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FACULTY PUBLICATION

RESEARCH PAPERS

May-2026



TITLE:

Uncovering Hidden Patterns: Association Rule Mining for Disease Detection and Treatment Planning in Healthcare

AUTHOR :

Agrawal A.; Umarani C.; Ali M.I.;
Mangrulkar A.L.; Shaikh M.; Gupta D.;
Somesula S.

JOURNAL NAME:

AI Techniques for Association Rule Mining
in Medical Data: Trends and Practical
Applications

DETAILS:

Published on 2026



ABSTRACT:

Association Rule Mining (ARM) has become an important tool for uncovering hidden patterns and clinically meaningful relationships in large healthcare datasets. With the growth of electronic health records, administrative claims, and patient monitoring systems, ARM helps identify disease co-occurrences, multimorbidity patterns, medication risks, and factors influencing patient outcomes. This review examines key ARM algorithms, recent methodological advances, and their applications in diagnosis support, drug safety, and precision medicine. It also highlights ongoing challenges related to data quality, integration, and clinical interpretability, while outlining future opportunities for improving patient management.

Link: <https://www.igi-global.com/chapter/uncovering-hidden-patterns/403755>





TITLE:

Passengers' Insights toward Low-Frills Airlines: Mapping Perceptions and Decision-Making Factors

AUTHOR :

Hasan A.; Kumar N.; Gaikwad S.V.; Yadav A.

JOURNAL NAME:

African Journal of Hospitality, Tourism and Leisure (Vol.-14, Issue-4)

DETAILS:

Published on 2026



ABSTRACT:

There is strong competition among low-cost airlines in the domestic Indian aviation sector. Since the competition is fierce in the airline industry, understanding travellers' perceptions will help develop marketing plans and enhance services. Although previous research has covered independent metrics such as timeliness, quality of service and pricing but not much has been explored about how travellers perceive and compare different airlines across service areas. This research explores how major low-cost airlines in India, such as IndiGo, SpiceJet, Akasa Air, Vistara, and Air India Express, are perceived by travellers. Primary data was obtained by administering surveys to domestic travellers. The study employed Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to identify five primary categories: brand reputation, in-flight services, punctuality, customer support, and connectivity. Using these factors, the study develops a two-dimensional perceptual map that represents where the selected airlines stand in the market. The analysis identifies four distinct competitive groups, each with its unique strengths. This kind of visual and tactical information benefits airline marketers, strategic planners, and policymakers by aiding them in improving their markets.

Link:

<https://www.scopus.com/pages/publications/105038459672?origin=resultslist>



TITLE:

Self-Healing Optimization Techniques in Bacterial Concrete as an Environmentally Sustainable Solution: A Focused Review and Experimental Comparative Analysis

AUTHOR :

Mundhe P.; Sakhare V.

JOURNAL NAME:

Environmental Quality Management (Vol.- 35, Issue-4)

DETAILS:

Published on 23 May 2026



ABSTRACT:

To aim at the infrastructure sustainability, bacterial concrete which is biologically inspired approach that utilizes bacteria to induce self-healing through microbial-induced calcite precipitation (MICP) is a way out. A review explores the optimization techniques used to improve this bioremediation process. The review focuses on various strategies to optimize the three key components of MICP: bacteria, nutrients, and mineral precursors. This review encompasses optimization across three primary dimensions: material parameter (bacterial strains, nutrient sources, and mineral precursors), process-based parameters (encapsulation methods delivery mechanisms, and impregnation techniques), and environmental/structural parameters (pH, temperature, moisture conditions, and crack characteristics). Different methods for selecting and incorporating bacterial strains with robust ureolytic activity, capable of efficiently producing the enzyme crucial for calcite precipitation is presented. Other nutrient sources and delivery systems are examined to ensure long-term bacterial viability and activity within the concrete matrix. Finally, the review analyses the techniques for optimizing along with the type and dosage of mineral precursors, such as calcium and carbonate sources, to promote efficient crack filling and improved healing capacity. By critically evaluating these optimization techniques, this review aims to provide valuable insights for researchers and practitioners seeking to develop more efficient and durable self-healing bacterial concrete. In the experimental study that followed the review, the effects of both monoculture and polyculture bacteria on the mechanical properties of concrete were investigated. The utilization of a *Bacillus* consortium (polyculture) turned out to be a significant advancement that accelerated the process of reaching compressive strength. This result emphasizes how synergistic microbial communities might improve self-healing capabilities. The findings showed that both cultures performed better than one another in reaching the desired compressive strength (34 MPa) in 14 days. Finally, based on the reviewed literature, the study provided recommendations for further research and development in the field of self-healing bacterial concrete. Link: <https://doi.org/10.1002/tgem.70370>



TITLE:

Natural Deep Eutectic Solvents for Enhanced Polyphenol Extraction From Edible Medicinal Plants With an Emphasis on Citrus limon L.

AUTHOR :

Dhumane S.C.; Deshmukh R.; Kutty N.N.

JOURNAL NAME:

ChemistrySelect (Vol.-11, Issue-17)

DETAILS:

Published on 30 April 2026



ABSTRACT:

Holy basil, lemon, and betel are known for various ethnomedicinal properties due to multiple phytochemicals, especially phenolics. Natural deep eutectic solvents act as a greener alternative for extracting bioactives from plant materials. The objective of this study was to optimize the extraction of phenolics using NADES-based systems. A total of 16 different molar combinations of sugar, organic acid, and choline chloride were used. For holy basil and lemon, the highest total phenolic content (TPC) was 13.50 ± 0.01 and 11.08 ± 0.10 μg gallic acid equivalent per mg dry biomass (GED) when extracted with malic acid: citric acid system (1:1), and while in betel, highest TPC was observed in 14.60 ± 0.01 GED in tartaric acid: choline chloride (1:2) based system. Liquid chromatography-mass spectroscopy analysis revealed the presence of 19 flavonoids and phenolics in lemon leaf extracts. These extracts also showed antioxidant and antimicrobial activities (against *Escherichia coli* and *Streptococcus*). Scanning electron microscopy studies of *E. coli* cells treated with NADES-based lemon leaves revealed disruption of cellular membranes leading to the formation of multiple craters, thereby causing intracellular content leakage causing lysis. In conclusion, NADES systems can lead to higher extraction efficiency and bioactivity of target molecules, acting as a sustainable alternative to conventional organic solvents.

Link: <https://doi.org/10.1002/slct.202504939>



TITLE:

Stimuli-Responsive Nano-Biomaterials:
Orchestrating Precision Theranostics in the
Tumour Microenvironment for Synergistic
Oncologic Interventions

AUTHOR :

Karnik A.; Bhusari S.; Jain S.; Vinhute S.;
Swami A.; Thakre K.; Karnik H.-V.

JOURNAL NAME:

Pharma Times (Vol.-58, Issue-2)

DETAILS:

Published on 2026



ABSTRACT:

Cancer theranostics represents a paradigm shift in oncology, merging diagnostics and therapeutics to enable personalised, real-time interventions. This chapter elucidates the transformative role of stimuli-responsive biomaterials—engineered “smart” platforms that dynamically adapt to tumour microenvironmental cues such as pH acidity, redox gradients, enzymatic overexpression, temperature elevations, and external fields like light or magnetism. We delineate their mechanisms, classifying responses into external (e.g., NIR light-induced photothermal conversion) and internal (e.g., MMP-triggered degradation) stimuli, and explore diverse material archetypes: polymers (e.g., PNIPAM for thermo-responsiveness), inorganic nanoparticles (e.g., AuNPs for plasmonic heating), hybrid composites, and hydrogels for sustained release. Design principles emphasise molecular tailoring (backbone modifications for biodegradability), surface engineering (PEGylation for stealth circulation, ligand conjugation for receptor targeting), and smart delivery architectures (e.g., redox-cleavable disulfides). Applications span targeted chemotherapy (pH-sensitive doxorubicin liposomes minimising cardiotoxicity), diagnostic imaging (SPIONs for MRI contrast in hypoxic tumours), and modalities like photothermal (gold nanorods for NIR ablation) and photodynamic therapy (porphyrin-loaded carriers generating ROS). Case studies highlight clinical translations, including thermo-responsive hydrogels for rheumatoid arthritis and enzyme-activated nanoparticles for Crohn’s disease, underscoring efficacy in reducing systemic toxicity while enhancing localisation. Challenges encompass biological barriers (immune evasion, BBB penetration), scalability (batch reproducibility, cost barriers), and regulatory hurdles (long-term biocompatibility assays). Future trajectories integrate multi-modal hybrids, CRISPR-enhanced gene editing, and AI-driven optimisation to combat drug resistance, fostering patient-centric, non-invasive paradigms.

Link:

<https://www.scopus.com/pages/publications/105039271758?origin=resultslist>



TITLE:

Enhancing clinical transparency through explainable artificial intelligence in surface electromyograph-based lower limb activity recognition

AUTHOR :

Pandharikar A.; Jahagirdar A.

JOURNAL NAME:

Explainable AI in Clinical Practice: Methods, Applications, and Implementation

DETAILS:

Published on January 2026



ABSTRACT:

Comprehending human mobility relies on lower limb activity recognition (LLAR), which is significantly utilized in performance monitoring, assistive technologies, and clinical rehabilitation. This study employs surface electromyography signals and machine learning (ML) models, including random forest, decision trees, and k-nearest neighbors, to classify normal and abnormal lower limb activities. This study specifically examines the challenge of accurately distinguishing muscle activation patterns in individuals with knee pathologies during activities such as standing, sitting, and walking. Model training and evaluation were performed utilizing a dataset of 22 individuals, comprising both those with and without knee pathologies. Integrated into a robust feature extraction pipeline were the statistical measures: mean absolute value, standard deviation, root mean square, zero crossings, velocity, and acceleration. The random forest model demonstrated superior performance compared to the other evaluated models, achieving an overall accuracy of 99.96% for normal activity and 99.95% for aberrant activity. Methods of explainable artificial intelligence (XAI) were integrated to enhance model interpretability and confidence. XAI applied to random forest using feature importance method determined that flexo-extension acceleration is the most significant feature, followed by Vasto Medial Mean, Biceps Femoris Mean, and EMG Semitendinosus RMS in terms of importance. The early diagnosis of musculoskeletal and neurological disorders, tailored rehabilitation programs, and the development of sophisticated prosthetics and exoskeletons are all contingent upon this research and have significant implications. This study enhances data-driven movement analysis and biomechanical assessment by integrating interpretable artificial intelligence techniques with highly accurate ML models.

Link: <https://doi.org/10.1016/B978-0-443-44111-0.00012-3>





TITLE:

Indian Sign Language Recognition and Translation into Regional Language for Hearing and Speech Impaired Bedridden People

AUTHOR :

Raj P.P.; Gokhale A.; Gutte V.S.; Murtuza S.D.

JOURNAL NAME:

International Conference on Emerging Trends and Innovations in ICT, ICEI 2026

DETAILS:

Published on January 2026



ABSTRACT:

This research paper presents a system for real-time Indian Sign Language (ISL) recognition and translation, designed to assist hospitalized or bedridden deaf and mute individuals in communicating with healthcare providers and caretakers. Utilizing MediaPipe for hand landmark detection and OpenCV for video capture, the system identifies emergency-related gestures, translating them into English, Hindi, and Marathi. A Random Forest Classifier is employed to classify signs, enabling accurate gesture recognition under varying conditions. The system addresses key technical challenges, including real-time gesture detection, feature normalization, and handling missing landmarks. Furthermore, the system was tested in real-world scenarios, resulting in excellent outcomes. By reducing reliance on human translators, this solution empowers deaf and mute individuals to communicate more effectively, enhancing their autonomy and inclusivity in healthcare environments. The proposed system offers a promising approach for bridging communication gaps, improving emergency response, and fostering greater inclusivity for the hearing and speech-impaired community, particularly in healthcare settings.

Link:

<https://www.scopus.com/pages/publications/105037830700?origin=resultslist>





TITLE:

Network Analysis of Digital Storytelling and
Content Marketing for Brand Community
Building

AUTHOR :

Kakade K.; Chitranshi J.; Daga P.; Nigadkar
M.P.; Shinde S.C.; Kediya S.

JOURNAL NAME:

ICRTEECT 2025 - 2nd International
Conference on Recent Trends in Electrical,
Electronics and Computing Technologies

DETAILS:

Published on October 2025



ABSTRACT:

Digital storytelling is a potent tool for companies to interact; it greatly influences community development around brands and encourages participation. Focussing on how digital storytelling and content marketing operate in networks, this paper examines their role in creating strong brand communities. Brands are being promoted more and more on online channels. Digital storytelling offers marketers a genuine and emotive means of interaction with their intended audiences. Combining digital storytelling with content marketing produces a strategy for creating consistent, engaging stories that strengthen the relationship with consumers. This paper investigates the complex relationships among brands, consumers, and content using network analysis. It creates a picture of how narrative material travels across social networks and alters human behaviour. The paper uses methods from social network analysis (SNA) to find the important community structures, leaders, and hubs that make people loyal to and promote a brand. Brands can build groups that go beyond business relationships and turn into real, long-term relationships with customers by telling interesting stories that are in line with their ideals and interests. The results help us learn more about how digital stories can change how people think about brands and how loyal they are to communities in the digital age.

Link:

<https://doi.org/10.1109/ICRTEECT67512.2025.11448684>



TITLE:

Introduction to CO2 capture technology

AUTHOR :

Agarwalla A.; Kaushik S.; Borgohain R.;
Prasad B.

JOURNAL NAME:

Biobased Materials in Carbon Capture
Applications

DETAILS:

Published on January 2026



ABSTRACT:

This chapter provides a thorough introduction to CO2 capture technology, starting with the problem of increasing CO2 emissions from human activities like industry, energy generation, and transportation. It reviews key CO2 capture approaches, including postcombustion, precombustion, and oxy-fuel combustion, explaining the processes that enable CO2 separation using different technologies. The technologies of capturing CO2, such as chemical absorption, adsorption, and membrane separation, are discussed in detail. The chapter also looks back at how CO2 capture technologies have evolved and highlights the latest improvements aimed at making these processes more efficient and cost-effective. Understanding these advancements is crucial for addressing climate change and shifting toward cleaner energy sources. The goal of the chapter is to provide readers with essential knowledge about how these technologies can help industries reduce their carbon output and support global efforts to limit the CO2 in the atmosphere, thereby contributing to environmental sustainability.

Link: <https://doi.org/10.1016/B978-0-443-36538-6.00006-1>



TITLE:

A Systematic Review of Natural and Synthetic Fiber Reinforcement in Concrete: Mechanical Performance, Durability Mechanisms, and Sustainability Pathways

AUTHOR :

Sonar P.; Patil S.

JOURNAL NAME:

SSRG International Journal of Civil Engineering (vol.-13, Issue-4)

DETAILS:

Published on 28 April 2026



ABSTRACT:

The increased environmental impact of cement manufacturing has sparked interest in Fiber-Reinforced Concrete (FRC) as a long-term alternative capable of enhancing mechanical performance while lowering material consumption. This paper provides a thorough evaluation of natural and synthetic fibers used in concrete, assessing their mechanical properties, durability, and environmental impact. A comprehensive search was conducted using keywords and Boolean combinations in Scopus, Web of Science, and Google Scholar. From an initial pool of 512 papers, 146 full-text publications were screened, and 58 studies meeting the predefined inclusion criteria were analyzed. Natural fibers, including jute, coir, bamboo, hemp, and palm, show considerable benefits in fracture resistance, toughness, and early-age shrinkage management, all while having a low embodied energy and complete biodegradability. Their disadvantages include hydrophilicity, changeable shape, and low long-term durability, which frequently necessitate chemical treatment or hybridization. Synthetic fibers such as polypropylene, polyethylene, carbon, and glass have excellent tensile strength, heat resistance, and durability, suitable for structural and high-performance applications. The synthesis indicates that hybrid fiber systems provide synergistic benefits by combining the environmental benefits of natural fibers with the mechanical strength of synthetic fibers. A rigorous study identifies research gaps in fiber dispersion, interfacial bonding, long-term durability under environmental cycles, and the lack of consistent testing methodologies. A conceptual framework is proposed to assist optimal fiber selection based on mechanical needs, sustainability goals, and durability concerns.

Link: <https://doi.org/10.14445/23488352/IJCE-V13I4P101>



TITLE:

Parametric Study and Performance Analysis
of Flanged Diverging Diffusers for Small
Wind Turbines

AUTHOR :

Mahajan M.R.; Nikhade S.D.; Kale S.A.

JOURNAL NAME:

Renewable Energy and Sustainable
Development (vol.-12, Issue-1)

DETAILS:

Published on 6 April 2026



ABSTRACT:

Flanged diverging diffusers are advantageous because of higher durability, lower mass and cost, better environmentally friendly design, compared to various diffuser models used to increase the wind velocity at wind turbine rotor planes. Diffuser length, expansion angle, and flange height affect the diffuser performance in terms of velocity enhancement and mass. This study has systematically used Design of Experiments (DOE) for these three parameters at five levels. The computational Fluid Dynamics (CFD) simulations are performed for a total of twenty-five diffuser models obtained using DOE. The results of one selected CFD model are validated with wind tunnel experimentation, showing acceptable agreement. CFD results are further examined using multivariate regression analysis, Pareto Charts, main effect plots, 2D interaction contours, and 3D surface response plots. The obtained regression equation delivers the predicted accuracy. Among the parameters, the expansion angle is observed as an important factor that influences the velocity output, followed by the diffuser length and flange height. Further, the optimum dimensions of the diffuser are found using desirability function analysis, which suggests the intermediate value of diffuser length, lower values of expansion angle, and flange height provide compromised velocity performance with significantly reduced mass and cost.

Link: <https://doi.org/10.21622/resd.2026.12.1.1765>





TITLE:

Predictive Maintenance of Sucker Rod Pumps Using Machine Learning Techniques

AUTHOR :

Sonawani S.; Jain S.; Jindal G.; Majeti V.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Sucker rod pumping systems are the most widely used artificial lift methods in the oil and gas industry. These pumps require regular maintenance to ensure that they are operating at optimal levels, and failure to do so can result in costly downtime and high maintenance costs. The operating circumstances are reflected in the shape of dynamometer cards, and various conditions can be identified by the card's typical features. In this paper, sensor-collected data from dynamometer cards is utilized for feature extraction and dimensionality reduction using Elliptical Fourier Descriptors, Principle Component Analysis (PCA), and Convolutional Autoencoders. Machine learning models like Convolutional Variational Autoencoders (CNN-VAE), Long Short-Term Memory (LSTM) autoencoders and Support Vector Machine (SVM) models are used to generate some synthetic data and train on a combination of real and synthetic data. This approach can save significant costs associated with downtime and repairs while improving overall system performance.

Link: https://link.springer.com/chapter/10.1007/978-981-95-5923-7_10



TITLE:

Notes on the genus *Macromia* Rambur, 1842
of Assam, northeast India (Anisoptera:
Macromidae)

AUTHOR :

Payra A.; Philip J.G.; Islam N.; Mardi S.;
Thakuria D.; Koparde P.

JOURNAL NAME:

Zootaxa (Vol.-5793, Issue-2)

DETAILS:

Published on April 2026



ABSTRACT:

The present paper reports *Macromia sombui* Vick, 1988 for the first time from India, almost 36 years after its first description from Royal Chitwan National Park of Nepal in 1988. *Macromia calliope flavocolorata* Fraser, 1922 and *Macromia cingulata* Rambur, 1842 are reported here for the first time from the northeast India based on specimens collected from the fringe area of Raimona National Park, Kachugaon Division, Bodoland Territorial Council (BTC), Assam, India. In addition, this paper incorporates *Macromia cupricincta* Fraser, 1924 into the Odonata list of Assam.

Link: <https://doi.org/10.11646/zootaxa.5793.2.6>



TITLE:

Strategic Transshipment Planning Using a Reverse Iterative Approach for Fully Fuzzy Rough Interval Integer Models

AUTHOR :

Baranwal T.; Akilbasha A.

JOURNAL NAME:

Operations Research Forum (Vol.-7, Issue-2)

DETAILS:

Published on 27 April 2026



ABSTRACT:

This study addresses fully fuzzy rough interval integer transshipment (FRIIT) problems, where triangular fuzzy interval integers—representing unit shipping costs, supply capacities, and destination demands—are transformed into rough interval integers. We propose a novel reverse iterative transshipment method to determine the optimal solution for such problems. Our method produces cost intervals 8–12% tighter than VAM and NWCM, in one-third fewer iterations. To demonstrate the efficacy of our method, we present a numerical example illustrating the optimization process for the FRIIT problem. The proposed solution provides actionable insights for decision-makers, enabling informed and strategic transshipment planning.

Link: <https://doi.org/10.1007/s43069-026-00639-w>



TITLE:

JaNarX: Smart Soil Moisture Prediction
using Jackal Optimiser Enabled Machine
Learning Model in IoT Coupled Agricultural
Applications

AUTHOR :

Patil S.J.; Ankayarkanni B.

JOURNAL NAME:

Pertanika Journal of Science and Technology
(Vol.-34, Issue-2)

DETAILS:

Published on 30 April 2026



ABSTRACT:

Soil moisture can be used to provide predictive information important for precision farming, irrigation management, and pollution monitoring. Nonetheless, existing approaches often struggle to handle non-linear temporal relationships, environmental uncertainties, and poor real-time integration of sensor data, thereby degrading prediction performance. To overcome these problems, in this article, we introduce JaNarX, a soil moisture prediction framework (SMPF) based on IoT and the NARX model, optimised with the Jackal Apis Optimisation (JAO) algorithm. The approach utilises time-series radar satellite variables, meteorological terms, and continuous in situ sensor data to better capture dynamic changes of soil moisture. The Wazihub Soil Moisture Dataset (WSMD), which is the aggregation of multi-sensor environmental data measured in in-field conditions from real agricultural fields in Senegal, was used for training and validation. JAO was used to speed up convergence and tune NARX hyperparameters for solving the local minima problem, and increase the generalisation performance of the model. Experimental results in MAE, MSE, and RMSE evaluations had MAE = 1.53, MSE = 2.89, and RMSE = 1.70, which outperformed the state-of-the-art base-models such as SVM, LSTM, GLM XGBR, and traditional NARX network. The simulation results confirm that the proposed IOT-based, JAO-optimised NARX structure can achieve more accurate prediction than the traditional method and has good stability and computational efficiency. This paper presents a scalable, high-accuracy model for the prediction of soil moisture, suitable to enable real-time planning decisions for precision irrigation and sustainable water management in agriculture.

Link:

<http://www.pertanika2.upm.edu.my/pjst/browse/regular-issue?article=JST-6050-2025>



TITLE:

Exploring Recent Advances in the Pharmacological Activities of Pyrazole Compounds: A Comprehensive Review

AUTHOR :

Raut K.G.; Chabukswar A.R.; Waghmare P.S.; Jagdale S.C.; Kachi O.G.; Pawar H.R.

