations under Scopus compared to other departments. It is observed that each faculty member has published, on average, 5 publications and each publication has received an average of 4 citations. All faculty members have created their profiles in IRINS. It is recommended that every institute should have its own research information management system so that the research contribution of their faculty members can be reflected globally, which in turn will enhance the citations and reputation of the institute

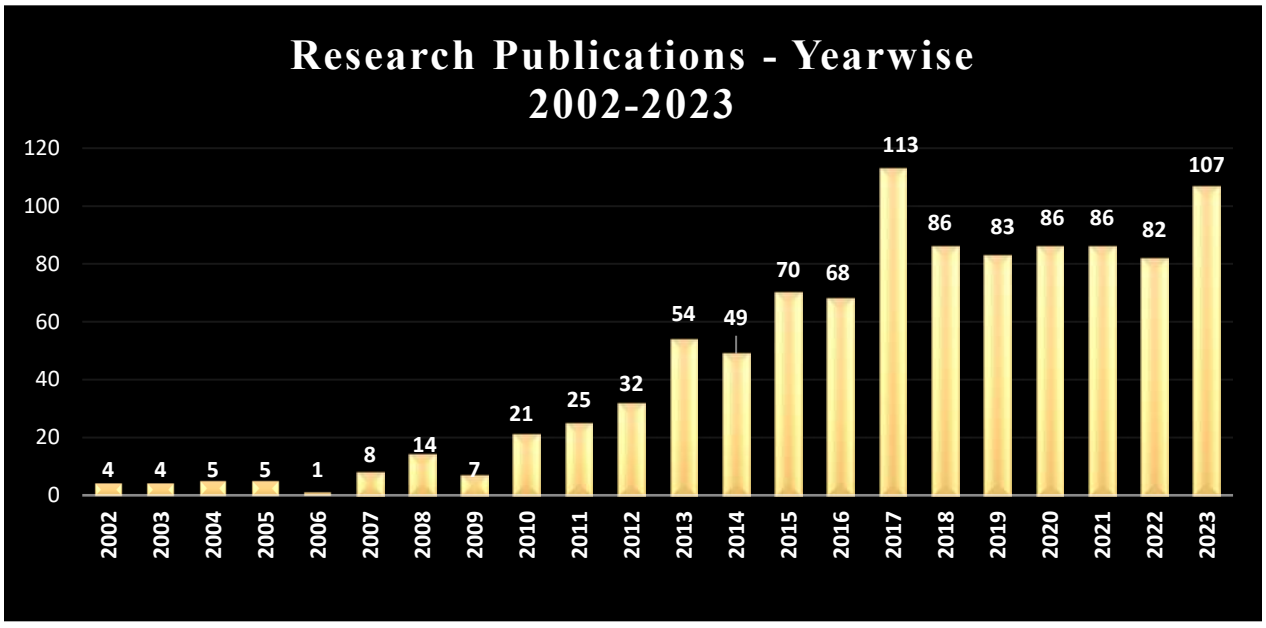
**Full paper: Proceedings 5th National Conference on Management of Modern Libraries (NACML)on the theme User-Centric Library Systems and Services: Trends and Challenges, Manipal Academy of Higher Education, Manipal 3rd- 4th February 2023, pp 105-112*











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

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