THE NORTHCAP UNIVERSITY

SAIT FOR SUSTAINABLE DEVELOPMENT 2023

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Book of Abstracts

INTERNATIONAL CONFERENCE

on Smart and AI Enabled Technology for Sustainable Development (SAIT for SD 2023)

12th - 13th September

About the Conference

The goal of this conference is to bring together leading academicians, scientists, researchers, scholars, industrialists and decision makers in various fields of engineering from around the world to exchange new ideas, share knowledge, explore recent developments in the field of smart and sustainable cities - applications and challenges in engineering. It also aims at throwing light on future development for Sustainable development.

Conference Themes

Track 1	Smart Cities, Materials, Infrastructure, Transport
Track 2	Energy and Environment
Track 3	Robotics, AI & ML, Automation in Advanced Manafacturing Processes
Track 4	IoT, Cyber Physical Systems, Game Theory
Track 5	Innovation in Engineering, Design & Practices
Track 6	Communication, Signal & Image Processing and Embedded Systems
Track 7	Computer Science for Sustainable Development
Track 8	Computational Mechanics
Track 9	Industry Practices

About the Department - MultiDisciplinary Engineering

The Department of Multidisciplinary Engineering at The NorthCap University is a platform for a creative collaboration of core engineering domains. The Department offers Ph.D., M.Tech., and B.Tech. programs of all core engineering domains such as Civil Engineering, Electrical, Electronics, Communication Engineering, and Mechanical Engineering. The Department is committed to imparting quality education and skill development amongst students through industry-ready programs. In addition, MDE is focused on socially relevant areas to carry out quality research by the faculty and students.

The Department has state of the art and high-tech facilities like CAD Lab, NABL-accredited labs for material testing, (NavIC) lab set up in collaboration with the Indian Space Research Organization (ISRO), Automation Lab set up in collaboration with Mitsubishi Electric India Ltd. In addition, the Department has a Daikin center of excellence for HVAC. It has a tinkering lab and maker's space for promoting innovation and technology development by the faculty and students. True to its vision and mission, the Department strives to be a global leader in innovation, academic excellence, and sustainable & socially relevant research projects.

Organizing Committee

The organizing committee has put in their best efforts for the successful organization of SAIT for SD 2023. The esteemed members of the organizing committee of the conference are:

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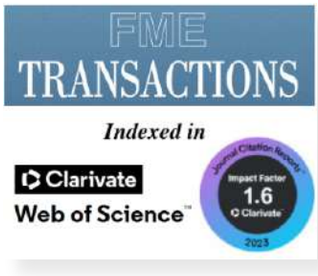

Prof. Prem Vrat
Pro-Chancellor
Chief Mentor
Professor of Eminence
The NorthCap University

Message

I am pleased to learn that the Department of Multidisciplinary Engineering at The NorthCap University, Gurugram is organizing an International Conference on 'Smart and AI- Enabled Technology for Sustainable Development' (SAIT for SD 2023), from 12th – 13th September 2023.

The conference will enable the participants to present their research on various new technological advancements and novel ideas and suggest solutions to current problems and challenges in the sustainable development.

Extensive research and collaborative efforts have been undertaken worldwide to support the United Nations Sustainable Development Goals (SDGs) for the year 2030. It becomes essential to synergize the efforts of professionals working in various fields of knowledge to update the emerging trends in sustainable development. The conferences and seminars provide the fraternity an opportunity to update their professional knowledge and equip themselves with the latest innovations in the fields.

I am hopeful that the conference on Smart and AI-enables Technology for Sustainable Development would serve the purpose of advancing the sustainability and technology integration.

I hope that the recommendations from the conference will suggest effective smart technologies and work collectively towards attainments of sustainable development goals. Furthermore, the forum may facilitate significant innovative breakthroughs by developing coordination between engineering, technology, and its applications for its development. I express my best wishes to all the speakers, researchers, delegates, and conference organizers. I complement the organizing team for their sincere hardwork in planning and implementing this prestigious event. I wish the international conference a great success.

Prof. Prem Vrat

Prof. Nupur Prakash
Vice Chancellor
The NorthCap University

Message

I am happy to know that the department of Multidisciplinary Engineering at the NorthCap University, Gurugram is organizing the International Conference on 'Smart and AI- Enabled Technology for Sustainable Development' (SAIT for SD 2023), from 12th – 13th September 2023.

Your presence here signifies a shared commitment to harnessing the transformative power of technology for the sustainable development of our world.

In a period marked by unprecedented global challenges, the need for the innovative solutions has never been more pressing. Our planet faces environmental crises, economic and healthcare disparities and numerous other complex issues. Yet, amidst these challenges, we find tremendous opportunities in the realm of Smart and AI-Enabled Technology.

Artificial intelligence, machine learning and advanced data analystics are driving a paradigm shift in how we approach sustainability. These technologies offer us the potential to make smarter, data-driven decisions that can lead to more efficient resource utilization, reduced environmental impact, and enhanced quality of life to all.

This conference represents a unique opportunity for us to unite our expertise and vision for a more sustainable, equitable, and prosperous future. I wish you all a productive and inspiring conference, filled with fruitful discussions and innovative ideas.

Thank you for your commitment and dedication.

Prof. Nupur Prakash

Dr. Kiran Bedi
PPMG, PNBB
Former LG - Puducherry
IPS (Retd.) & Magsaysay Awardee

Message from the Chief Guest

Namaskar!

I am pleased that Department of Multidisciplinary Engineering at the NorthCap University has organized the International Conference on 'Smart and AI- Enabled Technology for Sustainable Development' (SAIT for SD 2023). I am honoured and humbled to address you on one of the most pressing yet important issues of present time, Sustainable Development and its role in shaping a brighter future.

Sustainable Development is not a choice; it is a necessity. Its about meeting the needs of the present without compromising the ability of future generations to meet their own needs. I believe that Higher Educational Institutions like, The NorthCap University, have unique and critical role in helping our country to achieve the sustainable development goals and the mission to foster innovative research, impactful education and engaged communities to achieve environmental integrity, social equity and well-being.

I am hopeful that the deliberations held during the conference shall offer technological solutions to the challenges faced in sustainable development and embark the journey with unwavering commitment and immeasurable rewards.

I congratulate the organizing committee for bringing together the leading academicians, scientists, researchers, scholars, industrialists and decision makers in various fields of engineering from around the world to exchange new ideas, share knowledge, explore recent developments in the field of smart and sustainable cities and throw light for future directions.

I convey my best wishes for the success of this conference.

Thank you, Jai Hind!

Dr. Kiran Bedi

भारत सरकार
अंतरिक्ष विभाग
इसरो दूरमिति अनुवर्तन तथा आदेश संचारजाल (इस्ट्रैक)
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बी.एन. रामकृष्णा
B N RAMAKRISHNA
निदेशक/Director

Message

I am delighted that the department of Multidisciplinary Engineering at the NorthCap University, Gurugram is organizing the International Conference on 'Smart and AI- Enabled Technology for Sustainable Development' (SAIT for SD 2023), from 12th – 13th September 2023.

This conference marks a significant milestone in our collective journey towards harnessing the power of technology to address the pressing challenges of sustainable development. In an era defined by rapid technological advancements, the integration of Smart and AI-enabled technologies has the potential to revolutionize the way we approach sustainability. It is with great enthusiasm that we gather here to explore, disucss and collaborate on innovative solutions that we pave the way for a more sustainable future.

I hope that intense deliberations made during the conference will generate new ideas to carve a way towards sustianable development through the technological advancements and benefit the mankind.

I extend my warm appreciation to the organizing committee, speakers, sponsors and all those who have worked tirelessly for this conference. Your dedication to advancing the cause of sustainable development through technology is commendable.

I wish you all a productive and enlightening conference experience. May our collective efforts pave the way for a smarter, more sustainable world.

September 05, 2023

(B N RAMAKRISHNA)

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) **INDIAN SPACE RESEARCH ORGANISATION**

Prof. Amitava Sen Gupta
Honorary Distinguished Professor- Dept of Space/ISRO
Formerly at
CSIR-National Physical Laboratory,
Dr K S Krishnan Marg, New Delhi

Message

I am very pleased to learn that the Department of Multi-disciplinary Engineering is organizing the International Conference of Smart and AI Enabled Technology for Sustainable Development (SAIT for SD 2023). The main objective of the conference will be to deliberate on the future directions for sustainable development and to provide a platform for leading researchers, scholars, industrialists, and decision-makers worldwide to exchange ideas, share knowledge, and explore current developments.

According to the Netlingo, the word "Smart Technology" refers to "self-monitoring, analysis, and reporting technology." This refers to technologies that use artificial intelligence, machine learning, and big data analysis to provide cognitive awareness to objects that were in the past considered inanimate. The main benefits of Smart technologies are increased productivity and a more efficient use of resources and they inherently lead to sustainable development. The present conference has been designed to cover a broad spectrum of the range of Smart technologies by providing nine separate tracks that deal with Smart Cities, Energy and Environment, Robotics, Cyber-Physical Systems, Computational Mechanics and so on.

I am very hopeful that the Conference on SAIT for SD 2023 will be successful in providing an effective platform for a wide-ranging deliberation on use of Smart technologies to meet our future sustainable development goals. The conclusions drawn from the conference will result in high quality publications that will be valuable for the academicians, researchers, and the policy makers.

I have great pleasure in wishing all success to the SAIT for SD 2023 conference. My best wishes to all the delegates, speakers, and the conference organizers.

Prof. Amitava Sengupta

The ICFAI University, Dehradun

ICFAI UNIVERSITY
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Message

I am happy to know that the Department of Multidisciplinary Engineering, The North Cap University, Gurgaon, Haryana, is organizing an international conference on "Smart and AI- Enabled Technology for Sustainable Development' (SAIT for SD 2023), from 12th – 13th September 2023" with their technical partner "The institution of Engineers India".

The goal of this conference is to bring together leading academicians, scientists, researchers, scholars, industrialists and decision makers in various fields of engineering from around the world to exchange new ideas, share knowledge, and explore recent developments in the field of smart and sustainable cities - applications and challenges in engineering. It also aims at throwing light on future development for Sustainable development.

I congratulate the organizing team for selecting an important issue that will generate ideas to carve a path towards attaining the sustainable development goals 2030 with the use of technological advancements.

I extend my best wishes for the success of the conference.

RSingh 05/09/2023

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Message

It's truly inspiring to learn that The Department of Multidisciplinary Engineering at The North Cap University in Gurgaon, Haryana, is spearheading an international conference, titled "Smart and AI-Enabled Technology for Sustainable Development" **(SAIT for SD 2023)**. This significant event is set to take place from September 12th to 13th, 2023, and is being conducted in collaboration with their esteemed technical partner, "The Institution of Engineers India."

In our dynamic and ever-evolving world, the convergence of smart technologies and artificial intelligence represents a monumental opportunity to transform the landscape of sustainable development on a global scale. This conference stands as a pivotal juncture, uniting some of the brightest minds, innovators, and experts who are wholeheartedly committed to crafting a future that is not only brighter but also more sustainable, benefiting all of humanity.

I would like to extend my heartfelt wishes to the dedicated organizing team, hoping that this conference proves to be a resounding success, brimming with productive dialogues and the forging of meaningful connections. May the knowledge disseminated during this gathering serve as the catalyst for positive and lasting change, guiding us all toward a more sustainable and harmonious future.

As you come together for the International Conference SAIT for SD 2030, I send my warmest regards and encouragement to all participants. Your collective efforts and vision for a sustainable future are deeply commendable.

Dr.Sudheer Chintalapati

Additional Director(S)/ Scientist E

Message

It is good to know that an international conference on “Smart and AI- Enabled Technology for Sustainable Development’ (SAIT for SD 2023), has been organized bythe Department of Multidisciplinary Engineering, The North Cap University, Gurgaon, Haryanafrom 12th – 13th September 2023” with their technical partner “The institution of Engineers India”.

In todays ever-evolving world, the fusion of smart technologies and artificial intelligence has the potential to revolutionize sustainable development across the globe. This conference represents a pivotal moment, bringing together brilliant minds, innovators, and experts who are dedicated to shaping a brighter and more sustainable future for all.

Wish the organizing team a successful and enriching conference, filled with productive dialogues and meaningful connections. May the knowledge shared here be the catalyst for positive change, and may your endeavours lead us all towards a more sustainable and harmonious future.

I extend my warmest wishes to all of you as you convene for the International Conference SAIT for SD 2030.

Rajesh Kumar Singh
Chairman & Managing Director
Bridge And Roof Co. (India) Ltd.
(A Government of India Enterprise)

The Institution of Engineers (India)

(ESTABLISHED 1920, INCORPORATED BY ROYAL CHARTER 1935)

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"100 years of Relentless Journey Towards Engineering Advancement for Nation-building"

Date 6th Sep. 2023

Message for Abstract book for Conference SAIT on 12th & 13th Sep. 2023

Distinguished Guests, Esteemed Colleagues, and Fellow Participants,

It is a proud moment for the Institution of Engineers (India), Faridabad Local Centre to join as a technical partner for the esteemed International Conference on "Smart and AI-Enabled Technology for Sustainable Development" organised by the Department of Multidisciplinary Engineering, The North Cap University, Gurgaon, Haryana.

The Institution of Engineers (India), with its rich legacy and unwavering commitment to engineering excellence, brings a wealth of knowledge, experience, and expertise to the conference. With the Institution of Engineers as the technical partner, the delegates will have access to a vast network of experts, practitioners, and thought leaders who will undoubtedly enrich the discussions and deliberations.

In an era where the world faces unprecedented challenges, it is imperative that we harness the full potential of smart and AI-enabled technologies to drive forward the cause of sustainable development. These innovations have the power to reshape industries, economies, and societies for the better, offering solutions that are efficient, equitable, and environmentally responsible.

This conference shall provide a unique platform for us to exchange ideas, share insights, and foster collaborations that will propel us towards a brighter, more sustainable future. Together, we will delve into the myriad ways in which smart technologies and artificial intelligence can be applied to address global issues such as climate change, resource conservation, healthcare accessibility, and more.

As we embark on this collaborative journey, let us seize the opportunity to leverage the collective wisdom and together, we can chart a path towards a more sustainable, technologically empowered future.

Thank you, and let us look forward to an enlightening and productive conference ahead!

Warm regards,

Er. Kuldip Raj Gupta, FIE
Chairman

Keynote Speakers

Numerical Modelling in Geotechnical Engineering

Dr. R. Chitra

Director

Central Soil and Materials Research Station, New Delhi

Abstract

Numerical modelling is the use of computer programs to simulate processes that are difficult to reproduce with physical experiments. This tool is employed to simulate the actual problem mathematically and lead towards a most accurate solution within limited time. It can also be used to answer some of the highly complex questions associated with geo-mechanics. Numerical modelling in 2D and 3D using boundary element, finite element and distinct element methods are used to study the stability problems in the geotechnical engineering. Back analysis can also be done using the numerical analysis to estimate in-situ stresses, displacements and field rock properties. Geotechnical engineering problems encountered in the field such as foundation problem, slope instability, stability of shaft and tunnels, design of caverns, problems in mining industry, Extraction of geothermal energy and radioactive waste disposal with complex geological features such as faults and intrusions can be analysed using the Numerical analysis techniques which will give near solutions to these problems.

Dr. R. Chitra is working as Director at Central Soil and Materials Research Station, Department of Water Resources, River Development and Ganga Rejuvenation, New Delhi, Ministry of Jal Shakti. She has 35 years of experience in the field of geotechnical engineering. Her experience in planning, guiding and execution of geotechnical investigation works for river valley projects has spread to over 400 projects within India and neighbouring countries such as Nepal, Bhutan, Afghanistan and Myanmar. She has published 275 technical papers in various international and national journals and conference proceedings. She is member in the expert committees of most of the dam safety review panel, major dam projects and irrigation projects. She chairs two Committees of Bureau of Indian Standards (BIS) namely Foundation and sub-structure and Hydraulic Structures Instrumentation. She is also member of various committees of national repute like BIS, IRC etc. and her contributions towards formulation, review and updation of various Indian Standards are substantial.

Data Privacy in the age of AI and Quantum Computing

Mr. Amit Dubey

National Security Expert

Abstract

Our Cybersecurity Awareness Session is designed to empower individuals with the knowledge and skills necessary to protect themselves and their digital lives in an increasingly complex online world. During this informative session, we will delve into several crucial aspects of cybersecurity, including:

Social Engineering Attack Vectors: Learn about the various ways cybercriminals manipulate human psychology to gain unauthorized access to sensitive information. Explore the tactics behind phishing emails, deceptive phone calls, and other social engineering techniques, and discover how to recognize and defend against them.

Cyber Threat Landscape: Get an overview of the ever-evolving cybersecurity landscape. We'll discuss current threats, emerging trends, and the potential risks associated with new technologies. Understanding the cyber threat landscape is essential for staying vigilant and proactive in safeguarding your online presence.

Identity Theft: Explore the devastating consequences of identity theft and how it can impact your personal and financial well-being. Discover the methods cybercriminals use to steal identities and personal information. We'll provide practical tips on minimizing your risk and detecting identity theft early.

Financial Frauds: Dive into the world of financial frauds, from online scams to credit card fraud and investment schemes. Learn how cybercriminals target your finances and explore real-world cases. Gain insights into how to protect your financial assets and investments from fraudulent activities.

Protection Strategies: Discover effective strategies and best practices to fortify your digital defenses. We'll cover topics like strong password management, two-factor authentication, secure browsing habits, and the importance of software updates. You'll leave the session equipped with actionable steps to enhance your online security.

Our goal is to empower you with the knowledge and tools needed to navigate the digital world safely and confidently. By the end of this cybersecurity awareness session, you'll be better prepared to recognize potential threats, defend against cyberattacks, and protect your valuable personal and financial information. Your online safety is our priority, and together, we can build a safer digital community.