JOURNAL NAME:

Medicinal Chemistry (Vol.-22, Issue-3)

DETAILS:

Published on 11 September 2025



ABSTRACT:

Pyrazole-based compounds have gained considerable attention in recent years due to their diverse and potent pharmacological properties. This review provides an up-to-date examination of the therapeutic potential of various substituted pyrazole derivatives, highlighting their roles in combating diseases such as cancer, tuberculosis, fungal and viral infections, inflammation, and others. Unlike previous reviews, this article emphasises newly reported analogues with significant bioactivity and structure-activity relationships (SAR), which may pave the way for future drug development. The novelty of this work lies in its integrated perspective that bridges medicinal chemistry innovations with therapeutic relevance, providing researchers with a valuable resource for designing next-generation drug candidates based on the pyrazole scaffold.

Link:

<http://dx.doi.org/10.2174/0115734064385944250826074612>





TITLE:

Navigating Artificial Intelligence Adoption
Decisions in Entrepreneurial Ventures:
Insights from the Extended Technology-
Organization-Environment Framework

AUTHOR :

Shihab K.K.; Hasan A.; Gaikwad S.V.;
Agrawal M.; Sharma S.; Raghuwanshi S.

JOURNAL NAME:

Conference Proceedings - 4th IEEE
International Conference on Technology,
Engineering, Management for Societal
Impact using Marketing, Entrepreneurship
and Talent, TEMSMET 2025

DETAILS:

Published on October 2025



ABSTRACT:

This study investigates factors that influence how entrepreneurs in India are adopting artificial intelligence. 462 entrepreneurs belonging to different industries such as service, trade and manufacturing sectors were approached. Exploratory factor analysis-(EFA), confirmatory factor analysis-(CFA) along with structural equation modeling-(SEM) techniques were used for data analysis through SPSS (v22) and AMOS (v24). The results show that the organizational preparedness, technological commitment and external pressure play a major role in driving AI adoption whereas, sub-factors perceived ease of use and usefulness have minimal influence. These findings suggest that entrepreneurs need to pay more attention to organization and external market dynamics, rather than simple technological interfaces. This study also contributes to the challenges faced in AI adoption, especially by extending and validating the TOE-TAM framework within an entrepreneurial set-up. These insights can really help policymakers concerning challenges entrepreneurs faced with AI.

Link:

<https://doi.org/10.1109/TEMSMET65536.2025.11467530>



TITLE:

Investigation of anticancer and osteo-inductive potentials of *Desmodium gangeticum* leaf extract

AUTHOR :

Phatak S.; Chitale S.; Chaudhari S.; Kharade S.; Nerpagar N.; Sarvankar M.; Lele M.; Kulkarni S.; Hedao S.; Kutty N.N.; Godbole M.S.; Naik A.

JOURNAL NAME:

Journal of Herbs, Spices and Medicinal Plants

DETAILS:

Published on 11 May 2026



ABSTRACT:

Breast cancer metastasizes to bones, despite conventional treatments, causing tumor progression and bone loss. This study evaluated multipronged effects of *Desmodium gangeticum* leaf extract on breast cancer and bone formation. Methanolic leaf extract showed high phenolic and flavonoid content. HPLC identified bioactive compounds—gallic acid, ferulate, rutin, quercetin-3-O-glucoside and kaempferol-3-O-rutinoside. Leaf extract inhibited cell proliferation, induced apoptosis and cell cycle arrest, and inhibited migration of breast cancer cells. Extract promoted osteogenic differentiation and ALP activity in osteoblast-like cells. Extract also showed free-radical scavenging, anti-arthritis and anti-diabetic properties. Thus, *D. gangeticum* leaf extract may inhibit cancer progression and improve bone health.

Link: <https://doi.org/10.1080/10496475.2026.2669927>



TITLE:

Identification of Fraud in Accidental and Healthcare Insurance Using Local Outlier Factor: A Machine Learning Approach

AUTHOR :

Lele J.; Deshmukh V.; Chandra A.; Desai R.

JOURNAL NAME:

Journal of Computer Science (Vol.-21,
Issue-12)

DETAILS:

Published on 22 January 2026



ABSTRACT:

An unsupervised machine learning model that uses the mechanism of the Local Outlier Factor to flag and detect ambiguous as well as potentially fraudulent claims in Accidental and Healthcare insurance is proposed in this paper. It entirely automates the manual investigation of claims by claim appraisers in any organization. The ethos of this model is to comprehensively automate and expedite the claim investigation process using certain parameters to aid the claim appraiser's workload of going through straightforward claims and saving their time to investigate more critical and complex claims. The model flags anomalous claims by comparing them to the model's threshold, and input parameters and alerts are generated. These alerts generated are then investigated for fraud based on the parameters stated. The model can classify these claims and the cost of billable associated with these claims by reporting an accuracy of 99.5% for the Local Outlier Factor model in comparison with other implemented techniques of Isolation Forest which had an accuracy of only 78.37%. Our model has been tested and validated on real-world data and is showing promising results. Being able to identify and flag potentially fraudulent claims before they are paid out can save insurance companies a lot of money and resources.

Link: <https://doi.org/10.3844/jcssp.2025.2975.2985>





TITLE:

Weather Forecasting using Supervised Learning Techniques LSTM and XGBoost

AUTHOR :

Kosamkar P.; Gune S.

JOURNAL NAME:

2025 IEEE 3rd Global Conference on Wireless Computing and Networking, GCWCN 2025

DETAILS:

Published on November 2025



ABSTRACT:

Weather prediction is a crucial aspect in many fields. It impacts the decisions made in day-to-day life. From farming to aviation, it is important to take into consideration meteorological factors and insights for accurate weather forecasting. Currently, AI, ML, and DL models are used alongside the traditional NWP (Numerical Weather Prediction), in order to increase the accuracy of prediction. Traditional NWP exhibits a low accuracy as compared to models with ML integration (0.1% increase in accuracy). This paper focuses on implementation of Deep Learning Model - LSTM (Long Short-Term Memory) with different number of layers (1, 5, 10, 15) and Machine Learning Model - XGBoost to forecast certain factors of overall weather. Also, 2 different optimizers and activation functions (Adam, SGD, tanh, ReLu) are implemented in order to achieve a clear insight on which variation of LSTM yields more accuracy. It is observed that XGBoost (~73%) and one certain variation of LSTM (~72%) give the maximum accuracy. Even though many models are implemented till date for accurate weather forecasting, further research is required to analyze and create models that give high accuracy and perfect predictions.

Link: <https://doi.org/10.1109/GCWCN66157.2025.11448280>



TITLE:

Optimized Signal Acquisition and Advanced AI for Robust 1D EMG Classification: A Comparative Study of Machine Learning, Deep Learning, and Reinforcement Learning

AUTHOR :

Shinde A.; Shete V.; Mehendale N.

JOURNAL NAME:

Bioengineering (Vol.-13, Issue-4)

DETAILS:

Published on 15 April 2026



ABSTRACT:

Electromyography (EMG) signals are critical for prosthetic control, rehabilitation, and human-machine interaction, yet their classification remains challenging due to noise, non-stationarity, and inter-subject variability. This study presents a comprehensive comparative analysis of machine learning (ML), deep learning (DL), and reinforcement learning (RL) approaches for 1D EMG signal classification, with a systematic evaluation of signal acquisition parameters. Using both synthetic and real-world EMG datasets, we demonstrate that 8–10 bit quantization and a 2000 Hz sampling rate provide optimal signal fidelity while maintaining data efficiency. Among the evaluated models, ensemble methods (Gradient Boosting, Voting Ensemble) and advanced DL architectures (LSTM, Transformer) achieved superior performance on real EMG data, with accuracies reaching 100% and 96.3%, respectively. Notably, reinforcement learning agents (Deep Q-Networks) demonstrated 100% accuracy on multiclass synthetic data, revealing their potential for learning complex bio-signal representations. Our findings establish that meticulous optimization of preprocessing pipelines, combined with robust AI models, significantly enhances EMG classification accuracy. This work provides empirical guidance for selecting optimal acquisition parameters and AI architectures for practical EMG analysis systems, with direct implications for prosthetic control and rehabilitation technologies.

Link: <https://doi.org/10.3390/bioengineering13040463>



TITLE:

Retraction notice to “Advancing cancer theranostics through biomimetics: A comprehensive review”(Heliyon, (2024), 10, 6, (e27692), (S240584402403723X), 10.1016/j.heliyon.2024.e27692)

AUTHOR :

Anitha K.; Chenchula S.; Surendran V.;
Shvetank B.; Ravula P.; Milan R.;
Chikatipalli R.; R P.

JOURNAL NAME:

Heliyon (Vol.-12, Issue-7)

DETAILS:

Published on April 2026



ABSTRACT:

Nanotheranostics, especially those employing biomimetic approaches, are of substantial interest for molecular imaging and cancer therapy. The incorporation of diagnostics and therapeutics, known as cancer theranostics, represents a promising strategy in modern oncology. Biomimetics, inspired by nature, offers a multidisciplinary avenue with potential in advancing cancer theranostics. This review comprehensively analyses recent progress in biomimetics-based cancer theranostics, emphasizing its role in overcoming current treatment challenges, with a focus on breast, prostate, and skin cancers. Biomimetic approaches have been explored to address multidrug resistance (MDR), emphasizing their role in immunotherapy and photothermal therapy. The specific areas covered include biomimetic drug delivery systems bypassing MDR mechanisms, biomimetic platforms for immune checkpoint blockade, immune cell modulation, and photothermal tumor ablation. Pretargeting techniques enhancing radiotherapeutic agent uptake are discussed, along with a comprehensive review of clinical trials of global nanotheranostics. This review delves into biomimetic materials, nanotechnology, and bioinspired strategies for cancer imaging, diagnosis, and targeted drug delivery. These include imaging probes, contrast agents, and biosensors for enhanced specificity and sensitivity. Biomimetic strategies for targeted drug delivery involve the design of nanoparticles, liposomes, and hydrogels for site-specific delivery and improved therapeutic efficacy. Overall, this current review provides valuable information for investigators, clinicians, and biomedical engineers, offering insights into the latest biomimetics applications in cancer theranostics. Leveraging biomimetics aims to revolutionize cancer diagnosis, treatment, and patient outcomes.

Link: <https://doi.org/10.1016/j.heliyon.2026.e44878>





TITLE:

Cloud-Based File Storage and Collaboration Platform

AUTHOR :

Chandankhede C.; Yenkar S.; Prakash A.

JOURNAL NAME:

International Conference on Emerging Trends and Innovations in ICT, ICEI 2026

DETAILS:

Published on January 2026



ABSTRACT:

This paper develops a safe, scalable, and userfriendly cloud-based file storage and collaboration platform devised for education-related settings and explores the current challenges that students are facing while accessing digital resources for learning purposes. The proposed concept is developing a platform known as E-Book Store, through which students can upload, access, and share educational materials safely and effectively to enhance the availability of resources and integrate sophisticated security measures. This research has been based on existing literature that caters to data storage on the cloud, file sharing, and security techniques that are used in it and introduced several gaps which include scalability of the performance, comprehensive security, and user experience and justifying the requirement. Such a comprehensive gap analysis identifies enormous problems with the current systems implemented in the cloud, including large data handling, realtime collaboration optimization, and effective UX design for educational platforms. The literature survey also identified deficiencies regarding performance evaluation, real-world testing, and cost analysis of security mechanisms in particular within the context of educational settings. The novelty of this research lies in the integration of a built-in text-to-speech reader to improve access for varied learners, followed by the use of sophisticated encryption protocols and efficient file synchronization mechanisms that ensure both robust security and usability. Its USP is to provide robust scalability, multiplatform synchronization, and a user- friendly interface specifically designed for education-focused use cases. By bringing on board these innovative elements, the proposed platform aims to bridge the gaps that currently exist and be an all- encompassing, future-ready solution to improve collaboration and online learning in today's educational systems.

Link: <https://doi.org/10.1109/ICEI65890.2026.11448026>



TITLE:

Production Inventory Model for Multi-Item
Perishable Goods with Price and Stock-
Dependent Demand Under Trade Credit
Policy

AUTHOR :

Gupta A.A.

JOURNAL NAME:

Operations and Supply Chain Management
(Vol.-19, Issue-2)

DETAILS:

Published on 5 March 2026



ABSTRACT:

According to the law of demand, price and demand are inversely related. With the increase in price, the demand for an item decreases and vice versa. It is observed that the demand for an item is also influenced by the instantaneous stock level. In this paper, an attempt is made to develop a price and lot-size policy for perishable goods in the case of multi-item, whose demand has been considered to be dependent upon price as well as the stock level, and the goods are of a deteriorating nature. The deteriorating item loses its economic value with time. A mathematical model has been formulated to minimize total supply chain cost under trade credit policy. Illustrative numerical problems and further sensitivity analysis have been carried out. The results obtained show that model behaviour is justified for real-life experiences. It has been observed that the total supply chain cost for all three items increases gradually with the increase in the rate of deterioration. The cycle time, credit period, and lot size decrease with the increase in the deterioration rate. The production inventory model with trade credit financing can be useful for the supply chain managers to reduce supply chain cost and increase supply chain surplus.

Link: <https://doi.org/10.31387/oscm0650523>





TITLE:

Self-leadership, Employee Thriving, and Job Satisfaction: The Role of Flow at Work

AUTHOR :

Mahankali S.C.; Trivedi R.; Mathur S.;
Pattusamy M.

JOURNAL NAME:

Psychological Studies

DETAILS:

Published on 6 May 2026



ABSTRACT:

The study advances flow at work and self-determination literature by exploring the relationship between self-leadership and employee thriving. We examined whether the flow at work mediates the relationship between self-leadership and employee thriving. Further, the mediating role of flow at work between self-leadership and job satisfaction was also evaluated. The theoretical model was tested with cross-sectional data collected from 260 working professionals using the structural equation modeling technique. The results indicated that flow at work mediates the relationship between self-leadership and employee thriving. Additionally, results supported the hypothesized relationship between self-leadership and job satisfaction, mediated by flow at work. Our results held firm while controlling for age, tenure, and employment type for our hypothesized model. The study was one of the initial inquiries examining the role of self-determination strategies in facilitating flow at work. Further, the research reported here also examined the indirect role of self-leadership on employee thriving and job satisfaction. The research paper established strong empirical evidence on how employees can proactively enhance their learning, feel energetic, and feel contented in the workplace.

Link: <https://doi.org/10.1007/s12646-026-00882-5>





TITLE:

The Impact of Contactless Technologies on
Hotel and Restaurant Staff

AUTHOR :

Gurme V.A.M.; Damhare A.

JOURNAL NAME:

Future of Contactless Technology in Hotels
and Restaurants

DETAILS:

Published on August 2025



ABSTRACT:

The rapid implementation of contactless technologies in the operations of hotels and restaurants has significantly affected them as it shifts the roles, responsibilities, and service delivery patterns of the workers. This research is focused on the effects of contactless technologies on the workforce of hotels and restaurants, as well as assessing the advantages and disadvantages of the technologies. The technological shift from traditional service-based operations has brought about effective changes in manpower-related roles as employees needed to be aligned to the new digital technologies and application processes. Since these innovations are effective ways to increase efficiency and offer better experiences for guests, they also create problems of job insecurity, a need for upgradation, and future reductions in demand for manpower. It discusses the advantages and disadvantages of contactless technologies and the way automation can ease tasks, reduce the need for tactile engagement, and enhance safety standards. Copyright © 2026, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global Scientific Publishing is prohibited. Use of this chapter to train generative artificial intelligence (AI) technologies is expressly prohibited. The publisher reserves all rights to license its use for generative AI training and machine learning model development.

Link: <https://doi.org/10.4018/979-8-3373-1489-1.ch001>



TITLE:

Towards Sustainable Lawn Care: An Autonomous Grass-Cutting Robot Powered by LiPo Battery

AUTHOR :

Rane R.; Chavan V.S.; Chandrawat A.S.;
Modi V.; Yadav M.; Mishra S.

JOURNAL NAME:

Proceedings of the 6th International
Conference on Smart Electronics and
Communication, ICOSEC 2025

DETAILS:

Published on September 2025



ABSTRACT:

This paper proposes and analyzes the design and development of an autonomous grass-cutting robot powered primarily by a LiPo battery, with the future potential of integrating solar energy harvesting and IoT-based remote monitoring. The system is aimed at reducing human effort, minimizing environmental pollution, and decreasing reliance on conventional energy resources such as fossil fuels. The robot incorporates ultrasonic sensors for real-time obstacle detection, a microcontroller-based control unit for decision-making and automation, and DC motors for both the cutting mechanism and locomotion. A comprehensive review of existing research works has been carried out to identify current trends, limitations, and opportunities for innovation in the field of automated lawn care. Compared to traditional lawn mowers, the proposed design emphasizes sustainability, energy efficiency, and enhanced safety. Furthermore, its adaptability to renewable energy sources and IoT connectivity makes it suitable for future smart home and smart agriculture applications. Experimental observations and comparative analysis suggest that the robot achieves reliable performance while maintaining a low overall cost, making it a viable solution for environmentally friendly and efficient lawn maintenance.

Link: <https://doi.org/10.1109/ICOSEC67334.2025.11459682>



TITLE:

Experimental study of the thermal performance of a one-turn pulsating heat pipe under novel dual diameter configurations and varied fill ratios

AUTHOR :

Mushan S.G.; Deshmukh V.N.

JOURNAL NAME:

International Journal of Thermal Sciences
(Vol.-228)

DETAILS:

Published on May 2026



ABSTRACT:

The present study explores the influence of dual-diameter configuration on the thermal performance of a pulsating heat pipe (PHP) by employing larger and smaller internal diameters (ID) of 3.2 mm and 2 mm. Two distinct PHP models, specifically Model 1 with “Larger and smaller adiabatic” section and Model 2 with an “Equal length dual diameter” section, were developed, and the combined impact of the gradual heat input condition as well as fill ratio on the initiation of pulsation, thermal resistance and flow stability was systematically investigated. The results showed an initial rise in thermal resistance accompanied by a gradual rise in heat supply, indicating dominance of sensible heating, succeeded by a rapid decline upon pulsation initiation, indicating the conversion to oscillation-driven latent heat transfer. The onset of pulsation commenced early for Model 2 (at 30 W) in comparison to Model 1 (at 40W), demonstrating enhanced start-up features of Model 2. Further, Model 1 exhibited an affinity for flow regime transition at greater fill ratios, indicating an optimal functionality at a smaller liquid inventory (40% FR), while Model 2's more evenly distributed configuration enables effective use of higher liquid inventory (60% FR) for better latent heat transmission. Concerning the exhibited least thermal resistance of 1.15 K/W at 100 W heat input for dual-diameter PHPs in the literature, the present design exhibited an enhancement in thermal performance by 28.69% for Model 1 (0.82 K/W) and 33.04% for Model 2 (0.77 K/W), thereby statistically confirming the enhanced heat transfer ability of the proposed designs.

Link: <https://doi.org/10.1016/j.ijthermalsci.2026.111027>



TITLE:

FALCONS: Federated adversarial and lightweight classifier with offline & non-gradient shielding for traffic sign recognition in autonomous vehicles

AUTHOR :

Patil K.; Jadhav S.; Gunale K.

JOURNAL NAME:

Array (Vol.-30)

DETAILS:

Published on April 2026



ABSTRACT:

Autonomous Vehicles (AVs) increasingly depend on artificial intelligence (AI) for traffic sign recognition; however, adversarial vulnerability, privacy-preserving training, and real-time deployment constraints remain significant challenges. This paper presents FALCONS, a federated learning (FL)-based framework for traffic sign classification in Vehicular Ad Hoc Networks (VANETs), evaluated on the German Traffic Sign Recognition Benchmark (GTSRB). The proposed framework is lightweight, explainable, and operates in a serverless manner during testing and evaluation. A single-pass training paradigm on clean images is adopted, and robustness is assessed against multiple perturbations, including Snow Noise, Fast Gradient Sign Method (FGSM), and Red Patch Exploitation (RPE). Without adversarial retraining, the framework sustains >93–95% Top-25 accuracy under attack, while achieving 99.67% Top-1 and 100% Top-25 accuracy on clean data. To evaluate architectural generality, the same experimental pipeline is executed across ResNet-18, MobileNet-V2, and EfficientNet-B0 under identical conditions, enabling consistent and fair comparison. A decentralized file-based FL mechanism eliminates single-point dependency and supports offline, privacy-preserving collaboration among clients. Additionally, a Top-K robustness diagnostic is incorporated to analyze prediction stability under adversarial degradation in safety-critical scenarios. For deployment, ResNet-18 is optimized for low-latency inference and complemented by GUI-assisted inference and Excel-based logging for traceability. Experimental results averaged over five random seeds (mean $\pm$ standard deviation) ensure statistical reliability. Furthermore, a conceptual mapping between GTSRB and Indian MoRTH/IRC:67 standards highlights potential cross-domain applicability.

Link: <https://doi.org/10.1016/j.array.2026.100829>



TITLE:

Machine learning and deep learning approaches for Indian sign language recognition and translation: a comprehensive survey

AUTHOR :

More M.; Kale P.

JOURNAL NAME:

International Journal of Speech Technology
(Vol.-29, Issue-2)

DETAILS:

Published on 21 April 2026



ABSTRACT:

Indian Sign Language (ISL) translation and recognition face significant challenges due to a lack of sufficient datasets and difficulties in generalizing across various signs. These complexities make the real-time classification process more critical in improving communication between the Deaf and hearing communities. The latest developments in Machine Learning (ML) and Deep Learning (DL) techniques seem to offer encouraging possibilities for overcoming these challenges. An advanced learning technique is utilized to create more extensive datasets and support cross-linguistic research, which reduces computational time. Recently, different techniques have been analysed to determine effective ISL recognition and translation tasks. Hence, this research is focused on designing a survey by analyzing 75 research papers collected from 2007 to 2024 according to recognition and translation of ISL methods. The main contribution of this survey is to motivate research to enhance the effectiveness and accuracy of ISL recognition and translation, through an examination of performance methods on a range of different measures and datasets. The surveyed papers show attention to the difficulties encountered in previous research, to update these issues, recent works have focused on improving the limited real-time processing capabilities of DL and ML approaches. Exposing these issues and improving them with enhanced datasets has stimulated the ISL to the development of better ways for effective ISL communication.

Link: <https://link.springer.com/article/10.1007/s10772-026-10264-x>



TITLE:

Dark triad traits in higher education: a review, synthesis and research directions

AUTHOR :

Verma S.; Gupta A.; Borde P.S.

JOURNAL NAME:

Global Knowledge, Memory and Communication

DETAILS:

Published on January 2026



ABSTRACT:

Purpose – The impact of the dark triad (DT) personality traits (psychopathy, Machiavellianism and narcissism) in academia is gaining significant attention from scholars. The purpose of this study is to systematically explore the impact of DT personality traits on higher education systems. **Design/methodology/approach** – This study systematically synthesises the literature of 114 articles focusing on the implications of the DT traits in higher education systems using a content analysis approach. **Findings** – Four predominant themes were identified after an extensive content analysis of the chosen documents. This study also presented the research profiles of the selected articles. A future research agenda is proposed by identifying gaps in the extant literature. **Practical implications** – This study has significant practical implications for academic institutions, educators, career counsellors, etc. Academic institutions should align their programs with student personalities to achieve better outcomes. Educators should consider altering teaching approaches to achieve better academic outcomes that align with students' predominant DT traits. This study's outcomes can help career counsellors guide students in selecting academic streams which align better with their personalities. **Originality/value** – This study attempts to comprehensively synthesise the literature with an exclusive focus on the implications of DT traits in the higher education system. A conceptual framework was also developed to summarise the existing research. This review integrates the scattered body of knowledge in this field and provides several insightful theoretical and practical implications.

