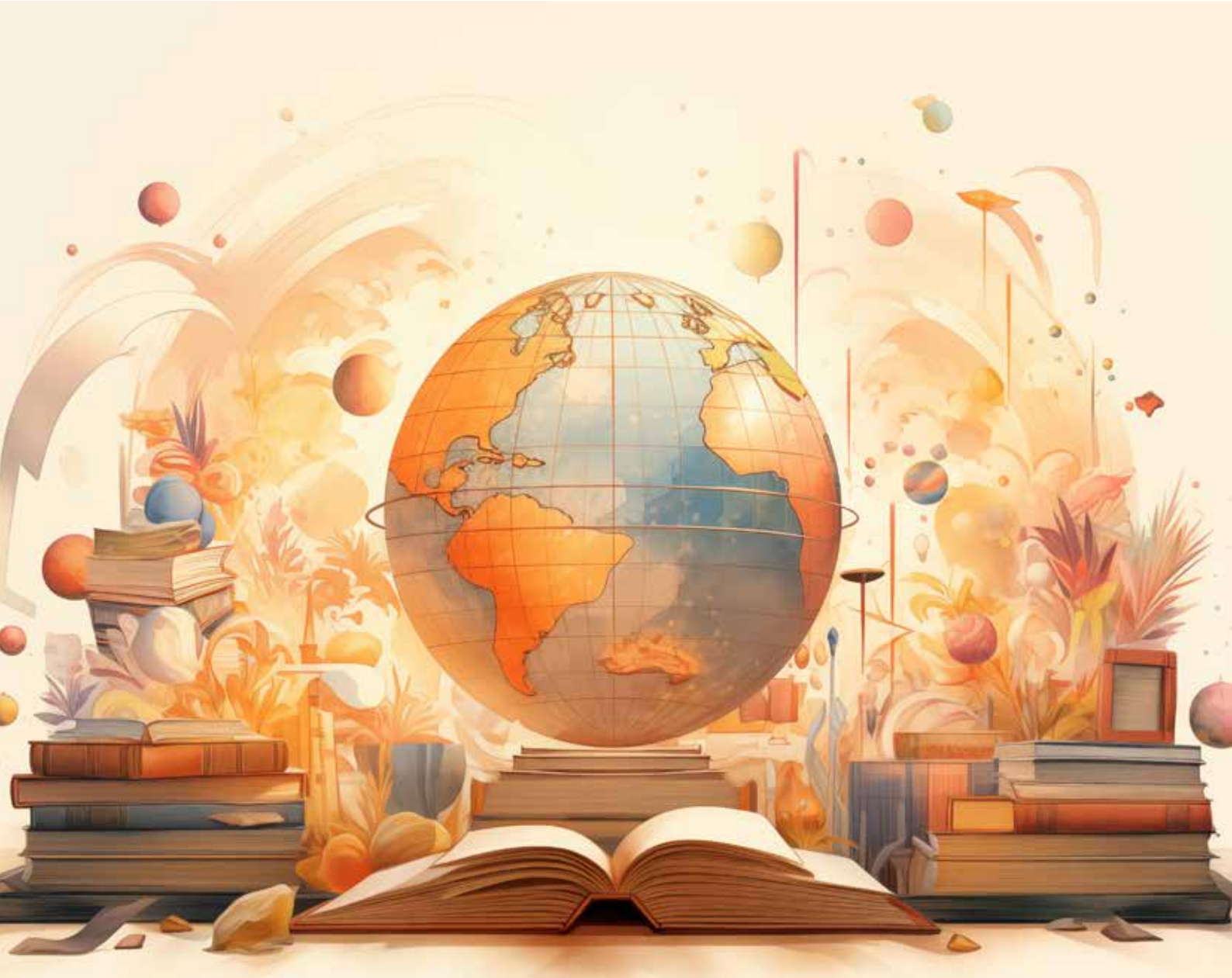
ALLIANCE UNIVERSITY
CENTRE for RESEARCH
DSIR RECOGNIZED SIRO
DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH GOVT. OF INDIA

ALLIANCE RESEARCH CHRONICLES

FEBRUARY 2026
Volume 2



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ALLIANCE RESEARCH CHRONICLES

FEBRUARY 2026
Volume **2**

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ABOUT ALLIANCE UNIVERSITY

Alliance reimagines the idea of the university by creating a community that leads the charge against the complex challenges of the 21st century. The university conceives research to be the essence of all teaching and learning practices. A unity between research and teaching is promoted to extend the frontiers of knowledge in order to solve real world problems at the local, national, and global scale. For this purpose, the university seeks to be the nerve centre of interaction between the industry, the government, the civil society, and the community at large.

In times when technological and social change is transforming the very idea of employability, the university embraces the increasing diversity of specializations while retaining the impulse to unify all knowledge.

A designed convergence of the business, engineering, law and liberal arts units precipitates transdisciplinarity as the core academic philosophy.

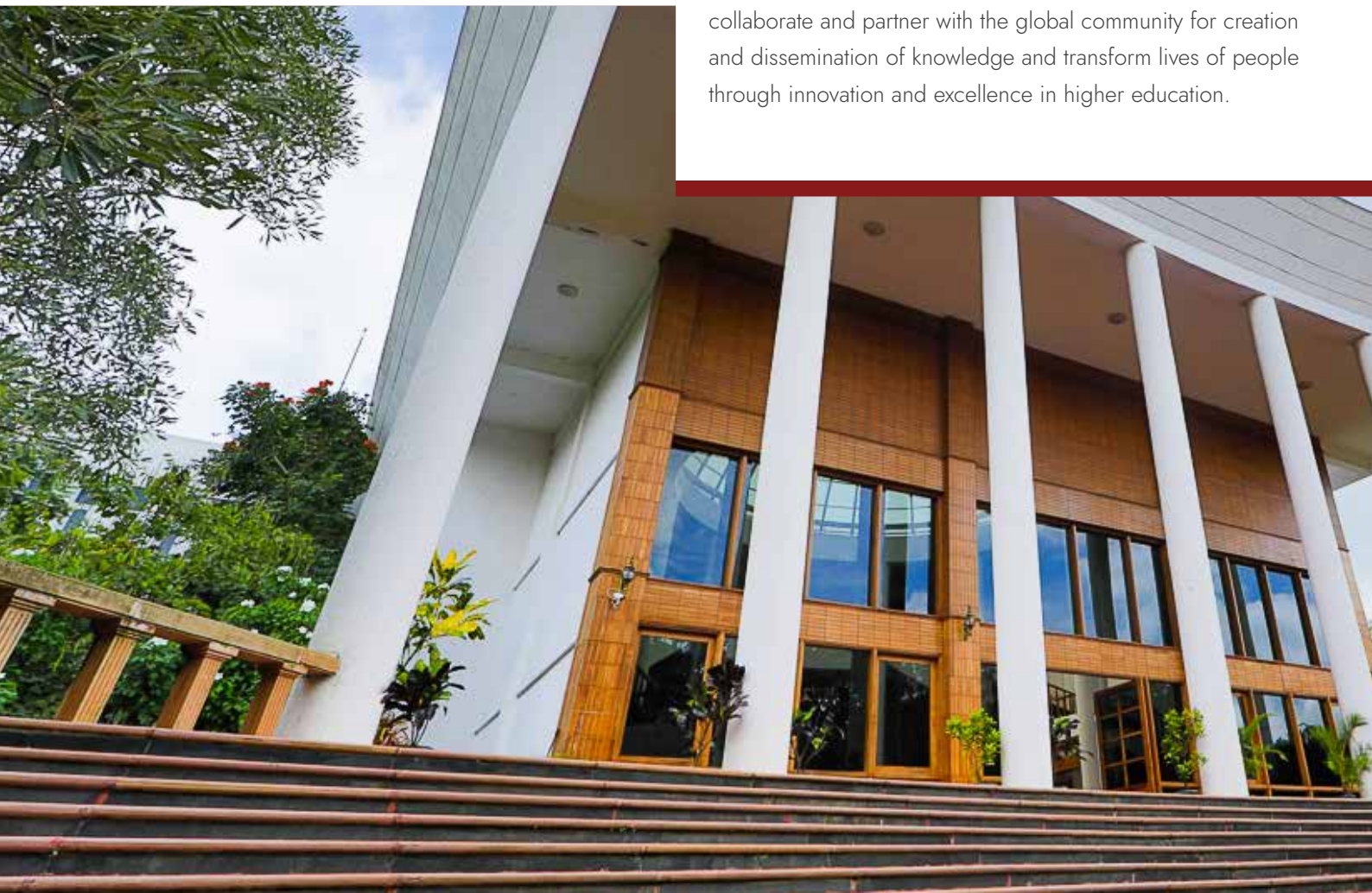
Freely working across divergent streams of knowledge like psychology and data science, technology and law, physics and philosophy or businesses and rhetoric, transdisciplinarity nurtures a dynamic foundation for the spirit of collaboration, inquiry, and enterprise.

VISION

Alliance University's vision is to be a world-class University that nurtures talent and catalytically transforms the lives of millions through excellence in teaching, research, service and community development. To uphold a commitment to shaping lives through scholarly teaching and learning, and that which contributes to an equitable and holistic transformation of society at large.

MISSION

The mission of the University is to create and sustain a community of lifelong learners in an environment that emphasizes literacy, critical thinking, and humanistic and scientific inquiry.
The University provides a dynamic, challenging and ethical environment for pursuing high quality teaching, research, learning and service across all areas of University, where students, faculty and other key constituents can interact, collaborate and partner with the global community for creation and dissemination of knowledge and transform lives of people through innovation and excellence in higher education.



ABOUT CENTRE *for* RESEARCH

The Centre for Research of Alliance University has been established to oversee the doctoral program and promote quality research through various Centres of Excellence (COEs) and publications.

The Centre for Research will be the nodal research center for Alliance University and will be committed to facilitating and promoting all academic research related activities. The Centre seeks to focus on providing a platform to Researchers and Academicians for thought provoking research on new and emerging fields and revolves around advancing knowledge and innovation within specific fields or interdisciplinary areas.

VISION

To pioneer transformative research initiatives that propel Alliance University to the forefront of global academia, driving innovation, societal advancement, and contributing to global progress and well-being.



MISSION

1. **Knowledge and Innovation:** Conduct cutting-edge research across disciplines to expand the frontiers of knowledge and drive innovation that addresses global challenges.
2. **Foster Collaborative Partnerships:** Cultivate partnerships with academic institutions, industries, and organizations worldwide to facilitate knowledge exchange, collaboration, and impactful research outcomes.
3. **Empower Research Scholars:** Provide a supportive environment, resources, and mentorship to empower researchers to pursue ambitious research agendas, develop critical skills, and become leaders in their fields.
4. **Address Global Challenges:** Tackle pressing global challenges such as climate change, healthcare disparities, food security, and technological advancement through interdisciplinary research that generates actionable solutions.
5. **Promote Societal Impact:** Translate research findings into real-world applications and policies that positively impact society, foster sustainable development, and contribute to the betterment of humanity and the planet.