Mr. Amit Dubey is a renowned National Security Expert, and a researcher in Artificial Intelligence and Quantum Computing,He is a resource person for Cyber Security and Cyber Crime Investigation to various Indian Government Agencies and Police deptt.He has been invited by Indian Parliament to consult Parliamentary Standing Committees on Cyber Security issues. A commonwealth UK, Chevening fellow, Amit has been trained in Defence Academy UK and did his post grad from Cranfield University, Shrivenham in Cyber Crime Investigation. Amit has trained more than 200000 police officers, Judges and Bureaucrats from India, Bangladesh, Sri Lanka, Singapore and Dubai etc. He has been appointed as a key member of various Govt. of India task forces like R&D Working group by Ministry of Electronics and IT, GOI., Cyber Security Policy Draft Committee of UP. A prominent speaker and a renowned name on national and international cyber security conferences, Amit is regularly quoted in Indian print and electronic media on global cyber issues. He is on advisory positions with Indian Banks and Media Houses and also invited by various arms of the Indian government, including its defense forces to train their cyber professionals, acknowledging his authority on cyber security.

Smart and AI-enabled technologies

Mr. Uday Narang

Founder and Chairman at Omega Seiki Mobility

Abstract

The ongoing integration of smart and AI-enabled technologies into sustainable development efforts is helping to address some of the world's most pressing challenges. However, it is essential to approach these technologies with a focus on equity, inclusivity, and ethical considerations to ensure that the benefits are shared by all and do not exacerbate existing inequalities.

Smart and AI-enabled technologies are playing a crucial role in advancing sustainable development within the electric vehicle (EV) sector. These technologies are helping to make EVs more efficient, accessible, and environmentally friendly. At Omega Seiki Mobility we run one of the largest fleet which OSM operates for last mile logistics services under the brand name UNOXpress. Last mile delivery is considered most difficult in terms of the complexity it brings to the business. Geographical diversity, difficult terrain and accessibility and unmapped areas across many parts of the country add to this complexity. To be successful in the last mile business you need to have a very high-quality vehicle and a very efficient software platform to manage the last mile. These are achieved by an intelligent system based on OSM-GRID using smart and AI Technologies. The system plots best optimised routes, has in built queuing system, tracking and correcting system for deliveries online. The data processing system is cloud based and has an app-based monitoring and use system.

For an OEM AI technologies play a very pivotal role for Battery Management: AI algorithms are used to optimize battery management systems in EVs. Charging Infrastructure Optimization: AI algorithms are used to optimize the placement and operation of charging infrastructure. Range Prediction: AI-powered predictive analytics help drivers estimate their EV's remaining range more accurately. This reduces "range anxiety" and encourages more people to switch to electric vehicles. Fleet Management: AI is used in fleet management systems to optimize the usage of electric vehicle fleets. This ensures efficient scheduling, charging, and maintenance, reducing operating costs and emissions. Manufacturing and Supply Chain: Smart manufacturing and supply chain solutions powered by AI help reduce waste and energy consumption during the production of EVs, making the manufacturing process more sustainable. Lifecycle Analysis: AI is employed to conduct lifecycle assessments of EVs, taking into account their environmental impact from production to disposal. This information helps manufacturers and consumers make more informed decisions and promotes sustainable practices. Recycling and Reuse: AI technologies are employed to identify and sort materials in retired EV batteries for recycling or repurposing, reducing waste and the need for raw materials in new battery production.

Smart and AI-enabled technologies are helping to accelerate the transition to sustainable transportation through electric vehicles. They improve EV efficiency, accessibility, and environmental friendliness, contributing to reduced emissions and a more sustainable future for mobility.

Mr. Uday Narang is the Founder and Chairman at Omega Seiki Mobility. He founded Omega Seiki Mobility (OSM) in 2018. Nurturing it to become the Tesla of the East for cargo vehicles the company is based in New Delhi with a vision to build a Pan Asia brand. He went on to lead oil, gas and power trading portfolios in several leading trading firms in America before moving to Europe as the President of a major energy trading corporation.

A brief introduction to Atomic Clocks and the latest advances in this field

Prof. Amitava Sen Gupta

Honorary Distinguished Professor- Dept of Space/ISRO
Formerly at
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Abstract

Satellite based navigation is an example of a few contemporary applications that have revolutionised our daily lives. Today, no matter where we are on the earth, thanks to the satellite constellation of the GPS (Global Positioning System) we never have to worry about two things – our precise location and the time. GPS is used globally for myriads of applications ranging from surveying, road transport, aviation, agriculture, IoT, telecommunications and so on. Currently, the Indian Space Research Organisation (ISRO) is developing the Indian Regional Navigation Satellite System (IRNSS), nicknamed NavIC, which is a satellite navigation system similar to the GPS. While the names such as GPS and NavIC are very familiar to most of us due their extensive applications in our daily lives, the basic principles underlying these systems are not well known to many. Even less well known is the fact that at the heart of any satellite navigation system are extremely precise atomic clocks which are synchronised with each other to better than a few billionths of a second or a few nanoseconds.

In this talk we shall mainly discuss the basic principles of operation of an atomic clock. The basis of an atomic clock is an atomic resonance which is a truly fundamental and invariant quantity. In the practical implementation a quartz oscillator is phase locked to the atomic resonance to give a usable output. We shall discuss recent developments in this field that have resulted in clock accuracies better than a part in 10^15. In simple terms, such a clock would lose or gain 1 sec in about 3 million years.

Prof. Amitava Sen Gupta is a Honorary Distinguished Professor- Department of Space/ISRO. He superannuated from the National Physical Laboratory (NPL), New Delhi in March 2015 as its Acting Director, holding the position of Scientist-H/Outstanding Scientist. He also headed the Time & Frequency Standards Division at NPL. He is an expert in the areas of Radio and Atmospheric Physics; Electronics; Atomic Physics; and Time and Frequency Standards. With over 35 years of research experience, his major contributions include design and development of India's first and one of the world's most accurate primary atomic clocks, known as the 'Cesium Fountain' and the development of the prototype of a space qualified Rubidium Clock for ISRO. He has recently initiated research and development on single trapped Yb ion based optical frequency standards at NPL. He has also developed India's first satellite based standard time broadcasts using the domestic INSAT satellites. Prof Sen Gupta was a member of the first and second Indian Antarctic Expeditions in 1981-82, where he performed experiments related to upper atmospheric radio propagation and Ozone studies. Subsequently, he was the leader of a 100 member team of the Eighth Indian Antarctic Expedition in 1988-89 setting up the permanent Indian Antarctic station 'Maitri'. He is a Fellow of the National Academy of Sciences, India (NASI), Fellow of the Institution of Electronic and Telecom Engineers (IETE), Fellow of the Metrology Society of India (MSI) and a Senior Member of the IEEE, USA. He received the O P Bhasin Award for Science and Technology (2002) for his significant contributions in the field of Electronics and Information Technology.

Fire Safety Enhancement in Sustainable Buildings Enabled by Building Information Modeling

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Abstract

Ensuring fire safety within sustainable buildings is a paramount concern in contemporary construction practices. The architectural planning of sustainable buildings demands the adoption of innovative materials and advanced technologies for effective fire prevention and control. The convergence of building information modeling (BIM) with IoT sensors, communication technologies, and machine learning algorithms has motivated researchers to reassess fire safety protocols for modern architectural designs.

This presentation discusses the role of BIM in formulating personalized fire evacuation routes by utilizing real-time data from the IoT sensors and tracking of building occupants. Additionally, it explores the integration of real-time indoor position systems (IPS) and wireless technologies for fire safety measures. A case study conducted in Engineering building at the University of North Florida for developing intelligent and personalized evacuation routes using BIM and IPS will be presented.

Dr. Kaushal is currently working as an Assistant Professor in the Electrical Engineering department at the University of North Florida, USA. She has earned a doctorate degree in Electrical engineering from the Indian Institute of Technology Delhi, India. She has worked on collaborative projects from the Indian Space Research Organization, and Aeronautical Development Agency, Department of Defense Research and Development, India. She has also authored a book on "Free Space Optical Communication", published by Springer which has received well recognition by researchers working in this area. Her research area includes wireless communication, wireless sensor networks, and the Internet of Things, with a special focus on applications related to 5G/6G communication networks.

Decarbonization and Smart Technologies in Energy Sector for Sustainable Development

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Abstract

Energy is one of the basic inputs for economic growth, automation, modernization and social development. The energy consumption is increasing all over the world where rapid developing in the automation and industrialization. But still now the energy sources are mainly fossil fuel based that emits greenhouse gases. The current CO_2 emission level already cross the safe level which is more than 400 ppm. As the fossil fuels are the main sources of CO_2 emission and air pollutions, the clean energy and decarbonization technologies are the potential solutions. Renewable energy integration in the energy supply system is very important to make the world environmentally friendly nature. Smart and decarbonization technologies are very potential smart and sustainable development.

Dr. Md. Hasanuzaman is currently working as Associate Professor at the Higher Institution Centre of Excellence (HICoE), UM Power Energy Dedicated Advanced Centre (UMPEDAC), University of Malaya, Malaysia. He was listed among the World's Top 2% Scientists for the year 2022, 2021 & 2020. He was Program Coordinator (Master of Renewable Energy, September 2012 to September 2020), Double Degree Programme with Master of Energy Science, Kyoto University, Japan. He is an Associate Editor of the Alexandria Engineering Journal, Elsevier; Associate Editor in Chief of the International Journal of Renewable Energy Resources; and has been a Guest Editor for Renewable Energy, Elsevier. His 2 books: (1) Technologies for Solar Thermal Energy, 2022 and (2) Energy for Sustainable Development, 2020 published by Elsevier. His research interests include thermal engineering, renewable energy, energy and buildings, energy policy, transport and electric vehicles. He has delivered many keynotes speech as a keynote speaker in many international conferences. He has also authored and co-authored more than 130 research papers and 50 conference proceedings. Dr. Hasan has more than 6490 citations with an h-index of 43 in the Scopus index and 9200 citations with an h-index of 47 in the google scholar index. Dr. Hasan has supervised and supervising more than 50 postgraduate students. He has secured and managed more than 7 million Ringgit national and international research grants as a PI & co-PI. He received a University of Malaya Excellence Award 2012 for his outstanding achievement in PhD.

Message from the Conference Chairperson

Prof. Sharda Vashisth

HoD - Department of Multidisciplinary Engineering

The members of the organizing committee and myself are very proud to present the Smart and AI enabled Technology for Sustainable Development 2023 and welcome all participants to The NorthCap University, Gurugram on 12-13 September 2023.

The conference aims to illuminate the future directions for sustainable development. It is a platform for leading academicians, scientists, researchers, scholars, industrialists, and decision-makers worldwide to exchange new ideas, share knowledge, and explore recent developments in smart and sustainable cities – applications and challenges in engineering. The range of specialisations and associated areas will enable us to accomplish our desired mission and purpose.

About 100 authors and attendees, including special Key Note speakers, will present their most recent work in a variety of subjects. The hard work and dedication of all the members of organizing, scientific, technical and financial committees during the preparation for this conference is highly appreciated. I am grateful to all the publishing partners (LNEE, Journal of Thermal Engineering, Sigma Journal, The Indian Concrete Journal, Journal of Computers, Mechanical and Management and Edited book published by Elsevier, Scopus Indexed) for their kind support. Without it, the conference would not have been possible at this level.

I'm also appreciative of all the keynote speakers from around the world who took time out of their busy schedules to raise the calibre of the scientific debate. I also want to express my gratitude to the Chief Patrons and the Patrons for their leadership and support.

Prof. Sharda Vashisth

Message from Conference Convener

Dr. Vaishali Sahu

Associate Head, Department of Multidisciplinary Engineering

I am glad to extend my warmest welcome to all of you as the Convener of the International Conference on Smart and AI-Enabled Technology for Sustainable Development (SAIT for SD 2023) at the NorthCap University during 12th-13th September 2023. It is with great enthusiasm and anticipation that we gather here to embark on a transformative journey towards a more sustainable and technologically advanced future.

During the course of this conference, our intention is to foster meaningful discussions, exchange ideas, and collaborate on groundbreaking research that will shape the future of sustainable development. Our diverse and distinguished panel of speakers and participants will provide valuable insights, and I encourage you all to actively engage in these discussions.

I would like to express my heartfelt gratitude to all the speakers, participants, technical partner "The Institution of India", publication partners, the sponsors, and the organizing committee who have made this conference possible. I am confident that our collective efforts will lead to meaningful outcomes. I also extend my warm gratitude to the Conference Chief Patrons, Patrons, Advisor and Chairperson for their unconditional support and guidance.

Thank you for your participation and commitment to this pressing issue. I look forward to the exciting discussions, collaborations, and breakthroughs that lie ahead during the International Conference on Smart and AI-Enabled Technology for Sustainable Development.

Dr. Vaishali Sahu

Advancements in Speed Breaker Detection: Leveraging YOLO Version 7 for Predicting Speed Breakers in Real-time

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Abstract

A major cause behind the increasing number of road accidents, are poor road conditions. Most of the developing countries are witnessing such accidents more often, these days. Improper speed breakers, broken speed breakers as well as unmarked and also marked speed breakers in some cases are making the probability of such accidents, higher. In this paper we intended to study and develop a custom trained machine learning model to detect both marked and unmarked speed breakers in real-time. A comparison study is done in this paper to select the best algorithm. The proposed methodology uses You Only Look Once (YOLO) version 7 to train a custom dataset and thus be able to detect speed breakers, achieving a precision of 0.951 and a recall value of 0.927. the m of the proposed methodology is 96.5%. The method can detect speed breakers in day-light as well as low-light real-time scenarios.

Keywords: Speed Breakers, YOLO, CNN, Detection, Marked, Unmarked, Road, Accident, Deep Learning, Real-time

Traffic Noise Prediction: Using Multiple Regression Modelling Approach

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Abstract
Traffic noise prediction models are required as aids in the design of highways to take corrective measures in advance by studying future trends, to minimize the traffic noise pollution. The main aim of the study is to identify the traffic, road geometrical and environmental parameters that increase the traffic noise pollution, so that the influencing factors may be rectified, and enhancement can be done for reducing the traffic noise pollution. To attain the goal a traffic noise prediction model is developed for highways of India using the Multiple Regression approach by considering various traffic, geometric and environmental parameters. The statistical analysis was performed and multiple regression model was developed based on the data collected from 31 sampling stations on two main highways of Delhi. The identified significant variables include number of lanes, average building height, international roughness index, temperature, windspeed and humidity. Validity of the developed model is evaluated by coefficient of determination R2=0.75 which show the model holds good fit.

Keywords: TNP model, Traffic noise pollution, Significant variables, Multiple regression modelling

Air Quality Forecast in Urban Areas Using XGBoost

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Abstract
Air pollution is a major environmental and public health concern, and predicting and forecasting air quality is essential for minimizing the adverse effects. This study examines the efficiency of Extreme gradient boosting (XG Boost) and Multi-Layer Perceptron (MLP) to predict and forecast PM2.5 in the highly polluted cities of Delhi and Kanpur, India. The Central Pollution Control Board (CPCB) website is utilized to acquire and preprocess secondary air quality and meteorological data. Root Mean Square Error (RMSE) and Mean absolute percentage error (MAPE) are the model performance metrics of the analys is. The XG Boost model performed best with the lowest RMSE of36.88 µg/m3 for Kanpur compared to the MLP model. Using the Kanpur model, the RMSE for the PM2.5 concentration in Delhi is 39.18 µg/m3. The yearly XG Boost model forecast PM2.5concentration four days in advance for Kanpur with MAPE of
20%, and three days in advance for Delhi with MAPE of 12%.The PM2.5 concentration was forecasted four days in advance byKanpur monthly model for December, with a MAPE of 5%. The monthly model forecast more accurately and depicts the trend of daily meteorology and air quality than the yearly forecast. For prediction and forecasting, the XG Boost model yields a
satisfactory result with a lower error rate. The research finding shave significant implications, enabling government authorities to provide ample warning to the public.

Keywords: Extreme Gradient Boosting (XGBoost) model,Multi-Layer Perceptron (MLP),Root mean square error (RMSE)

Effects of Coal Bottom Ash on the Standard Consistency and Setting time of Binary Binders

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Abstract
In this paper, bottom ash's capacity to be recycled is demonstrated at the submicron level. Due to its predominance in sand-sized particles, coal bottom ash has not yet been properly utilized in the building sector. To study the impact of standard consistency, initial and final setting times of the binary paste, Pulverized Coal Bottom ash (PBA) was substituted for Ordinary Portland Cement (OPC) as binary binders. Experiments show that pulverized bottom ash with a large surface area has a stronger impact on the replacement bottom ash's standard consistency. Due to the large surface area of pulverized bottom ash, water consumption increases PBA percentage levels inside the paste rise. The standard consistency and setting time of PBA cement paste at various replacement levels, ranging from 0% to 30% of PBA as a cement substitute. Vicats apparatus is used to ascertain the standard consistency and setting time, and it is discovered that the consistency of PBA cement paste grew as the PBA concentration increased and was in the range of 32% to 35.5%. When compared to OPC cement paste, PBA cement paste has a greater degree of consistency. The PBA content has been discovered to affect the PBA binder's setting time, which was found to range between 85 to 160 and 20 to 275 minutes. When the prices for OPC and PBA binder were compared, it was discovered that the price of PBA was much less than that of OPC binder.