Link: <https://doi.org/10.1108/GKMC-04-2025-0273>





TITLE:

Comparative Analysis of Deep Learning Models for Underwater Trash Detection: A Study of R-CNN, YOLO, SSD, and DeepLabv3+

AUTHOR :

Patil K.; Tiwari V.; Rajagopal A.; Nair R.;
Chachan N.; Bhamare M.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published on April 2026



ABSTRACT:

Underwater trash detection plays an important area of marine conservation, undoing the environmental effects of pollution. This study compares the performance of four deep learning architectures—R-CNN, YOLO, SSD, and DeepLabv3+—for object detection and classification of underwater trash. The models were tested for accuracy, precision, recall, and F1-score to determine their real-world applications. DeepLabv3+ performed the best with 94.34% accuracy and an F1-score of 91.16%, with excellent performance in pixel-wise segmentation and small object detection in challenging underwater environments. While YOLO and SSD offer speed and efficiency for real-time applications, R-CNN offers accurate object localization but suffer from occlusions. The results enhance automatic marine trash detection, paving the way for real-time applications in underwater surveillance and cleanup operations.

Link: https://doi.org/10.1007/978-981-95-5923-7_2



TITLE:

Microbial electrosynthesis for carbon capture: harnessing cyanobacteria for sustainable bioproducts and climate mitigation

AUTHOR :

Kadam D.; Prasad B.; Kaushik S.

JOURNAL NAME:

Biobased Materials in Carbon Capture Applications

DETAILS:

Published on 2026



ABSTRACT:

Microbial electrosynthesis (MES) is an innovative electrochemical technology that leverages the metabolic capabilities of microorganisms, particularly cyanobacteria, to convert carbon dioxide (CO₂) into valuable organic compounds. This process employs electrogenic microbes as biocatalysts, facilitating the reduction of CO₂ derived from waste materials with minimal energy input. The unique characteristics of microbial fuel cells, including low energy requirements, diverse product outputs, and the ability to utilize waste resources, make them essential components in future carbon management strategies. This review explores the fundamental principles of MES, its various applications, and its potential role in enhancing the efficiency of carbon capture technologies as part of broader climate change mitigation efforts. It highlights significant advancements in MES for CO₂ conversion, emphasizing the critical role of cyanobacteria in sustainable carbon capture and utilization. By addressing existing limitations and proposing future directions for research and implementation, MES has emerged as a promising avenue for combating climate change while simultaneously generating economically viable bioproducts that can replace fossil fuel-derived chemicals. This approach not only contributes to environmental sustainability but also supports the transition toward a circular economy.

Link: <https://doi.org/10.1016/B978-0-443-36538-6.00008-5>



TITLE:

Semi-supervised Shirorekha segmentation in handwritten Devanagari text using CycleGAN with dual attention

AUTHOR :

Bhat M.I.; Javed M.; B S.; Obaidullah S.M.

JOURNAL NAME:

Applied Soft Computing (Vol.-201)

DETAILS:

Published on May 2026



ABSTRACT:

Accurate identification and segmentation of the Shirorekha is a critical pre-processing stage in almost all machine interpretation pipelines for handwritten Devanagari word documents. However, it faces extreme challenges with limited pixel-labeled annotations, diverse writing styles, varying stroke widths, and document distortions. Existing two-stage approaches predominantly rely on hand-engineered features and traditional image processing which limits them to learning only local transformations. Alternatively, once adequately trained deep learning approaches can better generalize to diverse styles, stroke widths, and distortions when sufficient supervision is available. For this reason, we leverage a semi-supervised cycle-consistent generative adversarial network (CycleGAN) framework for Shirorekha segmentation. We further enhance the model with a dual-attention mechanism that captures both spatial and channel information, improving feature representation and localization. This design enables effective learning from limited labeled and abundant unlabeled data. Extensive experiments on a curated multi-dataset (legal amounts, city names, personality identification, and script datasets) demonstrate that the proposed model achieves a mIoU of 0.91 using only 60% of the labeled data, thereby achieving 91% of fully supervised performance. The proposed method outperforms several recent semi-supervised approaches across four datasets by up to 10.7%, achieves 17.7–22.9% improvement over traditional image processing methods, and provides a 13% gain over recent deep learning-based line detectors. Furthermore, the model maintains stable performance under moderate degradations, including Gaussian noise ($\sigma \leq 0.12$) and skew ($\pm 15^\circ$), while performance degrades under more severe distortions such as strong blur and resolution loss.

Link: <https://doi.org/10.1016/j.asoc.2026.115499>





TITLE:

Industry V.0: The Significance of Manufacturing Technologies: Industrial Net of Things, Cloud Computing, and Synthetic Intelligence

AUTHOR :

Patil R.V.

JOURNAL NAME:

Cloud Computing and IoT Strategies for Industry 5.0 Innovation

DETAILS:

Published on March 2026



ABSTRACT:

Manufacturers have seen noteworthy variations as a result of Industry 5.0 in recent years. They have seen firsthand the growth of robotics, cloud computing, and the Net of Things (NoT) in driving automation and data technology. Thanks to the seamless integration of software, hardware, and staff, smart factories are becoming increasingly prevalent, and an increasing number of manufacturers are experiencing success with “as-a-Service” business models. Industry 5.0 is now significantly more accessible to small and medium-sized businesses due to its growing maturity. Utilizing technology that gathers, organizes, and combines data with information from your ERP to improve your shop floor efficiency and provide insights is now a lot simpler. These days, it costs much less time, money, and effort for businesses of all sizes to gain realworld experience. These days, there's a shift away from the industry 5.0 model's emphasis on efficiency towards the realization that mechanized, smart plants must nevertheless prioritize people. More and more people are emerging to believe that social and technical systems can coexist to increase resilience, sustainability, and customization. Restoring people to the centre of industrial production will allow Industry 5.0 to make better use of their skills in creativity, critical thinking, and problem-solving. This work focuses on how Industry 5.0 uses contemporary technology (Industrial Net of Things (INoT), AI, and Cloud Computing) in significant ways. It intends to investigate the possible uses, advantages, and difficulties related to the implementation of the technologies in smart industries. This survey's contributions include giving a thorough summary of the body of research on the applications, procedures, technologies, and prospects around the usage of INoT, AI, and cloud computing in industry V.0. It pays close attention to several concerns linked to Synthetic Intelligence (SI) and big data in smart sectors, such as security and privacy issues with data, challenges related to interpretation, and adversarial attacks on AI models.

Link: <https://doi.org/10.2174/9789815322644126010004>



TITLE:

Design and development of the multispectral sensor with CIE Tristimulus colorimetry and machine learning framework for organic/non-organic tomato classification

AUTHOR :

Aher T.A.; Shaligram A.D.; Patil S.S.;
Shukre V.A.

JOURNAL NAME:

Organic Agriculture (Vol.-16, Issue-2)

DETAILS:

Published on 23 April 2026



ABSTRACT:

The differentiation of organic and non-organic produce is vital for trust and compliance. This research proposes a simple, non-destructive pipeline that combines Tristimulus Colorimetry with Machine Learning using the Portable Multispectral Sensor (VIS–NIR) to classify organic vs non-organic Tomatoes. Spectral reflectance from tomatoes (Organic, Non-Organic) collected under D65 was converted to CIE X, Y & Z, chromaticity (x, y), dominant wavelength, purity, NDVI, PRI, and two CIE-plane descriptors relative to a standard color anchor i.e. Radial shift (Δr) and angular shift ($\Delta \theta$). Supported by Vector Machines, Random Forests, and a lightweight CNN were trained with grid search and ten (10) fold cross-validation. The CNN performed best (Result: greater accuracy and greater F1 value for organic produce) and generalized to an external set of various organic & non-organic tomatoes (Result: greater accuracy for organic produce). Machine Learning Model interpretation indicated the Tristimulus features were most influential ($\sim 65\%$) Misclassifications were rare and occurred mainly at early ripening, where organics showed higher y-chromaticity (i.e. Greater chlorophyll retention) The method enables fast, low-cost field authentication without chemical analysis and is ready for sensor-embedded deployment.

Link: <https://doi.org/10.1007/s13165-026-00556-6>



TITLE:

Development of functionally modified low glycemic index rice flour from Sona Masuri through controlled enzymatic hydrolysis

AUTHOR :

Pachipala S.; Bashir O.; Pawase P.A.;
Mondal I.U.H.; Ambadi A.; Sherin Z.; Veer
S.J.; Abdi G.

JOURNAL NAME:

Food Chemistry Advances (vol.-11)

DETAILS:

Published on May 2026



ABSTRACT:

This study examines the potential of enzymatic modification in improving the nutritional profile of Sona Masuri rice flour, in light of increasing public health concerns regarding high-glycemic index diets. 1.5 % enzyme concentration, 90-minute incubation, and a reaction temperature of 55 °C was used to conduct the enzyme hydrolysis on optimal basis, using α -amylase and glucoamylase that helped in a significant decrease in GI, which reduced from 72.00 ± 0.80 (native) to 60.16 ± 1.06 . This reclassifies the rice flour from a high GI to a low-to-medium GI dietary product. Post-treatment study showed substantial changes in the starch digestibility fractions. The resistant starch (RS) fraction increased about 7 % and the rapidly digestible starch (RDS) reduced by around 27 %. Apparent amylose content decreased from 24.20 % to 18.49 %, accompanied by increased porosity and reduced bulk and true densities. FTIR analysis confirmed partial cleavage of glycosidic linkages and altered hydrogen bonding patterns, while FE-SEM micrographs revealed granule surface erosion, pore formation, and structural disruption. These physicochemical and microstructural changes contributed to reduced hydrolysis rate constants and equilibrium glucose release values. Overall, controlled enzymatic hydrolysis followed by retrogradation effectively modified starch digestibility, enhanced resistant starch formation, and reduced glycemic potential. The study, in conclusion, observed that enzymatic degradation is a promising approach to reduce the digestibility of rice starch, rendering them a good diet for diabetics.

Link: <https://doi.org/10.1016/j.focha.2026.101324>





TITLE:

Morlet Wavelet-Based Theta-Band EEG Analysis for Remote Sensing Applications

AUTHOR :

Shrivastava S.; Sinha A.; Srivastava P.;
Panigrahi N.

JOURNAL NAME:

CCIC 2026 - Contemporary Computing
Innovations Conference 2026

DETAILS:

Published on February 2026



ABSTRACT:

We present a method that processes Electroencephalogram (EEG) data for remote sensing object detection (RSOD) tasks. These tasks require information integration, visuospatial attention and decision-making skills. In this experiment, analysts examine high-resolution satellite imagery while their eye movements reflect underlying attention allocation and cognitive decision strategies. Our approach leverages the publicly available EEG + Eyetracking (ET) RSOD dataset. The methodology is specifically for theta-band neural oscillations extracted through Morlet wavelet time-frequency decomposition. A deep learning classifier processes neuralbehavioral features for object detection accuracy. By analyzing oscillatory brain dynamics, the method establishes a basis for intelligent support systems that can anticipate analyst performance. The study provides evidence for a robust relationship between theta-band neural activity and visuospatial attention required for RSOD tasks.

Link: <https://doi.org/10.1109/CCIC68129.2026.11486187>





TITLE:

Legal Implications of Artificial Intelligence
in Warfare

AUTHOR :

Chandra R.; Sanjaya K.

JOURNAL NAME:

Use and Abuse of AI in Warfare, Human
Development, and Social Justice

DETAILS:

Published on 2026



ABSTRACT:

The use of artificial intelligence in military applications is changing warfare as we know it, and bringing serious ethical, legal and operational challenges. This chapter addresses the challenges posed by AI-driven autonomous weapon systems during armed conflict specifically with respect to their compliance with international humanitarian law, accountability for military decisions or actions, ethical issues, and the role of international organisations in connection with development regulation of AI in warfare. In this analysis, the case studies—U.S. Department of Defense's Project Maven, Israel's Harpy drone system, Russia's Uran-9 combat vehicle and the U.K.'s Taranis drone—exemplify not only these powerful benefits but also autonomous weapon systems' grave dangers. The chapter calls for strong oversight, accountability, and compliance with international standards to make sure that the use of AI in militaries is ethical so that civilian lives are protected and human rights upheld.

Link: <https://www.igi-global.com/chapter/legal-implications-of-artificial-intelligence-in-warfare/397526>



TITLE:

Deep Learning Innovations in Ray Tracing:
A Survey of Transition to Neural Rendering

AUTHOR :

Dahiwal P.; Khonde S.; Warade K.;
Sonawane V.; Pawar S.S.; Deore S.; Raskar
S.; Singh T.; Dudhedia M.A.; Dhaigude
T.A.; Bodkhe B.K.; Gawande S.H.

JOURNAL NAME:

International Journal of Image and Graphics

DETAILS:

Published on May 2026



ABSTRACT:

This work provides a comprehensive analysis of the evolution of rendering techniques in computer graphics, focusing on the transition from rasterization, a method renowned for its efficiency, to physically based rendering techniques such as ray tracing and path tracing, which offer superior visual realism. Despite the unmatched accuracy of ray tracing in simulating complex light interactions, its widespread adoption has historically been limited by its high computational demands and sampling noise. Recent breakthroughs in deep learning have catalyzed a paradigm shift in rendering workflows, offering practical solutions to these challenges. Neural networks, through intelligent denoising, adaptive sampling strategies, and novel acceleration architectures, are now significantly enhancing both the performance and quality of ray tracing. This technological synergy is becoming increasingly critical to meet the escalating demand for high-fidelity, real-time graphics in fields such as gaming, virtual production, and immersive simulations. The report evaluates the transformative impact of deep learning on ray tracing and its implications for the future of interactive digital media.

Link: <https://doi.org/10.1142/S0219467828500131>



TITLE:

Cognitive Biases, Personality, and Stock Market Behavior: A Comprehensive Investigation

AUTHOR :

Kumari A.; Goyal R.; Kumar S.; Tripathi K.N.

JOURNAL NAME:

GMSARN International Journal (vol.-20, Issue-3)

DETAILS:

Published on 2026



ABSTRACT:

This study examines how personality traits and cognitive biases affects the financial decision-making process of individual investors in today's dynamic market of India. Specifically, it examines the direct and indirect effects of their big five traits i.e. Extroversion (EX), Agreeableness (AG), Conscientiousness (CO), Openness (OP) and Neuroticism (NE) and cognitive biases, such as Risk Tolerance (RT) and Overconfidence (OC). Sample size was collected from individual investors in India through a structured questionnaire using a purposive sampling method. PLS-SEM is subsequently applied to analyze the hypothesized associations among the variables. The findings unveiled strong relations between investors' personality traits (PT), cognitive biases, and investment behaviour (IB). Notably, overconfidence was identified as a strong mediator between personality traits (AG, CO, NE) and investment behaviour (IB) of individual investors. While, risk tolerance (RT) was found to be insignificant mediator. The study provides insights to the investors about their psychological biases and personality traits (PTs) which strongly influence their cognitive process by empowering them to make rational and sustainable investing decisions.

Link:

<https://www.scopus.com/pages/publications/105039306205?origin=resultslist>



TITLE:

Window-Based Multi-Path Transport Protocol to Alleviate Incast in Multi-homed Data Center Networks

AUTHOR :

Suryavanshi M.; Kumbhar V.; Gandal J.

JOURNAL NAME:

International Conference on Emerging Trends and Innovations in ICT, ICEI 2026

DETAILS:

Published on January 2026



ABSTRACT:

Data centers are scalable infrastructures designed to cater diverse applications and manage large volumes of data. To develop variety of Data Center Networks (DCNs), there exists a range of network topologies referred to as Data Center Network Architectures (DCNAs). Comparison of widely used DCNAs is presented in this paper. Servers running in multihomed DCNAs capable of sending and receiving traffic through more than one paths. This helps to obtain higher throughput and fairness in DCNs. The backbone of Internet is Single-Path Transmission Control Protocol (SPTCP). SPTCP is widely adopted in both Wide Area Networks (WANs) and DCNs. SPTCP performs well in WANs, but it fails to fully operate the bandwidth of network. It causes high delay in multi-homed DCNs. This paper analyses suitability of SPTCP in a multihomed DCNs. The extension to SPTCP, Multipath Transmission Control Protocol (MPTCP) permits servers in multi-home DCNs to send and receive data using more than one paths simultaneously. MPTCP offers improved throughput, fairness and robustness over multi-homed networks. Running MPTCP in multi-homed DCN for delay-sensitive rack-local short flows with many-to-one communication pattern creates MPTCP incast problem. This paper evaluates the performance of SPTCP and MPTCP in multi-homed DCNs. Furthermore, to alleviate MPTCP incast in multi-homed DCNs, a window-based multipath transport protocol (WBMPTP) is proposed. WBMPTP effectively manages all concurrent sender congestion window sizes based on Top of Rack (ToR) switch buffer capacity. Simulation results show that WBMPTP provides high goodput, reduced flow completion time, and helps alleviate MPTCP incast in multi-homed DCNs.

Link: <https://doi.org/10.1109/ICEI65890.2026.11447978>



TITLE:

Optimized PRNN-ENet for robust IDS in
IoV networks

AUTHOR :

Wagh M.B.; Suryawanshi V.A.; Lagdive
R.B.; Waghmare S.K.; Pawar S.S.

JOURNAL NAME:

Progress in Artificial Intelligence

DETAILS:

Published on 17 May 2026



ABSTRACT:

Modern connected vehicles face increased cyber threats due to expanded IoV attack surfaces. Robust intrusion detection systems are essential to counter vulnerabilities from weak authentication and encryption. Traditional methods are inadequate, therefore, an advanced real-time intrusion detection system (IDS) is needed to detect and mitigate evolving cyber-attacks in connected vehicles. To overcome these complications, optimized PRNN-ENet for robust IDS in IoV networks (IDS-PRNN-ENet-IoV) is proposed. The input data is collected from car hacking dataset. The gathered data are provided to the preprocessing phase. Here, fast guided median filter is used to normalize the data. Afterward, the pre-processed data are fed into the physically recurrent neural network (PRNN) with EfficientCovNet (PRNN-ENet), which classifies and detects the intrusion as normal, DoS, fuzzy, gear spoofing and RPM spoofing. Finally, a bitterling fish optimization algorithm is employed to optimize the weight parameters of PRNN-ENet. The IDS-PRNN-ENet-IoV technique is executed in Python and the metrics like accuracy, recall, f1-score is examined. The proposed IDS-PRNN-ENet-IoV achieves 6.14%, 7.13%, 6.06% higher accuracy, 7.28%, 10.24% and 5.39% higher recall and 5.10%, 5.20% and 7.48% higher f1-score when compared with the existing techniques.

Link: <https://doi.org/10.1007/s13748-026-00455-7>



TITLE:

Propagation and Interactions of Cos Gaussian Beams in Biased Photovoltaic Lithium Niobate Crystals: An Ab Initio Study

AUTHOR :

Katti A.; Kumar R.; Chourasia N.K.;
Chourasia R.K.

JOURNAL NAME:

Advanced Theory and Simulations (Vol.-9,
Issue-5)

DETAILS:

Published on 20 May 2026



ABSTRACT:

The article presents a comprehensive theoretical examination that combines a detailed analysis of nonlinear beam propagation in biased photovoltaic LNO crystals with first-principles predictions of electronic and optical properties. The full-potential linearized augmented plane wave approach inside the generalized gradient approximation, utilizing WIEN2k is used to study the electronic and optical characteristics. Direction-dependent refractive indices and absorption properties show a strong optical anisotropy and a direct band gap of 3.9 eV. Additionally, we study the propagation and interactions of cos Gaussian beams in biased photovoltaic LNO crystals for the first time. The dynamical evolution equation is solved theoretically by the use of the finite difference method. The direction of the external electric field profoundly affects the propagation and interactions of the cos Gaussian beams, and in the case of LNO, it either supports or opposes the self-defocusing caused by the photovoltaic effect. We then study the steady state propagation considering various cosine modulation parameters and different external electric fields. When effective self-focusing rises as a result of an external electric field, self-trapping and the development of optical spatial solitons, such as breathing solitons and Y-type breathing solitons, are seen. Soliton characteristics rely on the cos gaussian beam's modulation parameter. Lastly, the interaction between two in-phase and out-of-phase cos gaussian beams in a photovoltaic crystal is investigated, considering different separation lengths and cosine modulation constants.

Link: <https://doi.org/10.1002/adts.70413>



TITLE:

ANN based evaluation of thermal, mechanical, and physical properties of dried leaf fiber reinforced hybrid polymer composites

AUTHOR :

Gutte V.S.; Molawade M.H.; Rajput S.D.;
Satpute S.S.; Shaikh S.S.; Bhosale P.

JOURNAL NAME:

Interactions (vol.-247, Issue-1)

DETAILS:

Published on 6 May 2026



ABSTRACT:

Dried leaves are a highly regarded renewable resource and the primary source of cellulosic plant material. It is rumored that dried leaf fibers may enhance the strength of polymer laminates comparably to synthetic fibers. This study is distinctive as it used artificial neural network (ANN) methodology to investigate the influence of dried leaves fiber, alumina, copper, and silicon carbide reinforcement on the thermal, physical, and mechanical properties of epoxy, polylactic acid, and vinyl-ester polymers. The wet layup procedure supported by an ultrasonication bath was employed to fabricate these composites under ambient circumstances. The findings indicate that the dried leaves-alumina fillers enhanced the mechanical and thermal stability of all three polymers compared to the other samples. The Fourier-transform infrared (FTIR) spectra indicate that the fillers within the matrix form robust interfacial bonds, possibly due to the generation of novel hydroxyl functional groups. The thermogravimetric analysis indicated that the hybrid composites composed of dried leaves, silicon carbide filler, and polymer exhibited superior thermal stability. The findings were statistically significant at the 95% confidence level, as determined by the one-way ANOVA analysis. This study supports the notion that investigating innovative polymer composites is essential, and it demonstrates the efficacy of employing advanced modeling to accurately anticipate material properties.

Link: <https://doi.org/10.1007/s10751-026-02544-4>



TITLE:

Design and Operation of Bioelectrochemical System

AUTHOR :

Gade S.; Desai R.; Patil Y.

JOURNAL NAME:

Green Energy and Technology

DETAILS:

Published on 1 May 2026



ABSTRACT:

The MFC design supports bioelectricity generation in part because of the electrochemical gradient that exists between the anode and cathode. Mechanism for producing electrons and protons by microbial oxidation of organic compounds. It is carried out in simple, soft environmental conditions and operates using waste organic material as a substrate. Bioelectrochemical systems are more laborious since the BES process uses both biological and electrical means. Various models were employed during the optimization of the reactor design. A study on various model design reactors reveals that the components across different reactors are nearly identical. This chapter aims to supply ideas for the plan and assignments of BS to study various components that affect the design process.

Link: https://link.springer.com/chapter/10.1007/978-981-95-4310-6_4



TITLE:

Controlled release of urea from
poly(butylene adipate-co-terephthalate)
nanoparticles

AUTHOR :

Musale T.; Khurpade P.D.; Kulkarni A.D.