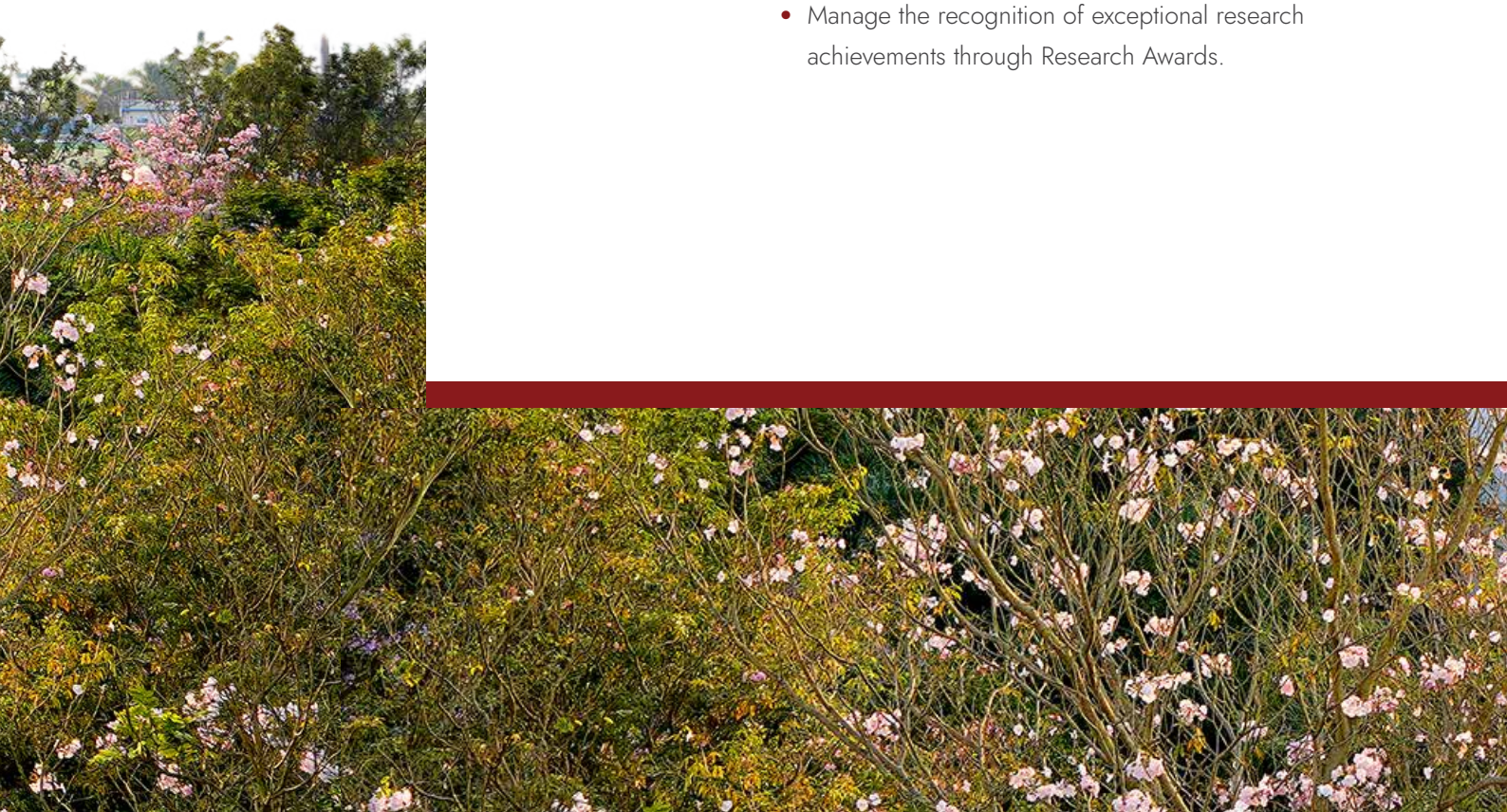
ABOUT CENTRE *for* RESEARCH (Contd.)

CORE VALUES

- **Collaboration:** Foster a culture of collaboration, inclusivity, and openness, recognizing the value of interdisciplinary teamwork and partnerships in addressing complex global challenges.
- **Innovation:** Embrace creativity, curiosity, and innovation, encouraging bold and unconventional approaches to research that lead to breakthrough discoveries and advancements.
- **Integrity:** Uphold the highest ethical standards in all research activities, demonstrating honesty, transparency, and accountability in the conduct and dissemination of research.
- **Agility:** Embrace agility and adaptability in response to evolving research landscapes and emerging challenges, fostering a culture of flexibility, innovation, and continuous improvement.
- **Diversity and Inclusion:** Value and celebrate diversity in perspectives, backgrounds, and experiences, fostering an inclusive research environment where all voices are heard, respected, and valued for their contributions.

OBJECTIVES

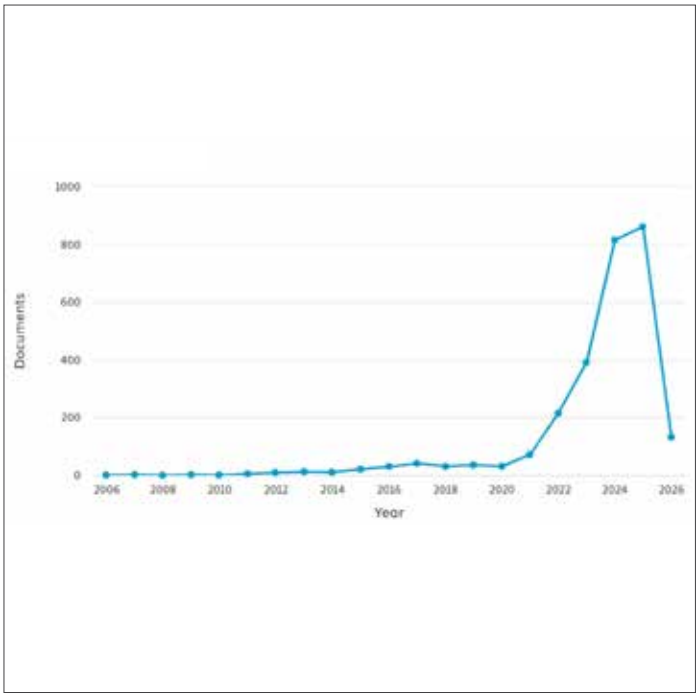
- Support the Ph.D. Admission process and facilitate the Ph.D. Program across all academic units of Alliance University.
- Providing resources and support for faculty, students, and visiting/full-time scholars engaged in research activities.
- Contributing to the advancement of knowledge through publications, presentations, and other forms of dissemination.
- Fostering collaboration among researchers within and outside the institution.
- Conducting cutting-edge research in specific fields or interdisciplinary areas.
- Addressing societal challenges and promoting solutions through research and innovation.
- Enhancing the reputation and impact of the institution through high-quality research outputs.
- Supporting the professional development of researchers and students through training, mentorship, and networking opportunities.
- Serving as a hub for intellectual exchange, seminars, workshops, and conferences to promote interdisciplinary collaboration and knowledge sharing.
- To oversee the working of Academic Integrity bodies which includes the Department Academic Integrity Panel (DAIP) and Institution Academic Integrity Panel (IAIP).
- Manage the recognition of exceptional research achievements through Research Awards.



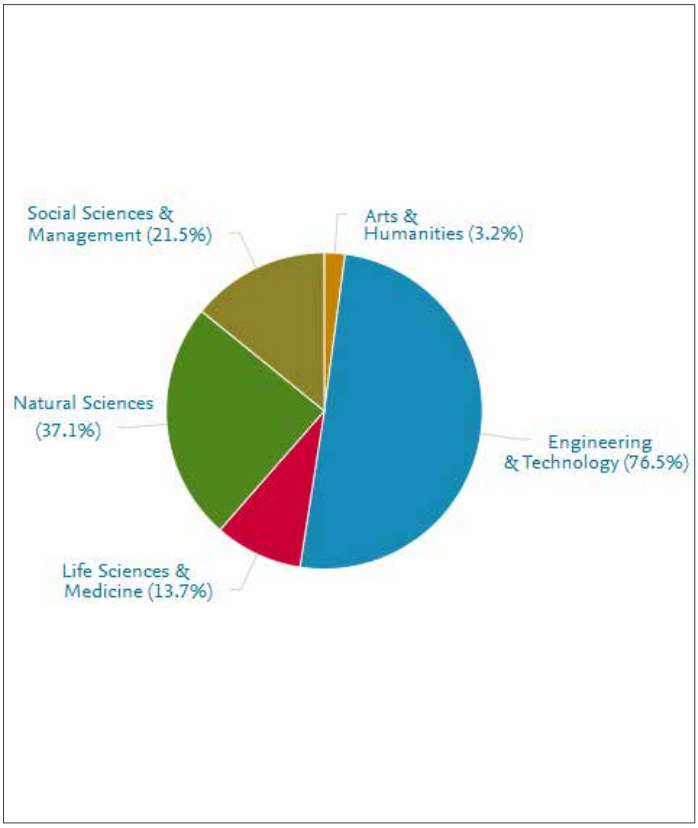


2792	1186
Documents	Authors

Documents by Year



Documents by Subject Area

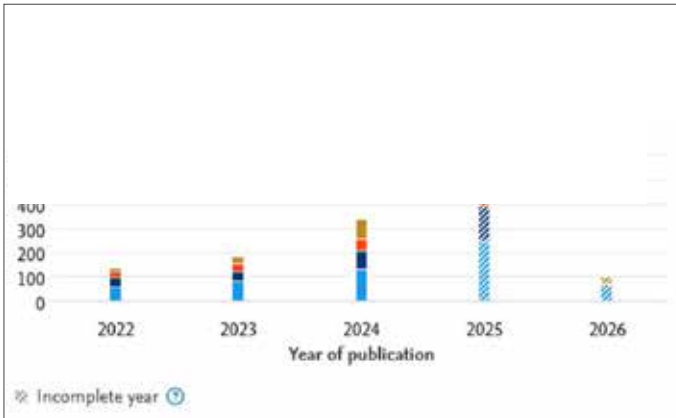


Summary

2792	1186	12920	4.3	1.62	49
Scholarly Output	Authors	Citation Count	Citations per Publication	Field-Weighted Citation Impact	H-index

Note: Scholarly output, Authors and Citation Count are Taken from SCOPUS, and other Metrics are taken from SCIVAL.

Publication by Journal Quartile



Quartiles	Publications	Publication share (%)
Q1 (top 25%)	572	43.5
Q2 (26% - 50%)	317	24.1
Q3 (51% - 75%)	172	13.1
Q4 (76% - 100%)	255	19.4

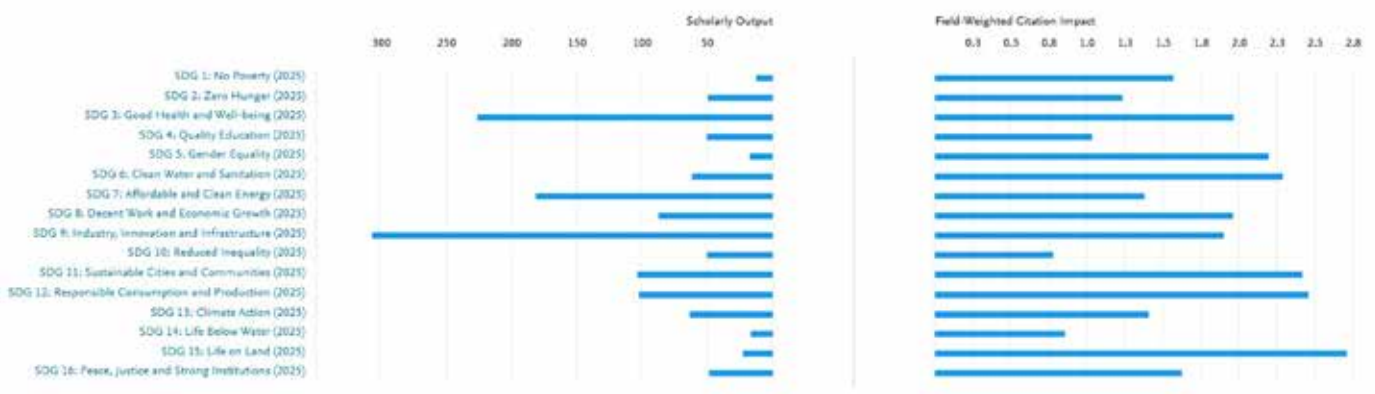
Cumulative shares	Publications	Publication share (%)
Q1 to Q2 (top 50%)	889	67.6
Q1 to Q3 (top 75%)	1,061	80.6

Geographical Collaboration Overall

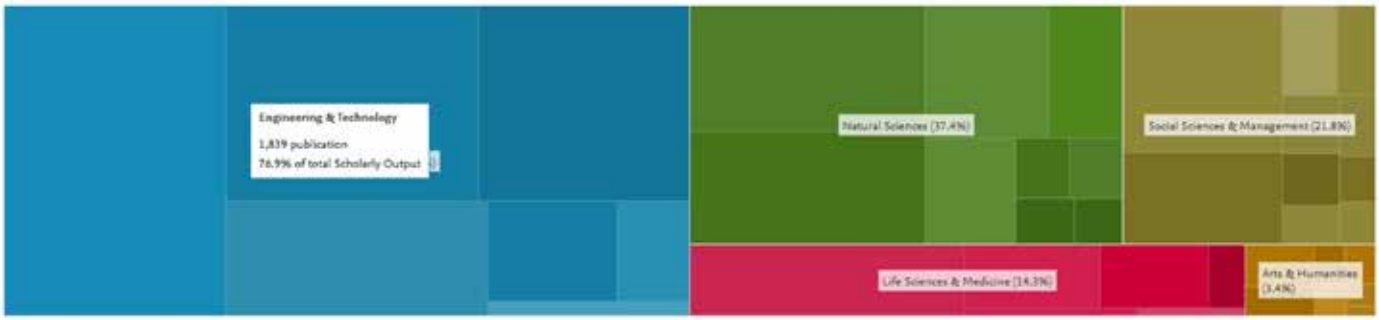


Metric	Publication share	Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
International collaboration	32.1%	768	5,796	7.5	1.84
Only national collaboration	47.8%	1,143	3,937	3.4	1.87
Only institutional collaboration	14.7%	352	409	1.2	0.77
Single authorship (no collaboration)	5.3%	128	147	1.1	0.46

Publication by SDG



Publication by Subject Areas



* The Publication metrices and the author affiliations are taken from SCOPUS/SciVal as on 15/3/2026


NON SOLUS
Scopus
JOURNALS


Clarivate™
Web of Science

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**89th**	**3.9**	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

CHARACTERIZATION OF BIOMASS BASED NOVEL MICROCRYSTALLINE CELLULOSE FROM EUCALYPTUS TERITICORNIS LEAF

Senthamaraikannan, P.; Narayanaperumal, N.P.; Divakaran, D.; Munusamy, Y.; **Suyambulingam, I.**; Kumar, R.