Keywords: Consistency, Bottom Ash, Setting time, Pulverized

Influence on Mechanical, Durability and Microstructural Properties of Incorporation of Printed Circuit Board (PCB) E-waste as replacement of Coarse Aggregates with and without other Additives: A Review

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Abstract

Nowadays, generation of E-waste has been increasing enormously. This pollution leads to great environmental impact. Specially after COVID-19, E-waste generation has taken a high jump. Almost every electronic item generally consists of Printed Circuit Board (PCB). This PCB E-waste can be diminished whether by landfilling or by incineration, in both ways environmental harm is inevitable. If some E-waste can replace coarse and fine aggregates of the concrete, it will be highly beneficial for the environmental as well as construction industry. To prevent environmental pollution caused by PCB E-waste, this paper critically reviews the usage of PCB plastic E-waste in construction specially as coarse aggregates. Mechanical properties are foremost consideration while using plastics into concrete. The compressive strength is observed lowering when E-waste plastic is added to the concrete. The split tensile and flexural strength are also got in decreasing manner. Durability properties are also a crucial part for complete evaluation of any concrete. For addressing the strength degradation problem, many researchers have used different materials in different quantities. As the properties are degraded, it becomes necessary to focus up on additive materials which can improve those properties. So, behaviour of PCB E-waste concrete with and without different additional materials become interesting to observe. This work comprises progressive insights which can be carried out from different work which lead towards green concrete, with the purpose of analysing green, sustainable and eco-friendly concrete which is not only utilizing PCB E-waste but also saving environment from the soil pollution as well as air pollution.

Keywords: PCB, E-Waste, Construction, Sustainable

Detailed Analysis on Development of Legislative Measures and Management with Shortcomings and Additional Measures of E-waste in India

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Abstract

Despite being a waste material, E-waste is a good source of valuable and precious metals. Due to its financial prospects, expanded commercial possibility, source of livelihood, and eventually achieving goal, urban mining of these metals has gained substantial attention in recent times. Developed countries have established a consciousness of e-waste recycling technologies, chain setup and management. Due to several problems and a lack of applicable methods, the situation is different in developing countries as compared to developed countries. Disposal and recycling of E-waste coming from Informal sector has become problem to India. Reason possibly be due to exponential increase in E-waste generation as well as global transboundary E-waste flow. The key issues influencing the entire E-waste value chain in India includes a lack of data catalogue, unlawful disposal, and a lack of treatment choices. Hence, this synthesis covers expansion of E-waste legislative development through management and its short comings with probable additional measures.

Keywords: Electronic waste, E-waste, Statistical analysis, E-waste management, Electrical and Electronic Equipment

Moving Towards Carbon Neutrality: A Comprehensive Assessment Of Various Process Of Green Hydrogen Production

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Abstract
Climate change is a terrible threat to all living things on Earth which is caused by the excessive use of fossil fuels and this is constantly prompting us to seek for various clean energy resources. Among many available clean energy resources Green hydrogen looks promising to achieve Goals of decarbonization. This study provides a summary of current green hydrogen production technologies from a technological, economic, and policy viewpoint. It also discusses potential green hydrogen production technologies and their viability. The higher cost of green hydrogen in comparison to its other competitors is the only deciding factor that limit its true potential. The paper also elaborates on the regulatory frameworks that could support further cost reduction and the general commercialization of electrolyser technologies.

Keywords: Renewable Energy, Production Technology

AI Voice Bots: Balancing Opportunities, Threats & Risks

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Abstract
Purpose: This research defines a three-angled approach to intensify the knowledge about the AI based Voice Bots. It investigates the current usage and future applications of AI voice bots in businesses at the same time it investigates in-depth the dangers of these AI voice bots technology with a special focus on societal implications & data privacy concerns. Lastly it proposes a framework of protective measures to ensure safe interaction between the customer and the AI voice bots. Research methodology: This methodology encompasses the in-depth review of available literature and other secondary sources to understand the AI from three-dimensions: usage, Dangers and Privacy concerns & mitigation of risk. This paper enhances the readers' understanding by reviewing the available literature to present a 360 degree view of utilization AI voice bots in the businesses and the dangers and privacy issues in customer life scenarios that it entails. Findings: The main findings reveal that usage of AI tools like voice bots would increase exponentially in future in areas such as retail, healthcare, customer service, hospitality etc where it potentially change the current levels of customer interactiveness and customer relationships, making more personalized product modifications and marketing possible. At the same time there is huge potential of its misuse in terms of handling of customer data, enhance social isolation ,can perpetuate biases and stereotypes, misrepresentation, decreased human touch and other ethical considerations. Originality/value - This study intends to identify a research plan based on investigating customer journey trends in today's changing times with AI incorporation. The research provides a novel model framework of the customer journey by directing customers into different stages and providing different touch-points in each stage, all supported with AI and ML.

Keywords: Conversational AI, Conversational Chatbots, Dangers of AI

Study & SWOT Analysis of Mobile Application Development Industry

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Abstract
We are all part of the 20th century, where the emergence of new technologies is occurring day by day at a rapid pace. New technologies are entering the market with numerous frameworks that simplify the development process for both web development and mobile application development as numerous new sectors emerge quickly. Currently, development is carried out in two fields: web development and mobile application development. Earlier, the development industry was mostly concentrated on web development, but it has since emerged, expanded, and given space to mobile application development, which is in huge demand in today's era. It completely changed the way users utilized software. Now it is easier to make a variety of services accessible to the public via mobile apps since everyone currently owns a mobile phone. The research aims at studying the mobile application development industry and analyzing its capabilities using the SWOT analysis method, which is used for situational analysis and determining an action plan. Now it is easier to make a variety of services accessible to the public via mobile apps since everyone currently owns a mobile phone. To conduct a SWOT analysis of the mobile app development market and the potential it holds in the future. To analyze and comprehend the significance the mobile app development business holds globally and in India. A thorough analysis of the mobile application development market is conducted by compiling data from a variety of secondary data sources, including websites, blogs, and several case studies that are referenced at the end of this article.

Keywords: Mobile application development, Apps, Web development, Ios, Android, SWOT analysis, App Development Industry

Design and Implementation of an Arduino-Based Portable Soil Testing Device for pH and Moisture Measurement

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Abstract
Agriculture is one of the most important aspects of the Indian economy. The productivity of agricultural lands is highly affected by the quality of the soil which is considered concerning its nutritional content. pH value and moisture content value are the two most important factors to determine soil fertility and irrigation need, respectively. In this paper, a novel design for a soil testing device has been proposed to measure the pH value and moisture content of the soil. The prototype has been developed which enables on-site testing. Experimental investigations for fabricated soil testing devices were successfully carried out for dry and wet soil samples. With the proposed soil testing device, a pH value of 7.96 and 43.5% moisture content were obtained for the dry soil sample. Also, a pH value of 5.32 and moisture content of 64.1% was found in the wet soil sample. The obtained test results show that the proposed device is an affordable and portable solution for farmers to test the soil before the farming process.

Keywords: Soil testing device, Measurement, Agriculture, Testing, Prototype

Exploring the Use of Machine Learning in Cybersecurity: Can it be a Game Changer?

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Abstract
As technology advances, cybercrime is a growing threat. Ethical hackers help by identifying vulnerabilities, but traditional intrusion detection systems struggle with complex attacks. Machine Learning is a crucial component in the development of Intrusion Detection Systems. However, current approaches are subject to certain limitations. Our proposed system addresses these issues and offers a scalable solution for identifying security threats. The focus of this research paper is to design an system that can effectively handle the detection of potential security threats with improved accuracy, precision, recall, f1-score, and minimized computational and communication costs. The paper evaluates different ML algorithms and experimental results show that the Random Forest algorithm achieves the highest accuracy i.e., 99%. Furthermore, the presented model outperforms the existing IDS system.

Keywords: Cybersecurity, Intrusion detection system (IDS), Machine Learning, Random Forest

Workflow Scheduling in Cloud Computing: Challenges & Opportunities

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Abstract
The emergence of the modernistic distributed systems paragon, cloud computing, has transformed the IT sector. It has grabbed notable attention from the academic community, industries, and government organizations. In the past decade, it has come to light as the economical spine of the modern-day world by offering on-demand services to anyone, anywhere, anytime as per the "pay-as-you-use" model. The world is progressing very fast, increasing the compute requirements of workload, which has led to extensive research on how to schedule and deploy tasks in distributed cloud environments efficiently and economically. This work identifies the challenges and the probability of scheduling workflows at minimum costs without needing any infrastructure.

Keywords: Distributed, Cloud Computing, Workflow, Scheduling

Study of Under Water Optical Communication System under the Influence of Turbulence

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Abstract
Due to the ocean's size and relative lack of exploration, underwater communication technologies are highly desired for subaquatic environment activities. The ten-meter long and few gigabit per second range optical communication system is practical and has an exciting prospect when compared to the currently available but low data rate (a few kilobits per second) acoustic technology and limited distance (a few metres) radio-frequency communication schemes. The visible range's high bandwidth and minimal ttenuation effect are utilised by the underwater wireless optical communication (UWOC) method for a variety of applications, including seafloor and offshore exploration, oil pipe control and maintenance, and pipeline leak detection. However, the underwater environment's attenuation, scattering, and turbulence effects present the biggest obstacles to the development of UWOC systems. The underwater optical channel is difficult to predict because of the temperature, salt, and bubbles, which also reduce the quality and range of optical beam transmission. In this paper, we investigated underwater turbulence generated and induced by turbulence, air bubbles.

Keywords: Air bubbles, salinity, temperature gradient, underwater wireless optical communication

A Study on Efficiency Prediction of Perovskite Solar Cell using Random Forest

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Abstract
This research investigates the impact of data points and parameters on predicting the efficiency of perovskite solar cells using a random forest ML model. Three cases of a dataset, with 60, 50, and 40 data points, were analyzed, revealing that accuracy decreases with reduced data points. The model's accuracy was found to be 95.73%, 92.88%, and 92.07% for the respective cases. Among the parameters 'Voc', 'Isc', 'Jsc', 'Pmax', 'Vmax', 'Imax', and 'Apeture', 'Jsc', 'Vmax', 'Apeture', 'Imax', 'Jsc', 'Voc', and 'Pmax' were identified as influential in predicting efficiency. This study aids in optimizing perovskite solar cells for enhanced efficiency and sustainable energy applications.

Keywords: Perovskite Solar Cells, Power Conversion Efficiency, Machine Learning, Random Forest

Convolutional neural network-based crop classification using remote sensor data

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Abstract
Sorting crops in large planting areas on a large scale is challenging without proper tools, leading to potential errors. Remote sensing data, which provides spectral signature information, has become valuable for accurate crop classification. This study developed a system that utilized remote sensing data and a modified VGGNet CNN to automatically classify crops. The system achieved impressive results, with an F1 score of 96.8%, accuracy of 97.57%, recall rate of 96.1%, and precision of 97.7%. Comparatively, other machine learning classifiers such as SVM, Gaussian, AdaBoost, and Logistic Regression did not perform as well as the CNN. These results demonstrate the effectiveness of CNNs for crop classification using spectral signatures from remote sensing data.

Keywords: VGGNet CNN, Deep Learning, Remote sensing data, Landsat8 satellite data

Design aspects of a SDR for the new NavIC L1 SPS signals

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Abstract

Navigation with Indian Constellation (NavIC), earlier known as Indian Regional Navigation Satellite System (IRNSS), is an independent regional navigation satellite system, designed to provide accurate position information in the Indian subcontinent. Till May 2023, NavIC used to provide Standard Positioning Service (SPS) on two frequency bands, namely, L5 (centered at 1176.45 MHz) and S (centered at 2492.028 MHz). NavIC constellation's newest satellite, NVS-01, launched on May 29, 2023, provides SPS on an additional frequency band, namely L1 (centered at 1575.42 MHz).

This paper deals with the design considerations and the architecture of a Software Defined Radio capable to process the new NavIC L1-SPS signals. The signal structure of the new NavIC L1-SPS signals is different than that of the NavIC L5-SPS and S-SPS signals and contains several features which entail a different approach towards the implementation of a NavIC-L1 SDR as compared to a NavIC L5/S receiver.

Keywords: Navigation with Indian Constellation (NavIC), SPS, PRN, SDR, SBOC, BCH, LDPC

Rainfall Prediction using Fuzzy Logic

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Abstract
In this paper, experimental work is done with real world scenarios and explore how fuzzy logic can be applied in MATLAB to find the amount and level of rainfall. Five triangular membership functions ranging from Very high, High, Medium, Low and Very Low are used. At present there are many techniques that can be used for forecasting rain like artificial neural networks and machine learning techniques which use previous year rainfall data to predict, but Fuzzy logic provides efficient technique compared to conventional methods because such techniques require lots of computational power to build the model and predict the future aspects. The proposed model is relatively inexpensive to run and the software used for this is fuzzy logic toolbox in MATLAB.

Keywords: Fuzzy Interface System, Rainfall prediction, Fuzzy Logic, Mamdani System, fuzzification

Conceding Sentiment Prognosis on Twitter Data

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Abstract
Twitter is the biggest micro-blogging website that gives people a platform to share their opinions about any new happenings around the world. The size of tweets is generally short which makes it very suitable for opinion mining. The primary focus of the paper is to analyze the feelings and ideas. In this paper, analysis is done on the classification of tweets on a particular keyword. The tweets related to the given keyword are collected, analyzed, and the result is generated in the form of percentage of positive, neutral and negative sentiments, which gives us a sense of overall sentiment of the keyword. Further, Classification is done using supervised learning algorithms and the best among these will be found by calculating the accuracy of each.

Keywords: Sentiment Analysis, Logistic Regression, Support Vector Machines, Opinion Mining Supervised Machine Learning, Naïve Bayes, Decision Tress, Accuracy, Polarity Prediction

Power Management of a DC Microgrid

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Abstract

Advancements in technology, economic challenges and impacts of environment demands distributed generation rather than centralized conventional generation. Use of distributed generation alleviates pressure from the main transmission system. But due to intermittent renewable generation, there are a number of technical issues in distributed generation, as it can affect the power quality of utility grids. The microgrid was introduced to meet the uneven behavior of distributed generation and surging their use. DC microgrids are popular as dc output sources such as wind mills, photovoltaic systems can be connected without any requirement of ac/dc conversion thus contributing to system efficiency. However, a number of technical issues have to be met for the installation and proper working of DC microgrids. This paper presents, a multilevel control structure which guarantees control of a dc microgrid in an efficient manner. A case study implementing a dc microgrid comprising of PV arrays, BESSs wind mill and AC grid is also presented. The dc bus voltage obtained is maintained constant with the help of PI(Proportional Integral) controller used.

Keywords: Energy Management, Hierarchical Control, Primary Control, Secondary Control.

Exploring NFT Ecosystem: Understanding the Issues and Opportunities in Creating Non- Fungible Tokens

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Abstract
The term "NFT Fungibility" describes products or objects that can be traded for other products or items of the same kind. Non-fungible tokens, or NFTs, are those that cannot be traded for any other products or things. A non-fungible token (NFT) is a picture of a special digital asset that cannot be exchanged for another NFT of the same kind. The idea behind NFT is that it is an un- replaceable digital certificate of authenticity. The concept of Non-Fungible Tokens (NFTs) has gained a lot of attention in the blockchain and cryptocurrency communities. Since these tokens are indivisible and one-of-a-kind, they enable the creation and ownership of digital goods like works of art, music, and even virtual real estate. In this paper, we provide a comprehensive study of NFTs, including their history, architecture, issues, creating NFTs and current use cases. As well as discussing the potential effects of NFTs on the larger art and music industries, we also study the economics of NFTs, including pricing strategies and market patterns. Finally, we examine the future of NFTs, discussing their potential impact on gaming, sports, and other industries, as well as their potential to revolutionize ownership and intellectual property rights.

Keywords: Non-fungible token, Blockchain, Decentralization, smart contract system.

Smart Sericulture Monitoring System using IoT

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Abstract
We discuss the system of sericulture farming and the approaches that can improve the quality of the silk that can be produced and also can improve the efficiency of the production. The major parameters that impact the silkworm are temperature, humidity, and light. These are achieved with the help of a Microcontroller(Arduino) which is assisted by IoT, all the sensor data which is acquired from sensors from the field will update a simple cloud channel so the farmer can monitor from any location. The main objective of this is to acquire good quality silk with the least human intervention and an effective solution to the sericulture field while simultaneously being cost- effective.

Keywords: Silkworm, Sericulture, IoT, Arduino, Humidity, Temperature, Light

Recent Developments in Wire Arc Additive Manufacturing for Sustainable Development

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Abstract

Additive manufacturing is a process of industry 4.0 in the 21st century, which makes product layer by layer from CAD model to final product. Additive manufacturing is further classified into powder-based and wire-based additive manufacturing. Wire arc additive manufacturing (WAAM) is wire based direct energy deposition method in which wire supply from a wire spoon through a nozzle, and an arc is generated, which melts the wire. Wire arc additive manufacturing has a good deposition rate, low cost, high efficiency, and high speed. Cold metal transfer (CMT) is an advanced version of gas metal arc welding (GMAW) with low heat input, so very few spatter and clean surfaces are produced in the CMT process. In the cold metal transfer process, metal transfer phenomena happen due to a short circuit transfer mechanism. Wire arc additive is widely used in automobiles, aerospace, tool, and marine industry nowadays.

Keyword: Cold Metal Transfer, Additive Manufacturing, Design of experiment, ANOVA, Optimization

Algal Biodiesel Production for its Utility as a Third-Generation Fuel: A review

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Abstract
Algal biodiesels have emerged as a promising renewable energy source with numerous advantages over conventional fossil fuels. This paper provides a comprehensive overview of the diverse production processes, types included, drawbacks and benefits while also critically assessing the potential gaps in the field. With a plethora of advantages like cost-effectiveness, nutrient cycling, yield benefits, sustainability and versatility required for commercial usage, several challenges are yet to be addressed for effective implementation. Novel research in aspects like enhanced lipid production, strain selection; needs to be further evaluated to make it accessible with uniformity. This paper highlights the methods and elements that contribute towards scaling up of algal biofuels production while upholding the goal of a cleaner, and greener sustainable future at the forefront.