JOURNAL NAME:

Green Materials

DETAILS:

Published on 10 April 2026



ABSTRACT:

Rapid dissolution, volatilisation and leaching of fertilisers has been a major concern in agriculture industry. Controlled-release fertilisers help to regulate the nutrient release and reduce the environmental damage. In the present study, poly(butylene adipate-co-terephthalate) (PBAT)-based nanoparticles were synthesised for the controlled delivery of urea. Formulations with different urea to PBAT weight ratios (1:5, 1:10 and 1:15) were prepared using solvent evaporation method and characterised for morphology, crystallinity and release kinetics. X-ray diffraction analysis showed the absence of additional peaks of urea, suggesting that urea remained dispersed within the PBAT network. Scanning electron microscopy images displayed changes from rough and agglomerated surfaces in samples with lower polymer content to compact and uniform surfaces for higher PBAT compositions, thereby indicating enhanced distribution and encapsulation of urea in the polymer matrix. Zero-order, first-order, Higuchi and Korsmeyer–Peppas models were used to study urea release kinetics. The analysis showed a transition from Fickian diffusion to anomalous transport and again to Fickian diffusion with increasing polymer content, suggesting molecular diffusion and polymer relaxation. The results highlight the role of polymer composition in controlling the nutrient release behaviour and the potential of PBAT-based systems as biodegradable controlled-release fertilisers for sustainable agricultural systems.

Link: <https://doi.org/10.1680/jgrma.26.00004>



TITLE:

Breaking Down IPO Barriers: Cultivating
Conducive Retail Investment Environment

AUTHOR :

Srivastava S.P.; Himanshu; Jyoti G.; Gupta
S.

JOURNAL NAME:

Journal of Public Affairs (Vol.-26, Issue-2)

DETAILS:

Published on 7 April 2026



ABSTRACT:

The paper aims at providing a modeling framework on the barriers, which influence the retail investment decision in the initial public offering (IPO) market. Based on a structured literature review and nominal group-based expert discussions, eight major barriers were identified and they were assessed through the grey-DEMATEL methodology. The findings point out that information asymmetry and higher pricing by issuers are the most prominent barriers. High information asymmetry and a lack of understanding of IPO issuers' future prospects force investors to make decisions based on heuristics rather than on reliable and relevant information. The absence of a standard valuation method compels uninformed investors to perform a subjective valuation of IPO issuers. Investors become unable to distinguish between underpriced and overpriced IPOs. Thus, this study provides a supporting explanation for the “winner's curse” and the “hot issue market” phenomena. The current study suggests that the establishment of a favorable investment environment is an ongoing activity, and the regulators have to intervene frequently in order to achieve optimality.

.Link: <https://doi.org/10.1002/pa.70127>



TITLE:

Valorization of peanut shell waste: A sustainable lignocellulosic resource for circular bioeconomy applications

AUTHOR :

Gavande V.; Gaikwad A.S.; Mahanwar P.A.;
Siva I.; Radhakrishnan S.; Mathew J.T.;
Kulkarni M.B.

JOURNAL NAME:

Results in Engineering (Vol.-30)

DETAILS:

Published on May 2026



ABSTRACT:

Interest in agro-waste valorization has increased due to the growing emphasis on circular bioeconomy and sustainable resource management on a global scale. This review explores peanut (*Arachis hypogaea* L.) shell waste as a flexible, inexpensive lignocellulosic resource for creating value-added products in a variety of industries, including construction, energy recovery, polymer composites, and agriculture. Unlike previous reviews that primarily compile data, this work synthesizes existing knowledge to identify technological limitations, economic considerations, and scalability challenges associated with each valorization route. Peanut shells exhibit significant potential as reinforcing fillers in polymer systems, precursors for bioenergy and functional carbon materials, and soil-enhancing biochar, contributing simultaneously to waste management and carbon mitigation strategies. Finally, key research gaps and future development directions are proposed, positioning peanut shell waste as a versatile platform material within sustainable biorefinery and circular resource utilization frameworks.

Link: <https://doi.org/10.1016/j.rineng.2026.110896>



TITLE:

Environmental governance for addressing sustainable development goal for climate change

AUTHOR :

Pharate B.; Ramanathan V.

JOURNAL NAME:

Journal of Environmental Biology (Vol.-47, Issue-2)

DETAILS:

Published on March 2026



ABSTRACT:

Sustainable Development Goal 13 for Climate Change and its component Goal 13.2 aims for countries to address climate change issue through governance. In this context, this research traces the journey of Indian environmental policy for climate action and examines the initiatives in India. The paper further explores the use of environmental impact assessment as a tool to achieve Goal 13.2. The study conducts a quantitative review of 270 environmental impact assessment reports through content analysis technique using a checklist and applying valuation criteria to explore application of climate change in practice. 83 of 270 reports were observed to include climate change criteria. This indicates a modest presence in climate-relevant content in conjunction with a temporal correlation with the State Action Plan for Climate Change (2017) for Maharashtra state. Overall, the link between climate change and environmental impact assessment was not critically established. The opportunity to address climate change through the existing framework for conducting an environmental impact assessment is highlighted through this study. The perspective that impact assessment is an important facet of environmental governance in India and can be directly aligned with Goal 13.2, extends beyond the conventional compliance-based understanding of an impact assessment.

Link: https://www.jeb.co.in/index.php?page=abstract&issue=202603_mar26_spl&number=3





TITLE:

IoT - Enabled Face Recognition Attendance System Using Raspberry Pi and OpenCV

AUTHOR :

Bajeli P.; Gutte V.S.

JOURNAL NAME:

2025 IEEE International Conference on Emerging Trends in Computing and Communication, ETCOM 2025

DETAILS:

Published on November 2025



ABSTRACT:

Automation of student attendance systems in smart classrooms is an imperative need for any modern educational institution. This paper proposes an IoT-enabled Face Recognition-Based Smart Attendance System developed with Python, OpenCV, and Raspberry Pi hardware. The proposed system automatically captures real-time images of students, recognizes them with a previously trained LBPH model, and saves their attendance directly into an SQL database. This data can later be exported through an Excel pipeline for color-coded reporting. Facial features of each student are captured during the enrollment phase, stored locally, and matched using a live camera feed. Verification is performed once every 20 minutes to check that the student remains present during the lecture; it is designed to automatically terminate after one hour. With an 8 MP camera and the use of the Raspberry Pi microcontroller, the system can work as an independent edge device. Output data is arranged in color-coded Excel reports, through which the teachers can identify present and absent students for each session. Experimental results confirm that with a high confidence threshold of 80%, face detection and recognition are reliable, and hence accurate attendance logging has been achieved under multiple illumination conditions. The system design offers a cost-effective, agile, and privacy-aware approach in attendance tracking; thus, it is well-suited for academic and business applications.

Link:

<https://doi.org/10.1109/ETCOM66606.2025.11436752>





TITLE:

Deep Learning in Neuroimaging: Advanced CNN Models for Brain Tumour Detection and Classification

AUTHOR :

Annadate P.; Annadate M.; Borade R.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1874 LNNS)

DETAILS:

Published on April 2026



ABSTRACT:

Brain tumours pose a significant global health challenge, with high mortality rates due to delayed or inaccurate diagnoses. Early detection and precise classification are crucial for effective treatment. However, traditional diagnosis relies on manual MRI interpretation, which is time-consuming and prone to human error. Radiologists often face large volumes of complex MRI data, leading to missed detections or misclassifications, particularly in small or low-contrast tumours. This study explores deep learning, specifically Convolutional Neural Networks (CNNs), for automated brain tumour detection and classification. Using extensive MRI datasets covering gliomas, meningiomas, and pituitary tumours, a Sequential CNN model achieved 99% accuracy in detecting abnormal regions. A modified VGG16 model attained 98% accuracy in tumour classification. These models outperform traditional methods by providing faster, more accurate diagnoses, reducing radiologists' workload, and expediting clinical decisions. Beyond clinical diagnostics, CNN-based models integrated into telemedicine could revolutionise healthcare, especially in low-resource areas with limited radiologists. By ensuring consistent and accurate diagnoses, this research contributes to improved patient outcomes and more efficient medical care.

Link: https://doi.org/10.1007/978-3-032-19681-1_3



TITLE:

Exploring Sustained-Release Topical Applications in Physiotherapy: A Study on Terminalia Bellirica

AUTHOR :

Burungale M.; Mantri S.

JOURNAL NAME:

Physiotherapy Using Artificial Intelligence

DETAILS:

Published on March 2026



ABSTRACT:

Sustained-release topicals are an important development in physiotherapy, allowing both longer duration drug dosing at the site of injury, reduced systemic exposure as well as improved patient compliance. Of various natural agents, Terminalia bellirica (Bibhitaki) a well-recognized medicinal plant in the traditional medicine systems has gained interest as a valuable candidate because of its strong anti-inflammatory, antioxidant and analgesic activities. In this study, we focused on the fabrication and therapeutic efficacy of T. bellirica extract hydrogel long-acting formulation for physiotherapy. The study comprised of extraction and phytochemical study of T. bellirica, formulation of the carbopol gel based sustained released gel, in vitro drug release study using the Franz diffusion cell and in vivo pharmacological study like anti-inflammatory, analgesic studies. A single-blind pilot clinical study was also carried out on patients who were going through physiotherapy for chronic lower back pain to determine the applicability of the gel in real life. Phytochemical screening has found out that there are some antioxidants in the bio-flavonoid group present in the product. The created hydrogel retains good rheological properties throughout the test period and releases the drug in a controlled manner for up to 24 hours. In vivo experiments have shown that inflammation and pain are definitely alleviated. The use of T. bellirica gel by the patients in the clinical trial leads to great pain alleviation, less need for NSAIDs, and better mobility. These data substantiate the utilization of sustained-release topical T. bellirica systems, which are effective, natural, and safer alternatives or co-adjuncts in the therapeutics of physiotherapeutic management of the musculoskeletal disorders. The combination of phytopharmaceuticals and controlled drug delivery systems opens new possibilities for non-invasive, patient-friendly rehabilitation strategies.

Link: <https://doi.org/10.1002/9781394391561.ch14>



TITLE:

Metaheuristic Optimization Algorithms for
Crop Yield Prediction Using a Multi-Layer
RNN Model

AUTHOR :

Pareek K.; Bhatnagar V.; Tiwari P.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1854, LNNS)

DETAILS:

Published on April 2026



ABSTRACT:

In order to optimize the hyperparameters of a multi-layer Recurrent Neural Network (RNN) for crop yield prediction, this research compares three metaheuristic optimization approaches: Genetic Algorithm (GA), Whale Optimization Algorithm (WOA), and Particle Swarm Optimization (PSO). The study is done for wheat yield in Rajasthan, India, using a multi-source data set that includes climatic parameters, soil properties, nutrient content (NPK), and past yield values. Deep models such as RNNs can learn temporal dependencies in such data. However, their performance tends to be very sensitive to architecture and training hyperparameters. To solve this problem, this study uses GA, WOA, and PSO to optimize nine essential RNN hyperparameters automatically. Mean Absolute Percentage Error (MAPE), Root Mean Square Error (RMSE), and Coefficient of Determination (R^2) are used to test the best models. Out of the three, the WOA-optimized RNN performed the best with the lowest RMSE (390.03), highest R^2 value (0.7340), and highest accuracy in prediction (85.00%). In addition, this work contributes to Sustainable Development Goal 2: Zero Hunger, which aims to eradicate hunger and attain food security via sustainable agriculture. By enhancing the prediction of wheat yield, the research aids farmers in better planning, utilizing resources more effectively, and eventually producing more wheat, giving rise to increased productivity and improved food supply. Proper forecasting also helps governments and policy planners coordinate food supplies and agricultural schemes. In simple terms, the suggested model serves to produce more wheat, which is a useful component in the global fight against hunger.

Link: https://link.springer.com/chapter/10.1007/978-3-032-18846-5_29



TITLE:

Types of biobased materials for CO2 capture

AUTHOR :

Agarwalla A.; Kaushik S.; Prasad B.

JOURNAL NAME:

Biobased Materials in Carbon Capture Applications

DETAILS:

Published on 2026



ABSTRACT:

This chapter focuses on different biobased materials suitable for CO₂ capture, highlighting their role in addressing climate change. It begins with biopolymers like chitosan and cellulose, known for their natural carbon dioxide absorption capabilities. The discussion then moves to biomass-derived sorbents, such as biochar and activated carbon, which are created from agricultural waste and are effective in capturing CO₂ emissions. Additionally, the chapter examines bio-inspired materials that replicate natural mechanisms to enhance CO₂ adsorption. By discussing the unique properties of these materials, the chapter emphasizes their significance in developing sustainable carbon capture technologies, reducing greenhouse gas emissions across industries, and promoting environmental sustainability. Understanding these biobased materials is crucial for creating effective strategies in the fight against climate change and promoting a more sustainable future.

Link: <https://doi.org/10.1016/B978-0-443-36538-6.00002-4>



TITLE:

Design, Development, and Performance
Evaluation of Mechanical Time Delay
Mechanism Integrated with Material
Handling System for Effective Potato
Quality Testing and Sorting

AUTHOR :

Ardak M.B.; Phate M.R.; Sathe A.

JOURNAL NAME:

Potato Research (Vol.-69, Issue-4)

DETAILS:

Published on 28 April 2026



ABSTRACT:

Post-harvest potato grading and quality assessment requires sufficient and controlled time delays to ensure accurate evaluation of defects, physiological changes, and export suitability. Conventional grading systems often lack reliable mechanisms to provide variable testing times, which limits consistency in quality control. To address this challenge, the present study develops and integrates a mechanical time delay system with an agricultural material handling unit to enable precise and adjustable delays during potato testing and sorting. The system employs a novel escapement mechanism with pallet-escape wheel arrangements, designed to improve accuracy, durability, and reliability under agricultural conditions. Experimental evaluation was carried out using response surface methodology (RSM) with Taguchi's L18 mixed plan to optimize parameters such as angular twist, pallet weight, and torque. Results indicate that the maximum time delay of 57.99 min is achieved at an angular twist of 280°, pallet weight of 590 mg, and torque of 85 N·mm. The system demonstrates flexibility, allowing delays from 30 s to nearly 58 min, depending on operational requirements. This novel approach enhances the efficiency of potato quality testing and sorting, ensuring better compliance with export standards and contributing to improved post-harvest management in the agricultural sector.

Link: <https://doi.org/10.1007/s11540-026-10060-9>



TITLE:

Decoding Spiritual Happiness in Poetry: An Analytical Study of the Selected Poems of John Keats

AUTHOR :

Gite C.T.

JOURNAL NAME:

Beyond the Smile: The Happiness Equation in Context, Work, and Practice

DETAILS:

Published on 6 November 2025



ABSTRACT:

This chapter discusses the aspects of spiritual happiness reflected in John Keats's poetry. It examines the study by providing insights into how Keats's poetry combines the knowledge of medicine and literature with a thorough understanding of spiritual elements. The study employs the library method to unravel the elements of spiritual happiness portrayed in John Keats's selected works. It further explores spiritual happiness enshrined in those works of poetry, which can help people explore spiritual solutions to today's complex world. It concludes that spirituality must be thoroughly studied in a complex world marked by numerous conflicts in line with the other fields for holistic happiness. Scholars must also research other forms of literature apart from poetry to discover possible solutions to their everyday problems. The study also suggests that meditation can help people delve into the different areas of the mind and explore the hidden space, creating immense transformations in the universe in the long run.

Link: https://doi.org/10.1007/978-981-96-6759-8_4



TITLE:

Morphological and Contour-Based
Handwritten English Word Segmentation on
IAM Dataset

AUTHOR :

Pawar B.S.; Patil C.H.; Jabde M.K.; Mali S.

JOURNAL NAME:

Communications in Computer and
Information Science (Vol.-2874 CCIS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Handwritten text recognition is a crucial task in document digitization, requiring accurate preprocessing and segmentation for effective Optical Character Recognition (OCR). This study focuses on developing an efficient preprocessing pipeline to enhance handwritten text quality and improve word segmentation accuracy using the IAM dataset. The proposed rule-based approach integrates standard image processing steps—grayscale conversion, Otsu's adaptive thresholding, and morphological operations in a novel sequential framework that strengthens word separation and suppresses background noise. A contour-based segmentation technique is then applied to accurately detect and isolate words. Experimental results demonstrate that the preprocessing pipeline significantly improves text clarity and segmentation accuracy, making it suitable for further OCR applications. The average result of segmentation achieved is 96.15% on English handwritten text, excluding the cursive style of handwriting. This work contributes to the advancement of handwritten text recognition by providing a robust preprocessing framework for complex handwritten documents. A comparative analysis highlights the trade-offs between traditional projection-based methods, deep learning approaches, and the proposed morphological segmentation. This study contributes to the field by offering an optimized preprocessing pipeline that improves word segmentation accuracy, ultimately aiding in better recognition performance for handwriting analysis systems. The proposed method provides a practical solution for automated handwritten document processing, making it valuable for applications such as digital archiving, transcription, and OCR preprocessing.

Link: https://doi.org/10.1007/978-3-032-22062-2_38



TITLE:

IoT-Enabled Lithium-Ion Battery Management System Using ESP32

AUTHOR :

Naik S.; Bhole H.; Naikwadi F.; Deshmukh M.; Gutte V.

JOURNAL NAME:

IC-DECON 2025 - 2025 International Conference on Data, Energy and Communication Network, Proceedings

DETAILS:

Published on December 2025



ABSTRACT:

The growing prevalence of battery-operated systems particularly those used in Electric Vehicles and in portable electronic application requires the use of intelligent and robust Battery Management Systems. Conventional BMS systems do not have any means of monitoring remotely, are expensive and have limited scalability. This paper discusses the design and implementation of an inexpensive smart Battery Management System using the ESP32 microcontroller. The system was able to monitor in real-time, parameters needed to be monitored in a battery such as voltage, temperature and State of Charge of the battery using a cloud-based dashboard. The system integrates a voltage divider for voltage sensing and thermistor for temperature detection. The charging of the battery is accomplished with a relay module controlled by the ESP32 complete with overcharging voltage and over-temperature sensing in place to ensure that the battery was safe and also lasts a longer time. The use of the ESP32 on-board Wi-Fi facilities enables the data to be transferred to the Arduino IoT Cloud enabling monitoring remote and visualization of data quickly. This research work shows a scalable and cost-efficient system which has heavily improved upon traditional methods of monitoring batteries, through the introduction of IoT connectivity and intelligent control.

Link: <https://doi.org/10.1109/DECoN67170.2025.11447719>





TITLE:

Smart Dam Water Monitoring System Using IOT for Sustainable Resource Management

AUTHOR :

Maskarenkhas K.; Gulgulia K.; Gaikwad H.;
Kardekar A.; Gutte V.

JOURNAL NAME:

2025 IEEE International Conference on
Emerging Trends in Computing and
Communication, ETCOM 2025

DETAILS:

Published on November 2025



ABSTRACT:

Dams play a important role in agriculture, flood management, and the sustainable supply of water for domestic and industrial use. This paper presents an IoT-based system designed to monitor a dam's water level in real time using sensors and long-range communication technologies. The system provides accurate and continuous data on water levels and rainfall, which can be accessed remotely by the authorities responsible for dam management. From their working desks, operators can control the opening and closing of dam gates to ensure efficient and safe water flow regulation. This remote management capability helps prevent operational failures and allows for better control during extreme weather conditions. By releasing water gradually and at managed speeds, the system helps reduce flood risks and reduces damage to downstream areas. With sensors such as water level detectors and rainfall sensors, the system ensures continuous monitoring and sustainable dam operation. Realtime data transmission through wireless communication allows for efficient management and improved safety. Overall, the integration of IoT and intelligent technologies supports effective water resource management and enhances the resilience of dam infrastructure.

Link: <https://doi.org/10.1109/ETCOM66606.2025.11436352>



TITLE:

ClearSight: Leveraging Face Recognition for
Enhanced Crime Detection

AUTHOR :

Ohal H.S.; Patil S.K.; More P.K.; Kawde
T.V.; Gatagat J.S.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Face recognition technology has emerged as a transformative solution in various sectors, offering robust mechanisms for identity verification and security applications. This paper explores the integration of FaceNet, an advanced facial recognition model, with TensorFlow to develop a comprehensive framework for secure and efficient face detection systems. By leveraging biometric authentication, the proposed framework generates unique embeddings for each individual, facilitating precise identity verification. Additionally, we implement data de-duplication techniques within the system to minimize storage redundancy and enhance the scalability of cloud-based applications. While the integration of a secure database is pivotal to safeguarding sensitive information, this aspect is briefly overviewed in the abstract, with detailed discussions reserved for subsequent sections. The study further highlights the system's application potential in real-world scenarios, emphasizing its contribution to the broader domain of intelligent systems for sustainable industrial infrastructure.

Link: https://doi.org/10.1007/978-981-95-5923-7_12



TITLE:

Adaptive Lightweight Elliptic Curve Cryptography Framework for Power-Constrained Iot Devices

AUTHOR :

Purohit N.; Joshi S.

JOURNAL NAME:

IC-DECON 2025 - 2025 International Conference on Data, Energy and Communication Network, Proceedings

DETAILS:

Published on December 2025



ABSTRACT:

The Internet of Things (IoT) ecosystem demands security solutions that combine strong cryptography with energy efficiency for resource-limited devices. Conventional algorithms such as RSA and DSA impose high computational and memory overheads, rendering them unsuitable for power-constrained nodes. This paper proposes an Adaptive Lightweight Elliptic Curve Cryptography (AL-ECC) framework designed for IoT environments. The suggested design use to select which curves to use, create keys on the fly, and change the level of security based on entropy and the power mode of the device. To protect against side-channel threats, the system uses blindfolded hashing, capability tokens, and entropy-driven key generation. Using a real-world dataset of forest fires and experiments on Raspberry Pi Zero W, Model A+, and Model B shows that the system uses very little power (0.002 J per operation), keeps memory usage fixed (0.4 MB), and quickly reaches low-latency cryptography performance. comparative testing shows that AL-ECC offers a flexible balance between safety and energy economy for a wide range of IoT settings.

Link: <https://doi.org/10.1109/DECoN67170.2025.11447506>



TITLE:

Experimental Investigation of Surface Integrity Analysis Using Machine Learning for Nano-Powder Mixed Electrical Discharge Machining

AUTHOR :

Kaigude A.R.; Khedkar N.K.; Jatti V.S.

JOURNAL NAME:

Journal of Manufacturing and Materials Processing (Vol.-10, Issue-4)

DETAILS:

Published on 28 March 2026



ABSTRACT:

This research investigates the optimization of surface integrity in powder-mixed electrical discharge machining (PMEDM) through the innovative use of Jatropa biodielectric fluid enhanced with titanium dioxide (TiO₂) nanoparticles. A comprehensive experimental framework was developed using design expert software (DOE) with Response Surface Methodology (RSM) to systematically analyze the machining of AISI D2 tool steel using copper electrodes. The study examined five critical process parameters, gap current (Ip), pulse-on duration (Ton), pulse-off time (Toff), gap voltage (V), and powder concentration, evaluating their combined effects on surface roughness (SR), surface crack density (SCD), and residual stress characteristics. Advanced characterization techniques including scanning electron microscopy (SEM) were employed to analyze surface topography and subsurface microstructural changes. The optimization process successfully identified optimal machining conditions of current = 9 A, Ton = 100 μ s, Toff = 10 μ s, and gap voltage = 65 V, achieving exceptional surface quality with a minimum surface roughness of 3.22 μ m. Remarkably, these optimized parameters resulted in crack-free surfaces with zero surface crack density and minimal residual stress values across the 2 θ range of 90° to 180°. To enhance predictive capabilities, supervised machine learning algorithms were implemented to model surface roughness behavior. Comparative analysis of classification algorithms demonstrated that Support Vector Machine (SVM), k-Nearest Neighbors (kNNs), and Gaussian Naïve Bayes achieved superior performance with F1-scores of 0.88 and prediction accuracies of 90%. The integration of sustainable Jatropa biodielectric with TiO₂ nanoparticles represents a significant advancement in environmentally conscious precision machining, while the machine learning approach establishes a robust framework for intelligent process optimization and quality prediction in advanced manufacturing applications.

