



**SOMAIYA**  
VIDYAVIHAR UNIVERSITY



## **Annual Research Meet 2026**

**February 26 – 27, 2026**

***Explore • Engage • Evolve***

A platform showcasing innovations, interdisciplinary research & academic excellence of Somaiya Vidyavihar University



**Organized by Somaiya Vidyavihar University**

# **Annual Research Meet 2026**

**February 26 – 27, 2026**

**Smt. Sakarben Sabhagruha  
Somaiya Vidyavihar University**

Celebrating Research Accomplishments across varied disciplines of Somaiya Vidyavihar University including but not limited to Basic & Applied Sciences, Engineering & Technology, Music & Performing Arts, Dharma Studies, Management, Education, Languages & Literature, Sports, Commerce & Business Studies, Humanities & Social Sciences, Yoga & Medicine, Library & Information Science.

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## **Somaiya Vidyavihar University**

Somaiya Vidyavihar University (Accredited with A Grade by NAAC), established in 2019, is a leading institution in Mumbai, India, built upon the 84-year legacy of the Somaiya Educational Trust. Guided by the motto “ज्ञानादेव तु कैवल्यम्” (Knowledge Alone Liberates), the university emphasises academic excellence, holistic development, and character-building.

Offering a diverse range of undergraduate, postgraduate, and doctoral programs, Somaiya Vidyavihar University integrates industry collaborations, interdisciplinary learning, and research-driven education. The university’s strategic location in Mumbai provides students with access to sectors such as finance, media, and urban studies. The university promotes innovation through a Startup Incubator. It also emphasises experiential learning with initiatives like the We-Chemie program and real-world projects.

With a strong commitment to sustainability, research, and the development of well-rounded leaders, Somaiya Vidyavihar University continues to play a pivotal role in shaping India’s educational landscape.

## **Annual Research Meet 2026 (ARM 2026)**

Annual Research Meet 2026 (ARM 2026) is a premier interdisciplinary academic platform that brings together researchers, academicians, scholars, industry professionals, and students from diverse domains. The event provides a vibrant forum for sharing knowledge, exchanging ideas, and showcasing innovative research outcomes, while promoting collaboration across disciplines.

ARM 2026 aims to foster research excellence by offering participants opportunities to present their work through full-length research papers, oral presentations, and poster presentations. The meeting serves as a dynamic space for discussing emerging trends, recent advancements, and future directions in multiple areas of research. By encouraging cross-disciplinary dialogue, critical thinking, and meaningful networking, ARM 2026 creates an environment that supports innovation, academic growth, and impactful research. In addition to technical sessions, ARM 2026 will serve as a platform for technology exhibitions, bringing together industry partners, startups, and innovators to showcase their products and technologies. The event aims to create a conducive environment for industry collaborations, technology transfer, intellectual property generation, innovation-driven partnerships and publications in high-impact journals. PhD scholars, especially those early in their research careers, will have the opportunity to share their work through poster presentations. The meeting will also feature plenary lectures by distinguished experts from various fields, providing valuable insights to research students and faculty members.

We welcome contributions from all research domains and invite participants to be part of this vibrant academic gathering that celebrates creativity, knowledge sharing, and scholarly excellence.

## **Patrons**

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### **Dr Seema Sambrani**

Head, Department of Life Sciences & IPR Cell In-charge

## **Program Chair**

### **Dr Arun Kumar Nayak**

Dean Research & Director SIRAC

## Foreword



**Dr. Arun Kumar Nayak**  
Dean Research, & Director, SIRAC

Somaiya Vidyavihar University stands out for its decades of legacy, and a unique "major-minor" multidisciplinary academic university blending Indian tradition with modern science, technology-driven education. It offers immense academic flexibility, strong industry links, and a "freedom of possibilities" for research and entrepreneurship, fostering holistic growth and sustainable living. The university has been investing and driving Research and development (R&D) intensively in its curriculum in basic and applied sciences including energy, health care, agriculture & food, water & sustainability, green technologies, manufacturing & electronics, etc. apart from culture, civilization, business, economics, language & literature, etc. This is accomplished by hundreds of PhD researchers working in diverse fields with the financial support from the university apart from extensive national & international collaborations with leading universities, industries and Government Organisations.

The university is poised to make massive investments in R&D to support India's transformation to Viksit Bharat by developing critical technologies in all fields to foster national growth, economic productivity, technological innovation & sovereignty, and improved quality of life of 1.4 billion of the human population on this part of the planet. ARM 2026 is a proud moment for the researchers and faculties of the university, to celebrate its research & innovation, and to display its accomplishments during February 26-27, 2026. ARM 2026 will host experts from diverse fields to speak on new frontiers in different domains to inspire the young minds to explore new avenues & initiate research & start-ups. As India dreams to be a 30 trillion \$ economy by 2047, the growth rate is envisaged multi-fold in almost all sectors. And Somaiya Vidyavihar University takes this as opportunities and looks into new avenues for research & development such as space & nuclear, human robotics, artificial intelligence, innovative drug design, data science & quantum computing, semiconductors, etc. Let me congratulate all PhD scholars & their guides, the conveners & volunteers who made this event successful & memorable.