Keywords: Algae, biofuels, biomass, algae cultivation, algae production ,

Fundus Image Generation using EyeGAN: An improved Generative Adversarial Network model

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Abstract

Deep learning models are widely used in various computer vision fields ranging from classification, segmentation or identification. But these models suffer from the problem of over fitting, due to the lack of balanced and labelled data. Generative Adversarial Networks are unsupervised learning image generators which do not require any additional information. GANs generate realistic images hence preserving the minute details from the original data. In this paper, a GAN model is presented for fundus image generation to overcome the problem of labelled data insufficiency faced by researchers in detection and classification of various fundus diseases. EyeGAN is a nine layered structure based on conditional GAN which generates unbiased good quality credible images and outperformed the existing GAN models by achieving the least Fréchet Inception Distance of 226.3. The public fundus datasets MESSIDOR I and MESSIDOR II are expanded by 1600 and 808 synthetic images respectively.

Keywords: Deep Learning, FID, Conditional GAN, Style GAN

An Innovative Medical System to Reduce Mortality Rates

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Abstract

Health service plays a crucial role in addressing the rising mortality rate among the Indian population, as indicated by data from public health and family welfare statistics, which shows a consistent increase in mortalities year after year. The goal of this study is to demonstrate a relationship between health care utilization and mortality utilizing the Apriori algorithm and Apriori TID algorithm. The number of fatalities in each population as a percentage of that population is expressed by mortality rates, which are demographic statistics. Although mortality and morbidity are two different concepts, mortality rates are frequently used to characterize a person's general health and well-being. As the mortality rate continues to rise, it becomes imperative to address the potential challenges that may arise in the healthcare sector. Therefore, it is crucial to focus on reducing the mortality rate through initiatives that benefit both healthcare providers and the general public. This project aims to improve healthcare services by employing various data mining algorithms to extract frequent item sets from the input data, which can then be used to generate association rules. Additionally, a dedicated website has been developed for hospitals to upload datasets and enhance their services.

Keywords: Health service, Apriori algorithm, Apriori TID algorithm, Data mining

Effect of Pulverized Ceramic Waste Powder as a Partial Cement Replacement in Cement Paste and Mortar Application

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Abstract
The current global challenge of waste management necessitates the exploration of viable alternatives. At present, the utilization of garbage is regarded as a viable alternative to landfilling. Numerous scholarly investigations have been conducted pertaining to the utilization of waste materials within the construction industry. The prevailing focus of these studies revolves around the incorporation of waste substances in building structures, as well as the utilization of waste in concrete production to yield novel forms of concrete. The utilization of waste-generating practices is not only cost-effective, but also represents a highly efficient and appealing strategy for addressing the issue of garbage disposal. The escalating quantity of ceramic waste has sparked the interest of numerous individuals in exploring sustainable possibilities for its utilization in construction materials. This work presents an investigation on the utilization of submicron ceramic waste for the production of sustainable construction materials. In order to modify the mechanical properties of blended cement products, submicron ceramic powder was employed as an additional cementitious ingredient, substituting 0 to 30% of the cement content. The findings of the study indicate that the utilization of ceramic powder at a concentration of 15% yields the most favourable outcomes for submicron ceramic waste powder. In addition, it is worth noting that ceramic powder exhibits superior mechanical qualities compared to control concrete. Moreover, the utilization of ceramic powder not only yields economic advantages but also contributes to environmental preservation by reducing the need for natural areas to be designated as waste disposal sites.

Keywords: Ceramic waste powder, Pulverized, Cement, Binder, Mortar, Strength

Effect of Submicron Ceramic Waste Powder on the Standard Consistency and Setting properties of Binary Binders

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Abstract
The most pressing problem facing humanity today is waste, and finding a solution is a top priority. Use of waste is now seen as a viable alternative to landfilling. Many papers have been written on the topic of recycling in the building industry, with much of the research focusing on repurposing old structures or incorporating waste materials into concrete to create novel varieties of the material. Putting waste to good use is not just a cost-effective solution to the disposal problem, but also an attractive one. The ever-increasing quantity of ceramic waste has caught the interest of many in discovering eco-friendly uses for it in building materials. In this study, we present a ceramic waste that was pulverized at 600 RPM to convert it into submicron level. Pulverized Ceramic waste was used to supplement cement up to 30%. The standard consistency and setting time of pulverized ceramic waste powder (PCWP) used in cement paste at various replacement levels, ranging from 0% to 30% as a cement substitute. Vicats apparatus is used to determine the standard consistency and setting time, and it is observed that the consistency of PCWP increased with the increasing % level of PCWP. When compared to OPC cement paste, PCWP cement paste has a greater degree of consistency. The PCWP content has been revealed the effect of PCWP binder's setting time, which was found to range between 90 to 138 and 200 to 245 minutes. When the prices for OPC and PCWP binder were compared, it was discovered that the price of PCWP was much less than that of OPC binder.

Keywords: Consistency,Ordinary Portland Cement, Pulverized Ceramic waste Powder (PCWP) Setting time, SEM, Thermogravimetric

Automated Plant disease detection: CNN for corn maize, tomato and potato

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Abstract
Plant ailments pose a substantial threat to global food security and the agricultural sector. Swift and precise detection of these diseases is pivotal for effectively managing them and preventing crop yield reductions. Lately, advanced deep learning techniques, specifically Convolutional Neural Networks (CNNs), have exhibited encouraging outcomes across various tasks involving image recognition. This undertaking strives to create and execute a model founded on CNNs to prognosticate plant diseases through leaf images. The proposed strategy encompasses three main phases: compiling and preparing the data, developing the model architecture, and assessing performance. Initially, an extensive dataset of plant leaf images, encompassing leaves afflicted by diverse diseases, is assembled. The images undergo preprocessing to heighten quality and eliminate disturbances, ensuring a dependable model training process. Subsequently, a CNN structure is devised and trained employing the dataset. The chosen CNN model adheres to a sequential design, where each layer possesses precisely one input and output. These layers are arranged sequentially to construct the entire network and incorporate multiple convolutional layers such as Conv_2D, Max_Pooling2D, Flatten, and Dense, enabling the learning of features from the input images. The findings underscore that the CNN-centered model for forecasting plant diseases attains remarkable training precision of 99.65%, accompanied by a testing accuracy of 99.44% and a validation accuracy of 98.61%, proficiently identifying prevalent ailments like common rust disease in corn plants, bacterial spot infection in tomato crops, and the early blight ailment in potato plants. In conclusion, the proposed CNN-driven prognostic model for plant diseases manifests encouraging outcomes in precisely recognizing these diseases from leaf images. The efficacious application of this model can assist farmers and agricultural specialists in informed decision-making, ultimately leading to enhanced crop administration, decreased losses, and a positive impact on global food security. Furthermore, this endeavor establishes a groundwork for forthcoming research and breakthroughs in the realm of deep learning-assisted plant disease detection.

Keywords: Image categorization, Identification of Plant diseases, Convolutional Neural, Network, Deep Learning

Enhancing Security and Privacy in Smart Cities: Exploring the Role of Blockchain Technology in Cyber-Physical Systems

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Abstract

The integration of cyber-physical systems (CPS) with smart cities has introduced numerous benefits, such as improved efficiency and sustainability. However, this integration has also raised concerns over security and privacy, particularly in terms of cyber-attacks, data breaches, and unauthorized access. Blockchain technology has been more prominent in recent years as a potential response to these problems. In recent years, blockchain technology has matured as a dependable solution to overcome these challenges. This paper explores the role of blockchain technology in enhancing the security and privacy of CPS in smart cities. It provides an overview of smart cities, CPS, and blockchain technology, and discusses the various security and privacy issues that arise when integrating these technologies. The paper then examines the potential of blockchain technology to address these challenges, including its ability to provide a tamper-proof and decentralized ledger, as well as secure and decentralized data sharing. The paper further discusses about the blockchain based CPS and highlights the existing blockchain-based CPS applications in smart cities and analyses their benefits and limitations to provide insights for policymakers, city planners, and researchers on how to design more secure and efficient smart cities.

Keywords: Cyber-Physical Systems, Smart Cities, Blockchain Technology, Security, Privacy, Decentralized Ledger, Sustainability

3-Tier Lightweight Framework for Redefined Security and Privacy Enablers in Sustainable Smart Cities

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Abstract
Cities are now transforming from digital cities to smart cities which are more oriented towards technology and sustainability. When a city is interconnected, adaptive, autonomous, sustainable, and robust, it is called a "smart" city. The integration of big data and interconnected devices with a rapidly growing population leads toward the establishment of smart cities. As the population grows and resources get scarce, efficient utilization becomes important. By 2025, the world population is projected to increase to 8 billion and IoT devices are projected to increase to 80 billion, with a 1:10 person to device ratio! Smart cities help to improve daily life and encourage sustainable development to improve the functionality of tasks. However, innovation cannot overlook the aspect of security and privacy threats while implementing. Rudimentary security mechanisms may not complement the bloom of technology. In this paper, we discuss the smart city components along with the associated threats. Also, we redefined the security and privacy objectives in light of the requirement of smart cities. Further, a 3-tier lightweight and scalable framework for sustainable smart cities is proposed with redefined security and privacy objectives.

Keywords: E2EE, Smart Governance, Sustainable Smart Cities, Security, Privacy

Retrospection of Bond strength of substrate with repair material for historical masonry structures

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Abstract
Masonry infrastructure repair is a daunting challenge. The short intervention and limited resources have led to the loss of novel rendering and finishing materials. In the present study, the bibliometric analysis is conducted for period 2003 to 2022. Co-cited reference analysis, keywords, cluster, and temporal evolution were used for analysis using Citespace software. Additionally, summary of suitable content showed that major challenges in this field are disparities in the properties of old mortar and new materials and the lack of documents to understand nature and methodology of construction. Based on the analysis and content review, a conceptual model is proposed inculcating four aspects: Finite element analysis, preparing numerical models, improvised techniques for bonding mechanisms and understanding mechanical attributes.

Keywords: repair material, mortar, bond strength, Co-citation Analysis, characterization

ANN-Based Automatic Speech Recognition System in Kannada language for People with Partial Speech Disorders

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Abstract

An innovative approach for assessing partial speech problems is the automatic speech recognition (ASR) system. ASR technology is used for significant quantity of naturally occurring speech from speakers with disabilities which can be subjected to linguistic and acoustical study. Kannada, an important Indian dialect, is the focus of the present study. ASR offers a variety of strategies based on the situation. The isolated word ASR system for the Kannada language is presented in the proposed study using artificial neural networks. Words that are spoken can be converted into the matching written formats using isolated word recognition. The properties of a speech stream are distinguished using Mel Frequency Cepstrum and Linear Predictive Coding (LPC). The objective of this study is to create a standalone word recognizer utilizing a word acoustic model and a combination of LPC and ANN. Two phases, such as training and testing, are part of the proposed task. 50 isolated words are recorded utilizing multiple speakers in a silent environment as part of the training process. There were both individuals with partial speech disorders and normal speakers of all ages and genders among individuals. The features of the resulting sample are extracted using LPC and trained using ANN after each word is repeated several times by the particular speaker. During the testing phase, the system receives input of isolated word utterances, LPC coefficients are determined, and recognition is done using the sigmoid function and text that corresponds to the stated word. 50 isolated words from the Kannada language were used to train and test the system. The system results obtained with an accuracy of 95.8 % for a combined population of normal speakers and partially speech disordered individuals.

Keywords: Partial Speech Disordered (PSD), Automatic speech recognition (ASR), Linear Predictive Coding (LPC), Artificial Neural Networks (ANN)

A study on Mental health of working professionals based on age and gender using machine learning techniques

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Abstract
The research on the current scenario shows that there has been an increase in suicides as a result of poor mental health. An individual's emotional, psychological, and social well-being are all reflected in their mental health. It determines how someone perceives, feels, and responds to a circumstance. Both keywords work and personal life can be impacted by poor mental health. For many years, the subject of mental health has been important and challenging, especially for working professionals. People eventually suffer from the contemporary (hectic) lifestyle and workload, increasing their risk of mental illnesses like anxiety and mood disorders. Thus, mental health issues among working professionals are on the rise. In this current scenario, there is need to study mental health detection. Machine learning is a field that is frequently used to make predictions or categorize objects. Thus, the system to predict the health of the working professional was proposed using machine learning. The proposed system adds number of machine learning techniques to forecast the mental health state of information technology professionals through the web application. The results were promising and as expected.

Keywords: Mmental health, Machine learning, Logistic Regressio, K-nearest neighbor, Decision tree, random forest

An enhanced efficientnet algorithm for prediction of cervical spine fracture

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Abstract
Over 1.5 million spine fractures result in 17,730 spinal cord injuries yearly. The cervical spine is where fractures in the spine most frequently occur. Usually, fractures in the cervical spine are caused by car accidents, slips and falls, and conditions like osteoporosis. The majority of the fractures are caused by osteoporosis. Every year, 2 million broken bones in people of all ages occur due to this condition. A cervical spine fracture can cause paralysis, brain damage, and possibly death for the sufferer. A delay in a fracture diagnosis can have terrible repercussions, including worsening of neurologic function and even death. It is crucial to find vertebral fractures quickly. Computed tomography, multidetector computed tomography, magnetic resonance imaging, and other techniques can be used to diagnose spine injuries. The results of these Computed Topography and Multidetector Computed Topography Scans are more precise. We use a state-of-the-art technique to build a model using different Deep neural network algorithms, such as EfficinetNet, Vision Transformer, VGG, Inspection, MobileNet, and Densenet, which will be applied on CT and MDCT scans of patients with spinal cord fractures for foretelling and diagnosing the trauma, paralysis, or catastrophic decline in neurologic function with serious repercussions. The accuracy of the proposed EfficientNet model in evaluating the probability of a cervical spine fracture is 79%.

Keywords: Cervical spine fractures,Trauma or neurological problems, Deep neural networks, EfficientNet, Fracture Prediction, CT Scans

Detection of amyotrophic lateral sclerosis using support vector machine

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Abstract
A neurological disease called Amyotrophic Lateral Sclerosis exists that damages brain and spinal cord nerve cells, causing muscular atrophy and eventually paralysis. Use a Support vector machine (SVM) for Amyotrophic Lateral Sclerosis diagnosis as part of machine learning to get the most accurate results for categorising health data. Early Amyotrophic Lateral Sclerosis diagnosis is essential for effective treatment. A supervised machine learning approach that excels in large-scale settings is the support vector machine. It is especially helpful in tackling complex problems with high-dimensional data where the characteristics and the goal variable have a non-linear relationship. In Some previous the functions are poorly connected and the use of classification models is appropriate for portable datasets that obscure key patient informationare best suited for short dimensional spaces, according to previous research applying the Functional Rating Scale score for Amyotrophic Lateral Sclerosis yields the least trustworthy conclusions.The ALSFRS-R score function reveals discrepancies in the bulbar,limb, and respiratory functions.The accuracy of the diagnosis can be impacted by a number of factors that alter sEMG signals, including electrode location, muscle exhaustion, and movement artefacts. Our findings imply that ML-based techniques may enhance the speed and diagnostic precision of ALS identification, which may result in better outcomes for people with this crippling condition.

Keywords: Motor Neuron Disease Diagnosis, Support Vector Machine, Amyotrophic Lateral Sclerosis ALS Clinical Trials Database, Fasciculations, Pooled Resource Open-Access, Graphical User Interface.

Classification of Psoriasis and Eczema Using Random Forest Algorithm

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Abstract
Random Forest plays an important role in different fields like Healthcare, Image, and Speech Recognition, among these Dermatological Disease detection is expensive due to Advanced Laser Technology. It's critical to have affordable illness detection. Machine learning algorithms are used to accomplish it. An algorithm for machine learning used for classification is called Random Forest. The algorithm is a type of ensemble learning technique that combines different decision trees to create a more accurate as well as reliable model. The Proposed approach can provide high accuracy and classify into either psoriasis or eczema diseases.

Keywords: Disease Detection, RandomForest, Classification, Psoriasis, Eczema, Laser Technology

Continuous Testing Modular Framework: A Literature Survey

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Abstract
Applications are continually tested across the whole software development life cycle (SDLC) in a method known as continuous testing (CT), which is used to assess the quality of software. The goal of CT is to offer important feedback earlier, enabling faster delivery and higher-quality software. The modular automation framework adheres to the abstraction principle and is readily extendable. With their minimal test scripts, modular frameworks are adaptable and incredibly simple to maintain. The "Continuous Testing Modular Framework" will be presented in this paper, and it will be used to demonstrate the advantages of a modular framework for continuous testing. This survey study offers a comparison and analysis of research surveys.

Keywords: DevOps, DevOps tools, Continuous Integration (CI), Continuous Testing (CT), Cloud

Comparative study of Regular Arch and Basket Handle Bridges and optimizing Efficiency and Material Usage

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Abstract
Bridges serve as critical infrastructure components, demanding rigorous engineering analysis to ensure structural integrity and efficient load distribution. Aspiring civil engineering students must grasp the behaviour of various bridge designs under different loads to optimize construction methods and reduce material consumption. This research work centres on a comparative performance analysis between regular arch bridges and innovative basket handle bridges in terms of deflection, shear force, bending moment, and potential reductions in required steel quantities. Regular arch bridges boast a long-standing history in bridge engineering, celebrated for their timeless elegance and structural efficiency. Conversely, basket handle bridges have gained popularity as creative alternatives to conventional arch bridge designs. The study delves into theoretical concepts, design considerations, and construction techniques unique to both bridge types. Employing analytical calculations and finite element analysis (FEA), researchers evaluate deflection, shear force, and bending moment profiles of regular arch bridges under varying load conditions. Additionally, the quantity of steel required for bridge construction is quantified, accounting for specific design parameters and material properties. This comprehensive analysis aims to assess the performance of regular arch bridges and basket handle bridges while identifying potential reductions in steel usage. Factors such as structural efficiency, cost-effectiveness, and aesthetic appeal are considered, enabling civil engineers and bridge designers to make informed decisions based on specific project requirements. Ultimately, this study seeks to enhance bridge construction practices by optimizing efficiency and minimizing material usage, contributing to more sustainable and resilient infrastructure development.