Link: <https://doi.org/10.3390/jmmp10040115>



TITLE:

Gentisic acid confers multimodal neuroprotection in experimental Alzheimer's disease by targeting oxidative stress, neuroinflammation, and protein aggregation

AUTHOR :

Soni U.; Pujari R.

JOURNAL NAME:

Phytomedicine (Vol.-156)

DETAILS:

Published on 2026



ABSTRACT:

Background Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline associated with oxidative stress, neuroinflammation, cholinergic dysfunction, and accumulation of amyloid- β (A β) and hyperphosphorylated tau (p-tau). Given the multifactorial nature of AD, phytochemicals with multi-target pharmacological properties are of growing therapeutic interest. Gentisic acid (GA; 2,5-dihydroxybenzoic acid) possesses established antioxidant and anti-inflammatory activities; however, its potential relevance in AD has not been comprehensively evaluated. Purpose This study investigated the neuroprotective potential of gentisic acid against Alzheimer-like pathology using integrated in vitro and in vivo experimental models. Study design A preclinical experimental study combining cell-based assays and an aluminium chloride (AlCl₃) and D-galactose (D-Gal)-induced rat model of AD-like neurodegeneration was conducted. Methods Blood-brain barrier (BBB) permeability of GA was assessed using a PAMPA-BBB assay. Neuroprotective effects were examined in AlCl₃-exposed SH-SY5Y cells. In vivo, Wistar rats received AlCl₃ and D-Gal to induce cognitive and biochemical alterations, followed by oral GA treatment. Behavioral paradigms such as open field, Morris water maze, novel object recognition, elevated plus maze and Y-maze tests were employed to assess spatial learning, recognition memory, and anxiety-like behavior. Oxidative stress markers, antioxidant enzymes, acetylcholinesterase activity, monoaminergic neurotransmitters, brain-derived neurotrophic factor (BDNF), pro-inflammatory cytokines, amyloid beta, and hyperphosphorylated tau protein levels were quantified. Histopathological evaluation of hippocampal and cortical regions was performed. Results GA demonstrated adequate BBB permeability and concentration-dependent protection against AlCl₃-induced cytotoxicity in SH-SY5Y cells. In the rat model, GA (10, 30, and 100 mg/kg, per oral (p.o.) improved cognitive performance and attenuated anxiety-like behavior.

.Link: <https://doi.org/10.1016/j.phymed.2026.158276>



TITLE:

Computational Biomarker Discovery for
Neurological and Psychiatric Disorders

AUTHOR :

Godbole C.; Mantri S.

JOURNAL NAME:

AI-driven Healthcare Innovations:
Applications in Neurology and Medicine

DETAILS:

Published on 9 April 2026



ABSTRACT:

This chapter discusses the current state of the computational biomarker discovery which is applied in key neurological disorders such as Alzheimer's disease, Parkinson's disease, epilepsy and multiple sclerosis, and psychiatric disorders such as major depressive disorder, schizophrenia, bipolar disorder and autism spectrum disorder. It emphasizes the role of computational models in managing multimodal data, recognizing disease-specific patterns and giving clinical interpretable results. The chapter covers machine learning and artificial intelligence (AI) with a focus on supervised, unsupervised and deep learning, and newly emerging models of multimodal integration, and explainable AI. Data scarcity and privacy concerns are major obstacles in computational biomarker discovery. Transfer learning and federated learning offer solutions. The chapter identifies challenges that inhibit clinical translation, such as data inconsistency, absence of standards, ethical concerns and regulatory hurdles. There are ethical and legal concerns regarding using patient information to identify computational biomarkers.

Link: <https://doi.org/10.1002/9781394452033.ch6>



TITLE:

Renewable Energy Output Prediction using
Machine Learning and Logistic Regression -
A Framework

AUTHOR :

Goswami S.; Goswami Banerjee B.; Roy T.;
Naik J.; Kar S.

JOURNAL NAME:

Conference Proceedings of International
Conference on Sustainable Technology in
Energy and Power Systems, STEPCon 2025

DETAILS:

Published on November 2025



ABSTRACT:

This work attempts to explore the improved applicability of a logistic regression framework to predict the renewable energy output of a place based on natural and engineered weather condition data, such as temperature, wind speed, humidity, air pressure, solar radiation, and wind power index. After cleaning and processing the dataset, the machine learning model was trained to classify the energy output of that place into high or low energy categories with 92.88% accuracy. The Confusion Matrix approach was taken to test the other aspects of the model performance, such as Precision, Recall, and F1 Score, and all came out to be 0.93 on a scale of 0 - 1 (weighted mean). A feature engineering approach for creating a Wind Power Index helped improve the results, leading to the observation that the classifier is highly precise in identifying high-energy output locations (a precision score of 0.98) after proper training. Though the dataset lacks temporal features such as the time of the day/week/month/year, the energy will be high; future implementations can certainly include these features.

Link:

<https://doi.org/10.1109/STEPCon66008.2025.11473710>



TITLE:

Predictive temperature control of electric two wheeler hub motor using gradient aware neural regulation with degradation tracking and fault tolerant multi condition torque adaptation

AUTHOR :

Deshmukh S.; Lokhande N.; Yeolekar S.

JOURNAL NAME:

Scientific Reports (vol.-16, Issue-1)

DETAILS:

Published on 13 March 2026



ABSTRACT:

Thermal stress in electric two-wheeler hub motors is a major bottleneck affecting drivetrain reliability, safety, and efficiency—especially under varied terrain, aggressive riding profiles, and sensor reliability degradation. This paper presents a novel Hybrid Gradient-Aware Neural Regulation (GANR) framework designed to enable predictive motor temperature control, real-time thermal degradation monitoring, and fault-tolerant torque shaping. The system integrates three distinct yet interlinked control layers: (i) gradient-sensitive neural temperature estimation, (ii) cumulative thermal damage indexing through a Motor Health Index (MHI), and (iii) multi-condition torque derating logic that adapts to ambient temperature, health state, and usage intensity. The controller combines a physics-based thermal model with a lightweight neural network estimator capable of learning under sensor drift, latency, or complete failure. A fallback and safety-mode flowchart ensure robust operation by switching to boundary-scaled torque caps and enabling a real-time decision layer that balances energy consumption, performance demand, and thermal safety. The system's intelligence also extends to an ambient-aware derating boundary and a thermal margin estimator to prevent runaway heating events. A detailed simulation framework is developed using real vehicle specifications, encompassing city, aggressive, and worst-case thermal cycles. Results reveal that the proposed control system can delay torque derating by up to 14%, improve energy efficiency by $\sim 7.4\%$, and achieve prediction RMSE below 2.1°C even under multiple sensor fault scenarios.

Link: <https://doi.org/10.1038/s41598-026-37505-y>



TITLE:

Energy-Efficient Air Drying: CFD-Assisted Design and Experimental Validation of a Refrigeration Dryer with Dual Heat Exchangers

AUTHOR :

Dhavan A.D.; Gadhe P.M.; Deshmukh V.N.;
Korane A.B.; Director

JOURNAL NAME:

Journal of The Institution of Engineers
(India): Series C

DETAILS:

Published on 22 May 2026



ABSTRACT:

This Paper describes the design and development of a 500 CFM energy-efficient refrigeration air dryer customized to the industrial applications, such as VMCs, CNC equipment, automation systems and food packaging operations. The system has two shell-and-tube heat exchangers, one air-to-air precooler and one air-to-refrigerant evaporator. R134a is used as the working fluid to increase thermal efficiency and decrease the required refrigeration. The configuration of the heat exchangers was optimized in a Computational Fluid Dynamics (CFD) analysis, which improved heat transfer and reduced the pressure drop. An elaborate design of the system including an exterior canopy was done to ensure efficient production. The effectiveness of the moisture extraction was consistent and effective at ambient temperatures between 15°C and 30°C, and the inlet air temperature was 52°C. The parameters of the system were set in such a way that an outlet air temperature of approximately 2°C was always attained and this allowed the system to dry more efficiently. The addition of the precooler lowered the thermal load of the evaporator by approximately 46% and this greatly enhanced the efficiency of energy. The outcomes of CFD showed that the air-side reduced its temperature by 34°C and the pressure drop by 2.1 bar, which were confirmed with the use of experimental data. The results prove the strength of the system and point to the possible improvement of the precooler design and functioning strategy.

Link: <https://doi.org/10.1007/s40032-026-01397-8>



TITLE:

Green Public Procurement in India: Policy Pathways to Sustainability

AUTHOR :

Dhawade M.

JOURNAL NAME:

Contributions to Management Science

DETAILS:

Published on 1 May 2026



ABSTRACT:

The Green Public Procurement (GPP) is one of the effective tools for advocating sustainability with considerations for environment in public procurement decisions. Across the world, some countries have formulated GPP frameworks. India presently lacks a dedicated policy framework for GPP. The chapter examines various initiatives undertaken by Indian government for facilitating GPP across multiple sectors. The chapter draws attention toward the evolving landscape of GPP in India. It analyzes pivotal government efforts, industry responses, and limitations in execution. This chapter includes an analysis of national laws such as General Financial Rules (GFR), policy guidelines by various ministries. Besides, the chapter examines the possible ecological as well as economic impacts of GPP in India. In other words, analyzes probable policy interventions needed to strengthen and institutionalize GPP in India. The chapter concludes with policy recommendations for developing countries like India who are seeking to upgrade their GPP strategies. India can serve as a powerful example—a beacon of light—for countries in the Global South looking to advance environmentally responsible public procurement. It advocates for multi-pronged strategy for GPP while deriving lessons from global best practice.

Link: https://doi.org/10.1007/978-3-032-16570-1_4



TITLE:

Principles of Green Chemistry in Grafting of
Polymers

AUTHOR :

Chabukswar A.R.; Jagdale S.C.; Kale Y.D.;
Polshettiwar S.A.

JOURNAL NAME:

Green Grafting: Innovations in Polymer
Functionalization for Sustainable Solutions
in Pharmaceutical and Healthcare Industry
(Part 1)

DETAILS:

Published on 2026



ABSTRACT:

The polymer system and its chemistry have their roots in the systematic study of applied chemistry. Despite its origins in the last century's changes in climate and environmental pollution, polymer and green chemistry have become a hot topic for chemists. The polymer industry plays a significant role in applied chemistry as polymers have become omnipresent. Polymer grafting is a unique technique that enhances the chemical, morphological, biocompatibility, and physical properties, thereby improving the potential of polymers in terms of conduction and various properties beyond charge transport. A polymer's base activity can be enhanced by further conjugation with copolymers or by grafting. The grafting procedure can enhance the desired properties of the parent polymer and the activity of natural or synthetic polymers without altering their core nature. By this technique, the polymer backbone gains new properties from grafting different monomers like improved elasticity, ion exchange, hydrophobic/hydrophilic character, heat resistance, absorption of water, chemosensitivity, pH sensitivity, antibacterial effect, dye adsorption capabilities, etc. This chapter also covers the effectiveness and advantages of the polymer grafting approaches with their various applications in different fields. For the environment's safety, the solutions used in the solution polymerisation technique often face issues due to their viscosity and heat transfer. The central issue faced is removing solvent from the polymer, which requires intensive energy consumption methods like distillation. Since not all polymerization techniques can be performed using greener solvents, chemists are working to find alternative routes and safer solvents to minimize waste and help save the environment for such polymers.

Link: <https://doi.org/10.2174/9798898811686126010005>





TITLE:

Yoga Pose Detection & Correction System

AUTHOR :

Shinde A.; Salkar S.; Oak S.; Kulkarni S.;
Pise N.

JOURNAL NAME:

CCIC 2026 - Contemporary Computing
Innovations Conference 2026

DETAILS:

Published on February 2026



ABSTRACT:

Yoga is all about the correct alignment, but often the beginners cannot stay on track without a teacher. The goal of this project is to create a live yoga pose detection and correction system that incorporates a camera, MediaPipe Pose, and angle-based verification of joints for pose recognition and validation. The backend and real-time video are managed through Flask and OpenCV, while the system provides instant on-screen feedback for incorrect poses. The poses supported are Tree, Downward Dog, Goddess, Lotus, Butterfly, and Meditation, making it a quick and lightweight solution for home practice.

Link: <https://doi.org/10.1109/CCIC68129.2026.11485918>



TITLE:

Advancing Sustainable Polymer Functionalization With Respect to Green Grafting in the Pharmaceutical and Healthcare Industry

AUTHOR :

Chopade J.; Hujare D.; Chopade V.;
Polshettiwar S.; Manmode R.

JOURNAL NAME:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 2)

DETAILS:

Published on 2026



ABSTRACT:

In biomedicine, the biocompatible and good physical and chemical properties of polyurethanes are frequently employed in medical devices, such as coronary stents. Despite being a perfect tissue frame in many ways, polyurethane exhibits better compatibility than other polymers, which can be partly attributed to its surface characteristics. Here, we outline a process for functionalizing polyurethane galls that entails integrating. The primary amine groups thus inserted into the polyurethane surface enable further coupling with dextran and recombinant peptides through reductive amination. Surface analysis is used to confirm the effectiveness of surface functionalization of an aliphatic poly(ether)urethane of medical grade. Polymers are so lightweight, moldable, and adaptable that they are indispensable in modern life; as a result, the human population grows, so will the need for polymers. During their usage, structural and functional polymers save CO₂ and have benefits for sustainability; yet, they pose problems when they reach the end of their useful lives. By utilizing the most recent developments in the field, polymer science and related fields can facilitate the circular economy of polymers by means of biodegradation or recycling. This can be achieved through the implementation of techniques for molecular and system design. Computational material science and advances in polymer chemistry and applications pave the way for a comprehensive approach to resolving these concerns through the design of materials that are biodegradable and recyclable. For applications involving controlled medication release, biodegradable polymers can be employed. They break down naturally in the body to produce non-toxic metabolites.

Link: <https://doi.org/10.2174/9798898813093126010011>



TITLE:

Effectiveness of a psychosocial intervention on fertility-related stress and quality of life among women undergoing infertility treatment

AUTHOR :

Yemul N.; Godbole M.; Ghule V.

JOURNAL NAME:

International Journal of Africa Nursing Sciences (Vol.-25)

DETAILS:

Published on May 2026



ABSTRACT:

Infertility is a multifaceted biopsychosocial condition that significantly affects women's emotional well-being and social functioning. Although assisted reproductive technologies address biomedical aspects of infertility, psychological distress often remains insufficiently integrated into routine care. The present study examined the effectiveness of a structured psychosocial intervention in reducing fertility-related stress and improving emotional and social quality of life among women undergoing infertility treatment. A controlled pre-post experimental design was used with 60 women with primary infertility (25–40 years) selected from fertility clinics in Pune, India. Participants were divided into two groups: the experimental group ($n = 30$) received a 28-day psychosocial intervention, and the control group ($n = 30$) received standard medical care. Fertility-related stress was measured using the COMPI Fertility Related Stress Scale, and emotional and social quality of life were assessed using the Fertility Quality of Life instrument before and after the intervention. Results showed that the experimental group reported significantly lower stress than the control group, $F(1,57) = 6.84$, $p = 0.011$, partial $\eta^2 = 0.11$, indicating that the intervention contributed to reducing stress. Significant improvements were also found in emotional quality of life, $F(1,57) = 8.27$, $p = 0.006$, partial $\eta^2 = 0.13$, and social quality of life, $F(1,57) = 5.92$, $p = 0.018$, partial $\eta^2 = 0.09$. Regression analysis indicated that reduction in fertility-related stress did not significantly predict post-intervention emotional and social well-being ($\beta = -0.38$, $p = 0.129$), explaining approximately 17% of the variance in quality-of-life outcomes. These findings suggest that while psychosocial interventions may contribute to emotional resilience and social adjustment, stress reduction alone may not be a strong independent predictor of overall quality-of-life improvements in infertility treatment settings.

Link: <https://doi.org/10.1016/j.ijans.2026.101093>



TITLE:

Thermal tuning and temporal dynamics of gap solitons in photorefractive photonic lattices

AUTHOR :

Katti A.; Chourasia R.K.

JOURNAL NAME:

Materials Letters (Vol.-419)

DETAILS:

Published on May 2026



ABSTRACT:

We examine for the first time, the temporal development and thermal properties of spatial gap solitons supported by photonic lattices in novel photorefractive crystals having quadratic as well as linear electro-optic effects. The study provides a detailed analysis of the temporal evolution of single- and double-peak gap solitons in the first as well second finite band gaps. Utilising the finite difference beam propagation method, we find that the unperturbed gap solitons exhibit consistent and stationary dynamical evolution throughout their formation cycle. Furthermore, we have investigated the temperature dependence of these gap solitons, establishing the thermal tunability of the localized modes. Our results are valuable for the physical viability and control of gap solitons in photorefractive media.

Link: <https://doi.org/10.1016/j.matlet.2026.140850>





TITLE:

Introduction to Green Grafting

AUTHOR :

Mulla T.; Patel D.; Dave D.; Vinchurkar K.;
Polshettiwar S.

JOURNAL NAME:

Green Grafting: Innovations in Polymer
Functionalization for Sustainable Solutions
in Pharmaceutical and Healthcare Industry
(Part 1)

DETAILS:

Published on March 2026



ABSTRACT:

Green grafting is an innovative approach in the realm of polymer functionalization, focusing on the integration of eco-friendly processes and sustainable materials to advance the pharmaceutical and healthcare industries. This introductory chapter provides a comprehensive overview of green grafting, outlining its principles, methods, and applications. Emphasis is placed on the environmental and economic benefits of adopting green grafting techniques, such as reduced carbon footprint, enhanced material efficiency, and minimized use of hazardous chemicals. The chapter delves into the chemistry of green grafting, exploring various green solvents, catalysts, and renewable resources employed in the functionalization of polymers. Key advancements in the field, including the development of biodegradable polymers and biobased grafting techniques, are thoroughly discussed. Furthermore, the chapter highlights the significant role of green grafting in enhancing drug delivery systems, medical devices, and tissue engineering. Through a series of case studies and realworld applications, the transformative impact of green grafting on sustainability in the pharmaceutical and healthcare sectors is demonstrated. The chapter concludes with a discussion on future directions and potential challenges, emphasizing the need for continued innovation and interdisciplinary collaboration to fully realize the benefits of green grafting in creating sustainable solutions.

Link: <https://doi.org/10.2174/9798898811686126010003>



TITLE:

AI-Powered Marketing in Immersive Worlds: Exploring Consumer Behaviour in Metaverse and VR Platforms

AUTHOR :

Rani B.; Bhartia S.; Sharma J.; Sani A.;
Khan A.A.; Hushain J.; Vajid A.

JOURNAL NAME:

Studies in Systems, Decision and Control
(vol.-646)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Metaverse and VR platforms are redefining consumers by enabling enterprises to interact in entirely new immersive ways. AI-based marketing solutions help personalize consumer journeys, automating workflows and optimizing marketing across digital platforms. In this paper, we examine AI applications in immersive VR and Metaverse environments and how they may change consumer behaviours and the relationship between consumers and consumer marketing. It considers trends such as predictive analytics, AI-powered avatars, and programmatic advertising, which are going to drive the way brands do virtual bricks and mortar, as well as how brands can start to predict and access the future behaviour of consumers. It also covers the psychological, emotional, and social impulses that are motivating and directing consumers to behave in these environments and explores the ethical implications of data privacy and bias in AI. Results indicate the need to understand consumer preferences in the virtual world if effective marketing strategies and happy long-term consumers are to be realized.

Link: https://doi.org/10.1007/978-3-032-11612-3_58





TITLE:

Overcoming sustainability challenges with digital twins

AUTHOR :

Bedekar M.; Mirasdar I.

JOURNAL NAME:

Digital Twins for Sustainable Development

DETAILS:

Published on 2026



ABSTRACT:

This chapter explores the significance and relevance of digital twin in various industry domains and the composition of a digital twin across various digital technologies. It indicates the relevance and use of digital twin in achieving Sustainable Development Goals in today's industry. Industry 4.0 can very well reap the immense advantages that digital twins have to offer. The chapter further discusses various case studies in heterogeneous domains where digital twins were adopted to improve and optimize processes, increase efficiency, and achieve the required effectiveness of physical processes. It concludes by highlighting the future scope of this technology intervention in various other domains. It will be an enabler for technology enthusiasts to explore further avenues of employing digital twin for better analysis, enhanced simulation, improved decision-making, specifically plan for predictive maintenance tasks, in various other domains.

Link: <https://doi.org/10.1016/B978-0-443-27388-9.00004-0>



TITLE:

Artificial neural network assisted optimization of tensile strength in Calotropis gigantea fiber reinforced nano-TiO₂ hybrid composites

AUTHOR :

Gutte V.S.; Bondar S.M.; Kulkarni Y.R.;
Sugave S.R.; Jagdale B.; Zade N.

JOURNAL NAME:

Interactions (Vol.-247, Issue-1)

DETAILS:

Published on 27 April 2026



ABSTRACT:

Artificial Intelligence techniques, including machine learning and artificial neural networks (ANN) are commonly employed to address various difficulties in Engineering. This research involved the creation of hybrid polymer by reinforcing polymer composite with natural fibers derived from Calotropis gigantea and Nano TiO₂. A chemical treatment with a sodium hydroxide (NaOH) solution in acetone (C₃H₆O) was performed to change surface characteristics of the fibers, enhancing their adhesion and interaction with the polymeric matrix. ANN model were initially trained and employed to forecast and enhance tensile strength of resulting CGF/nano TiO₂ hybrid nanocomposite (CGFN). The employed model was single-layer perceptron architecture configured as 3-5-1, featuring a hidden comprising 5 neurons. The CCD was employed to systematically investigate influence of various variables at tensile strength. SEM analyses demonstrated significant impact of NaOH alteration on fiber-matrix, affecting mechanical characteristics of composite. Results of mechanical testing conducted by ANOVA demonstrated that the primary determinants significantly influenced tensile strength, while the model exhibited an excellent fit with a coefficient of determination $R^2 = 0.9479$. ANN-CCD model predicted an optimal TS of 47.15 MPa, closely aligning with the experimentally obtained value of 47.33 MPa, resulting in an accuracy of approximately 98.45% in the model's prediction. This research highlights the efficacy of employing Artificial Neural Networks (ANN) in conjunction with Central Composite Design (CCD) to swiftly obtain dependable estimations of mechanical characteristics, so conserving experimental design time, production costs and resources in the development of composite materials. The utilization of calotropis gigantea fiber in conjunction with nano TiO₂ fosters a sustainable methodology by improving material efficacy while advancing development objectives at materials engineering.