## Vice Chancellor's message



**Prof. Ajay Kapoor**  
Vice Chancellor  
Somaiya Vidyavihar University

With immense pleasure and enthusiasm, I greet the research community of Somaiya Vidyavihar University! Research at SVU is truly diverse spanning almost ten disciplines with several specializations in each discipline. Certainly, this is an added advantage for researchers at SVU to utilize the multi-disciplinary interface for addressing global challenges. Annual Research Meet, SVU is a platform for researchers to explore multi-disciplinary facets related to their research by engaging in scholarly discussions and evolving a broader understanding of their research topic. Research scholars are encouraged to break silos, interact with colleagues and peers from different disciplines and update themselves on latest research endeavours and trends.

On a positive note, I already see a growth in inter-disciplinary interactions in research at SVU, glancing through the abstracts and I appreciate such collaborative dialogues. While exploring inter-disciplinarity within SVU is welcome, research scholars should also collaborate with both academia and industry at a global scale. To strengthen these collaborations, I emphasize that we build a strong foundation of publishing impactful research, publications, patents which could be commercialized and ultimately benefit the eco-system.

I extend my support and cooperation to SVU research scholars towards achieving their research goals and improving the research outcomes of SVU. Once again, I congratulate researchers participating in ARM 2026 and welcome all invited dignitaries for fruitful interactions!

**Chief Guest**  
**Prof. Jyestharaj B. Joshi**  
**Chancellor, Institute of Chemical Technology Mumbai.**



Professor Jyestharaj Joshi is currently the Chancellor, Institute of Chemical Technology, Mumbai. He is also a Distinguished Professor Emeritus at Homi Bhabha National Institute. A chemical engineer by training, Prof Joshi pursued his PhD at University Department of Chemical Technology, Mumbai. His areas of expertise include fluid mechanics, multiphase reactor design, computational fluid dynamics, atomic energy, solar energy and bio energy. Prof Joshi has had a significant impact on the academic, research and industrial sectors. He has guided over 130 PhD theses and 25 post-doctoral students in a span of 54 years.

Prof. Joshi is a fellow of the world Academy of Sciences, an international fellow of the US National Academy of Engineering. He received the Shanti Swarup Bhatnagar prize for engineering sciences in 1991, Lifetime achievement award from the Indian Chemical Council in 2025. Stanford University Survey has placed Prof Joshi among the top 0.1% of Engineer Scientists in the World. In 2014, his contribution to science was rewarded by conferring upon him the honorary **Padmabhushan** award by the Government of India.

Prof. Joshi also has about 50 innovations to his credit. He has played a pivotal role in increasing capacities, quality and safety of more than 100 operating processes making them globally competitive. His designs are substantially lower in capital and operating cost and equivalent to global standards in performance. Prof Joshi has held more than 300 workshops for promoting science awareness among school going students and science popularization movement through one act plays. He has undertaken active research programs for enhancing per capita income (GDP) of the citizens having GDP less than Rs. 50000 per annum.

## Plenary Speaker

**Prof. Jayaram N. Chengalur**

**Director, Tata Institute of Fundamental Research**

**Talk title: Exploration of the radio sky**



Jayaram N. Chengalur obtained his B.Tech. in Electrical Engineering from IIT-Kanpur in 1987. He then moved to Cornell University for his doctoral studies, completing his Ph.D. in 1994. Following this, he worked as a post-doctoral fellow at the Netherlands Institute for Radio Astronomy (ASTRON) in the Netherlands, before joining the National Centre for Radio Astrophysics in 1996. He is a Fellow of the Indian Academy of Sciences, the National Academy of Sciences, India, and the Indian National Science Academy.

## Plenary Speaker

**Prof. Dhruv Kumar Singh**

**Indian Institute of Technology (Indian School of Mines) Dhanbad**

**Talk title: From Resources to Resilience:  
Processing Critical Minerals and Rare Earths for Strategic Self-Reliance**



Dr. Dhruva Kumar Singh is a distinguished expert in rare earth resource processing and critical minerals, with over three decades of impactful contributions to India's strategic materials sector. A Gold Medallist in M.Sc. Chemistry from Magadh University, he joined Bhabha Atomic Research Centre (BARC) in 1991 after completing the 34th Batch of the BARC Training School. He earned his Ph.D. from University of Mumbai in 2001 and carried out post-doctoral research (2002–2004) at Florida State University under the mentorship of renowned nuclear scientist Prof. G. R. Choppin. At BARC, Dr. Singh played a pivotal role in developing process flowsheets for the extraction and separation of uranium, thorium, rare earth elements, cobalt, nickel, and other strategic metals from both primary and secondary resources. Several of these technologies have been successfully adopted by IREL (India) Limited for commercial production of rare earth compounds, significantly strengthening India's indigenous capabilities. With over 300 scientific publications and numerous invited lectures, he has contributed extensively to national scientific and policy initiatives, including committees constituted by NITI Aayog.

He currently serves as Chairman of its Committee on Critical and Strategic Minerals. In recognition of his outstanding contributions to rare earth and critical mineral processing, Dr. Singh has received several prestigious honors, including the INS Gold Medal (2006), Metallurgist of the Year Award (2015) by the Ministry of Steel, Government of India, DAE Group Achievement Awards (2018 & 2020), Hindustan Zinc Gold Medal (2019), VASVIK Award (2022) for Materials & Metallurgical Science and Technology, and multiple Lifetime Achievement Awards (2024) from the Rare Earth Association of India (REAI), the Indian Society of Analytical Scientists (ISAS), and REMAC. Following his superannuation in December 2024, Dr. Singh joined IIT (ISM) Dhanbad as Visiting Professor, continuing his engagement in research, mentorship, and national resource strategy.