Keywords: Bridges,Regular Arch, Basket Handle, Comparative Performance, Efficiency, Material Usage

Renewable Energy Management In Smart Grid Using XGBoost Algorithm

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Abstract
Machine learning algorithms are suitable in the management of renewable energy sources in smart grids. One of the most significant challenges in the integration of renewable energy sources into the grid is the intermittency of generation, which makes it difficult to forecast and manage the energy supply. The variability and unpredictability of renewable energy sources can lead to imbalances in energy supply and demand, causing grid instability and affecting energy quality. This can result in power outages, voltage fluctuations, and other disruptions that can affect the reliability of the grid . XGBoost algorithm is suitable for finding the stability of smart grid. It is highly accurate and efficient machine learning algorithm that is well-suited for predicting and analyzing energy generation and consumption patterns in a smart grid . By accurately forecasting energy generation, grid operators can better balance energy supply and demand, reducing the likelihood of grid instability and power outages.

Keywords: 1.smart grid, 2.XGBoost algorithm, 3.smart grid stability dataset, 4.Energy Supply, 5.Energy Demand.

Transportation of Hydrogen Blend through Natural Gas Pipelines- Sustainable Development -Role of statistical techniques

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Abstract

As a step towards reducing carbon emissions, several renewable options are being explored worldwide. Out of the several challenges with renewable energy such as production, storage, and transportation, the paper deals with the transportation of renewable energy as a hydrogen transport. Hydrogen is an important element in India's energy basket considering the target for carbon emission and large import bills for the purchase of fossil fuels. Hydrogen can be used either as a fuel with or without blending in natural gas or as a feed to other industries such as fertilizers.

Hydrogen transport through pipelines exists in various countries, albeit, with certain restrictions like low pressures, diameter, selection of steel grades, etc. Similarly, various design parameters have been added for hydrogen transport in ASME B 31.12 considering the threat assessment. The presence of hydrogen can deteriorate steel pipes, welds, valves and fitting through a variety of mechanisms including diffusion of hydrogen into steel matrix causing "Hydrogen Embrittlement". Damage caused by Hydrogen leads to cracking, blistering, reduction in mechanical properties and an increase in fatigue crack growth rate. The risk increases significantly in high-strength steel used in pipelines at higher stress levels.

Laying a new hydrogen pipeline entails significant costs as an additional infrastructure compared to repurposing an existing natural gas pipeline for the transport of hydrogen/hydrogen blend. In this paper, the limits of ASME B31.12 for Hydrogen transport are analyzed and compared in the context of existing Natural gas pipelines. ASME B 31.12 suggests the evaluation of one physical sample per 1.6 km in an existing natural gas pipeline for evaluation of the suitability of mechanical properties of the pipeline steel considered for repurposing for hydrogen service. There is a need for an alternate mechanism apropos the suggested step, being difficult to implement. The paper discusses a full methodology using Bayesian-based statistical modeling for the assessment of physical properties of the pipes which include in-situ metallography at the selected (based on Bayesian sampling) locations and weld joints, correlation of various properties of steel with in-situ metallography results for assessment of fracture toughness. The model would provide an alternate route for repurposing existing natural gas pipelines to hydrogen service.

Keywords: Hydrogen pipeline, Hydrogen Embrittlement, Repurpose, Statistical Modelling,

ENCRYPTION AND DECRYPTION ALGORITHM IN SIGNED GRAPHS

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Abstract
A signed graph S is a graph G in which every edge x carries a value s(x)∈{+1,-1} called its sign denoted by S=(G,s). Encryption and Decryption techniques are used to keep private information safe in the digital era. Signed graphs are very useful to make a strong and secure cryptographic system. A new way of using signed graphs is introduced to encrypt and decrypt the data. The method involves turning plain text into signed graph representations. Then, signed graphs are used in a graph-based encryption and decryption process. In this paper, signed graph basic ideas, algorithms, and security are defined. The signed graph-based solution is shown to be effective and efficient by doing a lot of experiments and comparing it to other encryption methods. The results show that this new technique has the potential to be a useful addition to the world of encryption and decoding methods.

Keywords: Security, Encryption, Decryption, Signed Graph, Cryptography, Algorithm, Network

Enhancing Tinkering Lab Efficiency and Utilization through Smart Automation

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Abstract

This research paper describes the successful implementation and result of the automation of The NorthCap University's Tinkering Lab. The automation system was designed to ease numerous aspects of lab management, including lights and fans control, component detection, security via a lock system, lab utilization monitoring, and real-time environmental monitoring using the Internet of Things (IoT). The architecture of the automation system includes multiple components that work together. An Android app that acts as the user interface, allowing users to input data via buttons or voice commands. This data is then sent to an ESP32, which processes it. If the data is unrelated to the functioning of ESP32, it acts as an MQTT publisher and publishes it. The Raspberry Pi serves as an MQTT broker, which serves as a central hub for handling communication between different devices. Other ESP8266s function as MQTT subscribers, receiving the data and giving the desired output. This automation has enhanced faculty productivity while also enhancing the overall management of the lab. The paper describes the design and deployment of the automation system and emphasizes its positive impact on everyday operations and the user experience.

Keywords: Tinkering Lab, Automation, Internet of Things (IoT), Security, MQTT, Raspberry Pi Android App

Amyotrophic Lateral Sclerosis Disease Detection Using Deep Learning Algorithms: Review

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Abstract
Amyotrophic Lateral Sclerosis (ALS) often known as Lou Gehrig's disease, is a rare neurological condition that damages motor neurons. Motor neurons are nerve cells in the brain and spinal cord that regulate voluntary muscular motions including chewing, walking, and speaking. ALS causes motor neuron degeneration, resulting in muscle weakness, twitching, and atrophy. As the disease progresses, the brain's ability to regulate voluntary movements diminishes, leading to worsening symptoms and potential fatality. Currently, there is no known cure for ALS, but various treatments and therapies can help manage symptoms, improve quality of life, and provide support for individuals with the disease. In the context of ALS, deep learning techniques can be applied to assist with clinical trials, predict disease progression, and aid in diagnosis. This literature review aims to provide a comprehensive overview of the current state of research on the application of deep learning in ALS. The review also investigates the deep learning models to analyze and process diverse medical data, including patient records, genetic information, and medical imaging. By employing these models, researchers can identify specific patterns and biomarkers associated with ALS, facilitating earlier and more accurate diagnoses.

Keywords: Amyotrophic Lateral Sclerosis, atrophy, Deep Learning, Motor neurons, progressive

Status on Energy Harvesting from Ambient Light and Its Future Prospects

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Abstract
Billions of wireless sensing devices must be powered for IoT applications. Collecting energy from the ambient environment to power sensor nodes is a promising solution. Solar energy has been one of the main sources of ambient energy due to its availability, higher power density, and the maturity of the solar photovoltaic industry. However, there are many scenarios (indoor environment, outdoor environment during night time, poor weather conditions, underground, etc) where ambient solar energy is either not available or not sufficient for practical applications. For such scenarios, other renewable sources of energy must be sought. Energy Harvesting applications are potentially everywhere. Applications that are now utilizing energy harvesting (or scavenging) include building automation systems, remote monitor/data acquisition devices and wireless sensor networks. Consumer electronic devices such as smartphones, tablets, and laptops typically require recharging once or twice a day and have limited battery life. Increasing adoption of and dependence on smartphones has led to consumers occasionally carrying conventional chargers, USBs, power packs, or solar chargers to sustain their devices throughout the day. These products are bulky, heavy, and expensive. New approaches are necessary to improve consumers' day-to-day experiences with charging their electronic devices. This paper explores the application of ambient light energy harvesting using different method.

Keywords: Energy Harvesting, Ambient Light, MPPT, IoT Battery, Solar Cells

Fintech and Financial Cybercrimes in the Indian Banking Sector: A Bibliometric Analysis

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Abstract

The digital revolution has crossed the doorstep of the banking sector across the globe. Financial Technology (fintech) has drifted away from the essence of the traditional banking system and had replaced this brick-and-motor system with the new application based revolutionized banking system. In today's era, customer wants innovative services which are quick and easy to handle, which is why fintech is gaining importance in the current market and triggering disruption to the traditional banking concept. In this race of providing innovative services to customers between bankers and fintech companies, the real winners are customers. Thereby, making fintech an industry norm in the financial service sector. This paper analyses 473 journal articles with a fintech adoption in the banking sector in 45 leading finance, economics, and banking journals between 1999 to 2022. The most persuasive articles, authors, and journals were identified through citation and bibliometric analysis. An investigation of the trends focused on the research topic, over twenty-three-year periods identified behavioral intentions, demographics, managerial strategies, financial innovations, cyber frauds, and cyber security. The implications of fintech in the Indian Banking sector are multi-faceted. The present study focuses on the influence of fintech on financial cybercrimes in the banking industry. We attempt to provide an extensive review of past pieces of literature focusing on the impact of fintech on the Indian banking sector through bibliometric analysis.

Keywords: bibliometric, payment gateway, cyber frauds, banking sector, cyber security, fintech

Infrastructure for smart and sustainable mobility and positive environmental impact of flexible work arrangements

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Abstract

India is on the brink of two major transformations, economic and sustainable transformation. Economic transformation is to meet growth and lifestyle aspirations of 1.4 billion people and sustainable transformation is to achieve carbon neutrality. Both these transformations are inter-related as increase in economy, industrialization and urbanization mitigation of Green House Gases (GHG) emissions are also important. In view of this India has set an ambitious target of achieving NET ZERO by 2070. This can be achieved by focusing on reduction of emissions in energy intensive industries, mobility/ transportation and agriculture. This paper focuses on reduction of GHG emissions in mobility sector and planning of smart cities. Vehicular emission accounts for 20-25% of total emission due to higher dependency on fuel. To achieve target of net zero by 2070 in transportation sector, innovations are required in development of alternate fuels, e-vehicles, better infrastructure of roads and strong public transport system. In this paper, three solutions are proposed to reduce the passenger vehicular emission and traffic congestion: first is to reduce the commute of organized workforce by 30% by giving them an option of remote working, second is to develop an infrastructure of transit-oriented development and third is to promote the use of rail-based mass rapid transport system on the identified and dedicated routes.

Keywords: FWA, Vehicular emission, IR residential facilities, Transit-oriented development DMRC.

Heat Management in Rooftop Photovoltaics: ANSYS Simulated Evaluation of Nanofluid and Water Coolants in Semiarid Region

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Abstract
In this study, ANSYS simulation was used to investigate the impact of different cooling fluids on the surface temperature of rooftop photovoltaic panels in a semi-arid climate. The study modelled a glass surface, photovoltaic (PV) layer, Tedler, absorber plate, and cooling pipe (with a serpentine shape) in ANSYS Design Modeler. The cooling investigations were performed using Ansys Fluent Computational fluid dynamics (CFD) for the laminar regime, with a constant flow rate of 0.028 kg/s. The investigated fluids were Fe3O4/water (case 1), TiO2/water (case 2), and pure water (case 3). The simulation results showed that the TiO2/water nanofluid had the best performance, with the PV surface temperature and cooling fluid outlet temperature recorded as 43.9 °C and 42.3 °C, respectively. The PV surface temperature and fluid outlet temperature for case 1 is 44.7 °C, 42.9 °C for case 2 44.6 °C, 42.8 °C and for case 3 45.1 °C, 42.8 °C, respectively- highlight the distinctive efficacy of our chosen nanofluid. Our study pioneers a novel approach to mitigating heat buildup in rooftop PV panels, with implications for optimizing their performance and lifespan.

Keywords: Internet of things; Rectifier Circuit; wireless sensor networks; Short message service

1-D Graphene Transistor based Energy-Efficient Novel Operational Transconductance Amplifier for Low Power Nanoelectronics

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Abstract
Abstract. In this investigation, we'll examine how one-dimensional (1-D) field-effect transistors will be potentially applicable in future very large-scale integration (VLSI) technologies. At the 45-nanometer technology node, we investigate the design and modeling of triple-cascode operational transconductance amplifiers (TCOTAs) constructed of metal oxide semiconductor field effect transistors (MOSFETs) as well as carbon nanotube field effect transistors (CNTFETs). The suggested architectures use both conventional MOSFETs and CNTFETs devices. The published simulation analysis of the TCOTAs shows that the proposed CNTFET-based devices perform significantly better than traditional ones. The DC gain, Speed, and PDP (Power-Delay Product) of the proposed CNTFET-based device, as well as the hybrid-based device, have all been found to greatly outperform those of conventional CMOS devices. Furthermore, the operational performance of proposed CNT-based TCOTAs is investigated by altering CNTFET diameters. We also emphasize 1-D material-based transistors' potential uses in conventional nanoelectronics, energy-efficient low-voltage analog mixed-signal circuits, and future interconnect technologies.

Keywords: CNTFET, CMOS, OTA, Triple-Cascode , Delay, PDP

Answer Ranking with Bert Under Deep Learning To Rank Paradigm

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Abstract

The most crucial part of a search engine is ranking. Since the majority of search engines work with a significant amount of natural language data, an efficient ranking system requires an in-depth understanding of text meaning.

Deep learning-based natural language processing models are now yielding encouraging results for ranking problems.

In this paper, we propose an innovative approach of fusing a transformer-based model BERT with various listwise loss functions for ranking answers for a given user question. This approach uses BERT to learn contextual embedding, which has been applied to capture complex question-answer relations for ranking. The architecture employs a list-wise technique for training a ranking function by employing a question and its related answers as one instance and minimizing a loss function defined on both predicted and actual labels. We validated our approach on publically available datasets semEval (2016) and semEval (2017) using NDCG as evaluation metrics for ranking results.

Keywords: Answer ranking, Bert, Deep learning, Learning to rank, Listwise loss

Synergizing Sonata and Reputation Experience Knowledge Model for Trustworthy Data Discovery

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Abstract

A cutting-edge and long-lasting method for gathering crucial data from users of mobile and smart devices is called mobile crowdsensing. Smart device data can be used for transportation, weather updates, air quality, healthcare, and other applications. A large number of people and a variety of devices are involved in this because of this we must ensure the data we obtain is trustworthy and reliable. We must determine how much we can trust specific people and their data because the reliability and accuracy of the data can significantly affect the choices and actions made based on it. In general, developing confidence in mobile crowdsensing data is crucial to maximizing the potential benefits and applications of this innovative method. We read a lot of reports and articles for this evaluation to see what other people have done to increase the data's trustworthiness, and we also notice some interesting new ideas emerging. These ideas might help to enhance and improve mobile crowdsensing. We also go over how these elements affect overall performance, the number of new members, and the veracity of the data. Finally, we compare two different ways of two different papers which are used to increase trustworthiness of data mobile crowdsensing. These studies use user reputation as their primary criterion. We have found that a hybrid of these two technologies performs better than these two individually. Finally, we hope that those looking for trustworthy mobile crowdsourcing will find this model to be helpful. These ideas can help us increase the usefulness and dependability of mobile crowdsensing, which is something we want to make a great way to gather data for everyone.

Keywords: Mobile Crowdsensing, Trustworthiness, Anomaly Detection, Internet of Things, False data

Classification of Cervical Cancer using ResNet-50

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Abstract
Convolutional neural networks as a part of deep learning is one of the best ways to get accurate results in terms of identification and classification of images in the medical field. In terms of public health, cervical cancer is a major issue and early detection and prevention can save lives. Pap smear tests are widely used for cervical cancer screening, where cells from the cervix are collected and examined for abnormal growth. However, accurately analyzing pap smear images can be challenging, and there is a need for automated methods for efficient and accurate diagnosis. In this study, we advocate a classification method for cervical cancer based on pap smear images using a Convolutional Neural Network (CNN) with ResNet50 architecture and applied on the SIPAKMED pap-smear image dataset. The use of ResNet50 architecture in the CNN allows to improve the feature extraction as well as classification. The accuracy levels reached were 97.5%, making it a powerful tool in medical image analysis. The proposed scheme is compared with VGG 11 architecture accuracy of 92%.

Keywords: Cervical Cancer, Convolutional Neural Network (CNN), pap-smear images, esnet50, Vgg-11.

Quantification of Brain Tumor region in MR Images using FCM technique

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Abstract
Medical Image processing confines the use and exploration of image datasets of human body obtained from CT or MRI scanner to guide medical interventions. The variations in tumor location, shape, and size present an important challenge to the identification of brain tumors. Although many clinical specialists or radiologists are skilled in spotting tumors and other abnormalities through imaging modalities using the MRI technology in the brain but it is noted that it takes more time and effort to identify, locate, and segment the affected part of the brain. In order to identify brain tumors in MR images, this effort first removes noise using noise removal technique Adaptive Median Filter(AMF) before enhancing the pictures with the contrast limited adaptive histogram equalization(CLAHE). Additionally, image segmentation is carried out using both fuzzy c-means ,thresholding and segmented image is created as input to canny edge detection that yields the tumor image and area of the region is calculated by finding area of largest contour region. The computational complexity that plagues earlier systems that mix fuzzy and k-means clustering for this purpose has been solved by the system created in this research.