Scientific Reports

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scientific reports

Abstract

Environmental protection is the key impetus for research into the utilisation of weeds derived from plants in this sector. Waste materials exhibit a wide range of potential uses, particularly following the recycling procedure. The study's methodology included the leaves of eucalyptus plants growing on trees. To enhance the efficacy of cellulose extraction from waste, many chemical processes may be employed, including bleaching, neutralisation, alkalization, slow pyrolysis, and acid hydrolysis. Fourier transform spectroscopy, UV-visible spectroscopy, thermal analysis, scanning electron microscopy, atomic force microscopy (AFM), and X-ray diffraction analysis were all employed in order to obtain additional data regarding the separated cellulose. The crystalline size of the cellulose powder that was extracted was determined to be 9.81 nm, and it had a significant crystallinity index of 70.34%. When subjected to scanning electron microscopy, a spherical and abrasive surface is detected. As seen by the differential thermogram curve, the highest temperature at which deterioration takes place is 321.50 °C. The micro-sized particles, which have a diameter between 150 and 220 µm on average, are identified by using ImageJ. The extracted Eucalyptus teriticornis leaves cellulose's density is 1.513 g/cm3. The yield percentage was exceptionally ordinary as 48.04%. Therefore, by improving its qualities, cellulose might potentially gain more viability for future uses.
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Author keywords- Biomass; Cellulose; Eucalyptus leaf; Microcrystalline cellulose; Plant-based biofiller

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**72nd**	**5.4**	03 GOOD HEALTH AND WELL-BEING

BIORESOURCE-DERIVED PROPOLIS WRAPPING FOR ZNO/TIO$_2$ NANOCOMPOSITES: A SUSTAINABLE PHOTO-ANTIBIOTIC MATERIAL

Ragini; Devi, S.; **Talreja, N.**; Chauhan, D.; Sahu, S.; Ashfaq, M.

Inorganic Chemistry Communications

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Abstract

Bacterial infectious diseases are a global health concern nowadays. Even though several antibiotics have been developed and effectively treat various microorganisms. Moreover, the emergence of bacterial resistance to antibiotics due to excessive use poses a major threat to human health, thereby necessitating the development of next-generation antibiotic materials. In this aspect, the present study focuses on the synthesis of bioresource-derived resin-wrapped bimetallic (ZnO/TiO_2)-based nanocomposite by using bee propolis (BP) (ZBPT)-based photo-antibiotic materials. The particle size of the ZBPT-based photo-antibiotic materials significantly decreases with increasing Zn-metals within ZBPT. Interestingly, upon incorporation of Zn-metals, the band gap narrowed (from 3.40 eV to 2.52 eV), thereby achieving high photo-antibacterial efficiency. The synthesised ZBPT-based photo-antibiotic materials were tested against Escherichia coli (E. coli) and Staphylococcus aureus (S. aureus) under both dark and light irradiation conditions. The ZBPT-based photo-antibiotic materials inhibited or killed 85% of bacterial strains within 24 h. In contrast, ZBPT-based photo-antibiotic materials inhibited 99.99% of bacteria within 5 min of solar irradiation by using ZBPT-3:1. Therefore, the synthesised ZBPT-based photo-antibiotic materials are facile, cost-effective and sustainable, with the potential to quickly remove or kill bacteria at the site of infection. © 2024

Author keywords- Bee propolis; Green synthesis; Infectious diseases; Photo-antibiotic materials; Semiconductor materials

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**78th**	**4.6**	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

CHEMICAL AND MICROSTRUCTURE CORRELATION TOWARDS OPTIMISATION OF THERMAL BEHAVIOUR OF BORIC ACID CROSSLINKED PVA-CELLULOSE NANOFIBER COMPOSITE

Sreedevi, T.; Ducos, F.; Susan George, J.; **Parameswaranpillai, J.**; Asha Bhanu, A.V.; Vahabi, H.; Poornima, V.P.

Polymers

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Abstract

Poly(vinyl alcohol) (PVA) as a superior biodegradable polymer, it requires structural modifications using crosslinking agents and nanofillers to assure thermal integrity. PVA-cellulose nanofiber (CNF) composite films were fabricated by solvent casting with boric acid as crosslinking agent (named PVA-BA-CNF composite). Chemical interactions established between components of the composite film was characterised by Fourier transform infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS). Newly formed B—O—C linkages were evident from chemical structure evaluation. Surface morphology of the film was evaluated using atomic force microscopy (AFM) and optical microscopy (OM). Morphological studies revealed a uniform dispersion of CNF in a PVA-BA crosslinked matrix especially at low boric acid content. Changes in crystallinity and crystalline size with extent of crosslinking in the composites has been evaluated using X-Ray diffraction (XRD) studies. Those parameters were correlated with melting temperature of the composites obtained from differential scanning calorimetry (DSC). The higher glass transition temperature recorded for PVA-BA-CNF composite films were correlated with increased crosslinking. The effect of boric acid content on thermal stability, degradation kinetics and the processing window for PVA-BA-CNF composites have been evaluated using thermogravimetric analysis (TGA). The apparent activation energy for thermal degradation was calculated using the Coats-Redfern method. Vertical flammability test was conducted to study flammability of composite films. The PVA-BA-CNF composites exhibit enhanced thermal properties making them as a potential candidate for applications where higher thermal resistance and processability are required.

Author keywords- Apparent activation energy; Cellulose nanofiber; Crosslinked matrix; Poly (vinyl alcohol); Thermal stability

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**97th**	**11.7**	16 PEACE, JUSTICE AND STRONG INSTITUTIONS

AI PRICE TAGS AND PRIVACY: WHEN YOUR DATA SETS YOUR PRICE

Mone, V.; Thommandru, A.; Maratovich, F.F.; Khurramovich, K.F.; Mirziyatovna, A.K.

Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery

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WIREs DATA MINING AND KNOWLEDGE DISCOVERY

Edited By: Witold Pedrycz
Online ISSN: 1942-4795
Print ISSN: 1942-4787

Abstract

This study examines personalized algorithmic pricing and consumer protection across three major jurisdictions the United States, European Union, and India analyzing how artificial intelligence-driven pricing systems challenge traditional regulatory frameworks and threaten consumer autonomy. The research adopts a comparative methodology combining doctrinal legal analysis with empirical examination of enforcement patterns, scrutinizing recent regulatory developments including the EU's Digital Services Act, the US Department of Justice's RealPage litigation, and India's Consumer Protection Act amendments. The central argument demonstrates that transparency-only approaches prove fundamentally inadequate in addressing algorithmic filter bubbles and market concentration. Evidence from India's fast-commerce sector reveals sophisticated discrimination patterns, including device-based pricing differentials and usage-pattern exploitation, while "hub-and-spoke conspiracies" enable algorithmic collusion without explicit coordination between competitors. Key findings of study that existing legal frameworks, designed for pre-digital markets, cannot effectively address technologically sophisticated forms of consumer harm and market manipulation. The study identifies critical gaps in jurisdictional approaches: India's reactive consumer protection model, the EU's proactive transparency requirements, and the US's antitrust-centric enforcement. The research proposes moving beyond disclosure paradigms toward "information enrichment" mandates requiring platforms to actively diversify algorithmic recommendations, coupled with user-controlled choice architectures and structural market reforms. These interventions, aligned with fundamental rights principles requiring states to serve as ultimate guarantors of diversity offering pathways for regulatory frameworks that balance technological innovation with consumer welfare and market competition. This article is categorized under: Commercial, Legal, and Ethical Issues > Legal Issues Commercial, Legal, and Ethical Issues > Ethical Considerations Commercial, Legal, and Ethical Issues > Security and Privacy.
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Author keywords- algorithmic pricing; consumer protection; digital competition law; personalized advertising; regulatory transparency

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**75th**	**6.6**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

INFLUENCE OF LIGHTWEIGHT PUMICE ON LOW VELOCITY IMPACT RESPONSE OF CARBON FIBER REINFORCED PUMICE EPOXY CORE SANDWICH COMPOSITES

Shaikh, I.I.; **Shahapurkar, K.**; Mc, K.; **Venkatesh, V.**; Natarajan, P.; Tirth, V.; Algahtani, A.; Boochani, A.; Bhaviripudi, V.R.; Venkatachalam, V.; Soudagar, M.E.M.; Pisarev, A.; Bashir, M.N.; Lee, J.S.; Singh, S.

Journal of Materials Research and Technology

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Dr. C Venkatesh
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Abstract

The present study investigates novel carbon fiber sandwich composites reinforced with lightweight pumice. Four types of sandwich composites are manufactured by varying the pumice content in 0, 3, 6 and 9 wt%. Composites are manufactured by casting the core first using an open mold, and the sandwich composites are prepared using a closed mold. Particle size analysis reveals the average size of pumice particles to be around 62.44 μm. Density of the sandwich composites decreases by 7 % with an increase in the pumice particle content from 0 to 9 wt%. The impact resistance of the sandwich composites increased with the increase in pumice content up to 6 wt% (CP-0, CP-3 and CP-9) and decreased at 9 wt% (CP-9). The energy absorbed by CP-0, CP-3, CP-6 and CP-9 was measured as 13.27, 24.69, 31.65 and 8.83 J, respectively. A notable increase of 86 % and 138 % in energy absorption was observed with 3 % and 6 % pumice content compared to CP-0. Compression after impact of impact-tested specimens reveals a compressive strength of 31, 35, 39 and 43 MPa for CP-0, CP-3, CP-6 and CP-9, respectively, indicating a 26 % and 39 % enhancement of CP-6 and CP-9 composites compared with CP-0 composites. Scanning electron micrographs of specimens after compression were performed to analyze the structure-property correspondences. Finally, numerical simulations to validate the conclusions of the study were performed.
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Author keywords- Carbon fiber; Compression after impact; Low velocity impact; Pumice; Sandwich composites

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**81st**	**6.5**	07 AFFORDABLE AND CLEAN ENERGY

CFD SIMULATION AND PERFORMANCE ANALYSIS OF A BIOMIMETIC POMPEII WORM-INSPIRED THERMAL MANAGEMENT SYSTEM FOR EV BATTERY PACKS

Thavasilingam, K.; Murugan, A.; Yuvaraj, S.; Ravivarman, R.; **Gopi Kannan, K.**; Seenikannan, P.

Discover Applied Sciences

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Abstract

Inspired by the thermotolerant cuticle morphology of the Pompeii worm (Alvinella pompejana), this study develops a biomimetic battery thermal management concept for lithium-ion cells (2.6 Ah, NMC) and assesses its performance against a straight-fin air-cooling baseline of equal footprint under forced-convection conditions. CFD is used to evaluate four fin configurations: no fins, rectangular, stepped, and the suggested biomimetic shape. The 2 C discharge is modelled as an equivalent constant heat-generation model; temperatures are the steady-state maximum cell-surface temperature (T<inf>max</inf>) unless otherwise indicated. The biomimetic design reduces the in-pack temperature spread towards the ≤ 5 °C design target, maintains T<inf>max</inf> within commonly recommended Li-ion operating bands (≈ 20–40 °C), and increases heat flux by 58% (7.3976 W m−2 at 2 C) in comparison to the straight-fin baseline under matched heat load and inlet conditions. In comparison to the straight-fin baseline, it reduces the cell-to-cell temperature spread (ΔT) by 82% within the EV-relevant 10–30 ms−1 airflow region. The area-averaged convective heat-transfer coefficient (h) is increased by 73% under the same conditions; the biomimetic geometry maintains ΔT at or below ~ 4 °C in contrast to stepped fins (ΔT ≈ 14.8 °C). In terms of practicality, the architecture is lightweight (about 1.8 kg as opposed to 4.2 kg for a comparable liquid loop) and performs almost independently of direction. In line with the observed improvements in thermal homogeneity and convective heat transfer, flow-field diagnostics demonstrate increased turbulent kinetic energy close to fin tips and cavities as well as improved secondary flows and local recirculation that encourage near-wall mixing. © The Author(s) 2026.

Author keywords- Biomimetic air cooling; CFD; EV battery thermal management; Passive cooling fins; Pressure drop; Temperature uniformity (ΔT)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**79th**	**8.5**	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

EFFECT OF ALKALI TREATMENT DURATION ON THE STRUCTURE AND PROPERTIES OF ELETTARIA CARDAMOMUM CELLULOSIC FIBER

Ahmed, M.J.; M, P.A.; Sathickbasha, S.; Moinuddin, S.Q.; Prasath, K.; **Senthamaraikannan, P.**; Avudaiappan, S.