## Plenary Speaker

**Prof Kanchana Mahadevan**

Department of Philosophy, University of Mumbai

Talk title: **Texts and Interpretations in Philosophy Research**



Kanchana Mahadevan was formerly Professor at the Department of Philosophy, University of Mumbai. She teaches and writes in the areas of feminist philosophy, decolonization, critical theory and political thought. Prof Kanchana has formerly been the Editor of the University of Mumbai's interdisciplinary journal *Sambhashan*. Her book **Between Femininity and Feminism: Colonial and Postcolonial Perspectives on Care** (Indian Council of Philosophical Research in collaboration with DK Printworld New Delhi) examines the relevance of Western feminist philosophy in the Indian context. She has coedited a volume of philosophical and psychological essays on the pandemic entitled *The COVID Spectrum: Theoretical and Experiential Perspectives* (Speaking Tiger Publications, New Delhi). Her recent work attempts to situate the care theoretical perspective in the Indian context, with special reference nursing policies and practices. She is also working on the significance of gender in debates on the secular and the post secular.

## Plenary Speaker

### **Dr Navin Khattry**

**Deputy Director & Professor, Advance Centre for Treatment Research & Education in Cancer, Tata Memorial Centre**

**Talk title: Basics of Bone Marrow Transplantation**



Dr Navin Khattry completed his MBBS from Calcutta Medical College, Kolkata, followed by MD in Internal Medicine from PGIMER, Chandigarh and DM in Medical Oncology at AIIMS, New Delhi. He was awarded the Shakuntala Jolly Gold Medal for the best student in Oncology for the year 2005. He further trained in BMT for a year and half at the Bristol Royal Hospital for Children and then joined Tata Memorial Centre, Mumbai, as an Assistant Professor in 2007.

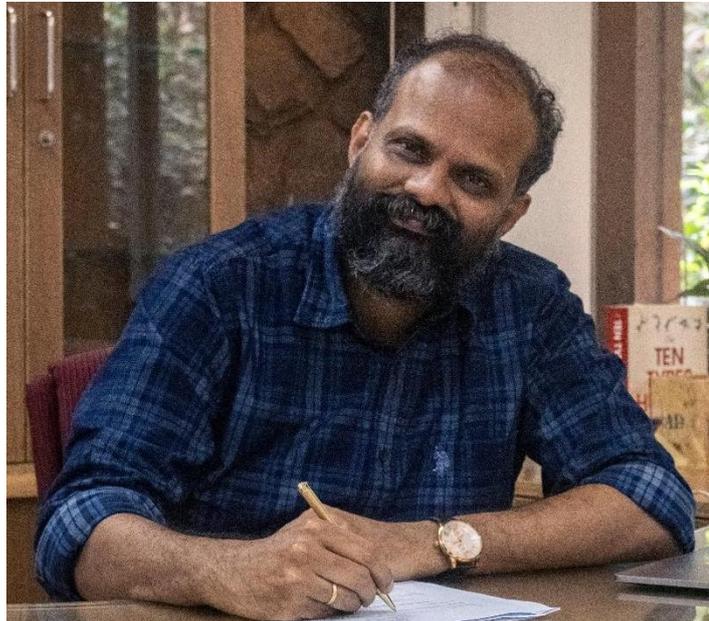
Dr Khattry has been instrumental in setting up the Bone Marrow Transplant Programme and Adult Haematolymphoid Unit, the Cellular Therapy Programme at ACTREC with help of his colleagues ACTREC, Kharghar, Navi Mumbai. He is also the Honorary Secretary of the Marrow Donor Registry India (an Unrelated Donor Registry) and is currently the Treasurer of Indian Society for Blood and Marrow Transplantation (ISBMT). He is the co-Chair of National Apex Committee of Stem Cell Research and Therapy of ICMR, the highest body that is involved in regulating the stem cell research in India. He also serves as a member of committees of various international organisations such as Asia Pacific Blood and Marrow Transplantation (APBMT) Group, American Society of Transplantation and Cellular Therapy (ASTCT) and Asian Cellular Therapy Organisation (ACTO). Currently, he is the Deputy Director of the Clinical Services at ACTREC, involved in setting up large clinical centres within the ACTREC Campus. He has been a mentor to many students in the field of haemato-oncology in the country and has received several awards for his work in this field. He has authored more than 100 publications in peer reviewed journals and has written chapters in several textbooks related to haemato-oncology and BMT.

## Plenary Speaker

**Prof Bino Paul**

**School of Management and Labour Studies  
Tata Institute of Social Sciences, Mumbai**

**Talk title: Transition to Social Sustainability: design and methods**



Bino Paul is a Professor at the Centre for Human Resources Management and Labour Relations, School of Management and Labour Studies and has previously served as the pro Vice Chancellor of TISS. Prof Paul focusses on understanding the labour market, socio-economic conditions of workers, employment structure as well as labour force-industry relations. His wider research interests encompass sustainability transition and human resource management in higher education.