Keywords: Fuzzy c-means, Brain tumor segmentation, Contouring, Threshold , egmentation,Tumor area

Preliminary Investigations of Microwave Heating for Surface Treatment of Low Carbon Steels

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Abstract
The processing of metallic materials through microwave heating is a novel approach. A lot of work is reported on microwave materials processing due to the inherent characteristics of rapid heating and energy saving. In the present work, microwave energy is used for heating the low-carbon steels using the hybrid heating approach. The parent steel samples were heat treated using microwaves at 2.45 GHz for 10-20 minutes using charcoal and graphite as susceptor materials. Heated samples were quenched using water at room temperature. The parent steel and heat-treated samples were characterized for microstructure analysis using Scanning Electron Microscope (SEM), carbon content using Optical Emission Spectroscopy (OES), and Rockwell hardness tester. The characterization results revealed that the microwave heating was intense to reach the austenization temperatures of steels at the surfaces. The Microwave Hybrid Heating (MHH) approach allowed successful heating to desired temperatures and surface heat treatment with quenching resulting in the fine martensitic structure within 10 minutes of microwave exposure. The OES results revealed the carbon intake during the heating process and carbon percentage at the surface increased from 0.16% to 0.21% due to the diffusion of graphite (carbon atoms) during phase change from austenite to martensitic structures. The formation of martensite at the surface increased the hardness by more than 3 times (58HRC) to the parent steel hardness (18 HRC). Overall analysis revealed that microwave heating was successfully used for surface heat treatment of steels with significantly lower energy and time consumption.
Keywords: Microwave heating, Heat treatment, Surface Engineering, Microstructure, Quenching, Hardness

Sentiment Analyses on IMDB Review Dataset

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Abstract
A computational method called sentiment analysis is employed to ascertain the emotional undertone or attitude of a text document, such as a review, tweet, or news story. The method entails analyzing the text to determine if it expresses positive or negative sentiment using machine learning models, deep neural network models, and natural language processing. This paper uses models like Naive Bayes, Logistic Regression, LSTM, LSVM, Decision tree, and BiLSTM to conduct a sentiment analysis (SA) study on the IMDB dataset. The investigation's goal is to evaluate how well these models perform in retrospection on movie reviews as the reviews are positive or negative. The study investigates how data pre-processing methods and hyperparameter tuning affect the models' accuracy. The end results demonstrate that, in terms of recall, precision, and accuracy, the BiLSTM model surpasses the other models, with the lstm, logistic regression, lsvm, decision tree, and naive bayes models coming in second through fourth, respectively. The paper emphasizes the potential of deep learning models—in particular, BiLSTM in sentiment analysis tasks as well as the significance of hyper-parameter tuning and pre-processing methods in reaching high accuracy.

Keywords: Sentiment Analyses, BiLSTM, LSTM,IMDB Dataset

Role of intelligent manufacturing in achieving Sustainable Development Goals (SDGs)

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Abstract

The manufacturing sector is getting revolutionized and newer efficient processes are emerging over the last decade. The intelligent manufacturing systems are in a growing trend in the manufacturing industry, where the focus is on improving the overall efficiency, productivity, net zero emissions, carbon neutrality, and sustainability of the production processes. As a result, intelligent manufacturing is becoming increasingly aligned with the United Nations' Sustainable Development Goals, where sustainability is the major area for improvement under SDG 7 (affordable and clean energy), SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (responsible consumption and production). The present work focuses on the recent trends in Intelligent, smart and sustainable manufacturing domain. The combination of Industry 4.0 and Intelligent Manufacturing can be titled as Smart Advanced & Automated Manufacturing (SAAM) systems. For SAAM to achieve operational efficiency, the sustainability criterion needs to be achieved for any process. For a Sustainable environment, it is necessary to reduce waste and Industry 4.0 plays a vital role in reducing waste. This can be achieved through digital interconnectivity of manufacturing systems, real time monitoring and smart predictions via Internet of Things (IOT) and Artificial Intelligence (AI). However, sustainability is a very vast term which is difficult to quantify; hence focus of this chapter is on the sustainability aspect of manufacturing processes based on process output where waste is reduced and efficiency is enhanced.
Keywords: Sustainable Development Goals (SDGs) of Intelligent Manufacturing

Breast Cancer Detection using Machine Learning Algorithms

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Abstract

Machine learning employs classification methods on datasets. The Machine Learning repository provided the cancer datasets that were used in this study, which were used for categorization. Breast cancer databases come in two varieties. There are various numbers of characteristics dispersed among these datasets. Breast cancer observes around 14% of all female cancers. One in every 28 women will develop breast cancer. To analyze patterns in datasets, machine learning algorithms like SVM, KNN, and decision trees are used. Computers are able to ”learn” from their past mistakes and come up with solutions that are difficult for humans to come up with. According to the study, there are many effective algorithms for analyzing the properties of data sets. This study compares and implements several well known classification methods, including Decision Trees, K Nearest Neighbor, SVM, Bayesian Network, and Naïve Bayes on the Wisconsin Diagnostic dataset by calculating its classification accuracy, and its sensitivity and specificity value.

Keywords: cancer, Ensemble Techniques, Machine Learning, breast cancer, women

Performance Estimation of the Dual-layered Coated Engine Piston

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Abstract
The focus of this paper is to study and understand the effectiveness of the piston rings of IC engines that have two coatings as means of minimizing wear. These coatings were composed of both hard materials like diamond-like carbon and tungsten carbide, as well as soft materials like an epoxy composite. The rings were first coated via physical vapour deposition (PVD) with either DLC or WC, followed by a polymeric coating of epoxy, graphene, and base oil SN150. Tribological tests were performed for 3.5 x 105 cycle at 1200 rpm of speed with 40% examining the engine's load to gauge their efficiency. Thus a strong coated ring is covered with polymer composites to avoid scratching. The top piston ring's DLC hard and soft polymer composite dual coating shows the least amount of wear. 1.8 x 10-12 mm3/Nm, in comparison to the rate of wear of the lower and middle rings' dual coatings.

Keywords: Minimizing wear, physical vapour deposition, polymeric coating

Performance Analysis of UAV enabled Two-Hop Mixed α − κ − μ/ Rayleigh based Wireless Communication System

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Abstract

The use of Unmanned Aerial Vehicles is increasing day by day to enhance the wireless communication networks because of its mobile and flexible nature. They act as both the relay nodes and as a flying base station resulting in extension of coverage area and enhancing the performance of network. In this following paper, we investigate the performance analysis of Uav enabled two-hop mixed α − κ − μ/Rayleigh based network where Uav is acting as decode and forward (DF) relay node between the transmission from Base station to multiple users as the direct link between them is blocked. The channel model used from base station to Uav is α − κ − μ fading model and from UAV to multiple users, Rayleigh fading model is used. Closed form expressions of Outage Probability is derived. Due to the complex nature and to get more detailing of Coding gain and diversity order, Asymptotic Outage Probability is also derived at higher Signal to noise ratio (SNR) readings.

Keywords: Unmanned Aerial Vehicles, Outage Probability, Asymptotic outage probability, α − κ − μ distribution, Rayleigh fading

Artificial Intelligence and Food Process Modeling a way towards Indian Millets

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Abstract
Artificial Intelligence (AI) is a mathematical tool which has features like human intelligence to solve various complex problems. It has the ability to act rationally and take decisions at a faster speed. Thistool has application in almost every aspect of human lives. This paper takes up the food process modeling using AI as this is novel and relatively complex. AI has applications in various food processing plant operations, viz., theory development using intelligent functions foradaptation, machine learning, classification, and prediction etc. Because of the model's parallel architecture, it performs quickly and because it has a quick computation time, it is suitable for use in real-time systems for a range of food processing activities. This study discusses some AI applications for modelling nonlinear food engineering challenges. Extraction, drying, filtration, fermentation, baking, dairy processing, and quality evaluation were all examined.Although AI has applications in almost all food materials, it has very less contribution in Millets. Different analytical tests available for this food grain are discussed in this paper along with the identification of major research gaps.

Keywords: Artificial Intelligence, Machine Learning algorithm, Artificial Neural Network, food technology, modeling & simulation

Carbon sequestration potential of local vegetation of village area of Haryana, India

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Abstract
Restoration of marginal and degraded environment, species and its lands are essential for regaining biodiversity and ecosystems, which further helps in targeting UN sustainable development goals. During the last few decades, many evergreen and fast growing trees have been introduced in India and worldwide to restore damaged and corrupted terrains for dependability of the ecosystem. Unfortunately, most of these introduced species (like Prosopis Juliflora present in the abundance at the aravalis range, India) are foreign species and invaded the entire nearby local species, further prompting huge biodiversity misfortune and land debasement. Therefore, it is of utmost importance to perform a complete analysis of the area for forestalling the future usage of such species for land reclamation. With this background, a dependency survey was conducted at Damdama and Khedla village alongside Aravalis range to know the extent to which people are dependent on this foreign species. Results indicates that it is being widely used for its woods but has long term harmful effect like allelochemicals released by its roots, leaves and fruits inhibits seeds germination of neighbouring species, thereby causing a biodiversity loss. Further, few local species left in that area like Anogeissus pendula, Acacia catechu, Dalbergia sissoo etc. has been compared with Prosopis Juliflora in terms of carbon sequestration potentials. Finally, it is recommended from this study that Prosopis Juliflora must be uprooted and wisely used as it has many medicinal uses, Prosopis pods can be used to prepare coffee, cattle feed, furniture's, woods as charcoals etc. and thus restoring lands and protecting Biodiversity.

Keywords: Foreign species, Biodiversity, Dependency survey, Carbon sequestration

Ensemble Based News Category Classification using Bidirectional GRUs and Attention Based LSTMs

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Abstract

In the digital age, efficient categorization of news articles is crucial for personalized content delivery and enhanced user experience. This paper explores the necessity of utilizing machine learning techniques for news article category classification and conducts a comparative analysis between Transformer and Recurrent Neural Network (RNN) models to determine the most efficient approach. Through an extensive literature review, the paper discusses the challenges associated with manual categorization and highlights the potential of machine learning algorithms in automating this process. Specifically, the study focuses on comparing the state-of-the-art Transformer models, known for their attention mechanisms and parallel processing capabilities, with traditional RNN models, known for their sequential processing and contextual learning abilities. The evaluation encompasses a diverse dataset of news articles, considering 40 categories and 199914 rows. The Transformers model implemented on the dataset yielded a validation accuracy of 71.92%,the GRU model yielded an accuracy of 65.79% and the Attention based LSTM model yielded an accuracy of 67.09%. This study provides valuable insights into selecting the most efficient model for this task and offers suggestions for further research in this domain. By leveraging the findings, news organizations and content platforms can streamline their processes, deliver more relevant content to users, and enhance their overall engagement and satisfaction.

Keywords: news category classification, selfattention, lstm, transformers

Mathematical Modelling of Fetal ECG Signal

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Abstract
Fetal electrocardiography is one of the most promising procedures of modern electronic fetal surveillance. Fetal Electrocardiogram (FECG) provides evaluative information about a fetus's heart in its developing stage in the mother's womb. So monitoring the fetus during pregnancy is very essential for determining several aspects of the mother's and the fetus's health. Although non-invasive fetal electrocardiography is getting advanced day by day still the major concern is the availability of fetal data. The lack of seldom occurring problematic circumstances, such as pregnancy with unfavorable results or situations when the heart rates of mother and fetus are similar and experience sudden heart rate fluctuations, is a fundamental driving force behind the simulation of fetal ECG signals. This paper presents the artificial synthesis and mathematical modelling of FECG signals. In our proposed method of mathematical modelling, in order to synthesize FECG-MECG mixture, a cluster of Gaussian kernel functions was used to approximate FECG cycles. Cardiac and noise sources were considered as point source dipoles that can be transfigured by rotation and translation.

Keywords: Fetal monitoring, Fetal heart rate, Wavelet Transform

Progress of Photonic crystal based Gas sensors in field of The Biosensing – A Review

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Abstract
This review aims to brief about the advancement of photonic crystal based gas sensors in bio sensing field. The dynamic properties of photonic crystal sensors viz its sensitivity, stability ,quality factor and its miniature size attributes to the development of high sensitive photonic crystal based optical gas sensors .Photonic crystals have periodic structures with different dielectric constant along the structure. Defects are introduced in the structure of the sensor which helps in confining the light in the structure. The refractive index variation in presence of an analyte shifts the resonance of the structure. Thus the shift in the resonant peak with an proportional change in the refractive index makes it a highly sensitive refractive index gas sensor. These sensors have shown great potential in detecting a wide range of analytes including gases, liquids, and biomolecules. In particular, they have been extensively used in wide range of applications in industry, healthcare, and research. This paper discusses the recent progress in design and analysis of various PhC based biosensors and hence shows the possibility of devising a highly sensitive, stable, label-free and non-invasive homogenous sensor allowing real-time monitoring in various environments.

Keywords: Refractive index sensor, Photonic Crystal sensor, PhC waveguide, Optical gas sensor, biosensor, photonic nanofilms, lithography

A supervised learning Approach using Random forest to detect Covid-19 with a prediction of recovery in Covid patients using cough audio signals

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Abstract

COVID-19, also known as 2019-nCoV, has claimed countless lives across the globe. There is no specific treatment or cure for COVID-19 at this time, however living with the illness and its consequences is unavoidable.One can quickly and effectively test for COVID to determine if they have COVID-19, hence reducing budgetary and administrative limitations on healthcare systems. According to research, a range of signs can be used to evaluate the likelihood of infection.Non-clinical techniques such as machine learning, data mining, deep learning, and other artificial intelligence technologies are among the most promising for use outside of a clinical setting.These strategies can be used to improve the diagnosis and prognosis of patients infected with the 2019-NCoV pandemic. COUGHVID, a positive and negative COVID-19 audio signal database, was employed in this study to evaluate a supervised learning approach such as random forest, decision trees, and support vector machines. To establish the strength of the relationship between the dependent features, the correlation coefficients between various dependent and independent variables were examined. To accurately distinguish COVID-19 patients from healthy individuals, the study used a machine learning approach that employed Mel-frequency cepstral coefficients and a neural network. The research produced a positive classification detection rate of 93 percent for participants and predicted the recovery period of COVID-19 patients with an accuracy rate of 91.5 percent by combining the optimal XGBoost model with a Random Forest model. The research employed a data set of 400 cough audio ignals that included both positive and negative COVID-19 cases. Recent research has demonstrated the potential of using audio data—such as voice, respiration, and cough—in the COVID-19 screening process. Given the available audio sample, these methods can only detect infections once, and they do not keep track of COVID-19's disease progression. There has been little research done on using longitudinal audio data to continuously track COVID-19 progression, particularly recovery. Tracking illness progression traits and recovery patterns may provide insights that result in earlier therapy initiation or modification, better resource allocation in healthcare systems, and other benefits.

Keywords: COVID-19, COUGHVID, MFCC

Cotton Diseases Classification Using ResNet-50 for Precision Agriculture

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Abstract

Deep Learning is a technology that is used to classify and identify images. Detecting diseased plants and acting accordingly is very helpful in the agricultural business. The industrial sector is dominated by cotton, one of the most significant cash crops and sources of fiber. Diseases caused by different diseases like bacteria blight, Leaf curl, and fusarium wilt are one of the main issues with cotton crops. So, it's important to determine the type of disease prior to its spreading, classify it, and apply the appropriate remedies. So, that it can increase the yield of the cotton crop. In order to this, classify these cotton diseases, using Resnet-50, a convolutional neural network (CNN) architecture. It is a very deep neural network that has 50 layers and can recognize very complex features and patterns in images. The accuracy of this study is 99.05%.

Keywords: Deep learning, Bacterial blight, Leaf curl, Fusarium wilt, Cotton, CNN, ResNet-50

Investigation of Performance and Emission Characteristics of a Four Stroke Diesel Engine Utilizing Linseed Oil with Diverse Additive Particles

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Abstract

The global demand for fossil fuel consumption is steadily increasing with significant impact on the environment, while their reserves are depleting rapidly owing to their limited availability. The combustion of fossil fuels in a diesel engine generates pollutants such as NOx, CO, HC, and smoke that have harmful effects on living beings and the environment. Furthermore, due to restricted government pollution regulations, the researchers prioritized the reduction of exhaust emissions from a diesel engine. Considering the challenges posed by emission reduction, the ongoing fuel crisis and cost concerns, utilizing biodiesel in diesel engines appears to be a dependable alternative solution. However, biodiesel blending with diesel fuel reduces the heating value of blended fuels, leading to reductions in the engine's performance parameters the experimental test engine employed in this study is a single-cylinder, water cooled, direct injection (DI) variable compression ratio (VCR) diesel engine of 3.7 kW at 1500 rpm. TiO2 and Al2O3 nanoparticles were chosen as additives for the fuel blends. Al2O3 and TiO2 the composition of Al2O3 and TiO2 nanoparticles are varied by each 50ppm and 100 ppm in the fuel blends. The fuel blend's constant fuel mix ratio was maintained throughout the test. The amount of canola biodiesel in the diesel-canola biodiesel blend is 30% (vol), and linseed biodiesel in the diesel-linseed biodiesel blend is 30% by vol. The injection pressure of the engine was varied by 200 to 220 bar with one step. According to the experimental outcomes, and overall diesel-canola blend with various nanoparticles at IP of 220 bars showed enhanced engine performance and emission characteristics as compared to nanoparticles incorporated diesel-linseed blend. Also, when compared to TiO2 nanoparticle fuel blends, it is noted that Al2O3 nanoparticle fuel blends exhibit improved performance and reduced exhaust emissions. Overall, the DBL30A100 blend obtained at an IP of 220 bar is the optimum blend.