International Journal of Biological Macromolecules

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Abstract

This study investigates the chemical and thermal properties of natural fiber extracted from the stem of Elettaria cardamomum Fiber (ECF), a readily available plant in the hilly regions of southern India (Tamil Nadu and Kerala). The fibers were chemically treated with 5% (w/v) sodium hydroxide (NaOH) for varying durations 45, 60, and 75 min. The treated samples were analyzed using chemical composition analysis, X-ray diffraction, thermogravimetric analysis, differential thermal analysis, Fourier-transform infrared spectroscopy, and scanning electron microscopy. Among the treated samples, the 60-min treatment exhibited the most favorable characteristics, including the highest cellulose content (71.91 wt%), substantial removal of hemicellulose (11.71 wt%) and lignin (14.38 wt%), reduced moisture content (8.65 wt%), and increased ash content (6.31 wt%). Structural analysis indicated enhanced crystallinity, corroborated by XRD and FTIR results. Thermally, 60-min treatment of Elettaria cardamomum fiber demonstrated superior stability, with cellulose degradation initiating at 251.2 °C and peaking at 455.8 °C. SEM imaging confirmed the effective removal of surface impurities. These findings suggest that 60-min treatment fiber is a promising candidate for developing sustainable, low-carbon footprint bio-composites.
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Author keywords- Alkali treatment; Chemical studies; Elettaria cardamomum fiber; Morphological studies; Physical studies

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**83rd**	**5.6**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

STRUCTURAL, OPTICAL, HYSTERESIS, LOW-FREQUENCY AND HIGH-FREQUENCY ELECTROMAGNETIC PARAMETER OF CR3+SUBSTITUTED SRY-HEXAFERRITE SYNTHESIZED IN THE PRESENCE OF CITRIC ACID AND LEMON JUICE

Patel, C.D.; Parmar, D.D.; Chaudhari, H.N.; **Singh C.**; Jotania, R.B.; Desimone, M.F.

Ceramics International

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Abstract

Present work reports comparative study on the structural, micro-structural, magnetic, optical, and electrical properties of Sr2Co2CrxFe12-xO22 (x = 0, 2, and 4) hexaferrites synthesized in the presence of citric acid and lemon juice using the modified citrate-gel auto-combustion technique. These properties were investigated using various instrumental techniques like FTIR, XRD, SEM, EDAX, UV–Vis, Raman spectroscopy, VSM, and low- and high frequency dielectric measurements. XRD analysis shows presence of the Y-type phase as major, with minor phases of M-type and spinel. With the substitution of Cr3+-content, the values of lattice constant a remained almost constant in all samples, but c decreased from 43.76 Å to 43.58 Å, and 43.66 Å to 43.53 Å, whereas unit cell volume (Vcell) also decreased in samples synthesized in the presence of citric acid and lemon juice (heated at 1000 °C for 5 h), respectively. Also as Cr-content increased from x = 0.0 to 2.0, the percentage of Y-phases increased, and the M-phase decreased in both samples synthesized in the presence of citric acid and lemon juice. An average crystallite size (Dxrd) is decreased in samples prepared using lemon juice. The surface morphology changes with Cr content, and small and large agglomerated grains are visible, a few samples show a hexagonal platelet structure. The range of the average grain size is found from 471 nm to 814 nm. EDAX analysis confirmed the presence of Cr-ions in all samples in accordance with their stoichiometric ratios. The band gap of the samples was reduced from 2.26 eV to 1.68 eV with Cr3+-substitution. In the Raman spectra, the shifting position of the Raman band was observed after Cr3+-substitution. Saturation magnetization (MS) was found to change from 31.52 to 52.10 emu/g. along with remanence magnetization (Mr): 12.06–27.89 emu/g, and coercivity (HC): 1005.6–1787.8 Oe. The Cr3+substituted samples had Mr/MS ratios exceeding 0.5, suggesting a single-domain magnetic structure, as well as Mr/MS ratios smaller than 0.5, indicating the presence of a multi-domain structure. Dielectric measurement shows the typical behavior of ferromagnetic materials. A single semicircle arc is present in the pure sample in the Cole-Cole type plot ((Formula presented) vs (Formula presented)). The complex modulus and impedance plots demonstrate that all samples exhibit a non-Debye type relaxation behavior across the frequency range of 20 Hz to 2 MHz. The obtained high-frequency results of citric derived samples with a loss tangent of less than 0.08 from 5 to 20 GHz enunciate their good scope for antenna substrate application.
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Author keywords- Citrate-gel auto combustion method; Dielectric properties; Lemon juice; Raman spectra; SEM; VSM; XRD; Y-type hexagonal ferrite

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**41st**	**1.958**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DEEP LEARNING BASED HYBRID LCCNN DUAL FEATURE EXTRACTION FRAMEWORK FOR SPECTRUM SENSING IN COGNITIVE RADIO WIRELESS SENSOR NETWORKS

Vijay, E.V.; Aparna, K.; **Madan Kumar, K.M.V.**

Engineering Research Express

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Abstract

Spectrum sensing, the ability to identify free bands in the radio spectrum, allows a cognitive radio system to establish a communication path free of interference, a key feature for efficient spectrum management in a dense environment. This work introduces a deep learning-based LCCNN (LMS-Covariance-CNN) dual feature extraction framework for improved spectrum sensing, employing the Least Mean Square equalizer, covariance analysis, and a CNN. The LMS equalizer mitigates channel-induced distortions and provides an equalized signal for better classification and feature extraction. The covariance matrix feature captures the statistical properties of the signal, or more precisely the correlations in the signal, for signal analysis, and the CNN learns temporal patterns from the covariance matrix features for better classification of signal presence in the channel. The feature extractors interact with each other and form a hybrid dual feature extraction framework based on temporal patterns and statistical correlations. The proposed LCCNN is robust and can be adaptable to noisy wireless environments. Performance outcomes show enhancement in probability of detection, false alarm rate, sensing error, and F1 score, showing the approach's efficiency in sensing the spectrum in wireless sensor networks.
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Author keywords- covariance; feature extraction; least mean square equalizer; probability of detection; sensing error; spectrum sensing

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**77th**	**4.7**	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

EFFECT OF STACKING SEQUENCE ON THE LOW VELOCITY IMPACT PERFORMANCE OF ABACA/RUBBER HYBRID POLYMER COMPOSITES

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Polymer Composites

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Abstract

Natural Fiber-Reinforced Composites (NFRCs) have emerged as potential alternatives to synthetic fiber-based composites for engineering applications in the automotive and aerospace industries. Despite their advantages, such as biodegradability and availability, NFRCs face limitations that restrict their use to non-structural applications due to challenges such as low-impact resistance. Hybrid composites have been employed to address these challenges. This study investigates the low-velocity impact (LVI) response of abaca/rubber hybrid composites with varying stacking sequences: abaca/rubber/abaca [A/R/A], abaca/rubber/rubber/abaca [A/R/R/A], and abaca/rubber/abaca/rubber/abaca [A/R/A/R/A]. The composites were subjected to impact energy levels of 10.24, 17.14, and 23.95 J using a conical-shaped impactor. Impact energy absorption, peak force, energy loss percentage (ELP), coefficient of restitution (CoR), and damage analysis were among the important performance metrics that were assessed. The [A/R/A] configuration demonstrated superior energy absorption, achieving 14.06% and 25.83% higher absorption compared to [A/R/R/A] and [A/R/A/R/A], respectively. The energy absorption ratios for [A/R/A], [A/R/R/A], and [A/R/A/R/A] were 70.06%, 60.20%, and 53.56%, respectively. Conversely, the [A/R/A/R/A] sequence exhibited enhanced damage resistance at all energy levels. These results indicate how hybrid composites may combine energy absorption and damage resistance to overcome the drawbacks of pure NFRCs, making them appropriate for sacrificial layer applications in low-velocity impact conditions. © 2026 Society of Plastics Engineers.

Author keywords- damage; hybrid composites; impact analysis; mechanical performance; polymer composites

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q3	**47th**	**0.87**	15 LIFE ON LAND

APPLYING CRITICAL THEORETICAL FRAMEWORKS TO UNDERSTAND BIODIVERSITY LOSS IN INDIA: PRESENT CONCERNS AND THE WAY FORWARD

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Ecology, Economy and Society

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Abstract

The Centre for Science and Environment (CSE) report, State of India's Environment, 2021, indicated that India faced severe losses in its biodiversity hotspots, especially in the Indo-Burma biodiversity hotspot, where vegetation loss was an overwhelming 95%. The inordinate loss of biodiversity in India was further reaffirmed in the findings of the subsequent State of India's Environment reports. In view of such severe biodiversity loss, caused largely by anthropogenic activities, this essay seeks to apply perspectives and theories such as the value–belief–norm model and the theory of moral development to understand why and how attitudes, belief systems, and values influence environmentally significant individual, institutional, or group behaviour. The paper also advocates for a robust criminal liability regime that can create sufficient deterrence against government agencies, private corporations, and individual actors causing environmental harm and substantive biodiversity loss. © Banerjee and Kumar 2026

Author keywords- Anthropogenic activities; Biodiversity hotspots; Biodiversity loss; Criminal liability; Theory of moral development; Value–belief–norm model

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	39th	0.6	04 QUALITY EDUCATION

SUPERDERIVATIONS FOR ABELIAN EXTENSIONS OF LIE SUPERALGEBRAS

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Communications in Algebra

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Abstract

Consider an abelian extension of Lie superalgebras (Formula presented.). The aim of this paper is to construct exact sequences that relate superderivations to the second cohomology group and to apply them in studying the extension of superderivations of (Formula presented.) and the lifting of superderivations of (Formula presented.) to certain superderivations of (Formula presented.). © 2025 Taylor & Francis Group, LLC.

Author keywords- Abelian extensions; Lie superalgebras; superderivations

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**50th**	**2.0**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

OPTIMIZED REVERSIBLE FULL ADDER USING LITHIUM NIOBATE MZI BASED PERES GATE

Chowdhury, B.; **Awasthi, S.**; Kumar Metya, S.K.

Circuits, Systems, and Signal Processing

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Abstract

Logical reversibility refers to a one-to-one mapping, allowing the inputs to be traced by examining the outputs. This concept is becoming increasingly important in fields like nanotechnology, quantum dot cellular automata, and quantum technology, as it reduces heat dissipation while effectively preserving data. With an emphasis on utilizing the fewest possible Electro-optic Mach-Zehnder Interferometers (EO-MZI) i.e., minimal optical cost, this study investigates the Peres Gate (PG) implementation based on EO-MZI.Furthermore, the concept of reversibility allows the circuit to preserve bits, thereby supporting Launder's limit. OptiBPM tool is used to investigate the design, and MATLAB is used to validate its mathematical power equation. The work also explores full adder (FA) utilizing the PG as the core logic element. This leverages the unique properties of PG to configure EO-MZI count optimized reversible full adder. Along with design, simulation, and analysis of the PG-based FA, this work also explores the system-level validation to ensure the correct operation of the FA in terms of wavelength () and horizontal diffusion constant ().
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Author keywords- Full Adder; Mach-Zehnder interferometer; Peres gate; Reversible gate

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**50th**	**2.0**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

OPTIMIZED FREDKIN GATE AND ITS APPLICATION TO DESIGN AN ANCILLA-DELAY-COST EFFICIENT (2I J) REVERSIBLE RAM

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Circuits, Systems, and Signal Processing

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Abstract

Reversible Computing can boost computational energy efficiency beyond the Landauer limit (kTln2) for irreversible bit operations. It holds great potential for future technologies like ultra-low power ICs, quantum-dot cellular automata (QCA), Quantum Computing, and Nanotechnology. So, there is an ongoing pursuit of efficient reversible circuits by optimizing quantum cost, constant inputs (ancilla), garbage outputs and delay, which heavily depends on the assumptions of underlying technology. In this work, we have proposed an optimized version of Fredkin Gate, one of the extensively used reversible gates for realization of almost all basic operations. We have also displayed some efficient designs of all the latches and flip-flops along with their master slave configurations having optimum performance metrics. The suggested D-FF, being the fundamental block of memory is used to explore the realization of a Reversible Random Access Memory (RRAM) along with a few new arrangements of its constituents like D Flip Flop (D-FF) based write authorized master–slave configuration and reversible decoder. The analysis depicting the comparison states that the new design of RRAM has outsmarted the existing works in terms of performance variables including hardware complexity.
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Author keywords- Master slave; Quantum cost; Reversible decoder; Reversible flip-flop; Reversible logic; RRAM

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**54th**	**2.8**	16 PEACE, JUSTICE AND STRONG INSTITUTIONS

IMMUNE CELL DYNAMICS IN NEUROLOGICAL DISORDERS: FROM INFLAMMATION TO MICROGLIOPATHY AND NEURON–GLIA CROSSTALK

Majumder, D.