Link: <https://doi.org/10.1007/s10751-026-02504-y>



TITLE:

Designing menus for profit: a revenue management perspective

AUTHOR :

Satpute P.R.; Bapat G.S.

JOURNAL NAME:

Emerald Emerging Markets Case Studies
(Vol.-16, Issue-2)

DETAILS:

Published on 8 April 2026



ABSTRACT:

Learning outcomes – The learning outcomes are as follows: Remembering: understand core revenue management concepts, including pricing strategies and capacity utilization; Understanding: recognize how menu engineering intersects with revenue management in small businesses; Applying: develop and implement strategies to balance profitability and customer satisfaction; and Analysing: evaluate real-world operational and financial data to craft actionable plans for small business growth. Case overview/synopsis – "The Engineered Menu" presents the challenges faced by Snacksbar Café, a small business in Pune, India, striving to optimize sales and profitability amidst competitive pressures. Despite being strategically located and popular with a diverse customer base, the café's performance stagnated over its first six months of operation. The protagonist, Mr. Dhanesh Vaidya, is tasked with revitalizing the café by implementing revenue management techniques tailored to small businesses. These include dynamic pricing, menu engineering, customer segmentation and operational efficiencies. The case offers students the opportunity to explore strategies for balancing demand, pricing and operational capacity, making it particularly suitable for discussions on Revenue Management for Small Businesses. Complexity academic level – It can be used in Executive MBA programs, Graduate MBA courses and Management Development Programs focusing on operational and financial decision-making in small businesses. Supplementary materials – Teaching notes are available for educators only. Subject code – CSS 12: Tourism and Hospitality.

Link: <https://doi.org/10.1108/EEMCS-03-2025-0112>



TITLE:

Integration of Mechanical Systems and IoT
for Smart and Climate-Resilient Irrigation in
Agriculture

AUTHOR :

Maharana H.K.; Kulkarni M.V.; Nayak R.C.;
Roul M.K.; Sarangi S.K.; Vijaybhai S.B.

JOURNAL NAME:

Communications in Computer and
Information Science

DETAILS:

Published on 1 April 2026



ABSTRACT:

Irrigation is a crucial component of agriculture, and technology-driven irrigation systems can significantly enhance farmers' active participation and productivity. This study presents two distinct IoT-enabled irrigation methods. The two new irrigation methods in small-scale farming that are introduced in this research are a solar-powered irrigation system and an IoT-based irrigation method with the use of a compound gear train mechanism. The latter is specifically designed to provide operational effectiveness during low sunlight hours, thus providing a steady supply of water. The speedy innovation of Internet of Things (IoT) technology has dramatically evolved farming activities, providing innovative solutions for improving crop production and making better use of resources. The current study ventures into the collaboration of IoT and climate-resilient technologies with a view to revolutionizing the agricultural irrigation sector through the harnessing of renewable energy. ESP8266 is at the heart of our concept, renowned for its easy-to-use interface as well as support for Wi-Fi, allowing a smart irrigation system to be implemented. The main objective of the current research is to design and develop a state-of-the-art circuit using the ESP8266 microcontroller to sense key environmental parameters such as Relative Humidity (RH), Dry Bulb Temperature, and Soil Moisture content. The system enables programmable control to keep the soil moisture content at its optimal level, i.e., for a saturation level of 80%. In addition, we suggest the incorporation of current solar water pumping and storage models in our IoT-based irrigation system to create a climate-resilient irrigation system. This is highly efficient for cultivating fruits and vegetables using drip and sprinkler irrigation methods. Under conditions of low sunlight, the gear train-driven irrigation system provides continuous water supply, making irrigation more reliable. This work develops a smart, climate-resilient irrigation system combining a compound gear train, solar power, and IoT-based control using an ESP8266 microcontroller. It addresses challenges in traditional irrigation by enabling real-time monitoring and efficient water use.

Link: https://link.springer.com/chapter/10.1007/978-3-032-17083-5_13





TITLE:

Indian students and democratic engagement:
parallel cohort insights into political
institutions, development, and sustainability
(2016 and 2022)

AUTHOR :

Karad R.K.; de Wit E.E.; Bunders-Aelen
J.G.F.

JOURNAL NAME:

Journal of Youth Studies

DETAILS:

Published on 21 May 2026



ABSTRACT:

This study examines the democratic orientations and political practices of Indian university students through two independent cross-sectional surveys conducted at national student parliament events in 2016 and 2022. The analysis reflects on the findings from these two large descriptive snapshots of students participating in these events in distinct socio-political contexts. Drawing on survey data complemented by focus group discussions (FGDs), it explores how students in these two time periods expressed their democratic engagement, institutional trust and priorities for development. Across both study cohorts, the findings reflect particularly low levels of support for formal institutions in the year 2022, while a strong concern for democratic values and principles is upheld, as well as an interest in solving issues such as social inequality, lack of access to education, and poverty. Interpreted through life-course and post-materialist frameworks, these findings are described as indicative of how students navigate their commitments to democracy within their respective contexts. The study develops the concepts of political plasticity to offer the idea that students are certainly not abandoning democracy, but re-imagining it as a relational and ethical practice in India's political climate.

Link: <https://doi.org/10.1080/13676261.2026.2677034>



TITLE:

Tailored imprinted polymers for selective recognition of sulfonated dyes: extraction of dyes from soft drinks, water and food samples

AUTHOR :

Shinde K.; Thorave R.; Shinde S.

JOURNAL NAME:

RSC Applied Polymers

DETAILS:

Published on 4 May 2026



ABSTRACT:

Synthetic sulfonated food dyes in beverages and processed foods pose health and environmental risks due to their persistence and potential toxicity. Traditional detection methods for these dyes lack selectivity and involve excessive solvent use. Herein, we report the synthesis of molecularly imprinted polymers (MIPs) featuring high affinity and enhanced capacity for binding to sulfonated dyes. The MIPs were prepared using phenyl sulfonic acid (PSA) as a template, a tweezer-type bis-imidazolium functional monomer, 2-hydroxyethyl methacrylate (HEMA) co-monomer, and ethylene glycol dimethacrylate (EGDMA) crosslinker. The recognition performance of the PSA-imprinted MIPs was evaluated via rebinding isotherm data, fitted to the mono-Langmuir isotherm model, which revealed binding capacities ranging from 100–300 $\mu\text{mol g}^{-1}$ with 103–104 M^{-1} affinity in organic and aqueous solvents. The optimized MIPs demonstrated superior affinity for a wide range of structurally diverse sulfonated dyes containing a PSA substructure. Their practical applicability was confirmed through successful recognition of commercial dyes in water, soft drinks, and food matrices, including the successful capture of food dye from adulterated turmeric samples. As a proof-of-concept, class-selective MIPs were employed as adsorbents in solid-phase extraction (SPE) cartridges, effectively capturing trace amounts of sulfonated dyes from water. Collectively, these results underscore the potential of the developed MIPs for food monitoring and environmental remediation.

Link: <https://doi.org/10.1039/D6LP00048G>



TITLE:

A Personalized, Non-Invasive Blood Glucose Prediction System Using a CNN-LSTM Model with a Sim-to-Real Transfer Learning Strategy

AUTHOR :

Dandge K.; Kumawat M.; Jadhav P.

JOURNAL NAME:

Engineering, Technology and Applied Science Research (Vol.-16, Issue-2)

DETAILS:

Published on April 2026



ABSTRACT:

The translation of Non-Invasive Glucose Monitoring (NIBGM) into routine clinical care is currently hindered by two significant engineering hurdles: the inherently weak signal fidelity, characterized by a low Signal-to-Noise Ratio (SNR), in optical sensors, and the "Cold Start" constraint common in deep learning applications. Traditional recursive architectures, such as Long Short-Term Memory networks (LSTMs), often struggle to generalize in data-sparse contexts typical of personalized medicine. To address these limitations, this study presents the Hybrid Temporal-Attention Network (HTAN), a novel framework that disentangles sensor artifacts from metabolic trends by integrating Residual Convolutional Neural Networks (CNNs) with Bi-directional LSTMs and Multi-Head Attention mechanisms. The validity of this architecture was assessed using a "Dual-Stream" protocol, with pre-training on a high-precision "Chaos-Augmented" Digital Twin ($N_{\text{syn}} = 100$, 2×106 samples) followed by benchmarking against three distinct real-world clinical cohorts ($N_{\text{real}} = 119$). Our analysis reveals a significant performance divergence by phenotype: while conventional Random Forest models achieve adequate accuracy for stable Type 2 Diabetes (MARD = 6.18%), the HTAN model exhibits superior robustness in high-volatility Type 1 Diabetes scenarios. Notably, on the complex Shanghai T1DM dataset ($N=7$), standard Bi-LSTMs struggled to track the dynamics effectively (Mean Absolute Relative Difference, MARD = 8.65%), whereas HTAN achieved a markedly lower MARD of 5.11%. These results indicate that attention-based methodologies, when initialized with synthetic physiological priors, offer a viable approach to modelling intricate metabolic instability in regimes with limited data.

Link: <https://doi.org/10.48084/etasr.16217>



TITLE:

Synergistic hybrid reinforcement effects of carbon black, silica, and multiwalled carbon nanotubes in self-healing natural rubber composites

AUTHOR:

Hajare B.; Radhakrishnan S.; Hilmi B.;
Syahira M.; Sani N.F.M.; Shuib R.K.

JOURNAL NAME:

Polymers and Polymer Composites (Vol.-34)

DETAILS:

Published on 5 May 2026



ABSTRACT:

This study investigated the influence of hybrid fillers such as carbon black (CB), silica, and multiwalled carbon nanotubes (MWCNTs) on mechanical properties and self-healing capability of the natural rubber (NR) composites based on metal thiolate ionic network. The Taguchi method was employed to optimize the hybrid filler composition using a reduced number of experiments, enabling efficient parameter evaluation, improved reliability of statistical analysis, and reduction in experimental cost and time. It was also used to optimize filler loadings and analyse their effects on key mechanical parameters including tensile strength, elongation at break, tear strength, hardness, compression set and crosslink density. Results suggest that MWCNTs contribute to enhanced mechanical performance through their high aspect ratio and interaction with the rubber matrix, followed by silica and carbon black. ANOVA analysis identified a filler combination of 15 phr CB, 20 phr silica, and 8 phr MWCNTs that represents a trade-off, where improved mechanical performance is achieved at the expense of reduced healing efficiency compared to unfilled NR.

Link: <https://doi.org/10.1177/09673911261448786>



TITLE:

EEG-Based Human Affective State Analysis
for Emotion Recognition

AUTHOR :

Chunawale A.; Bedekar M.; Bhalekar M.;
Girase S.

JOURNAL NAME:

Engineering, Technology and Applied
Science Research (Vol.-16, Issue-2)

DETAILS:

Published on April 2026



ABSTRACT:

The human brain signals generated during emotional activities can be recorded and analyzed with the use of Electroencephalography (EEG) to understand the exact state of the brain. EEG has influenced the field of affective computing research since it can classify human emotions more precisely than facial expression, text, body gestures, or audio signal recognition. Emotion classification utilizing machine learning includes the selection and extraction of various emotion-related features taken from the EEG signals. This study addresses the challenge of proper feature selection and accurate emotion classification based on real-time EEG data. The proposed system considers frequency and wavelet domain features. The Random Forest (RF) classifier gave the highest accuracy of 97% for classifying four emotions, namely happiness, sadness, calm, and stress. K-Nearest Neighbors (KNN) performed quite well with 94% accuracy followed by Decision Tree (DT) with 93% accuracy. Wavelet domain features had 89% accuracy with RF, outperforming Support Vector Machine (SVM), KNN, Gradient Boosting (GB) and Decision Tree.

Link: <https://doi.org/10.48084/etasr.16923>



TITLE:

Optimizing Agriculture: Integrating
Advanced Algorithms for Crop and
Irrigation Management

AUTHOR :

Gavas S.; Kosamkar P.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Reducing water usage and effective crop observing are essential to the modern agricultural sector because it directly affects productivity, preservation of resources, and sustainability. Information about crops' conditions and soil moisture availability must be accurate and provided in a timely manner to enable proper decisions to be made for improved agricultural results with minimum harm to the surrounding environment. Advanced algorithms of the Normalized Difference Vegetation Index (NDVI), the Normalized Difference Moisture Index (NDMI), and soil moisture sensing are integrated into the precision farming approach, as described in this study. Utilizing red light and near-infrared light that is reflectively absorbed enables NDVI to assess the health of a plant, while NDMI assesses moisture content within the soil and vegetation by reflecting near-infrared and shortwave infrared light. Combining high-resolution soil mapping with synthetic aperture radar (SAR) and remote sensing diagnostics allows this study to implement modern machine learning algorithms to develop reliable solutions to the rapid assessment of soil moisture content and crop health. Predictive analytics powered by modern sensor technologies provide the capability to automate irrigation management, which ultimately increases crop yields and provides a sustainable approach to agriculture while ensuring environmental protection. This system is so flexible that farmers and lawmakers alike will be able to make effective, real-time decisions about agricultural activities and improve the quality of farming practices.

Link: https://doi.org/10.1007/978-981-95-5923-7_5





TITLE:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 2)

AUTHOR :

Vinchurkar K.; Polshettiwar S.; Mahajan N.;
Bachhav Y.

JOURNAL NAME:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 2)

DETAILS:

Published on 2026



ABSTRACT:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in the Pharmaceutical and Healthcare Industry (Part 2) provides a clear and practical introduction to environmentally friendly grafting techniques that are reshaping modern polymer science. Covering nine focused chapters, the book explains the basics of polymer grafting, the role of green chemistry, and the use of renewable resources and green solvents in sustainable material development. It also highlights advanced eco-friendly grafting methods—including radiation-induced, plasma-assisted, enzymatic, and mechanochemical approaches—showing how these techniques improve efficiency while reducing environmental impact. Key Features - Explains core concepts of green grafting in a simple and structured way. - Highlights renewable resources, green solvents, and sustainable chemistry principles. - Covers advanced grafting methods with emphasis on environmental and industrial benefits. - Connects green grafting techniques to pharmaceutical and healthcare applications. - Designed to support both foundational learning and practical implementation. Target Readership: For students, researchers, and professionals in polymer science, pharmaceutical sciences, materials engineering, and sustainable technology.

Link: https://www.eurekaselect.com/ebook_volume/4047



TITLE:

Artificial Intelligence in Wastewater Management: Opportunities, Challenges, and Emerging Trends

AUTHOR :

Kaur P.; Kumar P.; Kumar U.; Bhardwaj
N.K.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

The water is a vital resource for social well-being, economic development, and sustenance of the environment. The water quality is being threatened by disposal of partially treated or untreated wastewater from industries, domestic, or other polluting sources. The quantum of wastewater generation is projected to increase further with urbanization and economic development. Particularly, wastewater management at urban centers in India is a challenge owing to poor monitoring and assessment of pollutants, and inadequate infrastructure development. The water contaminants pose potential threat to human health and aquatic ecosystems. The wastewater is a valuable resource for addressing challenges of water scarcity, economic development, and environmental protection in the era of climate change. There is need of robust and intelligent wastewater management systems for the effective monitoring and control of water pollution, recovery of value-added products, and productive reuse of treated water with application of data-driven state-of-the-art technologies. This chapter highlights potential applications of artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), simulation, and sensor-based technologies for wastewater management. The opportunities, challenges, and emerging trends in integrating the above technologies for real-time monitoring, control, optimal operation, and improved decision-making in smart wastewater management are evaluated in light of prevailing regulatory frameworks and standards

Link: https://link.springer.com/chapter/10.1007/978-981-95-5923-7_3



TITLE:

Fundamentals of biobased materials

AUTHOR :

Agarwalla A.; Kaushik S.; Prasad B.

JOURNAL NAME:

Biobased Materials in Carbon Capture
Applications

DETAILS:

Published on January 2026



ABSTRACT:

This chapter provides a comprehensive overview of biobased materials and their significant role in CO₂ capture. It begins by introducing the concept of biobased materials, explaining their advantages in sustainability and their ability to effectively absorb carbon dioxide from various sources. The chapter discusses various synthesis methods used to produce these materials, including both traditional and innovative techniques that enhance their performance in CO₂ sequestration. Characterization techniques are also discussed, showing how these methods evaluate the effectiveness of biobased materials in capturing carbon. Furthermore, the chapter addresses the sustainability aspects of biobased materials, considering their environmental impact and potential for reducing carbon footprints throughout their lifecycle. By examining the relationship between biobased materials and CO₂ capture, this chapter aims to highlight the importance of these materials in fighting climate change and advancing sustainable practices in various industries.

Link: <https://doi.org/10.1016/B978-0-443-36538-6.00005-X>





TITLE:

Interactional Classroom Justice in Indian Higher Education: Understanding its Role in the Process of Moving Away from Rote-based Pedagogy through Transdisciplinary and Transformative Learning

AUTHOR :

Karad R.V.; de Wit E.E.; Bunders-Aelen J.G.F.

JOURNAL NAME:

Journal of Higher Education Policy and Leadership Studies (Vol.-7, Issue-1)

DETAILS:

Published on 31 march 2026



ABSTRACT:

This paper explores how transdisciplinary research (TDR), transformative education and interactional classroom justice can together move Indian higher education (HE) beyond rote-based pedagogy. While India's National Education Policy (NEP) (2020) promotes creative and inquiry-based reforms of the system, less attention has been paid to understanding the fairness of everyday teacher–student interactions. Based on qualitative data from the Co-Creation in Society (CCIS) course, a two-week transdisciplinary and transformative initiative, this paper shares findings to support the idea that the redistribution of epistemic authority formed a key element in students' experiences. Students felt they were treated as co-researchers rather than passive recipients of knowledge. This shift offered a structural space for students to instigate discussions, ask questions and modeled respectful engagement with social stakeholders, reshaping students' sense of agency and intellectual growth. The study concludes by extending classroom justice theory to include epistemic authority, and offering a rare Indian perspective on classroom justice, broadening international debates on issues of equity, didactics, and leadership.

Link: <https://johepal.com/article-1-1637-en.html>



TITLE:

Smart and Resilient Construction Industry
Supply Chain: A Study on Industry 4.0
Integration and Future Opportunities

AUTHOR :

Dhopeshwar Y.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1783 LNNS)

DETAILS:

Published 1 April 2026



ABSTRACT:

The construction sector is undergoing significant advancements due to the digital revolution propelled by Industry 4.0 technologies in supply chain management (SCM). This study emphasizes that integrating automation, big data analytics, blockchain, and the Internet of Things (IoT) will enhance operational efficiency, transparency, and stakeholder collaboration. Our literature review indicates that these technologies improve decision-making and sustainability while streamlining procurement. However, challenges such as high implementation costs, skilled labor shortages, cybersecurity risks, and interoperability must be addressed for widespread adoption. Establishing standardized frameworks, strong data security, and strategic policy interventions is crucial. Future research should focus on optimizing integration models and developing cost-effective deployment strategies for the digital transformation of the construction supply chain.

Link: https://link.springer.com/chapter/10.1007/978-981-95-5923-7_9



TITLE:

The AI–consumer–sustainability nexus: a conceptual framework for real estate transformation

AUTHOR :

Saikhedkar U.; Mude G.

JOURNAL NAME:

International Journal of Housing Markets and Analysis

DETAILS:

Published on 4 March 2026



ABSTRACT:

Purpose – The success in the real estate business depends on the three streams – technology adoption, consumer behaviour and sustainability. While the technology of artificial intelligence (AI) has gained popularity in the marketing of property, the earlier research remains fragmented across the three streams. This paper aims to develop an integrative conceptual model, the AI–consumer–sustainability nexus, to connect these streams in a property–market context. **Design/methodology/approach** – A systematic literature review and thematic synthesis were conducted on 118 Scopus-indexed publications between 2015 and 2025. Themes were coded and consolidated to map pathways and derive hypotheses. To strengthen the conceptual integrity, semi-structured interviews with the stakeholders were conducted (a total of 24 interviews, including 11 with academicians and 13 with practitioners) to assess construct clarity and linkage plausibility. **Findings** – The framework places AI tools in real estate as the main driver and identifies consumer trust, perceived authenticity and value expression as key mediating variables. These variables shape near-term outcomes (purchase intention and market efficiency), which in turn influence longer-term sustainability outcomes. Policy and regulation operate as boundary conditions that can strengthen or weaken the proposed links. A total of 11 hypotheses are presented to guide future empirical testing. **Research limitations/implications** – In this conceptual study, hypotheses are not empirically tested. The review conducted is limited to Scopus literature (2015–2025). The framework guides future operationalisation and testing across housing-market and regulatory settings. **Practical implications** – AI adoption in housing depends on trust, authenticity and value expression, not accuracy alone. Platforms/developers should embed transparency and sustainability cues; regulators can use standards and disclosure to reduce uncertainty and support sustainable outcomes.

Link: <https://doi.org/10.1108/IJHMA-10-2025-0249>



TITLE:

Design Thinking as a Service Mindset:
Iterative Approaches to Transform
Hospitality Education

AUTHOR :

Singh M.; Mukherjee S.; Mukherjee M.

JOURNAL NAME:

Empowering Education With Iterative
Models and Design Thinking

DETAILS:

Published on 9 May 2026



ABSTRACT:

Hospitality education has traditionally emphasized technical competence and standardized service delivery; however, the evolving hospitality industry increasingly requires graduates who demonstrate empathy, creativity, adaptability, and innovative problem-solving skills. This chapter explores how design thinking, positioned as a service mindset and supported by iterative learning models, can transform hospitality education to better align with industry expectations. Using a conceptual and practice-oriented approach, the chapter integrates design thinking frameworks, experiential learning theories, and case-based illustrations from hospitality training. The findings highlight enhanced guest-centric learning, improved adaptability, stronger academia-industry linkages, and the development of sustainability and innovation competencies essential for future-ready hospitality professionals.

Link: <https://doi.org/10.4018/979-8-3373-7102-3.ch004>



TITLE:

Living off the Land Attacks: Detection and Mitigation Strategies

AUTHOR :

Mane O.; Hande Y.; Pai A.

JOURNAL NAME:

International Conference on Emerging Trends and Innovations in ICT, ICEI 2026

DETAILS:

Published on January 2026



ABSTRACT:

Living Off the Land (LOTL) attacks utilize legitimate system tools, including PowerShell, Windows Management Instrumentation (WMI), and scheduled tasks, to create malicious activity without being caught via traditional detection means. As attacks that operate with stealth and integrate themselves within systematic operations, LOTL is an extreme threat to cybersecurity and is particularly problematic in critical infrastructure contexts. The paper reviews LOTL attacks, including definitions, classifications, detection strategies, challenges, tools and frameworks, incidents, and prevention. Using academic sources, industry reports, and standards and guidance, we reveal the current state of LOTL detection and response by cybersecurity professionals and industries. We show that LOTL attacks are detected and classified best with behavioral analysis, machine learning, and logging, while recommending the use of resilience through multi-layer security. We also highlight considerable gaps in research and future directions.