Keywords: Keywords- Bio-fuel, Linseed B30+TIO2, Linseed B30+AL2O3, Linseed B30

Cosine Similarity Based Android Application For Intelligent Driver Recommendations

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Abstract

In several fields, machine learning techniques are employed extensively to address everyday issues. There are numerous issues that need to be resolved in the essential industry of transportation. Finding the nearest and most suitable driver is one of the problems that the majority of people deal with. In general, everyone needs a professional and courteous driver, but some people run into issues when they hire a driver without knowing about him. The proposed solution is to develop a mobile application that connects customers with drivers effectively. By utilizing cosine similarity, the app suggests a list of drivers based on the similarity between profile vectors of new drivers and the customer's previously hired driver. The app also dynamically updates the ranking of the driver in the list of suggested drivers, based on the cumulative rating of the driver which is calculated by considering feedback from other customers. This innovative approach simplifies the process for customers by eliminating the need for them to actively search for drivers who best match their preferences.

Keywords: Cosine Similarity, Dynamic Ranking, Android Mobile Application, User feedback

Construction & Demolition Waste – Overview, Insights, Management, reviews and its Future

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Abstract

India's construction industry is thriving. The construction sector is expanding at an incredible rate as a result of urbanization, industrialization, modernization, and an increased population. Constructing, remodeling, repairing, demolition of homes, big building structures, highways, bridges, piers, and dams results in the production of construction and demolition (C&D) debris. In order to replace outdated civil constructions with newer, bigger, and better ones, demolition activities are also being carried out. These processes produce garbage known as construction and demolition (C&D) waste, which is made up of a variety of materials with unique qualities. C&D waste negatively affects the environment and causes several different sorts of pollution. This paper focuses on understanding how much of C&D waste is generated, different types of C&D waste, impact of C&D waste on the environment, its management are all examined in this study. All this is accompanied by analysis of numerous data and survey results. Also the 3R's principle is C&D waste is shown. Details of the pollution related laws and policies enacted in India so far imposed for the construction and demolition industry is also discussed in detail. An insight (Review) of recent research around the world from 2020 till date is presented, and the gap in the work is identified. Finally, this paper concludes with the following conclusions. These days, the major effects of artificial intelligence (AI) can be seen in a variety of sectors, including agriculture and health care. Expert systems, natural language processing, speech recognition, and machine vision are some examples of specific AI applications. Engineering experts in the field of artificial intelligence utilize cutting-edge methods and tools to create software and robots that can reason and behave rationally. The use of artificial intelligence (AI) to convert C&D waste into building materials in order to promote a more circular and sustainable economy is felt to be one promising direction for innovation. Additionally, it has a big impact on how much garbage is generated during construction. The application of artificial intelligence (AI) in waste-to-building materials systems has enormous promise since it has the ability to optimize every step of the process, from garbage collection and sorting to material processing and construction. AI can help the sector make better use of the enormous volumes of garbage produced every day by utilizing machine learning algorithms and advanced analytics, lowering the industry's environmental impact and promoting a more sustainable future.

Keywords: Health service, Apriori algorithm, Apriori TID algorithm, Data mining

An Examination of Encryption Standards: AES and RSA - A Comprehensive Review

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Abstract
Cryptography encompasses a vast field with numerous substitution techniques. The aim of this review article is to present a brief summary targeting the readers and students regarding three commonly utilized algorithms: Symmetric - cryptography employs AES & DES, while asymmetric - cryptography utilizes Rivest, Shamir and Adleman. The primary objective is to enable readers to develop a basic understanding of the historical background of these algorithms, as well as comprehend their key operational principles. Moreover, this review will highlight the strengths and weaknesses of each algorithm, focusing on how they contribute to achieving security goals such as confidentiality and integrity. The paper will systematically present and evaluate the aforementioned algorithms, elucidating their interrelationships. Specifically, it will explore the connection between symmetric and asymmetric algorithms, distinguishing between those utilizing secret keys and those employing key pairs. Furthermore, the paper may shed light on potential research avenues for scholars in the field of cryptography.

Keywords: DES, Block Cipher, Asymmetric, RSA, Symmetric, AES, Cryptography

Classification of Acute Lymphoblastic Leukemia Using MobileNet and EfficientNetB3

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Abstract

Computer vision and deep learning are widely used in health care. Acute Lymphoblastic Leukemia (ALL) is a severe form of malignancy that affects the body's white blood cells. An early and precise diagnosis of ALL is critical for successful therapy and improved patient outcomes. In this project, the effectiveness of deep learning techniques including MobileNet and EfficientNetB3 are explored in conjunction with data augmentation for the classification of Acute Lymphoblastic Leukemia (ALL) using C-NMC Leukemia Classification Dataset. The approach of this project involves generating augmented data using various techniques such as flipping, rotating, and zooming to remove data imbalance in a dataset. After that split the data into training and testing data and then fine-tune the MobileNet and EfficientNetB3 models on the trained data, and evaluate the performance of both models using testing data based on recall, accuracy, F1score, precision, and Area Under Curve.

Keywords: MobileNet, Acute Lymphoblastic Leukemia(ALL), EfficientNetB3, Deep Learning, Data Augmentation

Analysis of Two Stage Operational Amplifier utilizing Carbon Nanotube Field Effect Transistor.

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Abstract
The primary objective of this investigation was to design an efficient two-stage operational amplifier (2SOA). The simulation was run on a 45nm technology node with Hspice software and a 0.9V supply voltage. Traditional CMOS and pure CNTFETs were used to build operational amplifier circuits. CNT-based circuits were proposed and compared to typical CMOS-based circuits. The proposed circuits demonstrated superior performance in various aspects, including DC Gain and output resistance, surpassing the performance of the standard devices. The circuit design put forth in this proposal holds the potential to serve as a highly effective solution for realizing low-power analog applications with remarkable efficiency.

Keywords: CNTs, Op-Amp, gain

WeatherSense: Scraping and Deep Learning for Weather Analysis and Prediction

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Abstract

Agriculture is essential in ensuring food security and development in the country. Maximizing scarce arable land is a pressing challenge in today's urbanization era. Agriculture can be made more efficient using technology and information science. This article presents an integrated approach to education in Indian agriculture that uses climate data to accurately analyze environmental factors such as temperature, soil, wind speed, and precipitation. The framework chooses the most accurate algorithm based on analysis and comparison.

By providing accurate weather information, farmers can make informed decisions about planting, pest and disease management, and other factors affecting crop growth. The ultimate goal is to increase farmers' profits and promote sustainable agriculture. Capacity can be further developed by integrating features that help farmers use sustainable technologies in specific climate models.

Keywords: WeatherDataAnalysis, CropYieldPrediction, DeepLearning, BiLSTM, WebScraping, MachineLearning

Tongue Driven System for People with Locomotive Disability – SAHAYAK

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Abstract
People who are severely disabled due to spinal cord injuries are a burden on society and families and cannot lead everyday lives. The development of assistive technologies has played an essential role in helping the paralyzed. This will improve their ability to control their environment, help them find jobs, reduce the workload of their family members and reduce their health costs. Tongue propulsion systems are one of the assistive technologies that help people with severe disabilities easily take control of their lives. The tongue is an appropriate organ for operating assistive technology.

Keywords: Tongue Driven Wheelchair, Patient monitoring Kit, Mobility Kit, Hall Effect Sensor Headset, Independent living Wheelchair.

An energy cloud efficient approach for Preserving the Confidence of Data Stored in the Cloud

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Abstract

Information technology has always struggled with the problem of keeping sensitive data safe. Due to the dispersed nature of the data stored on the cloud, this problem takes on further significance. Users' primary worries with cloud computing are on data security and privacy. Data security and privacy protection are becoming increasingly vital for the future growth of cloud computing technology in government, industry, and business, despite the fact that many approaches on the themes in cloud computing have been researched in both academic and industrial settings. Furthermore, as a research contribution, we have created a framework to address the security and privacy problems in Cloud Computing. For the security of CC, the proposed framework employs a hybrid authentication technique. The study gives academics and practitioners a better understanding of CC and the underlying security and privacy problems, as well as countermeasures and a creative solution.

Keywords: Cloud Computing (CC), Dynamically scalable services, Security assurance, Cloud acceptance

Smart Cart Using RFID

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Abstract
Over the past decade, the Internet has revolutionized how we shop, with the rise of e-commerce allowing us to buy products online through platforms like Amazon and Flipkart. However, traditional physical markets are still growing and offer a personal shopping experience. This project aims to create a Smart Shopping Cart for supermarkets to address common customer issues such as waiting in long queues for billing and overspending. This technology reduces the burden on cashiers by automatically calculating the total cost of the items in the cart. The Smart Cart provides a fast and efficient service, reducing congestion at the checkout counter and saving time and effort during the accounting process. The items in the cart are scanned for price and barcode details and the cost of each item is calculated and sent to an Arduino device. In traditional Indian markets, customers place items in a cart and then stand in a queue for billing, but this Smart Cart eliminates the need for this step.

Keywords: Health service, Apriori algorithm, Apriori TID algorithm, Data mining

Investigation of thermally evaporated Sn and In thin film's structural, morphological and adhesion properties

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Abstract

As the requirement for high performance, low weight , and efficient optoelectronic devices continue to up, the analysis of Sn and In thin films has become critical in advancing materials science and engineering. Sn and In films were deposited on Si substrate using thermal evaporation technique. The film's crystalline structure, topography, morphology, compositional and adhesion properties were investigated by using X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS) and atomic force microscopy (AFM). The X-ray diffractogram indicated polycrystalline phase with (101) orientation plane from both Sn and In films. The average crystallite size, mircostrain and dislocation density of both the films were determined from X-ray results. SEM examination indicated lumps deposition of particle sizes from nanometer to micron size of Sn film and continuous films over entire Si substrate with randomly oriented particles of 1-2 μm sizes of In film.EDS compositional analysis confirmed the presence of pure Sn and In in the film. AFM examination revealed the rms roughness values of 44 nm and 20 nm of Sn and In films, respectively. Adhesion force and work of adhesion were calculated between the AFM tip and films using force microscopy in contact mode. Ellipsometric parameters ψ and Δ of the films were determined to find the surface condition. Sn and In film's adhesion on the surface was tested by scotch tape test.

Keywords: Thin film, Tin, Indium, AFM

Studying the Critical Barriers Hindering the Adoption of Data-Driven Decision-Making in Advanced Manufacturing Systems.

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Abstract

Data-driven decision-making is a crucial approach in enhancing the efficiency, productivity, and competitiveness of advanced manufacturing systems. However, it faces several barriers, including inadequate data infrastructure, interoperability challenges, organizational resistance to change, lack of data literacy, and concerns about data security and privacy. This research paper identifies these barriers through literature review, case studies, and expert interviews, providing a comprehensive understanding of the complex impediments faced by manufacturers when integrating data-driven decision-making into their operations. The study discusses the identified barriers in detail with the aim of presenting their impact on the adoption of data driven decision making in AMS. The insights from this study can guide manufacturing enterprises, policymakers, and researchers in developing effective strategies to facilitate the adoption of data-driven decision-making, catalyzing the transformation of advanced manufacturing systems. The ultimate goal is to improve operational efficiencies, informed decision-making, and sustainable growth within advanced manufacturing systems.

Keywords: Advanced manufacturing systems, Decision Making, Big Data, Barriers, Digitalization, Industry 4.0.

A DC microgrid with an interleaved DC-DC boost converter interface

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Abstract

The essential components of a DC microgrid are the various Distributed Generators (DGs) like solar photovoltaic system, wind energy system, bio-mass etc. The integration of these DGs is however, a complicated and challenging task. In particular, the output from the PV cells is DC in nature and has the magnitude of few tens of volts which is much below the suitable value to be coupled to the DC bus for distribution. A DC-DC boost converter is used to raise the output voltage from the DGs to a value at which coupling to the DC bus is possible. Two or more converters connected in parallel are observed to be more efficient as compared to the traditional boost converter. This paper intends to compare the performance of an interleaved DC-DC boost converter to the traditional boost converter as an interface to the DGs in the DC microgrid. For the comparative evaluation, the two prominent DGs under consideration, the wind and the solar PV system are interfaced separately to the two variants of the boost converter and the simulation is done using MATLAB/SIMULINK.

Keywords: Distributed Generators, DC microgrid, DC-DC boost converter, interleaving technique

Bcdml: Breast Cancer Discovery with Machine Learning

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Abstract
Breast cancer is the most frequent disease among women, and effective treatment is dependent on early detection. Recently, several techniques such as mammography, MRI, and ultrasound have been applied. Recent advances in Artificial Intelligence have shown promising results in improving early detection and treatment, particularly for breast cancer, which will ultimately improve patient survival rates. Cancerous cells proliferate in milk ducts. The limitations of currently available breast cancer analysis methodologies can be overcome by developing deep learning and other AI technologies. The feasibility of multiple Machine Learning algorithms is evaluated using Wisconsin Breast Cancer dataset and thus improving the accuracy of diagnosing of breast cancer.

Keywords: Machine Learning, Deep Learning, Breast Cancer, Wisconsin dataset

Analyzing Role of Smart Energy Policies in Sustainability: A Review Study

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Abstract

Smart energy is the procedure of employing devices for energy efficiency. The thrust is on influential, supportable renewable energy sources that endorse superior eco-friendliness while mitigating the cost. This study seeks to conduct a complete analysis of the current literature on the function of smart energy policy in India that has been published in peer-reviewed publications. The material congregated in this study has been occupied from trustworthy mechanisms of secondary data gathering including historical studies. In the current study, the systematic literature review (SLR) has been employed to understand the role of smart energy policies. It was collected that every nation is conceptualizing the rising demand for smart energy resources and infrastructure. Every city is aiming to be known as a smart city in energy usage and applications. The future of mankind is dependent on the present use of energy resources. For sustainable use of resources, smart technology devices need to be embedded in the products to reduce the cost and increase efficiency. The future of energy is smart with the assistance of IT-enabled infrastructure. The world is looking for the era of clean and renewable energy to confirm sustainability in its operations. Smart energy appeared to be the fastest-growing arena in the industry presently and with the growing demand for solar panels, smart meters, other forms of renewable forms of energy it has a bright and promising future.

Keywords: Smart energy policies resources, sustainability future.

Development of Anti-Theft Vehicle Security System Using GPS, GSM and Bluetooth Modules

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Abstract
GPS technology is used to assist or to drive the vehicle to the desired location and it was already available the modern four-wheeler vehicles. This feature will only guide to a particular location, but it does not have the facility to share the current location of the vehicle to the requested person. There are different varieties of vehicles at different price ranges, but none of your vehicle has the facility to share its location in order to track the vehicle when it was theft. To overcome the above problems a GPS and GSM technology-based system was developed to remotely controlling the starting and stopping of the engine when it was theft. The present work aims in developing the missing factors like keyless starting, stopping, and location sharing to the vehicle owner where the information about their vehicles are identified and the same technology can also be seen in modern vehicles in present automobiles sectors. These features were built and tested for two-wheeler vehicles and the same can be furnished in four-wheeler vehicles also. The GSM Module used in the present work have worked only when the signal strength and active plan was available in the SIM card. Response times of message triggering was found satisfactory. The system can be mounted or fitted in any vehicle in a hidden or suitable compartment.

Keywords: Anti-Theft system, Vehicle Security System, Vehicle GPS Tracking, GSM & Blutooth Modules

Solving the Train Scheduling problem using MIP and ACO

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Abstract
Train scheduling is an important railway process that helps to establish train arrival and departure times at station to prevent accidents between different trains. This study investigates the train scheduling problem (TSP) with variable train precedences on a single-track Indian Railway (IR) line. To begin, a good model for a TSP has been built using mixed-integer programming, and the Ant Colony Optimisation (ACO) approach has been devised to tackle the problem. Several numerical experiments are carried in which the total travel time is minimized and different strategies are applied to solve track conflicts. Finally, the Indian Railway (IR) manual solution approach is compared to the solution produced using the proposed speed-up strategies and CPLEX solver. The proposed speed-up strategies result in a 6.827% reduction in overall trip time when compared to the manual solution method. Based on the order of the trains, a collision-free time is calculated.

Keywords: Mathematical Model, ACO, Indian Railways, Train Scheduling

Way forward to High Strength Sustainable Ternary Geopolymer Concrete: Mechanical attributes

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Abstract
With the objective of making today's concreting practices more sustainable, the current study compares ternary geopolymer concrete made with a mix of fly ash, ground granulated blast furnace slag, and metakaolin, along with natural and foundry sand, in two different types of specimens. Several cylindrical, beam, and reinforced slab specimens of M35, M45, and M60 grade geopolymer concrete were cast and tested for compressive strength, flexural strength, split tensile strength, cyclic bending strength, and impact strength during the study. The study's findings demonstrate that ternary geopolymer concrete has higher mechanical strength (compressive, tensile, and fatigue) than traditional OPC-based concrete. Further, while natural sand specimens were observed performing better than foundry sand specimens, the findings reported for foundry sand samples were found to be within the prescribed strength criteria provided by IS codal regulations. The study's findings also provide unique correlations between split tensile strength and characteristic compressive strength of ternary geopolymer concrete that can be reckoned by practicing engineers for ready use. The study's findings encourage the use of foundry sand as a substitute for scarce natural sand. Adding to financial aspect, the study also presents a cost comparison promoting more economic usage of high strength ternary geopolymer concrete over lower grades of concrete.