Molecular Biology Reports

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Abstract

The immune system is a complex network of cells and molecules that preserves homeostasis and provides defence against pathogens. Within the central nervous system (CNS), immune cells perform distinct yet integrated roles, balancing neuronal survival with inflammatory responses. Neuroinflammation is a hallmark of several neurological disorders, where immune activation may become maladaptive and drive neurodegeneration. Microglia, the resident macrophage-like immune cells of the brain, represent a unique interface between immune and neural function. They regulate synaptic pruning, release trophic factors, and respond to injury; however, their chronic or patchy activation leads to microgliopathy, an emerging pathological state underpinning diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), multiple sclerosis (MS), and ischemic stroke. This review traces the evolution of immune involvement from peripheral to central contexts, examines microglial signalling mechanisms in health and disease, and highlights how dysregulated neuron–microglia communication contributes to disease pathology. This review also explores biomarkers, signalling cascades such as NF- B, MAPK, JAK/STAT, and calcium-mediated pathways, and discuss future perspectives on targeting microglial states for therapeutic intervention. © The Author(s), under exclusive licence to Springer Nature B.V. 2026.

Author keywords- Microglia; Microgliopathy; Neuroinflammation; Neurological disorders; Neuron–Glia signalling

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**45th**	**2.3**	03 GOOD HEALTH AND WELL-BEING

A COMPREHENSIVE REVIEW ON THE MITIGATION OF RESIDUAL STRAIN IN THE COMPOSITE–ADHESIVE–FLANGE INTERFACE OF LIQUID HYDROGEN STORAGE TANKS

Selvan, A.; **Suyambulingam, I.**; Arun, A.; Narayanaperumal, S.; **Senthamaraikannan, P.**

Cryogenics

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Abstract

The rapid development of hydrogen propulsion for aerospace has created demanding requirements for enabling lightweight, efficient liquid hydrogen storage. The National Aeronautics and Space Administration (NASA) and others are seeking to reduce mass by developing composite cryogenic tanks to replace metallic varieties. However, the inclusion of composites, adhesives, and metallic flanges complicates the management of residual strains that arise from thermal mismatch, curing, and thermal cycling. If left unaddressed, these strains result in interfacial damages such as microcracking, delamination, and debonding, which in turn compromise long-term performance. This comprehensive review discusses the factors that control the generation of residual strain between composites and metals in composite–adhesive–flange joints, including coefficients of thermal expansion mismatch between carbon fiber-reinforced polymer composites, cryogenic adhesives, and metals, as well as curing, thermal gradients in the joints, and environmental exposure. Experimental and simulation techniques strain gages, Digital Image Correlation (DIC), X-ray or neutron diffraction, and FEA are evaluated against their performance in determining stress fields and failure predictions. Mitigation strategies can be classified as material modification, design optimization, and process improvement. Fillers such as carbon nanotubes (CNTs), graphene, or MXenes improve the toughness and thermal stability of the adhesive, whereas joint design changes, including tapers, spew fillets, and reverse tapers, can lower peel and shear stresses. The development of smart composites, such as self-sensing adhesives with FBGs and sensors based on CNTs and negative co-efficient of thermal expansion (CTE) fillers enables in situ monitoring and adaptive stress redistribution at cryogenic temperatures. This review provides a roadmap to minimize residual strain and guarantee the reliability of next-generation hydrogen storage for aerospace missions and sustainable energy. © 2026 Elsevier Ltd.

Author keywords- Adhesive joints; CTE; Hydrogen; Liquid hydrogen storage; SDG 7: Sustainable Energy

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**77th**	**5.9**	07 AFFORDABLE AND CLEAN ENERGY

POLYLACTIC ACID-BASED GREEN POLYMERS FOR FOOD PACKAGING APPLICATION. A COMPREHENSIVE REVIEW

Panda, L.; **Parameswaranpillai, J.; Jineesh, J.A.; Mishra, V.**; Ng, L.F.; Dominic, C.D.; Appukuttan, A.; Krishnasamy, S.

Food Bioscience

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Abstract

Petroleum based plastics currently leads the food packaging industry due to its low cost, easy processibility, and lightweight. However, they are non-biodegradable, obtained from non-renewable resources and generates high amount of greenhouse gases during their production. If not properly recycled, these plastics will end up in landfill or oceans and caused the formation of microplastics, a potential toxic material for animals and human beings. Therefore, there is a need for biodegradable plastics from renewable sources as an alternative to oil-based conventional plastic. It is emphasized that fully green polylactic acid (PLA) is a feasible substitute for traditional plastics used in food packaging. However, the limiting aspects of PLA in food packaging industry include its brittleness, poor heat resistance, poor oxygen and water vapor barrier properties, and limited availability of suitable recyclable plant facilities. Incorporating nanofillers, nucleating agents, blending with thermally stable polymers, annealing, and chemical crosslinking will enhance thermo-mechanical, antimicrobial, antioxidant, and barrier properties, making this biopolymer competitive with traditional plastics. This manuscript will give a clear understanding of the processing of PLA, its properties, drawbacks, and solutions to overcome the problems for any real-world applications in food packaging. © 2026

Author keywords- Biocomposites; Biodegradable polymer; Food packaging; Green materials; Sustainable solutions

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	76th	3.1	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

METASTABLE PHASES AND MEMORY APPLICATIONS OF FERROELECTRIC HfO_2: MATERIALS INSIGHTS AND SYSTEM-LEVEL PERSPECTIVES

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Materials Technology

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Abstract

Ferroelectric hafnium oxide (HfO_2) has gained major interest for its strong polarization, excellent endurance, and CMOS compatibility, making it ideal for next-generation microelectronic devices. This review critically examines the structural phases of HfO_2, focusing on the metastable orthorhombic $Pca2_1$ phase responsible for ferroelectricity. Mechanisms such as doping, strain, interfacial effects, and oxygen vacancy engineering that stabilize this phase are analyzed, along with the influence of processing parameters like ALD, annealing, and film thickness on device behavior. Advanced characterization and DFT simulations elucidate polarization and defect interactions. The integration of HfO_2 into memory and logic architectures demonstrates its promise for scalable non-volatile memory, energy-efficient computing, and neuromorphic hardware. At the circuit and system level, the review connects ferroelectric phase and defect physics to variability-aware design of FeFET/FTJ arrays, in-/near-memory accelerators, and HfO_2-based sensors, showing how coercive-field dispersion and endurance-retention trade-offs affect BER and efficiency.
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Author keywords- CMOS compatibility; doping and defect engineering; Ferroelectric HfO_2; ferroelectric memory devices; hafnium oxide thin films; oxygen vacancies

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**82nd**	**1.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

TORT, THEOLOGY, AND THE COLONIAL MIND: RETHINKING THE 'ACT OF GOD'

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Frontiers in Political Science

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Abstract

What does it mean to attribute a flood, a landslide, or a gas leak to an "Act of God"? The question appears legally sound, conceptually coherent, and culturally neutral. We question this neutrality. This paper examines the doctrine of "Act of God" not as a universal legal category but as a concept with Christian-European origins that was later secularized and widely adopted, sometimes by colonial transplantation and sometimes by selective legal borrowing. That the doctrine of "Act of God" today appears self-evident, even in societies where neither "God" nor "religion" exist as native categories, is not evidence of universal agreement, but of a significant transformation in how legal systems reason about misfortune. This paper traces how tortious liability and disaster jurisprudence, as they travel across legal cultures, carry with them a theological residue that modern law has neither shed nor acknowledged. That non-European societies today either mimic these categories or resist them by asserting equivalence does not constitute decolonization. The solution, therefore, must begin not with better laws, but with better questions, questions that emerge from within the conceptual worlds of the societies being governed. Methodologically, this is a conceptual-historical and comparative jurisprudence analysis; no empirical data are used.
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Author keywords- act of god; colonial consciousness; epistemic pluralism; legal universalism; tortious liability



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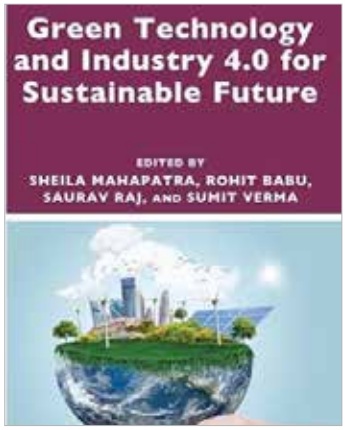
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	**NA**	**NA**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

GREEN TECHNOLOGY AND INDUSTRY 4.0 FOR SUSTAINABLE FUTURE

Mahapatra, S.; Babu, R.; Raj, S.; Verma, S.

Green Technology and Industry 4.0 for Sustainable Future

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Abstract

The text provides readers with an understanding of how green technology solutions can be applied to support sustainable manufacturing practices in the context of Industry 4.0. It illustrates practical guidance and case studies that demonstrate the potential benefits of this approach, as well as insights into cutting-edge research, and best practices. This book: Discusses topics such as zero-emission, carbon-neutral materials, wastewater management, additive and lean manufacturing, and the Internet of Things for green technology Highlights the importance of using sustainable materials such as bioplastics, bio-based polymers, and sustainable composites for reducing the environmental impact of manufacturing activities Shares ideas, research development, and methods on opportunities and challenges in green technology such as wastewater management, usage of green materials, and waste to energy Showcases energy-efficient technologies such as light- emitting diode (LED) lighting, efficient heating, cooling systems, and automated energy management systems in reducing energy consumption Covers artificial intelligence, machine learning, and the Internet of Things (IoT) in optimizing industrial processes, reducing waste and energy consumption, and improving overall efficiency It is primarily written for senior undergraduates, graduate students, and academic researchers in the fields of electrical engineering, electronics and communication engineering, environmental engineering, manufacturing engineering, industrial engineering, and production engineering.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	13 CLIMATE ACTION

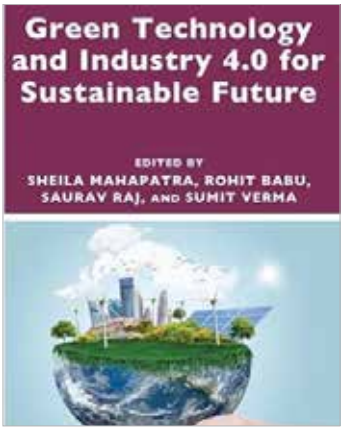
SUSTAINABLE SOLUTIONS EXPLORING THE LATEST INNOVATIONS IN GREEN TECHNOLOGY

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Green Technology and Industry 4.0 for Sustainable Future

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Abstract

Green technology, also known as clean or sustainable technology, is a pivotal strategy for tackling environmental challenges while fostering economic growth and social progress. In an era of climate change, resource depletion, and environmental degradation, green technology provides innovative solutions to minimise ecological impact, curb greenhouse gas emissions, and advance sustainable development. Green technology, when applied to the processes of industries, aims to the economic and environmental prosperity. This chapter mainly focusses on the aspects of green technology in different sectors that includes energy efficiency, waste management, conservation of water, agriculture sustainability, green building construction, and transport in the aviation sector. The advancements in green technology to reshape industries and sustainability and solar and wind power usage to develop eco-friendly vehicles and materials are discussed.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY

SMART GRID AND ENERGY MANAGEMENT

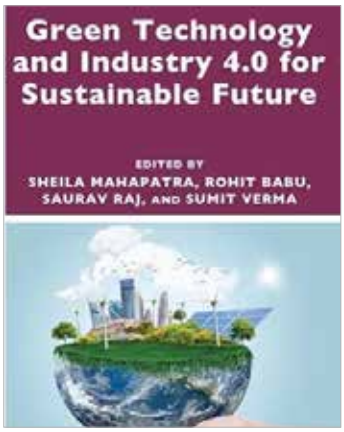
Swetha, G.S.; Mahapatra, S.; Sungheetha, A.; Agrawal, N.

Green Technology and Industry 4.0 for Sustainable Future

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Abstract

Enhancing efficiency, reliability, and sustainability in modern energy systems is dependent on smart grids (SG) and energy management. SG is a groundbreaking innovation in the domain of electrical power systems. They use digital technology, communication networks, and data analytics to change conventional grids into smart, adaptive, and environmentally friendly energy infrastructure. Nevertheless, it is crucial to tackle issues like cybersecurity and privacy for making the most of these smart energy systems. There is a crucial role of SG in guiding a sustainable future as our energy requirements change. The management of energy includes overseeing, regulating, and improving energy consumption in various sectors like commercial, residential, transportation and industrial. It has a crucial function in smart grids by enhancing grid efficiency and promoting sustainable energy practices. SG offers the necessary technology and infrastructure for modern grid control, while energy management tactics assist consumers and utilities in making informed decisions to minimize energy waste and expenses. This chapter investigates the progress of intelligent grid systems for promoting sustainable energy usage in buildings and urban spaces, aiming to decrease energy consumption and reduce CO2 emissions. It highlights the advantages associated with SGs, in conjunction with energy management principles. Additionally, the chapter explores the driving factors behind the improvement of existing power distribution systems. To demonstrate the effectiveness of the energy management control measures, two simulators—one for the home and one for the grid—are discussed. The chapter elucidates the assessment of environmental advantages, encompassing an economic analysis of the energy management system (EMS). The evaluation of ecological benefits additionally portrays evaluation of the cost-effectiveness of the EMS with renewable energy. Further advancements and future scope of SG in energy management efficiency are discussed, with the conclusions completing the chapter.
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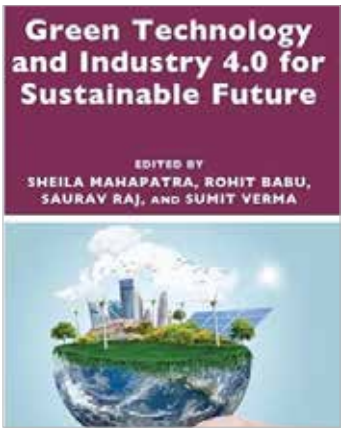
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ESTIMATING LEVELS OF SURFACE CONTAMINATION OF SILICONE RUBBER INSULATORS BY EMPLOYING WAVELET DECOMPOSITION AND MACHINE LEARNING-BASED TECHNIQUES

Sit, K.; Pradhan, A.K.; Dalai, S.; Chatterjee, B.