## Plenary Speaker

**Dr Praveen S**

**Scientific Officer  
Bhabha Atomic Research Center**

**Talk title: AI & Quantum Revolution Opportunities & Challenges**



Praveenkumar Suggiseti is a Senior Scientist at BARC, Mumbai, and a faculty member and M.Tech guide at Homi Bhabha National Institute. He has over 23 years of experience in the semiconductor and Quantum ecosystem, covering silicon, CMOS, GaN, MEMS, RF, and superconducting quantum technologies. He is an Expert Member of India's National Quantum Mission, an advisor to Amaravati Quantum Valley. His significant projects include the development of silicon strip detectors for the world's largest experiment at CERN in Geneva. He has also developed various indigenous semiconductor technologies and devices, such as silicon photomultipliers, radiation-sensitive MOSFETs, MEMS ultrasonic transducers, high-power LDMOS devices, and Superconducting Quantum Processors. He was recognized with the 2025 International Physics Breakthrough Award as part of a Group Award for his contributions at CERN, Geneva. His academic contributions include 190 publications with approximately 18,000 citations and an h-index of 45.

## Industry Expert

**Dr Shrikant Nalawade**

**Head, Milliken Chemical & Textile (India) Co. Pvt. Ltd.**

**Talk title: From Campus to Corporate: Aligning Skills with Industry Needs**



Dr. Shrikant Nalawade is a distinguished chemical scientist and industry leader with over 20 years of experience spanning FMCG, pharmaceuticals, perfumery, color chemicals, and specialty chemicals. He holds a Ph.D. in Chemistry from the University of Mumbai, an Executive General Management qualification from IIM Bangalore, and is an alumnus of Somaiya Vidyavihar University (B.Sc., M.Sc.). In his current role as Head of Milliken Chemical & Textile (India) Co. Pvt. Ltd, Dr. Nalawade oversees R&D, technology innovation, and strategic business initiatives. He has previously contributed his expertise to Hindustan Unilever Ltd., Mumbai, and Lupin Research Park, Lupin Limited, Pune, among others.

**Panel discussion:**  
**Beyond Green Tech: Integrating Science/Technology & Social equity for a sustainable future**



**Moderator:**  
**Professor Raman Ramachandran**  
**Director, K J Somaiya School of Management**

## ARM 2026 Schedule

**Day 1: 26<sup>th</sup> February 2026,  
Venue: Smt. Sakarben Sabhagruha, Somaiya Vidyavihar University**

08:30 – 09:30	Registration and breakfast
09:30 – 09:35	Inaugural tone setting
09:35 – 09:40	Lamp lighting, Prayer
09:40 – 09:45	Welcome address (Convener)
09:45 – 09:50	Opening remarks by Dean Research & Introduction of Chief Guest
09:50 – 09:55	Felicitation of Chief Guest by Honourable Vice Chancellor
09:55 – 10:05	Foreword by Honourable Vice Chancellor
10:05 – 10:10	Unveiling of ARM 2026 Abstract booklet & SVU Faculty Publications 2025
10:10 – 11:00	Keynote address by Chief Guest: Prof J.B. Joshi
11:00 – 11:05	Vote of thanks
11:05 – 11:10	Inauguration of Book & Poster Exhibition
11:10 – 11:30	Tea-break
11:30 – 13:00	Parallel track sessions – I (Oral presentations by PhD Students in respective Schools)
13:00 – 14:00	Lunch-break (Gargi Plaza)
14:00 – 15:30	Parallel track sessions – II (Oral Presentations by PhD Students in respective Schools)
15:30 – 16:30	Posters and Exhibit (Gargi Plaza) with Tea
16:30 – 17:30	Performance by Maya School of Music & Performing Arts

## ARM 2026 Schedule

**Day 2: 27<sup>th</sup> February 2026**

**Venue: Smt. Sakarben Sabhagruha, Somaiya Vidyavihar University**

09:30 – 10:30 Posters and Book Exhibit with Tea (Gargi Plaza)

Session I

10:30 – 11:00

Industry partner interaction

Dr Shrikant Nalawade, Head, Milliken Chemical & Textile (India)

Chair: Dr Achala Danait, Center for Strategic Industry Partnerships

Session II: Plenary

Prof Santosh Narayankhedkar, Dean Academics

11:00 – 11:30

Plenary 1: Prof. Jayaram Chengalur, Director, TIFR

11:30 – 12:00

Plenary 2: Prof. Dhruv Kumar Singh, Faculty, IITISM Dhanbad

12:00 – 12:30

Plenary 3: Prof. Kanchana Mahadevan, University of Mumbai

12:30 – 13:30

Lunch-break (Gargi Plaza)

Session III: Plenary

Chair, Prof Mitali Nayak, Dean Medicine,

K J Somaiya Medical College & Research Center

13:30 – 14:00

Plenary 4: Prof. Navin Khattry, Deputy Director, ACTREC, TMC

14:00 – 14:30

Plenary 5: Prof. Bino Paul, Tata Institute of Social Sciences

14:30 – 15:00

Plenary 6: Prof. Praveen S, Bhabha Atomic Research Center

15:00 – 15:30

Tea-break (Gargi Plaza)

15:30 – 16:30

Panel Discussion: Beyond Green Tech: Integrating Science/Technology & Social equity for a sustainable future

Prof. Ajay Kapoor, Vice Chancellor, SVU (Chair)

Prof. Raman Ramachandran, Director, KJSIM (Moderator)