Keywords: Mechanical properties, High Strength Ternary Geopolymer Concrete, Waste utilization, Cyclic Bending Strength, Cost Analysis

An Analysis of low-Overhead and High Efficiency Task Scheduling in the Cloud and Fog Environments

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Abstract

Cloud-fog computing is a heterogeneous set of service environments designed to give consumers with quick, adaptive services in response to the explosion of data generated every day by the Internet of Things (IoT). To ensure that inbound Internet of Things (IoT) jobs are performed on time and service level agreements (SLA's) are satisfied, the provider allocates sufficient resources and employs scheduling algorithms in fog or cloud environments. Nevertheless, many of the current approaches fail to take into account crucial factors like energy use and cost, both of which have significant effects on the effectiveness of cloud services. A trustworthy scheduling method that optimizes scheduling of the varied workload and boosts service quality is the answer to these problems (QoS). To arrange IoT inquiries in a cloud-fog setting, we adopt a strategy inspired by nature and call it electric earthworm optimization (EEOA). It was found that the solution-finding performance of the electric fish optimization algorithm (EFO) might be enhanced by combining it with the earthworm optimization algorithm (EOA), and thus this method was developed. The execution time, cost, makespan, and energy use of the proposed scheduling approach were measured using benchmarks developed from large-scale, real-world workloads such as CEA- CURIE and HPC2N. Simulation results reveal that the suggested method outperforms state-of-the-art algorithms by a wide margin in terms of efficiency (89%), energy consumption (94%), and overall cost (87%). Extensive simulations show that the proposed technique saves time compared to the status quo.

Keywords: Cloud Computing, Fog Environment, IoT, and HPC2N

A Critical Review on Recycled Aggregates for A Sustainable Concrete Development

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Abstract
In civil industry professionals need to address sustainability development by disposing of the consumption of natural resources. Many researchers are interested by using the recycled, reusable products as a substitute of virgin materials for to reduce a pollution, energy consumption, environmental impact and global warming. The opportunities of using recycled concrete aggregates (C&D Wastes) may lead to demand and serving of environment. This present paper gives a brief aim of recycled aggregate in production of concrete. This study attempts to elucidate the approaches properties of RCAs containing RAs. And this paper investigates the main theme of the recycled aggregate domain, current challenges and research gaps of utilizing the RA, discussing the reasons why this promising technology has not adopted widely in construction industry, recommendations could be made for promoting of these RA and with practical problems and also helping to find out the research directions for an upcoming research scholar are well detailed.

Keywords: Construction waste, Recycled aggregates, Recycled aggregate concrete, Sustainable development.

Path Planning of Agri-bot for Cauliflower's Health Monitoring using Bezier Curve

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Abstract
From the last decade, smart farming is getting more attention. The mobile robots with autonomous and safe navigation systems have been studied for various agricultural applications and challenges include path planning, motion control, mapping, and localization. This paper presents the path planning of Agri-bot for the monitoring of cauliflower's health. Agriculture field environment for cauliflower is created in CoppeliaSim software and Agri-bot is imported in the same software. Further co-simulation with Matlab/Simulink are performed. IR sensors are installed at front and rear of Agri-bot to measure the longitudinal distance on real time. Bezier curve algorithm is created to follow the path planning for cauliflower rows. It is noticed that the proposed algorithm improves the performance of the central path of Agri-robot to obey the central line of cauliflower's row. As a result, there will be accuracy in its health monitoring.

Keywords: Agri bot, Cauliflower, Agriculture Field Row, Kinematics, Path Planning, Bezier Curve

Deep learning for traffic sign recognition: Pride or prejudiced?

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Abstract
A crucial and vital component of Advanced Driver Assistance Systems (ADAS) is traffic sign recognition (TSR). TSR has been studied for a while, yet despite this, there are still several difficulties with TSR. A review of the TSR literature reveals that significant progress has been made in developing a generalized recognition system. A thorough search of the TSR literature reveals very few articles on partial occlusion in TSR. It has been noted that Deep neural network (DNN) is frequently a preferred option for researchers in TSR in real-time. In this work, generative models have been integrated with DNN. Particularly, a differentiable compositional model replaces the final convolution layer of the DNN. The integrated model focuses on the partially obscured traffic sign store's ability to recognize signs. Numerous tests are run on the publicly accessible data sets GTSRB and BTSC. The proposed model outperforms DNN for traffic sign images. The proposed model has been compared against other techniques to see its effectiveness.

Keywords: Traffic sign recognition (TSR), Deep neural networks (DNN), Standard image datasets(GTSRB BTSC)

Energy Harvesting for Sustainable FSO-UAV Communication in the Presence of Various Cloud Models

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Abstract
Researchers are increasingly focusing on free space optical (FSO) communication as a high-speed wireless communication solution for both backhaul and fronthaul networks in 5G and future 5G+ systems. Also, unmanned Aerial Vehicles (UAVs) or drones are becoming popular for various applications, such as surveillance, monitoring, imaging, and data collection. These UAVs are required to have a longer flight time to ensure the sustainability of the communication system over long distances. Therefore, energy harvesting in an FSO-UAV-based communication system using simultaneous lightwave information and power transfer (SLIPT) is proposed in this manuscript. For this study, simulations were carried out for various cloud models, beam divergence, and zenith angles. The energy harvested from photo voltaic (PV) solar panels integrated into drones is determined across different altitudes and various FSO link design parameters. It is found that under clear sky conditions, the system can harvest up to 1 mW of power at a UAV altitude of 150 m, regardless of the zenith angle. A significant drop in the harvested energy is observed as the beam divergence increases from 1 mrad to 3 mrad for all cloud models. Further, it is observed that the configuration of the FSO system particularly in terms of beam divergence, link length, and zenith angle plays a critical role in energy harvesting when operating under diverse cloud models. These results emphasize the significance of customizing FSO link design parameters to adapt to different atmospheric conditions, with a specific focus on cloud cover, in order to maximize both energy generation and overall system performance.

Keywords: Energy harvesting, FSO, UAVs, IoT, cloud models, PV solar panel, OptSim, MODTRAN

Intelligent Emission Monitoring and Compliance Prediction in Industries: An AI-driven Approach

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Abstract
This paper discusses the importance of efficient industrial processes in reducing harmful emissions, particularly Nitrogen Oxides (NOx), in today's sustainability-focused era. It introduces a predictive model called CODE (Combustion Optimization and Emission Detection) that uses a deep neural network and various input parameters to forecast and optimize NOx emissions. The model is trained with Mean Squared Error (MSE) loss and utilizes the Nesterov ADAM (NADAM) optimization algorithm. The text also mentions the use of other optimization algorithms like Adam and RMSProp. The CODE model's accuracy is validated using real-world data and the mean absolute error (MAE) metric, demonstrating its ability to predict NOx emissions accurately and enable proactive emission maintenance.

Keywords: PEMS, Deep neural network, NADAM, Adam, Mean absolute error (MAE), Machine learning

Quality and Capacity Optimization in Production: Preventive Maintenance and Fault Analysis Insights

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Abstract

Industry 4.0 environment primarily focus on both high-quality products and maximum production capacity. With that in mind, this study delves into the connection between PM and fault analysis as two crucial methods for optimizing production quality and capacity. According to the reviewed literature, PM and fault analysis play a crucial role in maximizing both production quality and output. Important results from the research show how these measures work together to improve equipment dependability, reduce faults, limit unplanned downtime, and, in the end, make products of higher quality and increase production capacity. Modern technologies like data analytics and machine learning are emphasized for their revolutionary impact on these tactics, which are discussed at length. Recognizing the difficulties and potential of Industry 4.0, it emphasizes the need to tailor these methods to meet the demands of advanced manufacturing systems. This study lays the framework for future studies and the actual use of preventative maintenance and fault analysis methodologies for improving the quality and capacity of production.

Keywords: Advanced manufacturing systems, Preventive Maintenance, Fault Analysis, Quality, Capacity, Production, Industry 4.0

A comprehensive review on Nanoadditives in Diesel-Biodiesel Blends: Implications for Combustion and Emission Performance

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Abstract

Nanoscale additives have emerged as an effective way to improve the performance of diesel/biodiesel blends and solve problems related to blend efficiency, emissions reduction and engine performance. This review article examines the use of nanoadditives in diesel/biodiesel blends and their effects on various compounds and emissions. Combining the findings from selected case studies, this review provides deep insight into the mechanisms of nanodope interactions in oil matrices. In this article, the effects of nanoparticles on ignition properties, combustion kinetics, particle formation and exhaust emissions are examined. From a critical perspective, this review demonstrates not only the advantages of nanoadditives, but also the need for better understanding and further research to develop their use with diesel/biodiesel blends in a biogas derived compressed natural gas (BioCNG) dual fuel engine.

Keywords: Nanoadditives, combustion, emissions, biodiesel, performance

Design and Analysis of Gate All Around FinFET with and without Buried Oxide

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Abstract

FinFET devices are winning a strong place in replacing MOSFETs due to their eminent Short Channel Effects (SCEs) controllability. In this paper, the Gate All Around (GAA) FinFET device and GAA FinFET device with Buried Oxide (BOX) have been designed at 24nm technology node using Cogenda TCAD tool. The analysis of the designed devices has been done based on performance-related parameters such as ON current (ION), OFF current (IOFF), and ION to IOFF ratio. The designed devices have also been compared and the results reveal that there is a reduction of 45 times in IOFF of GAA FinFET device compared to GAA FinFET device with buried oxide which makes GAA FinFET device suitable for power optimization applications. The ION of GAA FinFET with BOX is 3.56 times better than GAA FinFET which makes it a great choice for high-speed operations.

Keywords: FinFET, GAA FinFET, Buried oxide, Leakage Current, TCAD

Risks related to Artificial Intelligence & their mitigation techniques: Review on recent advances

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Abstract

As artificial intelligence (AI) continues to advance, its integration into various domains, the technology brings forth a multitude of benefits. However, alongside the advantages, there are also significant risks associated with AI deployment. This review paper synthesizes and analyses the potential risks linked to AI technologies and proposes techniques to mitigate these risks. By examining a range of perspectives, this study aims to provide a comprehensive overview of the key concerns surrounding AI implementation and strategies to address them.

Keywords: Artificial Intelligence, Risk Mitigation, Frameworks, Control, ChatGPT, Generative AI

Experimental Investigation of Performance and Emissions of Single Cylinder Diesel Engine using HHO and Biodiesel Blends

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Price, depleting resources and exhaust emissions of conventional fuels that cause the environmental pollution and health problems has increased the interest in the field of alternative fuels for internal combustion engines. In the present work the effect of hydroxy gas (HHO) supplement with sesame oil biodiesel in single cylinder, four stroke diesel engine for compression ratio 16, 17 and 18 is investigated. The biodiesel blends B10, B20, B40 and B60 were used that was prepared by transesterification process. The blends used as fuel supplemented with HHO along with intake air. Here hydroxy gas was produced by water electrolysis process and was made to supply into intake manifold with air at flow rate of 1 lpm, 2 lpm and 3 lpm. The experimental results of biodiesel supplement with HHO were compared to neat diesel operation. There is increase of 4%, 2% and 1.1 % in brake thermal efficiency for B10, B20, B40 blends while 9% decrement in brake thermal efficiency for B60 blend was observed. Brake specific fuel consumption was found decreasing by 7%, 6% and 2% for B10, B20 and B40 blends. For emission parameters the average CO reduction of 33%, 28%, 23%, and 13% were observed for B10, B20, B30 and B40 blend respectively at compression ratio 18 with 3 lpm of HHO. B40 and B60 blend shows 4% and 6% rise in HC emissions. Increased NOX was observed with hydroxy gas supplement for all blends when compared with neat diesel.

Keywords: Hydroxy gas (HHO), Biodiesel, CI Engine, Sesame Oil, VCR

Creating a High-speed LTE Communication Corridor for Railways with Limited Spectrum of 1.6 MHz x 2 and Supporting Video Applications with Advancements in Massive MIMO Technology citing an example of Indian Railways

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Abstract

This research paper proves that a high-speed LTE communication corridor can be created for railways using a RF (Radio Frequency) dimensioning tool, within 1.6 MHz x 2 spectrum. The resultant throughput suffices requirements of evolving video applications. Also demonstrates a specific study-case of Indian Railways as an example which can be generalized across the world.

Also recommends using 4x4 MIMO in current 1.6 MHz x 2 spectrum to enhance throughput and support video application demand.

However, highlights the need for railway companies across the globe to secure 5 MHz spectrum, as 16x16 MIMO could be a new reality within that, supporting many more applications.

Stresses on the sideline, also to go for a MORAN (Mobile Operator RAN) architecture to optimize the man and material efforts.

Keywords: Long Term Evolution (LTE) for Railways, Future Mobile Railway Communication (FMRC), Massive MIMO (multiple input multiple output)

Early Prediction of Sepsis: A Comprehensive Analysis of Machine Learning and Deep Learning Approaches

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Abstract
Sepsis remains is a life-threatening critical challenge in healthcare due to its rapid progression and high mortality rates. Early detection and intervention are crucial for improving patient outcomes. This paper presents a comprehensive analysis of the current landscape of early sepsis prediction using Machine Learning (ML) and Deep Learning (DL) techniques. We examine the existing literature to highlight the advancements, challenges, and future prospects of utilizing data-driven algorithms for timely sepsis prediction. Through a systematic review of research studies, we identify key trends, methodologies, and performance metrics, aiming to provide a holistic understanding of the state-of-the-art in this critical field.

Keywords: Sepsis prediction, Machine learning, Deep learning, performance metrics

Impediments to Circularity in Construction Waste Management, An Indian Perspective

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Abstract
The increasing population, outstretched resources, and rapid urbanization are significant contributors to the negative impacts of construction waste in urban India. Also, outdated and inadequate infrastructure to manage the volumes of waste generated appears to be a common denominator across the domains of construction waste management. Improper planning and insufficient data combined with the ineffective application of waste management standards augment the challenges urban cities like Bangalore, India, face. Current research indicates that approximately one-third of extracted natural resources are channeled into the construction industry, generating almost a quarter of the solid waste globally. A "linear economic" model is pervasive in the construction industry, with the norm procuring, processing, utilizing, and disposal of materials and waste. More recently, a paradigm shift has been observed, with concepts of Circular Economy and closed-loop principles in the construction industry. Circularity positively impacts waste management, ensuring the waste is circulated and facilitating environmental, economic, and social benefits. Incorporating principles of circularity into waste management results in positive impacts such as a considerable reduction in volumes, increase in re-manufacture, re-fabrication, and utilization of usable construction waste. This study presents a recent literature review of gaps and impediments to achieving circularity within waste management for construction activities in urban areas. Numerous areas for improvement or interventions are identified and detailed as recommendations. This literature review uses a systematic approach to determine various aspects of construction waste and barriers to achieving circularity. A literature review of waste characterization, current practices, and applicable models such as Life Cycle Assessments (LCA), material reuse, and recycling are studied. Finally, where appropriate, a summary of conclusions with observations is provided.

Keywords: Rapid Urbanization, Construction and demolition waste, Circular economy, Linear model, Waste generation, Life cycle assessments, Waste hierarchy

Exploring the Implementation of Blockchain in India's Construction Industry using PLS-SEM Technique

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Abstract
As one of the largest unorganized sectors, the construction industry in India suffers several difficulties, including lack of confidence, unreliability, data loss, and manipulation. Researchers devised a revolutionary technology called blockchain to eliminate these issues. Blockchain is a distributed ledger technology which facilitates storing and recording transactions. This technology offers several advantages, including transparency, reliability, security, and immutability. Blockchain technology has the potential to solve several problems in the Indian construction industry, but its adoption is likely to be hampered by a lack of awareness and understanding. This knowledge gap hinders adoption of blockchain in Indian construction industry. This study aims to identify the factors affecting resistance to adopting blockchain technology. To identify the factors a structural model is constructed and evaluated hypothesis using PLS-SEM software. Survey was conducted and data is collected from 156 personals who are working in Indian construction field. Findings revealed factors (effect) such as complexity or ambiguity, competency, scalability, budget, necessity, governmental support, and inadequate infrastructure influence adoption of blockchain technology. These findings can aid developers, managers, decision makers and government entities to work on the problematic part in adoption of blockchain in construction

Keywords: blockchain implementation, blockchain in Indian construction industry, blockchain in construction industry, blockchain barriers

Asymmetric double-image encryption using random audio file and Fourier transform

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In today's era, assurance for the secure transmission of data has become the utmost priority. Encryption is a vital tool for safeguarding data and ensuring that it reaches the right individuals only, restricting unauthorized access. This paper presents a novel scheme comprised of two grayscale images to be encrypted using an audio file. To attain the goal, the scheme leverages a fast Fourier transform and QZ modulation algorithm. Grayscale images are transformed from their spatial domain to their frequency domain. Along with that audio sound map is processed through the Fourier plane. The results are combined to create a black & white output. Phase truncation and phase retrieval operations are performed on the output to generate keys for decryption and for further encryption process respectively. Numerical simulations are carried out to demonstrate the feasibility and security of the proposed scheme. In addition to that low mean square error (MSE) and high Peak Signal Noise Ratio (PSNR) values confirm the robustness of the scheme. For the promising solution for secure data transmission, this scheme offers enhanced security and complexity.

Keywords: Fourier transform, QZ modulation algorithm, Grayscale image

Free vibration analysis of bi-directional functionally graded plates: Wavelet finite element method-based approach

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With the development of material sciences, functionally graded materials have been used for designing and manufacturing various engineering structures. The present work aims to carry out free vibration analysis of plates made of bi-directional functionally graded materials (2D-FGM). The analysis has been carried out using higher-order zigzag theory in the framework of wavelet finite element method (WFEM). B-spline wavelet on the interval (BSWI) and Haar wavelets are the two mother wavelets employed for predicting the approximation function. The computational efficiency of the WFEM-based methodology is demonstrated by comparing the present methodology with the conventional finite element method as the WFEM can predict the behavior of bi-directional FGM plates with a lesser number of elements. The present results are compared with the published results to demonstrate the efficacy and accuracy of the present methodology.

Keywords: Bi-directional FGM plate, Free vibration, Wavelet finite element method, BSWI, Haar wavelet

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