Green Technology and Industry 4.0 for Sustainable Future

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Abstract

An evolutionary strategy of green evaluation in the power system as well as in the era of artificial intelligence (AI) is machine learning (ML). Evolutionary techniques are employed in various fields of research. One of the important applications of evolutionary techniques is in the field of condition monitoring study of overhead line insulators. Insulators of overhead lines play a significant role in power system networks for power transmission and distribution. The power may go out completely if the overhead line insulators fail to operate. It is therefore effective to monitor overhead line insulators through surface leakage current (SLC) studies. The study employs a laboratory configuration to capture leakage current signals from multiple contaminated surfaces of silicone rubber (SiR) insulators. As a result of analyzing the SLC data, some important features about contamination levels can be extracted. Additionally, based on these characteristics, machine learning-based eco-friendly evaluation techniques are used to identify contamination classes in SiR insulators. To extract and classify features, a signal analysis tool that is wavelet decomposition and a few popular machine learning classifiers (i.e., random forest, support vector machine, Gaussian naive Bayes, and k-nearest neighbor), are employed in this work. A comparative analysis was performed to predict the degradation levels of the SiR insulators using individual ML classifiers employing advanced evaluation models in this work. This chapter determined the optimal factors that can predict the extent of dirt accumulation on SiR insulators surface.

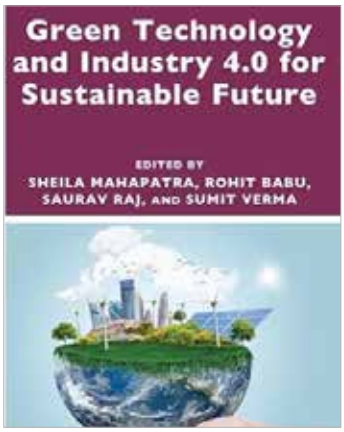
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING

EXPLOITING SMART CITY TECHNOLOGY: USING CONVOLUTION NEURAL NETWORK COMPUTER VISION TOOLS FOR COVID-19 MONITORING

Kumar, N.A.; Rakhee, n.; Kumar Cheerla, V.V.K.; Vulapula, S.R.

Green Technology and Industry 4.0 for Sustainable Future

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Abstract

A large family of viruses known as coronaviruses can cause various illnesses, ranging from the common cold to more severe diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). In 2020, the World Health Organization (WHO) declared the newly identified coronavirus disease 2019 (COVID-19) a global pandemic after its initial outbreak in China in 2019. As 2019 ended, humanity was blindsided by an unexpected foe: the highly contagious respiratory illness COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This global pandemic presented unprecedented challenges, particularly in densely populated urban areas. Yet, amidst these struggles, smart cities emerged as beacons of innovation, harnessing technology to prioritize public health and safety in a rapidly urbanizing world. This work investigates the crucial role of AI-powered COVID-19 detection and classification systems in smart city environments. These systems leverage data analytics and artificial intelligence to effectively monitor and manage the virus's spread. The study assesses the performance of two distinct datasets using various evaluation metrics. Notably, Mobile Net V2 and very deep convolution network (VGG19) models achieved remarkable accuracy, exceeding 97% for binary classifications (COVID-19/normal, COVID-19/pneumonia) and exceeding 92% for a three-class model (COVID-19/pneumonia/normal). Beyond accuracy, the work delves deep into the intricate components of these innovative solutions, encompassing advanced image processing techniques, machine learning algorithms, and real-time data analysis capabilities. In essence, this work paves the way for smart cities to leverage AI as a potent weapon in the fight against COVID-19, ultimately safeguarding public health and well-being. Harnessing technology for healthier cities, early detection and analysis powered by smart city systems can significantly bolster urban resilience against infectious diseases like COVID-19. This not only reduces pressure on healthcare infrastructure but also minimizes economic disruptions caused by lockdowns. Moreover, valuable data gleaned from these systems can guide long-term urban planning and public health initiatives, safeguarding resident well-being.
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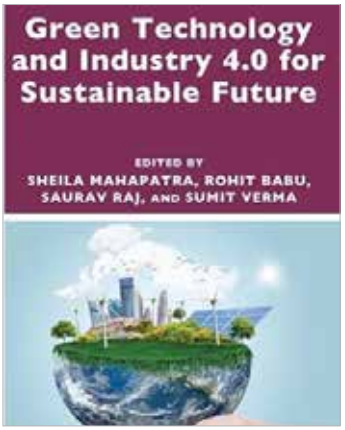
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	12 RESPONSIBLE CONSUMPTION AND PRODUCTION

GREEN ICT: MANAGEMENT OF E-WASTE FOR ENVIRONMENT SUSTAINABILITY

Kalaiselvi, S.; **Senbagavalli, M.**; Jesudas, T.

Green Technology and Industry 4.0 for Sustainable Future

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Abstract

In today's digital era, information and communication technologies (ICTs) play an important role in the day-to-day life of people. Everyone is more connected through ICTs instead of face-to-face communication. Email, live streaming, social media, and other digital platforms have become integral parts of modern communication, enabling people to connect globally. This digital era has also witnessed the integration of ICTs into essential sectors such as healthcare, education, and public services. The evolution of technology leads to the upgraded products and gadgets over time. Electronic waste encompasses discarded electronic devices and gadgets, ranging from smartphones and laptops to household appliances and other electronic components. As these products become obsolete, unwanted, or reach the end of their useful life, they contribute to the growing global issue of e-waste. Therefore, it is crucial to adopt responsible e-waste management practices. Certified e-waste recyclers play a key role in ensuring that electronic devices are dismantled, recycled, and disposed of in an environmentally friendly manner as e-waste can pollute soil, water, and air, posing threats to human health, wildlife, and ecosystems if disposed improperly. This chapter outlines an overview of the impact of the improper discarding of e-waste and the proper way of recycling e-waste.

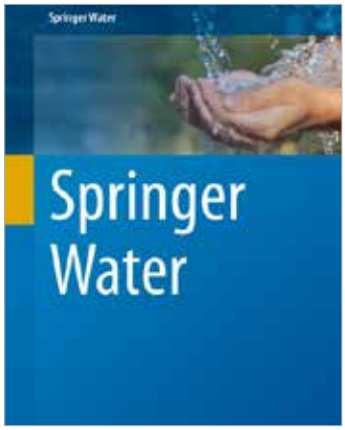
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING

FUNGAL-BASED NANOSYSTEM: FUTURISTIC TOOLS FOR CONTROLLING FUNGAL INFECTIONS

Yadav, A.; Chauhan, D.; **Talreja, N**.; Khan, S.; Ashfaq, M.

Springer Water

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Abstract

Fungal infections pose a serious risk to human health, especially to those with weakened immune systems. Although fungi are common and difficult to treat, it might be challenging to manage these infections because there aren't many antifungal medication options. Furthermore, these medications can cause fungus to develop drug resistance, making treatments less effective. Fungal nanosystems can be considered one of the most prospective research domains. These nanosystems employ nano-scaled particles extracted from or based on fungi for enhancing fungi for combating fungal infections due to its unique properties of fungal-based nanomaterials. These devices would be able to easily identify fungal cells, deliver antifungal medications to the scene, and enhance the host's immune response. Furthermore, fungal-based nanosystems should eventually be able to help with the faster and more accurate identification of fungal infections. This book chapter aims to describe studies in which nanomaterials/nanosystems were synthesized using fungi as reducing agents, discussing the mechanisms and optimization of the synthesis, as well as the applications. The literature shows that various species of fungus have potential for use in biogenic synthesis, enabling the production of nanomaterials/nanosystems and this nanosystem is used for controlling fungal infection. Nanosystems/ nanomaterials synthesized using fungi enable the control of fungal infection, with low toxicity and good biocompatibility. The potential applications of fungal-based nanosystems as fungal infection control solutions in the future. Fungal-based nanosystems, which build on current research trends, have the potential to become more effective in the fight against fungal infections in the future.
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Author keywords- Antifungal; Fungi; Infection; Nanomaterials; Nanosystem

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	04 QUALITY EDUCATION

HARNESSING MACHINE LEARNING FOR CREATING OF SMART BOOK RECOMMENDATION SYSTEM

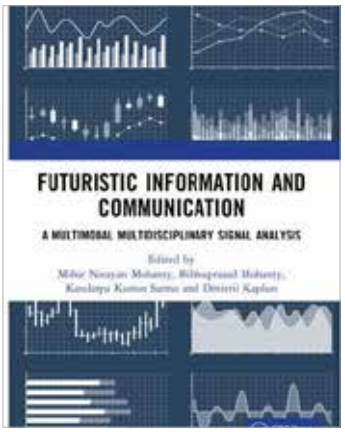
Sahu, P.; **Ghantasala, G.S.P.**; Kumar Mohapatra, S.K.; Mohanty, J.; **Sharma, R.; Sungheetha, A.**

Futuristic Information and Communication: A Multimodal Multidisciplinary Signal Analysis

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Abstract

The primary goal of a recommendation system is to simplify the process of suggesting relevant items to users, enhancing their experience and making their lives easier. As data grows rapidly over the web, users gradually more depend on resourceful tools to explore and right to use appropriate information. Recommendation systems have happened to important for customer internet corporations, including e-commerce policy, streaming facilities, and online networking services, since they provide modified proposals to users including their inclination. They are built to increase customer contentment and engagement that ultimately drives productivity due to improved sales, customer preservation, and extended use of the platforms. Recommendation systems have an important place in online book marketing, as they help retailer's advice books, which are in line with the reading predilection of their customers, increasing their level of contentment and resulting in more sales. This novel work focusing to sustain readers by creating a book commendation system driven by machine learning that investigates customer preferences and the reading prototypes of those users. By applying collaborative filtering methods, including Pearson correlation and cosine similarity in Nearest Neighbors, and popularity-based methods, the structure will be able to lead customers in the direction of books of interest, cultivating for reading and promoting the growth of that habit.

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Author keywords- Book recommender system; collaborative filtering; cosine similarity; nearest neighbor; Pearson correlation; popularity-based filtering

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DISCRIMINATION OF POWER SYSTEM DISTURBANCE AND CYBER- ATTACKS THROUGH MACHINE LEARNING AND EXPLAINABLE ARTIFICIAL INTELLIGENCE

Agrawal, N.; **Mahapatra, S.**

Integration of Internet of Things and Machine Learning: Design Models, Architectures and Application

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Abstract

This chapter explores power system disturbances and cyber-attacks using various machine learning (ML) models/algorithms. These algorithms can differentiate between natural attacks and harmful disturbances by leveraging the non-linear, intricate connections among power system measurements. To alleviate the responsibility of a power system operator in ascertaining if a disturbance stems from an intentional act, this study seeks to pinpoint the most effective ML model that is precise in classification and can provide trustworthy decision support. The framework for the power system utilized in this assessment consists of a sophisticated combination of network monitoring tools and Syslog systems. The whole work is done in a Python environment. The Extra Trees Classifier (ETC) demonstrated the best results with an Accuracy of 0.97, Precision of 0.98, Recall of 0.95, and an F1-score of 0.96. The findings support the notion that ML is a highly effective and dependable method for identifying and differentiating disturbances and attacks. The SHapley Additive exPlanations (SHAP) and Local Interpretable Model-agnostic Explanations (LIME) methods from explainable artificial intelligence (XAI) are implemented for ETC, Random Forest and Light GBM classifiers. With the LIME method, the 50th instance is predicted to have an attack with 100% confidence. This research is vital for enhancing the cybersecurity resilience of modern power systems, particularly against stealthy and sophisticated attacks.
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Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	07 AFFORDABLE AND CLEAN ENERGY

MITIGATION OF POWER QUALITY ISSUES IN DISTRIBUTION NETWORK THROUGH INTERLINE UNIFIED POWER QUALITY CONDITIONER

Jeba Singh, O.; Godwin Immanuel, D.; **Mahapatra, S.; Sharma, R.; Sungheetha, A.**