Link: <https://doi.org/10.1109/ICEI65890.2026.11447548>



TITLE:

Design and Synthesis of 5-nitro Indazole Acetamides and Evaluation of their Antitubercular and Antifungal Activities

AUTHOR :

Kachi O.G.; Pawar H.R.; Jagdale S.; Raut K.G.; Kale Y.D.; Shinde M.P.; Hingane D.G.; Satpute D.B.; Kolhe N.H.; Chabukswar A.R.

JOURNAL NAME:

Current Bioactive Compounds (Vol.-22, Issue-6)

DETAILS:

Published on May 2025



ABSTRACT:

Aim: To design, synthesize, and evaluate 5-nitro indazole acetamide molecules for their antitubercular and antifungal activities. **Introduction:** The emergence of fungal resistance, multidrug-resistant strains of Mycobacterium tuberculosis, co-infections involving tuberculosis, and the recurrence of fungal diseases such as COVID-19 highlight the need for the design and synthesis of novel therapeutic molecules. **Objective:** The objective of the study is to design, synthesize, and evaluate 5-nitro indazole acetamides and evaluate them against fungi and tuberculosis. **Methods:** Molecules were designed by molecular docking software using PDB codes 2AQK and 1EA1 against tuberculosis and fungi respectively. The 5-nitro indazole acetamides were synthesized using substituted anilines and evaluated for their anti-fungal activity using the zone of inhibition and anti-tuberculosis assay. **Results and Discussion:** 5-nitro indazole acetamides with dimethyl aniline substitution demonstrated better docking interaction with tuberculosis target protein 2AQK. Compounds with fluorine and morpholine ring in 5-nitro indazole acetamides exhibited significant anti-tubercular activity, with a minimum inhibitory concentration (MIC) as low as 1.6µg/mL against the Mycobacterium tuberculosis H37Rv strain. Ethyl and methoxy substituted anilines used in the synthesis of 5-nitro indazole acetamides exhibited significant docking interactions with the fungi target protein 1EA1. These compounds demonstrated significant zones of inhibition and showed MIC values of 50µg/mL against Aspergillus niger and Candida albicans, comparable to those of Fluconazole. **Conclusion:** Out of nine 5-nitro indazole acetamides, indazoles with methyl, ethyl, methoxy, and morpholine group substitution were found to show significant anti-tuberculosis and anti-fungal activities due to better binding interaction with target proteins.

Link:

<http://dx.doi.org/10.2174/0115734072364579250505080057>





TITLE:

Exploring Diverse Techniques to Analyze Sentiments

AUTHOR :

Patil K.; Deshpande H.; Camelo L.;
Coutinho Q.; Pai A.; Patil S.; Sliveira C.;
Karpe R.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(1887 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

Sentiment analysis utilizes natural language processing to obtain and classify sentiment from data in the text form. The paper emphasizes on the classification of mobile product reviews using various algorithms. The experimentation is conducted on the two datasets obtained after cleaning where one dataset accounts for the negations in sentences whereas the other dataset does not. The experimentation process involves combining the feature extraction techniques with the different algorithms. Feature extraction is implemented uses a Count Vectorizer (CV) and Term Frequency – Inverse Document Frequency (TF-IDF). The classification is executed utilizing machine learning techniques like Naïve Bayes, Support Vector Machine, Random Forest, Logistic Regression, and deep learning techniques, including Long Short-Term Memory (LSTM), Bidirectional Encoder Representations from Transformers (BERT) and a hybrid of BERT with Bi-Directional LSTM. The results show that among machine learning algorithms, RF performs the best with both extraction techniques giving accuracies of 0.9774 with TF-IDF and 0.972 with CV. Among deep learning models, the execution of BERT model by itself provides the best accuracy of 0.9863. It is observed that the dataset handling sentence negation improves the execution of all algorithms. This comprehensive evaluation highlights the effectiveness of both standard machine learning and advanced deep learning methods for analyzing sentiments.

Link: https://link.springer.com/chapter/10.1007/978-3-032-20253-6_34



TITLE:

Improvement in Performance of Axial Flux Motor for EVs Using Optimization Methods- A Pilot Study

AUTHOR :

Paithankar S.S.; Hiwale A.S.; Khadse C.B.

JOURNAL NAME:

2026 3rd International Conference on Advancements and Key Challenges in Green Energy and Computing, AKGEC 2026

DETAILS:

Published on February 2026



ABSTRACT:

Permanent Magnet Axial Flux (AFPM) motor's improved power to weight ratio and superior torque to weight ratio and compact structure are making it more and more popular in electric car market. The construction, design and optimization techniques used to increase a motor performance can be used to examine its developments. The twin rotor axial flux PM motor is discussed in this study. The advancements of any motor can be analyzed based on the structure, design and optimization methods deployed for its performance improvement. In this paper, the proposed motor design equations are reviewed, and different optimization methods are analyzed for improvement in motor performance. Three important optimization methods reviewed in this study are genetic algorithm, particle swarm optimization algorithm and Taguchi algorithm. Based on the analysis, the main findings are: 1. Power density is improved by selecting advanced material to minimize losses; it has direct connection to the efficiency of the motor 2. Torque to volume ratio is increased by reducing ripple torque and cogging torque.

Link: <https://doi.org/10.1109/AKGEC68790.2026.11485757>



TITLE:

The MobileNetV2-Driven XAI Framework
for Hydroponic Spinach Disease Diagnosis

AUTHOR :

Kulkarni P.V.; Gohokar V.

JOURNAL NAME:

Engineering, Technology and Applied
Science Research (Vol.-16, Issue-2)

DETAILS:

Published on April 2026



ABSTRACT:

Being one of the best-organized, sustainable, and nature-friendly methods in urban agriculture, hydroponics is a state-of-the-art approach. Among hydroponic leafy crops, spinach, a commonly chosen plant due to its short cultivation cycle, high nutritional benefits, and steady consumer demands, is vulnerable to various diseases caused by pests, fungi, and bacteria. This leads to significant losses and quality issues, even when it is grown under controlled conditions. Taking into account these constraints, this study presents an automated, flexible, and reliable disease detection solution, specifically developed for hydroponic spinach farming. The proposed method works with spinach leaf image data and integrates advanced machine learning techniques. MobileNetV2, a conventional deep learning classifier known for effective feature extraction, is the core of the proposed system architecture. To maintain the classifier robustness and prevent overfitting, particularly in the case when data are limited, image augmentation and K-fold cross-validation are incorporated. Key metrics such as accuracy, precision, recall, F1-score, and computational complexity are used to evaluate the performance of the system. The results show that an accuracy of approximately 90% can be achieved using moderate computational resources. Furthermore, Explainable Artificial Intelligence (XAI) is also applied to understand model predictions in a better way and validate disease-specific feature learning. This ensures that the proposed method can identify plant diseases correctly without the need for complex infrastructure.

Link: <https://doi.org/10.48084/etasr.16406>





TITLE:

Proximity-Gated Wake-Word Spotting on
Low-Power Embedded Hardware Using
Quantized CNNs

AUTHOR :

Kadam S.; Upadhyay T.; Tiwari V.; Singh
P.; Pandey P.; Gutte V.S.

JOURNAL NAME:

2025 4th International Conference on
Cognitive and Intelligent Technology, ICCIT
2025

DETAILS:

Published on December 2025



ABSTRACT:

Wake Word Spotting (WWS) refers to the usage of short voice commands to enable hands-free interaction with smart devices. While many WWS systems already exist, they rely on cloud connectivity or high-performance processors, resulting in increased latency, higher energy consumption, and privacy concerns. This restricts the suitability of these systems for embedded and offline IoT applications. In this paper, we present a Wake Word Spotting system that is fully offline, and designed for low power microcontroller-based devices. This system employs an 8-bit quantized convolutional network (CNN) trained using a modified subset of the Google Speech Commands Dataset (v2), and recognizes the wake word “hello”. We integrate an ultrasonic proximity sensor that activates the processes of audio capture, feature extraction, and neural inference only when a user is detected within a 30 cm range of the device. This further improves energy efficiency, as it avoids unnecessary continuous audio processing. The complete pipeline runs entirely on the ESP32 microcontroller, and uses the TensorFlow Lite for Microcontrollers (TFLM) Library, ensuring that user audio is not transmitted anywhere outside of the device. An OLED display and status LED are integrated to provide real-time feedback during the device operation. The trained CNN model achieves over 90% classification accuracy, and has a low false-alarm rate on offline evaluation performed. When deployed on the ESP32, the system demonstrates sub-10 ms inference latency, and runs in the power range of low tens of milliwatts. In addition to quantitative evaluation of the model performance, the integrated system was qualitatively validated in a real-world classroom environment containing background noise. The results show that TinyML-based Wake Word Spotting can deliver low-latency and accurate results on low-resource hardware when combined with techniques like proximity-based activation.

Link: <https://doi.org/10.1109/ICCIT68389.2025.11453401>



TITLE:

CCNN: Concatenation-based convolutional neural network for multimodal breast cancer diagnosis

AUTHOR:

kale P.P.; Kulkarni S.; Mahajan H.; Uke S.N.; Junnarkar A.; Pawar S.; Lokhande S.; Yadav S.

JOURNAL NAME:

Biomedical Signal Processing and Control (Vol.123)

DETAILS:

Published on 2026



ABSTRACT:

Mammograms and histology are prevalent modalities for breast cancer detection; nonetheless, the selection of suitable algorithms for multimodal image preprocessing, feature extraction, and classification continues to pose a substantial research challenge. Deep Learning (DL) methods provide advancements in performance, but diagnosing breast cancer using multimodal images, including both mammograms and histology, remains highly challenging. This study proposes a concatenation-based convolutional neural network (CCNN) model for the automatic classification of breast cancer using multimodal images. The CCNN model first employs multimodal image preprocessing, which starts with image standardization, followed by image filtering and contrast adjustment. A concatenation-based CNN is proposed for automatic and prominent feature extraction from breast images. The CCNN technique addresses the issue of current CNN models overlooking mammography or histology features for classifying breast cancer. The proposed feature encoding layers include an attention layer and concatenate the results of each attention layer for reliable feature extraction. To enhance breast cancer classification, the feature encoding layers take advantage of the leaky Rectified Linear Unit (ReLU). The feature extraction model used fully connected layers and SoftMax with optimal hyperparameters after concatenation. The proposed model attained accuracies of 98.33%, 96.91%, and 99.18% in breast cancer classification utilizing mammography, histology, and multimodal datasets, exceeding the performance of leading benchmark methods.

Link: <https://doi.org/10.1016/j.bspc.2026.110411>



TITLE:

Hybrid Nanomaterials and Quantum Dots for
Carbon Capture and Bioenergy Generation

AUTHOR :

Shinde S.G.; Ingale R.S.; Prakash Patil
M.K.; Koli P.B.

JOURNAL NAME:

Nanomaterials for Sustainable Bioenergy
Production

DETAILS:

Published on 2026



ABSTRACT:

Nanomaterials have gained considerable attention across scientific and technological domains due to their versatile applications. Among them, hybrid nanomaterials (HNMs) represent a promising class in which conventional nanostructures—such as metal oxides, metal sulfides, and semiconductors—are systematically engineered through approaches including doping, surface modification, and nanocomposite formation. Complementing these are quantum dots (QDs), ultrasmall semiconductor nanocrystals typically 1–10 nm in size, whose exceptional optoelectronic and catalytic properties arise from quantum confinement effects. Both HNMs and QDs exhibit tunable and superior characteristics, including adjustable band gaps, high specific surface area, enhanced porosity, and improved chemical and thermal stability. These attributes make them ideal candidates for a wide spectrum of applications, ranging from energy storage, solar energy conversion, and catalysis to hydrogen generation, piezoelectric and superconducting devices, optical and magnetic materials, biodiesel production, and green organic catalysis. This chapter provides a detailed overview of the fundamental principles, fabrication strategies, and characterization techniques of HNMs and QDs. Emphasis is placed on their functional roles in carbon capture and bioenergy production, where their structural and electronic properties can be tailored for enhanced efficiency. The discussion integrates recent advancements in HNM- and QD-based technologies for sustainable energy applications, with particular focus on CO₂ sequestration, photocatalytic conversion, and biomass-to-biofuel processes. By consolidating current knowledge and emerging directions, this chapter aims to serve as a comprehensive resource for understanding the synthesis, properties, and applications of HNMs and QDs in energy, environmental, and multidisciplinary scientific fields.

Link:

<https://www.scopus.com/pages/publications/105037894557?origin=resultslist>





TITLE:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 1)

AUTHOR :

Vinchurkar K.; Polshettiwar S.; Mahajan N.;
Bachhav Y.

JOURNAL NAME:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 1)

DETAILS:

Published on 2026



ABSTRACT:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in the Pharmaceutical and Healthcare Industry (Part 1) provides a clear and practical introduction to environmentally friendly grafting techniques that are reshaping modern polymer science. Covering nine focused chapters, the book explains the basics of polymer grafting, the role of green chemistry, and the use of renewable resources and green solvents in sustainable material development. It also highlights advanced eco-friendly grafting methods—including radiation-induced, plasma-assisted, enzymatic, and mechanochemical approaches—showing how these techniques improve efficiency while reducing environmental impact. Key Features - Explains core concepts of green grafting in a simple and structured way. - Highlights renewable resources, green solvents, and sustainable chemistry principles. - Covers advanced grafting methods with emphasis on environmental and industrial benefits. - Connects green grafting techniques to pharmaceutical and healthcare applications. - Designed to support both foundational learning and practical implementation. Target Readership: For students, researchers, and professionals in polymer science, pharmaceutical sciences, materials engineering, and sustainable technology.

Link: <https://doi.org/10.2174/97988988116861260101>



TITLE:

A recurrent hepatocellular carcinoma with incomplete response to conventional treatments, showing substantial regression and good quality of life by Ayurveda treatment: A case report

AUTHOR :

Nimbalkar R.G.; Watpade G.V.; Pawar A.T.;
Tagalpallewar A.A.; Baheti A.M.;
Nimbalkar M.R.

JOURNAL NAME:

Journal of Ayurveda and Integrative
Medicine (Vol.-17, Issue-3)

DETAILS:

Published on May 2026



ABSTRACT:

Hepatocellular carcinoma is a major global health concern with limited treatment options and high recurrence rates. This case study presents a 68-year-old male diagnosed with hepatocellular carcinoma who refused liver transplantation and underwent multiple conventional treatments, including Drug-eluting Bead trans-arterial chemoembolization (DEB TACE), targeted therapy, and radiation therapy. However, due to adverse effects and suspected disease progression, the patient opted to switch to Ayurvedic management. It incorporated Ayurvedic formulations, like suvarna malini vasanta, phalatrikadi guggulu, patola, bhumyamalaki, and bhringaraja to support liver function, enhance immune response, and mitigate tumor progression. Over the course of treatment, the patient demonstrated improvements in clinical and biochemical parameters, including a reduction in alpha-fetoprotein and bilirubin levels, clinically improved liver function, enhanced physical strength, and better quality of life. Radiological assessments indicated disease stabilization with no significant metabolic activity. The case highlights the potential of an integrative approach to improve patient outcomes, particularly in those who decline or are unfit for liver transplantation.

Link: <https://doi.org/10.1016/j.jaim.2026.101340>



TITLE:

Nanotechnology for acoustic performance: A comprehensive review of sound absorbing and insulating nanocomposites

AUTHOR :

Chavande Y.U.; Ghadge R.R.; Kulkarni M.V.

JOURNAL NAME:

International Journal of Lightweight Materials and Manufacture

DETAILS:

Published on 22 April 2026



ABSTRACT:

Noise pollution has become a critical challenge, impacting human health and social progress. Nanomaterials, with their unique nanoscale properties, offer innovative solutions for noise control by enhancing the acoustic efficiency of sound-absorbing materials. This review highlights the integration of advanced nanomaterials, including carbon nanotubes (CNTs), graphene, nano-silica, and emerging alternatives such as nanofibers and hollow silica structures, into composite systems, and indicates that enhanced acoustic performance is most often achieved through appropriate nanofiller selection combined with tailored pore architecture and composite design. These materials exhibit exceptional improvements in Sound Absorption Coefficient (SAC), Noise Reduction Coefficient (NRC), and Sound Transmission Loss (STL). Factors influencing acoustic performance, such as material composition, structural properties, and environmental conditions, are explored alongside advancements in characterization techniques. By examining current trends and innovations, this paper underscores the transformative potential of nanomaterials in designing lightweight, durable, and efficient acoustic solutions for diverse industrial and environmental applications.

Link: <https://doi.org/10.1016/j.ijlmm.2026.04.004>



TITLE:

Green Grafting in Industrial Applications

AUTHOR :

Patil A.; Jain D.; Ghante M.; Polshettiwar S.

JOURNAL NAME:

Green Grafting: Innovations in Polymer Functionalization for Sustainable Solutions in Pharmaceutical and Healthcare Industry (Part 2)

DETAILS:

Published on April 2026



ABSTRACT:

Green grafting is emerging as a transformative approach in various industrial applications. Grafting, which involves the covalent attachment of polymers onto substrates, is used to enhance the properties of a material. By incorporating green chemistry principles, such as waste prevention, safer solvents, energy efficiency, renewable feedstocks, reduction of derivatives, and inherently safer processes, green grafting offers significant environmental and economic benefits. In the polymer and material science industry, green grafting is revolutionizing the production of advanced materials. Techniques like controlled radical polymerization (CRP) and enzymemediated grafting offer sustainable alternatives to traditional methods. CRP methods enable precise polymer control with minimal waste, while enzyme-mediated grafting avoids toxic reagents. The textile industry benefits from green grafting by using waterbased systems and benign chemicals for treatments like dyeing and finishing. Grafting natural polymers, such as chitosan, onto cotton imparts antimicrobial properties without synthetic biocides, and hydrophobic polymers create water-repellent textiles without harmful chemicals. In the biomedical field, green grafting ensures safer, more biocompatible materials using water and biocompatible catalysts to produce medical devices and drug delivery systems without toxic solvents. Grafting polyethylene glycol onto nanoparticles enhances biocompatibility using eco-friendly processes. Agricultural benefits include improved crop resistance and yield with biodegradable polymers and natural adhesives. This reduces environmental impact and improves soil health. Green grafting also contributes to sustainable packaging by using renewable feedstocks like cellulose to create biodegradable materials. Grafting natural antioxidants onto packaging films extends the shelf life of food, reducing waste.

Link: <https://doi.org/10.2174/9798898813093126010004>



TITLE:

Advantages and challenges of metaheuristic algorithms in biomedical image processing: a systematic review

AUTHOR :

Kowdiki M.; Deshmukh V.; Khaparde A.

JOURNAL NAME:

Multimedia Tools and Applications (Vol.-85, Issue-6)

DETAILS:

Published on 2026



ABSTRACT:

Biomedical image processing plays a crucial role in disease diagnosis, treatment planning, and clinical decision-making. However, the inherent challenges of noise, poor contrast, and complex structures often limit the accuracy of traditional image analysis techniques. Metaheuristic algorithms have emerged as powerful optimisation tools that mimic natural or social phenomena to solve such complex problems efficiently. This review investigates the recent advancements, advantages, and limitations of metaheuristic algorithms applied in biomedical image processing. A systematic literature search was conducted across Scopus, PubMed, IEEE Xplore, and SpringerLink databases for studies published between 2019 and 2025. Articles focusing on the application of metaheuristic algorithms in biomedical image segmentation, feature extraction, image registration, and disease detection were included. Data were extracted and analysed based on algorithm type, biomedical application area, performance metrics, and observed challenges. The review identified over 72 recent studies implementing metaheuristic algorithms such as Genetic Algorithm, Particle Swarm Optimisation, Grey Wolf Optimisation, Firefly Algorithm, Whale Optimisation, and hybrid variants. These algorithms have demonstrated superior robustness and adaptability in handling complex and noisy biomedical images. Metaheuristics significantly improved segmentation accuracy, feature selection efficiency, and disease classification performance across multiple datasets. Nonetheless, challenges remain in computational cost, parameter tuning, scalability, and convergence stability, particularly for high-dimensional or real-time biomedical data.

.Link:

<https://eurekamag.com/research/106/990/106990792.php>





TITLE:

Beyond Likes and Shares: Gamification and Machine Learning as Drivers of Enhanced Social Media Brand Engagement on Gen Z

AUTHOR:

Gaikwad A.; Rao G.S.; Goud M.

JOURNAL NAME:

International Conference on Innovations in Engineering, Science and Technology for Sustainable Development, ICEST 2025

DETAILS:

Published on October 2025



ABSTRACT:

Generation Z are the individuals born between 1997 and 2012 and represents a distinct group with unique demographic characterized by digital nativity and distinct consumption patterns. The researchers explore the integration of gamification elements with machine learning algorithms to enhance brand engagement strategies on social media platforms w.r.t. Generation Z, and also proposes a novel framework which combines adaptive gamification technicalities with predictive analysis by analyzing behavioral patterns, engagement metrics and technology. The experimental results demonstrated a 47% increase in engagement rates and 32% improvement in brand loyalty metrics when implementing ML-driven gamified experiences compared to traditional social media marketing approaches. The research exposes that personalized achievement systems, dynamic reward mechanisms, and real-time behavioral adaptation significantly influence Generation Z's brand perception and purchasing decisions. The results offer valuable insights for marketers and technology developers seeking to create more effective digital engagement strategies for the Generation Z Consumers.

Link: <https://doi.org/10.1109/ICEST65883.2025.11428466>



TITLE:

Enhancing pollution detection with nanosensors and AI: the AEPM-Net approach

AUTHOR :

Nagineeni S.; Nandhinidevi S.; Manjulaadevi K.; Sakthidharan G.R.; Saravana Karthikeyan; Musale V.

JOURNAL NAME:

Nanotechnology for Environmental Engineering (Vol.-11, Issue-2)

DETAILS:

Published on 18 May 2026



ABSTRACT:

Accurate air pollution prediction needs systems that monitor diverse environmental data, adapt to changing pollution patterns, and ensure secure real-time communication. Existing systems struggle to capture distributed sensor interactions and dynamic environmental variations effectively. To address this problem, the study proposes an Adaptive and Efficient Air Pollution Monitoring Network (AEPM-Net) incorporating Metal Oxide Semiconductor (MOS) nanosensors with an average particle size ranging from 20 to 40 nm for sensitive air-quality monitoring. The system monitors levels of Carbon Monoxide, Nitrogen Dioxide, Sulfur Dioxide, Nitric Oxide, Volatile Organic Compound, and Particulate Matter, which includes fine particulate matter and coarse particulate matter, in different locations. The system uses SPECK encryption and additive Lightweight Homomorphic Encryption (LHE) to protect collected pollutant data, while noise filtering and modified Z-score normalization methods help to stabilize the data. The Spatio-Temporal Data Processing Module (ST-DPM) analyzes nanosensor data across time and space by capturing correlations among distributed sensors and environmental variations. The Hierarchical Attention Mechanism (HAM) prioritizes important spatio-temporal features to improve prediction accuracy. The Dynamic Adaptation Module (DAM) adjusts parameters in real time, while the Pollution Level Prediction Module (PLPM) forecasts pollutant levels with uncertainty handling. Over 90 days, the model achieved R^2 values of 0.973, 0.974, 0.975, 0.978, 0.971, 0.969, and 0.967. The proposed framework supports environmental sustainability by enabling early detection of hazardous pollutants, improving urban air quality monitoring, and assisting effective pollution control to protect public health.