Prof. Santosh Narayankhedkar, Dean Academics, SVU

Prof. Suresh Ukarande, Director, KJSSE, SVU

Prof. Bino Paul, Tata Institute of Social Sciences

16:30 – 16:50

Oral and poster presentation awards

16:50 – 17:00

Valedictory remarks by Vice Chancellor, SVU

17:00 – 17:20

Research Scholar Remarks

17:20 – 17:30

Vote of Thanks by Convener ARM 2026

17:30

National Anthem

## ARM 2026 Schedule (Oral presentations)

Faculty	Location	Time
Commerce and Business Studies	Seminar Hall, Dr Shantilal K Somaiya School of Commerce and Business Studies	11:30 am-12:30 pm
Humanities and Social Sciences	Seminar Hall, Dr Shantilal K Somaiya School of Commerce and Business Studies	12:30 pm-01:00 pm 02:00 pm-02:30 pm
Basic and Applied Sciences	Room No 202, Einstein Hall, K J Somaiya School of Engineering	11:30 pm - 12:50 pm
Medicine: Physiotherapy	Room No 202, Einstein Hall, K J Somaiya School of Engineering	02:10 pm - 02:50 pm
Education	Board Room, K J Somaiya School of Education	11:30 am - 02:45 pm
Dharma Studies	Room 201, Chanakya Building, K J Somaiya Institute of Management	11:30 am - 01:00 pm 02:00 pm - 03:00 pm
Engineering	K J Somaiya School of Engineering	11:30 am - 01:00 pm 02:00 pm - 03:30 pm
	A-315, Mechanical, Energy and Science and Humanity	
	A-225, Electronics and Electronics and Telecommunication	
	B-113, Computer and Information Technology	
Management	K J Somaiya Institute of Management	11:30 am - 01:00 pm
	Classroom Nos 303 A & 304 and AV Room	

## Abstracts: Commerce & Business Studies

### Oral presentations:

- Ravi Kanji Chavda*: A study on evaluating psychological factors influencing plant based diet among Gen Z.....22
- Kamalika Ray*: Extent and nature of Corporate Social Responsibility activities: A sectoral analysis of selected NSE-listed companies in India.....23
- Mayank Satra*: An empirical study of ESG scores and stock price recovery.....24
- Megha Balu*: An analytical study of firm performance during corporate restructuring.....25
- Pranali Lokhande*: Privacy, trust, and inclusion: Understanding consumer willingness to share digital data for credit access.....26
- Supriya Maurya*: A study on balancing innovation and ethics: A human-centric framework for AI adoption in Human Resource Management.....27

### Poster presentations:

- Anchal Shroff*: The impact of sustainability awareness, brand environmental responsibility, and peer influence on Gen Z's cosmetic purchase behaviour.....28
- Sayali Nene*: Tracing global research on microfinance for financial inclusion: A bibliometric study.....29

**Note: For all abstracts:  
corresponding author is marked by \*  
Equal contributor is marked by †,  
Numbers denote author affiliation**

# A study on evaluating psychological factors influencing plant-based diet among Gen Z

Ravi Chavda<sup>1\*</sup> and Aparna Jain<sup>1</sup>

<sup>1</sup>*Department of Commerce and Business Studies, Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [ravi.chavda@somaiya.edu](mailto:ravi.chavda@somaiya.edu)

## **Abstract:**

This paper explored the psychological determinants of adoption of plant-based diet in Generation Z. The study aimed at empirically evaluating the role of internal decision-making processes in determining willingness, consistency, and involvement into plant-based dietary practices within the cohort of the youth. The research design applied in the study is quantitative research design based on Structural Equation Modelling (SEM) in SmartPLS. The sample was non-random purposive in nature, and the researcher used 215 Generation Z respondents to gather primary data. The proposed model consists of five unobservable variables that are evaluated with the help of nineteen observable measures that make it possible to assess both measurement and structural relationships between psychological variables and adoption of plant-based diet. The findings indicate that the impact of environmental concern, ethical beliefs, health consciousness, and social influence on the adoption of a plant-based diet in Generation Z is positive and statistically significant. The results indicate that dietary adoption is produced by an integration of individual values and health-related perception and social situations as opposed to an individual motivating variable. The findings can provide quality information to teachers, policymakers, medical practitioners working in the field of public health, and food industry stakeholders by determining the psychological motivators that affect the adoption of plant-based diets among the youth. The awareness of these factors can aid the creation of specific awareness programs and behavioral change interventions to promote sustainable and healthy eating habits. This research adds to the body of literature because it empirically studies the adoption of plant-based diets through the lens of psychology based on structural equation modelling framework. The generation Z-oriented study offers evidence-based understanding of an under-investigated population target group and contributes to the research of modern dietary habits.

**Keywords:** Plant-based diet, Structural Equation Modelling, vegan food products.

Manuscript for this abstract was submitted for internal review

## **Extent and nature of Corporate Social Responsibility activities: A sectoral analysis of selected NSE-listed companies in India**

Kamalika Ray<sup>1\*</sup> and Sachin Acharekar<sup>1†</sup>

*<sup>1</sup>Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [kamalika.ray@somaiya.edu](mailto:kamalika.ray@somaiya.edu)

### **Abstract:**

Corporate Social Responsibility (CSR) has emerged as a vital element of corporate governance, aiming to align business practices with social and environmental responsibilities worldwide. In India, the Companies Act, 2013, under Section 135, made CSR expenditure mandatory for some qualifying companies. This led to a change in how companies plan and report on their social efforts. Although compliance and disclosure processes have been enhanced, it is still unclear how CSR related decisions have changed over time in different industries and how they fit with sustainable ideals. Through an ex-post-facto research of NSE-listed enterprises from 2014–15 to 2023–24, this paper examines the scope and features of Corporate Social Responsibility (CSR) initiatives among selected NSE-listed businesses across various industries in India and demonstrates that CSR actions are progressively aligned with the Sustainable Development Goals (S). Secondary data is used from annual reports, Business Responsibility Reports (BRR), and Business Responsibility & Sustainability Reports (BRSR) to figure out CSR spending trends, sort initiatives into priority areas as per the nine principles of sustainability, and look at how strategy has changed with each amendment in policies related to CSR. Content analysis shows that programs are moving away from being charitable and toward being strategically linked with the SDGs and measuring their impact. There are differences within sectors; for example, banking focuses on financial inclusion whereas FMCG focuses on rural development. Findings show that compliance is getting better, but there are still gaps in authenticity. This information can be used to establish policies for outcome-based reporting. Ethical data management makes things clear, and recommendations call for industry benchmarking and primary impact validation to give stakeholders more value.