Lecture Notes in Networks and Systems

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Abstract

The advancement of power electronic devices and its usage in electrical applications leads to many problems in the quality of power. But a good quality power is essential for industries and domestic purposes. In this article, an advanced custom power device termed Interline Unified Power Quality Conditioner (IUPQC) is proposed to mitigate the power quality problems like swell, sag and harmonics. The control strategy applied in the IUPQC scheme uses the conventional proportional-integral (PI) controller so that, the complexity is reduced. Various load conditions like linear, nonlinear, and unbalanced loads are experimented in the technique to prove the effectiveness of the custom power device IUPQC. Total Harmonic Distortion (THD) levels in line current are reduced to minimum range within the IEEE standard. The simulations are carried out in MATLAB/ Simulink tool and the results are presented. The performance of IUPQC in mitigating the sag and swell voltages along with the reduction of harmonics is superior compared to the other devices like DSTATCOM, Dynamic Voltage Restorer (DVR) and Unified Power Quality Conditioner (UPQC).
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Author keywords- Harmonics; Interline UPQC; Power quality; Voltage sag; Voltage swell

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	03 GOOD HEALTH AND WELL-BEING

ENHANCED MELANOMA RECOGNITION: LEVERAGING DEEP LEARNING FOR ACCURATE CLASSIFICATION AND EARLY DIAGNOSIS

Ajitha, E.; Diwan, B.; Jeba Singh, O.; **Sharma, R.**

Lecture Notes in Networks and Systems

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Abstract

Skin cancer, especially melanoma, is often aggressive in its nature, and hence, early diagnostics and accurate data about the tumor are often critical for its treatment and increasing the chances of survival. A vast amount of dermoscopical pictures of malignant and benign skin lesions were used in designing and evaluation of this deep learning model. ResNet-50 is the model adopted, which has proven quite useful in classifying images. Moreover, the express integration of other explainable artificial intelligence methods including Grad-CAM and functionality assisted in visualizing the specific areas that the model was focusing on and thereby improving the ability to explain the model's predictions. Hence, we can conclude that the model has a 94% accuracy, 92% precision, 93% recall, and the AUC-ROC is 0.96.
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Author keywords- Deep learning; Explainable AI; Grad-CAM; Melanoma; ResNet-50

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	11 SUSTAINABLE CITIES AND COMMUNITIES

ENERGY-EFFICIENT GAN-ACCELERATED STREAM PROCESSING FRAMEWORK FOR SMART CITY IOT APPLICATIONS

Sungheetha, A.; Sharma, R.; Blake, J.; **Mahapatra, S.**; Abeysinghe, N.; Parashar, K.

Lecture Notes in Networks and Systems

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Abstract

This paper presents a novel energy-efficient framework integrating Gallium Nitride (GaN) hardware accelerators with real-time stream processing for sustainable smart city IoT applications. The proposed system combines high-speed modulation characteristics of scaled GaN laser diodes operating at 2.4 GHz with reconfigurable Multiple-In Multiple-Out (MIMO) antenna arrays to enable efficient processing of intensive data streams from urban IoT sensors. The hybrid architecture leverages both edge and cloud computing paradigms, achieving statistically significant improvements of 47.7% in energy efficiency (95% CI: 44.2–51.3%, p<0.001) and 68.0% latency reduction (95% CI: 65.1–70.9%, p<0.001) compared to traditional approaches. The system incorporates resonant-cavity light-emitting diode technology for high-bandwidth data transmission and employs machine learning-based adaptive stream processing algorithms optimized for urban infrastructure monitoring. Experimental validation across 14 international deployments in Singapore, Barcelona, Toronto, and Dubai demonstrates consistent performance improvements while maintaining 99.8% system reliability and processing throughput of 8.7 Gbps. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2026.

Author keywords- Edge Computing; Energy Efficiency; GaN Technology; IoT Analytics; Smart Cities; Stream Processing

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	11 SUSTAINABLE CITIES AND COMMUNITIES

BWIDTH ADAPTIVE BINNING EDGE COMPUTING FRAMEWORK WITH AI FOR SMART CITY HEALTHCARE MONITORING AND ENERGY MANAGEMENT

Sungheetha, A.; Sharma, R.; Blake, J.; **Mahapatra, S.**; Jeba Singh, O.; Dhawan, A.

Lecture Notes in Networks and Systems

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Abstract

This paper presents an innovative AI-enabled edge computing framework that integrates healthcare monitoring and energy management in smart cities through adaptive binning techniques. The proposed system combines distributed IoT sensors, blockchain-based secure data transmission, and neuromorphic computing to create a scalable infrastructure for urban health monitoring and energy optimization. Our framework addresses critical challenges in existing systems, including data privacy, energy efficiency, and real-time processing capabilities. The SMILE (Secure Middleware for Intelligent Life Enhancement) middleware serves as the core orchestration layer, managing distributed sensor networks while maintaining data security through federated Byzantine fault tolerance mechanisms. Compared to baseline cloud-centric and edge-only architectures, the implementation shows significant improvements in processing efficiency (47% faster than traditional cloud systems), reduction in energy consumption (38% compared to standard edge deployments) and diagnostic accuracy (93.5% versus 85% baseline accuracy). Experimental validation in 14 international deployment sites shows the system's adaptability to diverse urban environments with statistical significance $p<0.001$. The framework's integration of adaptive histogram-based stream processing with custom neural networks enables effective management of distributed sensor networks while maintaining data security and system reliability.
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Author keywords- Adaptive Binning; Edge Computing; Energy Management; IoT Security; Neuromorphic Computing; Smart Healthcare; Urban Computing

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	03 GOOD HEALTH AND WELL-BEING

FORMAL VERIFICATION AND COMPARATIVE ANALYSIS OF A LIGHTWEIGHT AUTHENTICATION PROTOCOL FOR IOT HEALTHCARE APPLICATIONS

Vetrivendan, L.; Chandila, S.; Mishra, K.N.; Arvindhan, M.; Arockiam, D.

Lecture Notes in Networks and Systems

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Abstract

The exponential growth of IoT-enabled smart city applications, especially in healthcare, necessitates secure and efficient authentication schemes that operate within embedded device constraints. This paper proposes a lightweight and privacy preserving mutual authentication scheme in order to allow the secure communication between devices and gateway nodes in IoT-based smart city environments while lowering computational costs. The proposed approach leverages the use of simple cryptographic operations (XOR, concatenation, and hashing) to mutually authenticate and generate session keys, as well as protect identities, with negligible performance cost. Thereby three major contributions of this work are offline device registration preventing illegal access, which leads to challenge-response authentication resistant to replay, impersonation and man-in-the-middle attacks, and finally formal security verification through AVISPA to demonstrate protection against identified threats. When compared with existing protocols, our scheme leads to improvements in computational, communication overhead and security strength. Results verified the framework's provision for IoT systems with limited resources, precisely in health sector where data form and secrecy are critical factors. Scalability improvements and fog/edge computing integration will be the subject of future work as we aim toward wider implementation in smart cities. This research contributes on the lightweight authentication methods and practical approach to secure IoT infrastructure in the context of changing urban environments. Here we propose a new scheme for privacy based mutual authentication for IoT based healthcare solution. Our proposed model is explicitly designed for the constrained computing power of IoT devices employ a lightweight cryptography actions like XOR, consultation and hashing In this way, the scheme enables secure session creation between authentic devices and the gateway nodes, thereby minimizing the vulnerability of illegal access to sensitive health care infrastructure, due to this design. Through rigorous security and performance assessments, we show that our scheme is both superior and more efficient than several existing authentications protocols in the literature.
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Author keywords- healthcare IoT; IoT security; lightweight cryptography; mutual authentication; privacy preservation; smart cities

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**22nd**	**0.62**	03 GOOD HEALTH AND WELL-BEING

FUZZY-NEURAL HYBRID MODELS FOR EARLY DETECTION OF NEURODEGENERATIVE DISORDERS USING MULTIMODAL MEDICAL DATA AND TEMPORAL PATTERN ANALYSIS

Pradeep, G.S.P.; Kolla, T.; **Sharma, R.; Sungheetha, A.; Vijayalakshmi, N.**; Vidyullatha, P.

Lecture Notes in Networks and Systems

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Abstract

The early identification of neurodegenerative diseases, like Alzheimer's and Parkinson's disease, is crucial for their management, although difficult due to subtle, heterogeneous, and evolutionarily conditioned clinical patterns. In this paper, we present a fuzzy-neural hybrid that incorporates the beneficial properties of fuzzy inference systems and temporal deep learning toward improved early diagnosis. Our model analyzes longitudinal multimodal medical data (neuroimaging and clinical scores), combining fuzzy rule-based feature encoding with Long Short-Term Memory (LSTM) networks for temporal pattern extraction. Interpretability is provided by assigning Gaussian membership functions, while the LSTM component encodes the dynamics of disease progression. The proposed system is validated on synthetic and benchmark datasets, showing robust classification performance and excellent temporal tracking of patient trajectories. Interpretations of internal representations are provided through visualizations such as confusion matrices, t-SNE embeddings, and 3D PCA trajectories. The results indicate that the hybrid approach provides both powerful predictions and transparent operation, making it an excellent option for clinical decision support in neurodegenerative diagnostics. The authors propose a hybrid diagnostic system that uses Gaussian fuzzy membership functions for interpretable feature encoding and LSTM networks for temporal sequence modeling of multimodal medical data. The authors validated their method with synthetic data as well as benchmark datasets, achieving perfect binary classification in their experimental results. © The Author(s), under exclusive license to Springer Nature Switzerland AG 2026.

Author keywords- Disease progression; Feature fusion; Fuzzy logic; LSTM; Medical diagnosis; Multimodal data; Neural networks; Neurodegenerative disorders; Temporal modeling

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/Q4	**23rd**	**0.36**	03 GOOD HEALTH AND WELL-BEING

OBESITY LEVEL CLASSIFICATION USING BAT OPTIMIZED RANDOM FOREST

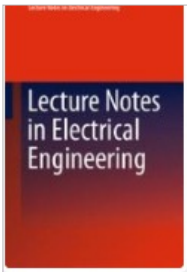
Babu, T.; Nair, R.R.; Jacob, N.; Kishore, S.; Menon, U.; Sainath, C.G.; **Sharma, R.**

Lecture Notes in Electrical Engineering

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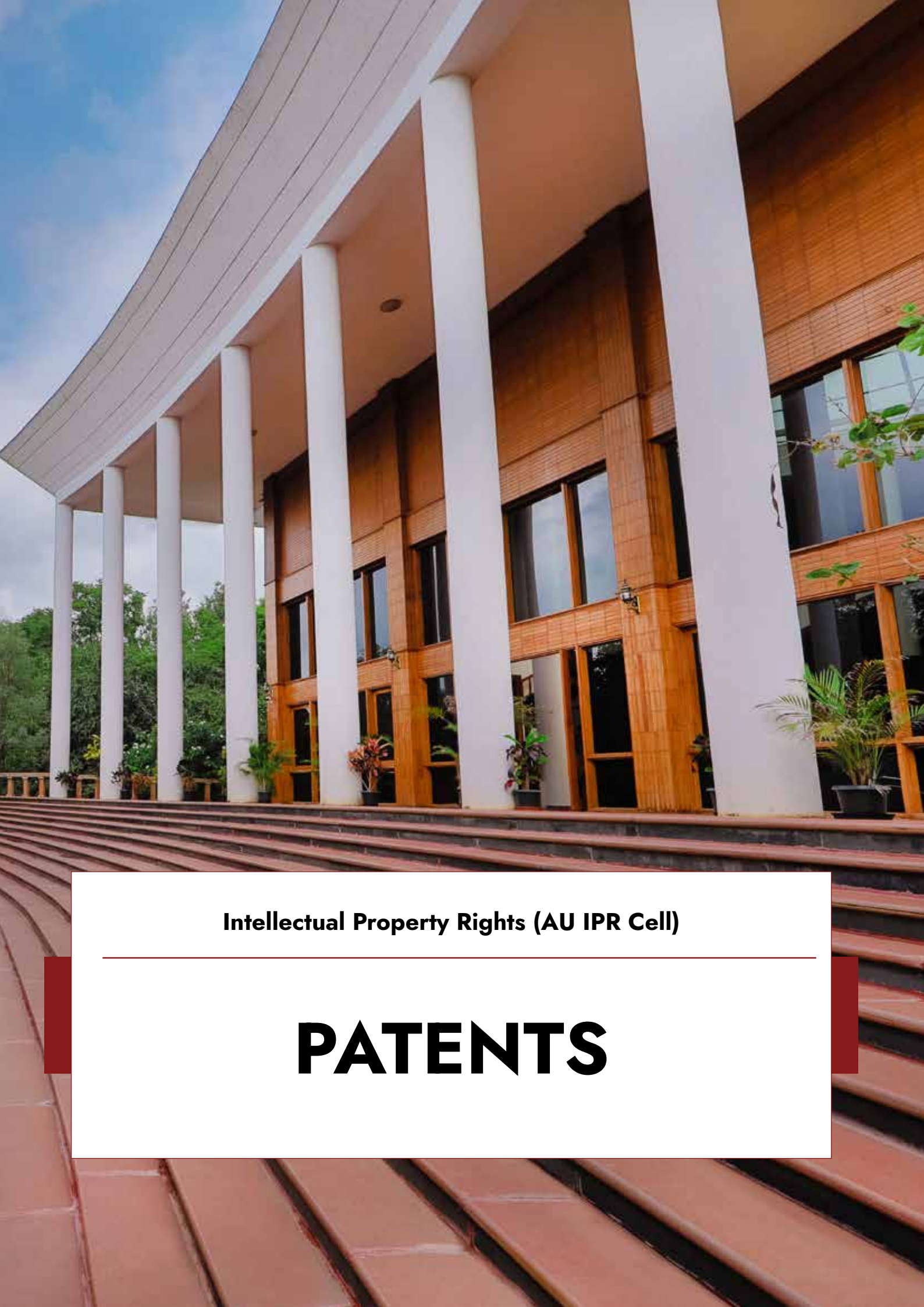
Lecture Notes in Electrical Engineering