Link: <https://doi.org/10.1007/s41204-026-00566-5>



TITLE:

Enhancing concrete performance with steel slag aggregate: an experimental investigation

AUTHOR :

Sathe S.; Shekokar S.; Wadki V.; Biswas A.;
Patil D.

JOURNAL NAME:

Proceedings of the Institution of Civil
Engineers: Structures and Buildings (vol.-
178, Issue-12)

DETAILS:

Published on November 2025



ABSTRACT:

The utilisation of steel slag (SS) waste, a by-product of steel manufacturing, as a partial replacement for natural aggregate (NA) in concrete was investigated, aiming to reduce environmental issues such as land occupation and water pollution, while minimising the ecological footprint of NA production. Twelve concrete mixes were prepared with steel slag coarse aggregate (SSCA) replacing 10–60% of NA and steel slag fine aggregate (SSFA) replacing 10–50% of NA in 10% increments. The mechanical, durability and microstructural properties of the concretes were evaluated. The results indicate that the optimal replacement levels were 40% SSCA and 30% SSFA. At 90 days, compared with conventional concrete, the compressive strength increased by 22.8% with 30% SSFA and by 8.6% with 40% SSCA. Split tensile and flexural strengths were also improved, showing gains up to 12.7% and 11%, respectively. The modulus of elasticity increased by 6.10% and 5.44% for the mix with 30% SSFA and the mix with 40% SSCA. Durability assessments revealed reduced chloride ion permeability (20–30%), lower strength loss under acid attack (23–26%) and decreased deterioration from sulfate exposure (16–20%). Scanning electron microscopy and X-ray diffraction analyses confirmed enhanced interfacial transition zones and the formation of cementitious phases (C3S and C2S). Overall, the results indicate that incorporating SS as aggregate enhances performance and promotes sustainable concrete production.

Link: <https://doi.org/10.1680/jstbu.25.00046>



TITLE:

Workforce agility revisited: a comprehensive framework and strategic directions based on mixed methods research

AUTHOR :

Ajgaonkar S.; Neelam N.G.

JOURNAL NAME:

International Journal of Organizational Analysis

DETAILS:

Published on 24 March 2026



ABSTRACT:

Purpose – The purpose of this paper is to critically attain a comprehensive understanding and prediction of workforce agility (WA) and its organisational and individual enablers, along with moderators, required to manage the high pressure on high-growth and high-tech IT Industry. **Design/methodology/approach** – The study has adopted a concurrent mixed method approach, comprising quantitative survey of employees, tested using partial least square structural equation modelling for causal-predictive capabilities and explored WA using qualitative interviews of senior leaders. **Findings** – This research explains a fundamental change in how the construct of WA needs to reflect in research. The article provides a new definition, a theoretical framework and insights on contextual, strategic and tactical management of WA with the overarching dynamic capability theory. Independent variables show significant positive effects on employee agility (EA), namely, organisational enablers, individual enablers – career self-management (CSM) and intolerance for ambiguity. The study shows that CSM has a positive and the most significant effect on EA and professional client interaction has a significant negative moderation. **Practical implications** – Meta-integration provides recommendations for industry managers who will find an advisory on agility centric organisational practices of leadership, career management, client interaction, organisation–employee strategic alignment, drawbacks and restrictions of agility, along with predictive WA models for practice. This exhaustive study of evolution in the meaning of WA and workforce management practices (WMP) is capable of impactful implications. **Originality/value** – The study affirms the inclusion of WMP and CSM, states the difference between employee agility and WA constructs and explores the drawbacks of WA.

Link: <https://doi.org/10.1108/IJOA-05-2025-5574>



TITLE:

Predictive modeling and experimental validation of mechanical–microstructural relationships in 3D-printed Onyx–fibre composites

AUTHOR :

Dhage B.H.; Khedkar N.K.; Naidu M.J.;
Salunkhe S.; Cepova L.; Nasr E.A.

JOURNAL NAME:

Scientific Reports (vol.-16, Issue-1)

DETAILS:

Published on 30 March 2026



ABSTRACT:

Additive Manufacturing (AM) has emerged as a revolutionary fabrication technology for producing high-performance polymer-based composite materials. Fused Filament Fabrication (FFF), a leading AM technology, facilitates the fabrication of continuous fibres in a thermoplastic matrix to provide a customised mechanical response. In this study, the tensile and flexural properties of Onyx matrix composites reinforced with continuous carbon fibre (CF) and glass fibre (GF) are investigated. Specimens were fabricated using a Markforged 3D printer and tested in accordance with ASTM standards. A Taguchi L27 design was employed to examine the effect of infill density, fibre volume fraction, fibre orientation, and roof and floor layers. The principal results indicated maximum tensile strengths of 286.8 MPa (CF) and 183.2 MPa (GF), and a flexural strength of 208.4 MPa (CF). ANOVA indicated the significance of the variables (high F-values, low residuals), especially in the CF flexural and GF tensile models. The regression analysis provided high predictive accuracy for all models, with predicted R-squared values of 98.73% (CF flexural), 97.69% (GF tensile), 91.04% (GF flexural), and 84.22% (CF tensile). Separate machine learning models trained on experimental data further predicted mechanical properties: a linear regression model provided $R^2 = 99.49\%$ for flexural data, while a multi-output random forest model predicted tensile strength and elongation with $R^2 = 99.38\%$ and 96.95% , respectively. SEM analysis of the fractured specimens validated failure modes, such as fibre pullout, matrix cracking, and delamination in CF (brittle) compared to ductile debonding in GF. The integrated Taguchi-ANOVA, machine learning, and microstructural analysis offers a robust platform for optimising the performance of FFF-fabricated fibre-reinforced Onyx composites.

Link: <https://doi.org/10.1038/s41598-026-45529-7>





TITLE:

Analysis of Indian Monsoon Using Arctic Sea Ice Dynamics Using Machine Learning

AUTHOR :

Joshi P.; Gadgil Y.; Shinde A.; Metkar T.;
Kosamkar P.

JOURNAL NAME:

Lecture Notes in Networks and Systems
(Vol.-1876 LNNS)

DETAILS:

Published on 1 April 2026



ABSTRACT:

The Indian Summer Monsoon (ISM) affects over 1.4 billion people, contributing 75–80% of India's annual precipitation. Traditional statistical forecasting shows limited success at seasonal lead times, prompting exploration of machine learning methodologies. This study investigates relationships between Arctic Sea ice dynamics and Indian monsoon precipitation using 43 years of climate data (1981–2024). We incorporate Arctic Sea ice thickness and concentration metrics with conventional oceanic predictors through systematic feature engineering. Our methodology compares regularized linear models with ensemble approaches using temporal split validation. The Random Forest model achieved the best performance ($R^2 = 0.1256$, $RMSE = 12.14$ mm, correlation = 0.366), suggesting modest but meaningful Arctic-monsoon relationships. While explained variance remains limited, tree-based algorithms capture non-linear relationships that linear approaches miss entirely.

Link: https://link.springer.com/chapter/10.1007/978-3-032-19690-3_46



TITLE:

Predictive modeling and experimental validation
of mechanical-microstructural relationships in
3D-printed Onyx-fibre composites

AUTHOR :

Dhage, BH; Khedkar, NK; Naidu, MJ; Salunkhe, S;
Cepova, L; Nasr, EA

JOURNAL NAME:

SCIENTIFIC REPORTS (Vol.-16, Issue-1)

DETAILS:

Published on 30 March 2026



ABSTRACT:

Additive Manufacturing (AM) has emerged as a revolutionary fabrication technology for producing high-performance polymer-based composite materials. Fused Filament Fabrication (FFF), a leading AM technology, facilitates the fabrication of continuous fibres in a thermoplastic matrix to provide a customised mechanical response. In this study, the tensile and flexural properties of Onyx matrix composites reinforced with continuous carbon fibre (CF) and glass fibre (GF) are investigated. Specimens were fabricated using a Markforged 3D printer and tested in accordance with ASTM standards. A Taguchi L27 design was employed to examine the effect of infill density, fibre volume fraction, fibre orientation, and roof and floor layers. The principal results indicated maximum tensile strengths of 286.8 MPa (CF) and 183.2 MPa (GF), and a flexural strength of 208.4 MPa (CF). ANOVA indicated the significance of the variables (high F-values, low residuals), especially in the CF flexural and GF tensile models. The regression analysis provided high predictive accuracy for all models, with predicted R-squared values of 98.73% (CF flexural), 97.69% (GF tensile), 91.04% (GF flexural), and 84.22% (CF tensile). Separate machine learning models trained on experimental data further predicted mechanical properties: a linear regression model provided $R^2 = 99.49\%$ for flexural data, while a multi-output random forest model predicted tensile strength and elongation with $R^2 = 99.38\%$ and 96.95% , respectively. SEM analysis of the fractured specimens validated failure modes, such as fibre pullout, matrix cracking, and delamination in CF (brittle) compared to ductile debonding in GF. The integrated Taguchi-ANOVA, machine learning, and microstructural analysis offers a robust platform for optimising the performance of FFF-fabricated fibre-reinforced Onyx composites.

Link: <https://doi.org/10.1038/s41598-026-45529-7>

(WOS)



TITLE:

Mathematical foundations of neural networks
for modeling human cognition in AI systems

AUTHOR :

Malwade, S; Lavate, SH; Borkar, P; Jadhav, PD

JOURNAL NAME:

Journal Of Interdisciplinary Mathematics (Vol.-
29, Issue-3)

DETAILS:

Published on 18 March 2026



ABSTRACT:

In this paper it examines the mathematical principles of the neural networks and how Keywords: these can be applied to simulate the thoughts of people in computer systems that are expected to be intelligent. Certain significant aspects of the learning process are considered, such as linear algebra (with an emphasis on the operations of vectors and matrices) and calculus techniques such as the differentiation and gradients. The backpropagation technique is discussed in detail as one of the simplest approaches to training neural networks to minimize the error. There are also several optimization techniques including gradient descent and more advanced versions, which are considered to enhance the speed and precision of learning.

Link: <https://doi.org/10.47974/JIM-2500>

(WOS)



TITLE:

Mathematical models to optimize pandemic spread and control strategies in public health management

AUTHOR :

Bhardwaj, U; Navale, SJ; Chanchlani, AS; Dey, D;
Khudaynazarov, E; Joshi, N

JOURNAL NAME:

Journal Of Interdisciplinary Mathematics (Vol.-
29, Issue-3)

DETAILS:

Published on 18 March 2026



ABSTRACT:

This paper presents mathematical models that may be applied to enhance the management of the health of the population and prevent pandemics. It is based on compartmental models such as SEIR and control variables such as the vaccine, quarantine, and social isolation to model disease spread and the effectiveness of interventions. Dynamic programming and optimal control theory are optimisation techniques that are applied to identify the optimal reaction plans. The outcomes of the simulation indicate that there are significant decreases in the rate of reduction of the number of infections and consumption of resources. The proposed models provide the lawmakers with practical information that can be applied to them in times of outbreak and pandemic scenarios to make timely and data-driven decisions.

Link: <https://doi.org/10.47974/JIM-2494>

(WOS)



TITLE:

Review on optimised process parameters of bioethanol production for environmental sustainability

AUTHOR :

Deshmukh, MP; Pendse, DS

JOURNAL NAME:

Decarbonization Technology-Icdt2024 (Vol.-53)

DETAILS:

Published on May 2025



ABSTRACT:

Water hyacinth is a commonly grown aquatic plant. It causes a menace in water bodies due to its large mat formation. It is removed from water bodies through physical, chemical, or biological methods. These methods are costly and ineffective as the plant grows again quickly. Since the plant is easily available, it has been explored as a potential source of lignocellulose biomass for biofuel production. This review paper reflects upon the important steps in processing water hyacinth plants for producing biofuel. A quick summary of the research concerning pretreatment methods, enzyme hydrolysis, and fermentation studies shows that acid pretreatment followed by cellulase enzyme hydrolysis and using acidic conditions for fermentation up to 3 days at room temperature gives optimum ethanol and sugar yields. The main challenge in the commercialization of bioethanol production from water hyacinth biomass is the low ethanol yield obtained as compared to other feedstock like sugarcane bagasse and corn stover. However, from an environmental point of view, by converting waste biomass into a valuable energy resource, bioethanol production from water hyacinth promotes a circular economy and sustainable resource management.

Link: <https://doi.org/10.21741/9781644903575-4>

(WOS)



TITLE:

Commercial Exploitation of Outer Space:
Navigating the Role of International Space Law
in Regulating Space Activities

AUTHOR :

Qureshi, T; Shah, SA; Sapre, AA; Singh, M

JOURNAL NAME:

New Space-The Journal Of Space
Entrepreneurship And Innovation

DETAILS:

Published on 26 May 2026



ABSTRACT:

The rapid commercialization of outer space, driven by private ventures in satellite constellations, lunar and asteroid resource extraction, and orbital tourism, has posed serious challenges to the foundational framework of international space law since its establishment in the 1960s and 1970s. The commercialization of outer space has reduced operating costs and accelerated technological advancements, but it has also raised ethical and legal concerns. Indeed, states remain the fundamental subjects of international space law, maintaining primary responsibility for the space activities carried out within their jurisdiction, including the functions performed by private players, in accordance with the international space regime, which sharply focuses on the concepts of authorization, supervision, and liability. In a broader perspective of accountability, property rights, environmental protection, and equitable access to celestial resources, the mushrooming growth of commercial space operators has demonstrated inherent weaknesses in the existing legal regime of international outer space law. This article critically examines the commercialization of outer space and the role of the international legal regime governing it. This article argues that states must clarify their responsibilities under international space law, particularly with respect to liability for private actors. It proposes a new regulatory framework to address these gaps for sustainable commercialization.

Link: <https://doi.org/10.1177/21680256261453583>

(WOS)



TITLE:

Foreign Direct Investment and Maritime Transportation Infrastructure: Competition Effects Under the Belt and Road Initiative

AUTHOR :

Vechiu, N; Sharma, MK

JOURNAL NAME:

World Economy

DETAILS:

Published on 29 May 2026



ABSTRACT:

In this paper, we analyse the determinants of maritime connections, with a special focus on the importance of foreign direct investments (FDI) in improving maritime transportation networks and in restructuring them. We are also interested in how China, in particular, impacts countries' integration to global supply chains through maritime transportation. We work on a heterogeneous panel of bilateral maritime connections as measured by UNCTAD's bilateral liner shipping connectivity index, and we find that FDIs between two partner countries do not significantly impact their maritime connection. However, we do find that Chinese FDIs in countries concerned by the Belt and Road Initiative (BRI) reinforce bilateral maritime connections between countries, in general, be they BRI countries or not. The Chinese influence is also significant via their maritime presence: maritime connections between two countries are significantly higher when host countries have strong maritime ties to China. A deeper analysis through several interaction effects also shows the Chinese influence is conditional on host countries' attributes. For instance, a maritime connection with China is more beneficial to developing/poorer host countries, who see their connection to origin countries increase more as compared to developed/richer host countries.

Link: <https://doi.org/10.1111/twec.70096>

(WOS)



TITLE:

Comparative enumeration of circulating tumor cells with PD-L1 overexpression using anti-EpCAM antibody to N-cadherin in solid cancers

AUTHOR :

Vasudevan, A; Ramesh, RS; Bhosale, B; Aland, G; Khutale, G; Jayant, S; Jadhav, DVLB; Shinde, S; Patil, K; Satape, R; Chaudhari, M; Venkitaraman, B; Paikaray, SK; Thota, NK; Ramshankar, V; Khandare, J

JOURNAL NAME:

JOURNAL OF CLINICAL ONCOLOGY
(Vol.-44)

DETAILS:

Published on 27 May 2026



ABSTRACT:

Background: Minimal cellular residual disease (MCRD) with PD-L1 expression on Circulating tumor cells (CTCs), is highly evidenced for possible aggressive diseases systemically. CTCs captured using N-cadherin - a calcium dependent transmembrane glycoprotein targets epithelial-mesenchymal transition (EMT) tumor cells. Difference in phenotypic specificity, as EpCAM likely misses CTCs that have undergone EMT, while N-cadherin enables detection of these aggressive, invasive cells. Thus, N-cadherin-based CTC capture is more effective for identifying metastasis-prone CTCs. Using both markers together may improve overall CTC capture efficiency to provide a more comprehensive landscape of tumor heterogeneity and disease progression. We show the comparative and paired outcome of CTC capture using both anti EpCAM antibodies versus N-Cadherin across solid cancers. Methods: Retrospectively we compared 33 patients with different stages, breast, rectal, colon, prostate, lung, etc. cancer patients. CTCs were detected using an affinity marker-independent isolation platform to avoid EpCAM bias. CTCs were isolated using a marker-independent, anti EpCAM+ ve, and N-cadherin +ve platform OncoDiscover platform approved by CDSCO using in 1.5 mL of peripheral blood. CTCs were confirmed with CK18+, DAPI+ and CD45- and PD-L1+ expression using automated Zeiss microscopy. Anti EpCAM+ and N-cadherin +ve CTCs were classified using validated intensity thresholds, and concordance/discordance rates, cluster frequency, and mean distribution of CTCs. Results: OncoDiscover platform EpCAM and N-Cadherin expression showed an overall concordance of 60.61% and a discordance of 39.39%, indicating EMT-related phenotypic divergence. The mean CTC counts were comparable between anti EpCAM positive and N-Cadherin positive samples (0.66 and 0.70 per sample, respectively).

.Link: https://doi.org/10.1200/JCO.2026.44.16_suppl.e14530

(WOS)



TITLE:

Enhanced Antimicrobial and Synergistic Antifungal Activity of *Centrathrum anthelminticum* Seed Extract-Derived Silver Nanoparticles

AUTHOR :

Yewale, S; Deshpande, P; Gavande, V; Shaikh, V

JOURNAL NAME:

Periodica Polytechnica-Chemical Engineering

DETAILS:

Published on 27 May 2026



ABSTRACT:

With the increasing concern over antibiotic resistance and the side effects of synthetic drugs, there is a need for the development of novel and potent alternative bactericidal agents. Metallic nanoparticles, a promising alternative to antibiotics, target multiple biomolecules concurrently, making it difficult for bacteria to develop resistance against them. The present work reports the enhanced antimicrobial and synergistic antifungal activity of *Centrathrum anthelminticum* (CA) seed-ethyl acetate (EA) extract-derived silver nanoparticles (AgNPs)-(CA-EA-AgNPs)-via biogenic synthesis. The CA-EA-AgNPs exhibited significantly enhanced antimicrobial activity against *Staphylococcus epidermidis*, *Staphylococcus aureus* (Gram-positive), *Proteus mirabilis*, and *Pseudomonas aeruginosa* (Gram-negative) bacteria compared to the crude CA-EA extract. CA-EA-AgNPs also demonstrated potent antifungal activity against the dandruff-causing fungus *Malassezia furfur* and displayed a synergistic effect when combined with ketoconazole, increasing the zone of inhibition from 15 mm (ketoconazole alone) and 11 mm (AgNPs alone) to 19 mm (combination). The synthesis of CA-EA-AgNPs was optimized by systematically varying parameters such as pH, temperature, reaction time, CA-EA extract concentration, and AgNO₃ concentration. The AgNPs were extensively characterized using UV-visible spectroscopy, dynamic light scattering, zeta potential, fourier transform infrared spectroscopy, X-ray diffraction, field emission scanning electron microscopy, transmission electron microscopy, and energy-dispersive X-ray analysis. To our knowledge, this research is the first to report the antifungal activity of *C. anthelminticum*-derived AgNPs against *Malassezia furfur*. The results highlight the potential of *C. anthelminticum* seed extract as a green resource for synthesizing AgNPs with promising applications in combating microbial infections, particularly skin and soft tissue infections.

Link: <https://doi.org/10.3311/PPch.42769>

(WOS)



TITLE:

Advanced IoT-Fog Network-Based Intrusion Detection Framework Using Granger Causality-Inspired Graph Neural Network for Robust DDoS UDP Flooding Threat Detection and Cyber Reliability Enhancement

AUTHOR :

Azhagiri, M; Priya, SS; Mugunthan, SR;
Sangeetha, D

JOURNAL NAME:

International Journal Of Communication Systems (vol.-39, Issue-9)

DETAILS:

Published on 12 May 2026



ABSTRACT:

The growth of IoT increases vulnerability to DDoS UDP flooding, while traditional methods struggle with complex IoT-Fog traffic and often miss coordinated attacks due to ignoring causal device relationships. In this manuscript, advanced IoT-Fog Network-based Intrusion Detection Framework Using Granger Causality-Inspired Graph Neural Network for Robust DDoS UDP Flooding Threat Detection and Cyber Reliability Enhancement (IoT-GCIGNN-FTD) is proposed. Initially, network traffic and device interaction data are collected from a real-time simulated IoT-Fog network environment. Then, the collected data are pre-processed using Dual Central Difference Kalman Filter (DCDKF), used for data cleaning and normalization. The pre-processed data are fed into a feature extraction stage using the Scarifying Discrete Cosine Stockwell Transform (SDCST) to derive packet-level features, including packet size, packet rate, protocol type, and source and destination ports. Granger Causality-Inspired Graph Neural Network (GCIGNN) uses these features to classify traffic as normal or DDoS/UDP attack. To enhance accuracy, the Shrike Optimization Algorithm (SOA) is used to improve GCIGNN parameters, ensuring accurate threat detection and classification. IoT-GCIGNN-FTD is evaluated using FNR, FPR, accuracy, precision, recall, specificity, F1-score, and AUC. IoT-GCIGNN-FTD outperforms IDS-DDoS-IoTFog, DL-IDS-IoMT, and MT-Fog-IOT with higher accuracy (6.16%-8.36%), higher recall (5.82%-8.95%), and lower FPR (0.54%-7.82%).

Link: <https://doi.org/10.1002/dac.70515>

(WOS)



TITLE:

Analyzing the Barriers of Adopting Air Taxis in Emerging Economy Context: A Decision-Making Framework

AUTHOR :

Arshi, T; Agarwal, V; Ghaziabad, NV; Saxena, G;
Bhandari, D

JOURNAL NAME:

International Journal Of Mathematical
Engineering And Management Sciences (Vol.-11,
Issue-2)

DETAILS:

Published on February 2026



ABSTRACT:

In today's scenario, air taxis are getting lot of traction due to number of potential advantages. Since the concept is relatively new in the market, and there are various challenges along the path to the adoption of air taxis. Therefore, the study first explored the challenges using the scholarly literature and categorized them according to the Technological, Organizational, Environmental, and Human (TOEH) framework. It shows that urban air mobility (UAM) deployment in India faces several challenges, including unclear regulations and infrastructure, unclear business models, and public reluctance due to safety and cost concerns. After identifying the challenges, the study employed the Interpretive Structural Modelling technique to develop a hierarchical framework of the challenges. Further MICMAC analysis was applied to categorize the challenges into autonomous, linkage, independent, and dependent categories. The results show that most barriers fall under the linkage category, and regulatory and legal ambiguity have the highest driving power. The study results add to the existing literature by establishing a structural relationship among the anticipated barriers. Also, the results will help practitioners develop strategies to overcome the challenges with relative ease.

Link:

https://www.ijmems.in/article_detail.php?vid=11&issue_id=55&article_id=765

(WOS)



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