**Keywords:** Corporate Social Responsibility (CSR), sustainability, Business Responsibility Reporting (BRR), Sustainable Development Goals (SDGs), India, impact assessment.

Manuscript for this abstract was submitted for internal review

## **An empirical study of ESG scores and stock price recovery**

Mayank Satra<sup>1\*</sup> and Rajalakshmi Anantraman<sup>1</sup>

*<sup>1</sup>Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [mayank.satra@somaiya.edu](mailto:mayank.satra@somaiya.edu)

### **Abstract:**

This paper examines the impact of environmental, social, and governance (ESG) scores on recovery of stock prices in the aftermath of the 2022 technology correction. We investigate the association between ESG ratings and drawdown recovery speed (across several horizons of 3, 6, 9, 12, 24, and 36 months) as well as the number of days to full recovery using firm-level drawdown data and percentage recoveries. The analysis merges descriptive estimates, correlation matrices and models with robust standard errors, and is complemented by survival techniques to adjust for right-censored data (i.e., individuals who have not recovered yet). Results suggest that companies with a better ESG profile improve faster and obtain higher recoveries, specifically the governance pillar is the most relevant. Less strong but still positive are the associations found with environmental and social scores. Furthermore, companies that were able to increase their ESG rating between 2020 and 2024 did recover faster while those who scored worse took longer to do so (although caution in interpreting causality is needed). These results imply that ESG performance, and in particular governance quality, might be a signal of resilience to investors when the market is experiencing stress. This investigation adds to a growing body of research in the area of ESG and financial performance, examining post-drawdown recovery dynamics, which has implications for portfolio managers, corporate executives, and policymakers. The limitations of the studies focus on industry level, sample size and possible endogeneity and suggested new lines of future investigation in cross-industry/macroeconomic regimes.

**Keywords:** ESG scores, ESG Pillars, governance, stock price recovery, drawdown resilience, Stock performance, sustainability and markets.

## **An analytical study of firm performance during corporate restructuring**

Megha Balu<sup>1\*</sup> and Rajalakshmi Anantharaman<sup>2</sup>

<sup>1</sup>*Department of Commerce and Business Studies, Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Department of Accounting and Finance, Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [megha.balu@somaiya.edu](mailto:megha.balu@somaiya.edu)

### **Abstract:**

Corporate restructuring has emerged as an important mechanism for regaining financial strength and operational stability of corporations in distress over a long period of time, especially in emerging economies like India. The existing literature largely focuses on post-restructuring outcomes, whereas there is a lack of systematic evidence on firm performance during the reconstruction era. This creates a knowledge gap regarding how profitability, investment behaviour and value creation evolve as restructuring is being practised actively. Here we demonstrate that corporate reconstruction is linked to high levels of heterogeneity in performance of the firms, which is symbolised by ongoing accounting losses, poor economic profit and uneven investment in fixed assets during the process of reconstruction. This paper utilises firm-level panel-based data of firms during the restructuring period to investigate profit after tax, economic profit (residual income), and investment in fixed assets, focusing solely on the reconstruction period to reflect contemporary performance processes. The results have contributed to value erosion and capital allocation behaviour in the process of restructuring, and they have significant implications for policymakers, lenders, and corporate managers to devise a better restructuring framework and monitoring mechanism.

**Keywords:** Corporate restructuring, firm performance, reconstruction period, economic profit (EVA), investment in fixed assets.

## **Privacy, trust, and inclusion: Understanding consumer willingness to share digital data for credit access**

Pranali Lokhande<sup>1\*</sup>, Sachin Acharekar<sup>1†</sup> and Aarti S. Nayak<sup>1†</sup>

*<sup>1</sup>Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [pranali.lokhande@somaiya.edu](mailto:pranali.lokhande@somaiya.edu)

### **Abstract:**

The rapid expansion of the fintech lending ecosystem promises to increase financial inclusion by integrating “credit invisible” consumers who lack traditional credit histories. These alternative credit scoring models often rely on the analysis of applicants’ digital footprints such as social media activity, device information and online behaviour. This research evaluates critical factors of the willingness of consumers to share digital footprints in exchange for credit access in emerging markets. Although alternative credit scoring using digital data offers vast opportunities for expanding financial inclusion, its execution entirely relies on the consent and data sharing of a consumer. This research examines how individuals approach the complex interchange between the benefits of improved access to credit and the risks involved such as misuse of data and invasion of privacy. The theoretical framework for this study states that data sharing decisions involve a mental calculation of benefits against potential costs. The study particularly explores how perceived benefits of data sharing, including access to previously inaccessible credit and more favourable loan terms, compete with perceived risks, such as data protection failures and illicit use of personal data. In addition to that, the research examines the critical moderating factors of institutional trust, confidence of lender’s competence, ethical standards and digital literacy to understand digital data practices. Through an extensive analysis of consumer attitudes and behavioural intentions, this study offers a valuable insight into the psychological process underlying data sharing decisions in high-risk financial situations. The findings offer significant implications for fintech companies to design transparent, secure systems and for policymakers seeking to create balanced regulatory frameworks that encourage both financial innovation and robust consumer protection in the digital lending ecosystem.