Abstract

Obesity poses a significant health risk worldwide, necessitating accurate classification for effective intervention. Hence proposed a novel approach for obesity classification using a Random Forest (RF) classifier optimized by the Binary Altruistic Teaching (BAT) algorithm. The BAT algorithm helps in automatically tuning into regions where promising solutions to the optimization problem may be found, exhibiting a rapid convergence rate. The proposed work consists of seven classes for the obesity classification. The proposed work improved classification accuracy based on BMI, age, gender, and lifestyle factors. Experimental results on benchmark datasets demonstrate the efficacy of our method. The dataset for the proposed work is collected from Kaggle website with 17 features. The Optimised Random Forest Classifier achieves the highest accuracy of 0.9819 as compared to the other classifiers such as LGBM, Decision Tree, Extra Trees, and Random Forest. This advancement could aid healthcare professionals in designing targeted interventions and personalized treatment plans for obesity-related complications. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2026.

Author keywords- Benchmark datasets; Binary Altruistic Teaching (BAT) algorithm; Classification accuracy; Obesity classification; Personalized treatment plans; Random Forest classifier





Intellectual Property Rights (AU IPR Cell)

PATENTS

Application No 202641013563

Title of the invention **A BLOCKCHAIN-ENABLED SECURE FINTECH TRANSACTION VERIFICATION SYSTEM**

Dr. Aisha Banu
Assistant Professor
Finance
Alliance School of Business

Name of Inventor **Dr. Aisha Banu**, Dr. Tejaswini Bastray, Dr. Chethan Raj K, T Ranjani, and Dr. Mahabub Basha S

Abstract

The present invention relates to a blockchain-enabled secure financial technology (FinTech) transaction verification system that provides tamper-resistant, transparent, and real-time validation of digital financial transactions across distributed computing environments. The proposed system integrates a permissioned blockchain network with a multi-layer transaction verification engine to ensure end-to-end security, data integrity, and fraud prevention in digital payment ecosystems. The system comprises a transaction initiation module, a cryptographic identity authentication unit, a smart contract-based rule validation layer, and a distributed ledger storage mechanism. Each financial transaction is first authenticated using a combination of cryptographic keys, behavioral signatures, and device-level metadata to verify user legitimacy. Upon authentication, the transaction is processed through programmable smart contracts that dynamically validate compliance with predefined financial rules, risk thresholds, regulatory constraints, and transaction patterns. Verified transactions are immutably recorded as blockchain blocks using consensus mechanisms that prevent unauthorized modification, double spending, and replay attacks. The invention further incorporates an anomaly detection and audit module that continuously monitors transaction flows using pattern analysis and historical ledger data to identify suspicious activities in real time. Unlike conventional centralized transaction systems, the proposed architecture eliminates single points of failure and enhances trust by enabling decentralized verification across multiple nodes while maintaining controlled access for financial institutions and regulatory entities. The system supports interoperability with existing banking infrastructure, digital wallets, and payment gateways through secure application programming interfaces (APIs), allowing seamless adoption without disrupting legacy systems. Additionally, encrypted off-chain storage is employed for sensitive transaction metadata to ensure scalability and data privacy while preserving on-chain verification hashes for integrity assurance. The blockchain-enabled verification framework is adaptable to various FinTech applications, including peer-to-peer payments, cross-border transactions, digital lending, and real-time settlement systems. By combining blockchain immutability, cryptographic security, and automated rule enforcement, the invention significantly reduces transaction fraud, operational costs, and verification latency while improving transparency, accountability, and regulatory compliance. The proposed system thereby offers a robust, scalable, and secure solution for next-generation digital financial transaction verification in decentralized financial ecosystems.

Application No **202641015690**

Title of the invention **DIGITAL LENDING ADOPTION SCALE OF ADULTS IN INDIA**

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Abstract

Digital lending has been growing steadily in India employing disruptive digital technologies and alternative credit scoring method. Digital lending poses a threat for the traditional lending methods which are slow and time consuming. Despite the significant growth of digital lending among the young generation, empirical researches examining the determinants of digital lending adoption among young adults are limited. This study bridges this gap by developing and validating a comprehensive scale to measure digital lending adoption among young adults in India. Young adults aged between 19 and 35 years were the unit of analysis. Data were collected using a structured questionnaire comprising 54 Likert-scale statements which represent perceived usefulness, perceived ease of use, perceived trust, perceived risk, social influence, facilitating conditions, ease of access, financial literacy, and cost-related factors. Exploratory Factor Analysis was conducted to identify the underlying factor structure. The results of the analysis revealed six distinct dimensions influencing digital lending adoption among young adults, namely Accessibility, Perceived Security, Peer Influence, Perceived Trust and Convenience, Digital Financial Literacy, and Cost of Borrowing.
Keywords: Digital Lending, Adoption, Digital Technologies, Digital Literacy, Digital Financial Literacy, Young Adults, India.

Application No **202641016707**

Title of the invention **EXPLAINABLE AI FRAMEWORK FOR TRANSPARENT AND TRACEABLE AUTOMATED DECISION-MAKING**

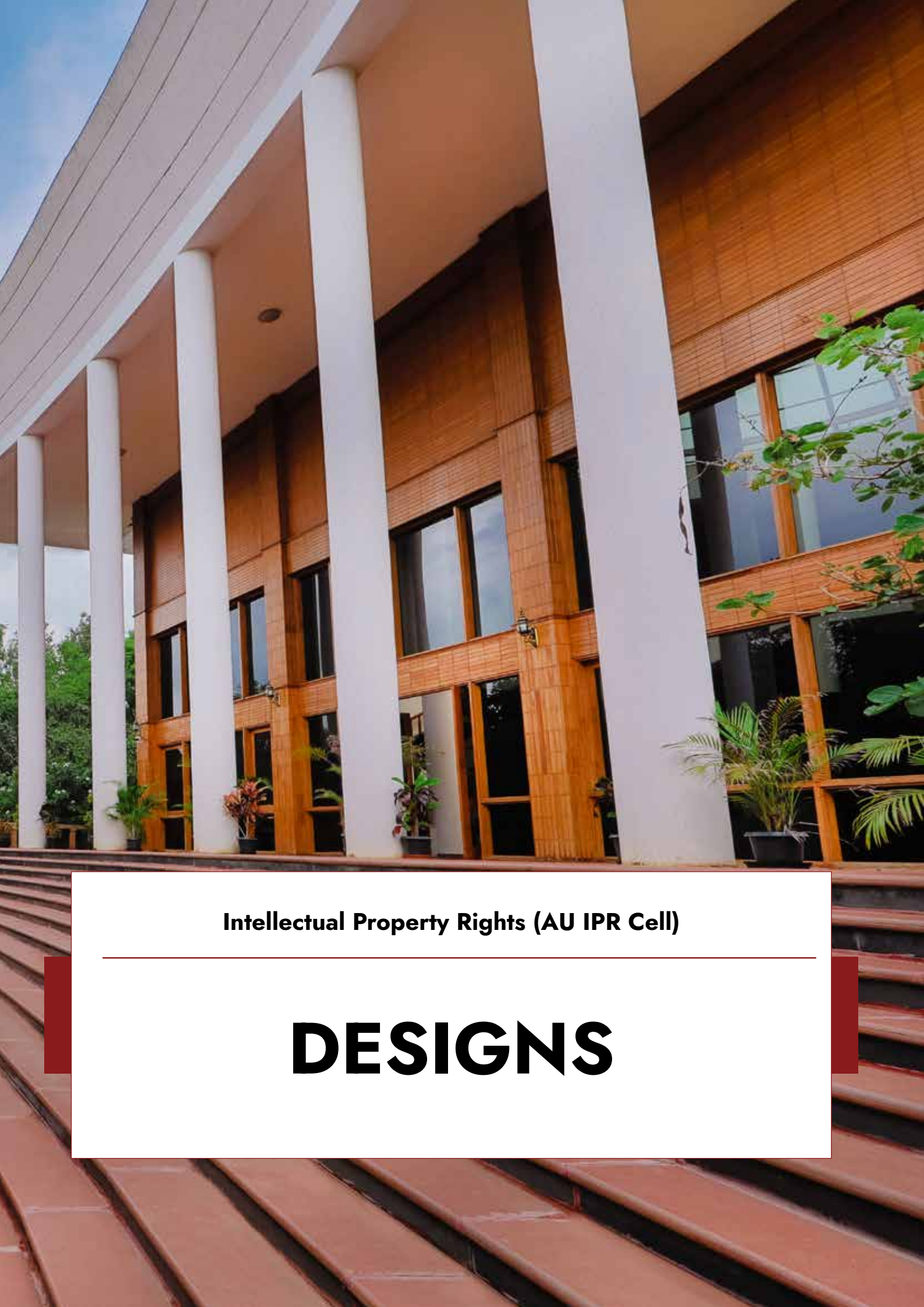
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Abstract

An explainable AI framework for transparent and traceable automated decision-making is disclosed. The framework integrates with AI models through a model integration layer that captures decision inputs, model identifiers, and outputs. An explanation engine hosts multiple post-hoc and ante-hoc methods and generates local and global explanations according to model metadata and risk policies. A decision provenance subsystem records comprehensive metadata and explanation artifacts for each decision in a tamper-evident log, enabling reconstruction and audit of historical outcomes. An explanation orchestration and delivery module tailors explanation content and format to user roles, providing concise narratives for end users and detailed technical information for experts and regulators. A governance console defines policies, monitors explanation quality and usage, and supports compliance reporting aligned with AI transparency requirements. The invention enhances trust, accountability, and regulatory compliance for AI-driven decisions by embedding explainability and traceability into operational workflows and system architecture.





Intellectual Property Rights (AU IPR Cell)

DESIGNS

Design No: **475320-001**

Title of the Design:

PORTABLE COMMUNITY ENROLLMENT AND VERIFICATION DEVICE

Name of Applicant:

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Dr. Sayantan Mukherjee
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Description

Portable community enrollment and verification device features a compact, handheld electronic unit designed for secure identity enrollment and verification in field environments. The design incorporates a central display interface, integrated control buttons, and a stylus input module to facilitate user interaction and data entry. The system is engineered to support identity capture, authentication, and digital record management through portable and technology-assisted operation. Its ergonomic and robust configuration enhances mobility, reliability, and ease of use, making it suitable for community registration, verification, and service delivery applications in decentralized environments.



Design No: **474995-001**

Title of the Design:

CYBERSECURITY THREAT MONITOR DEVICE USING AI

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Description

Cybersecurity threat monitor device using AI features a compact electronic monitoring unit designed for intelligent detection and analysis of potential cybersecurity threats within connected networks. The design incorporates multiple antenna modules for wireless communication, an integrated display interface, and functional control buttons for operational interaction. The system is engineered to monitor network activities, analyze data patterns using AI-assisted algorithms, and provide visual status indications for threat detection and system performance. Its structured and durable configuration supports reliable deployment, continuous monitoring, and enhanced protection within smart network and digital infrastructure environments.



Design No: **475091-001**

Title of the Design:

IOT-BASED GRAIN STORAGE MONITORING DEVICE

Name of Applicant:

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Description

IoT-based grain storage monitoring device features a compact electronic monitoring unit designed for real-time assessment of grain storage conditions. The design incorporates an integrated display interface, functional control buttons, status indicator lights, and multiple sensor connectivity ports for environmental data acquisition. The system is engineered to monitor parameters such as temperature, humidity, and storage conditions, while enabling wireless data transmission through IoT-enabled communication. Its durable and structured configuration supports reliable deployment, continuous monitoring, and improved management of grain storage environments to help maintain quality and prevent spoilage.





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