**Keywords:** Digital footprint, alternative credit scoring, willingness to share, financial inclusion, data privacy.

## **A study on balancing innovation and ethics: A human-centric framework for AI adoption in Human Resource Management**

Supriya Maurya<sup>1\*</sup> and Bharati Makhijani<sup>1</sup>

*<sup>1</sup>Department of Commerce and Business Studies, Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [supriya.maurya@somaiya.edu](mailto:supriya.maurya@somaiya.edu)

### **Abstract:**

More companies now use artificial intelligence when hiring people, judging their work, or deciding team setups - speed and numbers guide choices more than before. Still, depending too much on hidden formulas brings up questions about what is fair, who can see how results are made, whether private details stay safe, who answers for mistakes, and why gut feelings matter less in job choices. When machines start steering someone's path at work or shaping a whole company's future, doing things the right way matters more than ever. This research looks at scholarly articles from 2015 to 2025, focusing on moral concerns when using AI in human resources. Instead of just listing problems, Rooted in ideas about social systems, workplace equity, and how people accept new tools, it introduces the ETHIC-HR Framework- a way to build AI into HR work while keeping humans central. Rather than leaving choices to machines alone, the approach supports openness, broad participation, clear ownership, and ongoing human judgment.

**Keywords:** Artificial intelligence, ethical AI, Human Resource Management, human-centric HRM, algorithmic fairness, people analytics.

## **The impact of sustainability awareness, brand environmental responsibility, and peer influence on Gen Z's cosmetic purchase behaviour**

Anchal Shroff<sup>1\*</sup> and Aparna Jain<sup>1</sup>

*<sup>1</sup>Dr. Shantilal K Somaiya School of Commerce & Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: [anchal.shroff@somaiya.edu](mailto:anchal.shroff@somaiya.edu), [aparna.jain@somaiya.edu](mailto:aparna.jain@somaiya.edu)

### **Abstract:**

The rapid growth of the cosmetic industry in the digital era has been significantly influenced by changing consumer values and social dynamics, particularly among Generation Z. This study investigates the impact of three key factors: sustainability awareness, perceived environmental responsibility of brands, and peer influence on Gen Z's cosmetic purchase behaviour. With increasing global concern for environmental issues, sustainability awareness has emerged as a critical determinant of consumer decision-making. Similarly, the perceived environmental responsibility of cosmetic brands plays a vital role in shaping trust and loyalty, as Gen Z consumers are more inclined to support companies that demonstrate ethical and eco-friendly practices. Peer recommendations and social validation further amplify purchase intentions, given the strong reliance of Gen Z on digital communities and social networks for guidance. Using a structured questionnaire and quantitative analysis, this research explores the effects of these variables on purchase behaviour. The study contributes to understanding how ethical branding and social validation collectively shape Gen Z's cosmetic consumption in marketplaces.

**Keywords:** Generation Z, online cosmetic purchase behaviour, sustainability awareness, perceived value, peer influence, social validation, Structural Equation Modelling (SEM)

## Tracing global research on microfinance for financial inclusion: A bibliometric study

Sayali Nene<sup>1\*</sup> and Sachin Acharekar<sup>2</sup>

<sup>1</sup> *Department of Commerce and Business Studies, Dr. Shantilal K Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup> *Department of Accounting and Finance, Dr. Shantilal K. Somaiya School of Commerce and Business Studies, Somaiya Vidyavihar University, Mumbai*

Email: sayali.nene@somaiya.edu, sachin@somaiya.edu

### **Abstract:**

Microfinance has emerged as a key mechanism for strengthening financial inclusion by extending credit and basic financial services to underserved and low-income communities, particularly in developing economies. Over the last decade, global research in this area has expanded across themes such as access to credit, poverty reduction, women's empowerment, digital adoption, and institutional performance, highlighting the growing relevance of microfinance in inclusive development discourse. Despite the rising volume of publications, there remains limited consolidated evidence on how microfinance and financial inclusion research has evolved globally in terms of publication patterns, leading contributors, dominant themes, and emerging research directions. This study aims to map global research trends in microfinance and financial inclusion during 2015–2025 and identify major thematic clusters, keyword linkages, and emerging areas shaping future research. A bibliometric analysis was conducted using Scopus-indexed publications from 2015 to 2025, including a total of 556 documents. Network and overlay visualizations of co-occurring keywords were generated using VOS viewer to examine thematic relationships and shifts in research focus. The study identifies India as the leading country globally in research output, with the highest number of publications. Six thematic clusters were revealed: (1) Financial Systems, Credit Access & Banking; (2) Islamic Microfinance & Women Empowerment; (3) Innovation, Digital Transformation & Institutional Focus; (4) Poverty Alleviation & Social Development; (5) Performance Measurement & Policy Evaluation; and (6) Demographics, Inequality & Gender Inclusion. Recent trends indicate increasing focus on digital transformation, fintech integration, and women's empowerment as emerging themes. The findings provide a structured understanding of the evolution of microfinance research and highlight a clear shift towards digital inclusion and innovation, offering useful insights for scholars, policymakers, and practitioners working towards inclusive financial development.

**Keywords:** Microfinance, financial inclusion, bibliometric study, global research, trends



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## Exploring yoga-related adverse effects, injury prevention and injury management in yogic and ayurvedic scriptures

Prutha Bhatt <sup>1\*</sup> and Brijesh Singh<sup>1†</sup>

<sup>1</sup>K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai

Email: [prutha.ab@somaiya.edu](mailto:prutha.ab@somaiya.edu)

### Abstract:

With increased participation in Yoga over the last few decades, there has also been a rise in adverse effects and injuries related to Yoga. Contemporary literature and academic research highlight the issue and advocate for the prevention and management of such injuries. There is a body of scholarly research explaining Yoga-related injuries, their aetiology, mechanisms, and causes, as well as injury prevention (IP) and injury management (IM) strategies. However, there is a lack of scholarly discussion about the scriptural insights into this phenomenon. The paper aims to fill this gap by evaluating yoga-related adverse effects, their prevention, and their management through the scriptural lens. The classical texts on Yoga, such as the Pātañjala Yoga Darśana, the Bhagavad Gītā, the Upaniṣads, and some Haṭha yogic texts, present valuable insights into these adverse effects. Commentaries such as Vyāsa Bhāṣya, Bhoja vṛtti, Tattva Vaiśārādī, and PātañjalaVārtika, as well as texts like Yoga Rahasya and Satkarmasaṅgrahaḥ, highlight vital information that helps shape IP and IM strategies in real-world settings. Details from Āyurvedic texts, such as the Caraka Saṁhitā and the Aṣṭāṅga Hṛdaya, when combined with the Caturvyūha concept of Yoga, help develop a holistic framework for the phenomenon. This paper examines the phenomenon of Yoga-related adverse effects by delving into Yoga and Āyurvedic scriptures. It presents details that can be integrated with contemporary methods to develop safe, effective, and informed yoga practices for all.

**Keywords:** Injuries, Injury management, Injury prevention, Scriptural insights, Yoga-related adverse effects

Manuscript for this abstract was submitted for internal review

**डॉ० हुकमचन्द भारिल्ल विरचित 'वैराग्य' महाकाव्य में प्रतिपादित आदर्श नगर एवं नागरिकता का प्रतिपादन**

गुणवंती शाह

के. जे. सोमैया इंस्टीट्यूट ऑफ धर्मा स्टडीज़, सोमैया विद्याविहार विद्यापीठ, मुम्बई

Email: [gunvantiben.s@somaiya.edu](mailto:gunvantiben.s@somaiya.edu)

**सारांश**

वैराग्य महाकाव्य जैनधर्म के २२वें तीर्थंकर श्री नेमिनाथ के जीवनचरित पर आधारित अठारह अध्यायों का एक काव्यग्रन्थ है, जिसके रचयिता डॉ० हुकमचन्द भारिल्ल हैं। इस महाकाव्य में ऋतुवर्णन, नगरवर्णन, रात्रिवर्णन आदि के साथ काव्य के सभी तत्वों का समावेश हुआ है, मध्य-मध्य में मानवीयता के पोशक तत्वों का भी यथायोग्य प्रस्फुटन हुआ है। एक मनुष्य में मनुष्यता के लिए आवश्यक बातें और उसे आदर्श नागरिक बनाने में महत्वपूर्ण योगदान की चर्चा भी सामान्यतः पाई जाती है।

## **Narrative strategies and spatial storytelling: the seventeenth-century murals of the Śivakāmasundari shrine at Chidambaram**

Ramakrishnan Panchapakesan<sup>1</sup> and Pallavi Nalawade Jambhale<sup>2</sup>

<sup>1</sup> *Somaiya School of Design, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup> *K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

Email: [ramakrishnan.p@somaiya.edu](mailto:ramakrishnan.p@somaiya.edu)

### **Abstract:**

This study offers an in-depth analysis of the 17<sup>th</sup> century narrative murals at Goddess Shivagami's shrine in Chidambaram, highlighting their significance as overlooked yet vital expressions of South Indian visual storytelling. These murals provide a crucial lens for understanding the artistic and narrative traditions of the period. The research examines narrative techniques used by artists and the strategic placement of murals, highlighting architecture's role in shaping the visual storytelling experience. The analysis highlights the placement, composition, and visual sequencing of the murals, revealing how they guided viewers through intricate narratives on the walls and ceilings. This research highlights narrative methodologies, design, placement, and function of murals in South Indian temples, contributing to the broader study of Indian visual culture. However, the process of painting the mural or the comparison of visual depictions with textual sources is beyond the scope of this paper. This study employs a multidisciplinary research methodology to analyze the murals from both the temples under study, focusing on their spatial organization and narrative techniques. Field documentation will involve high-resolution photography, and observational analysis to record the composition, style, and condition of the murals. Architectural analysis will examine how the placement of these narratives within the mandapa influences the viewer's engagement, considering sightlines, movement patterns, and the relationship between murals and temple rituals. Comparative analysis will contextualize these murals within the broader corpus of paintings from other temples in the 17th century, identifying stylistic and narrative parallels with other Tamil temple murals. Additionally, thematic interpretation will explore the visual strategies used to simplify and structure the narrative for effective storytelling. By integrating these approaches, the study aims to deepen the understanding of how spatial dynamics and artistic techniques were employed to enhance the narrative experience in the temples.

**Keywords:** Visual storytelling; Narratology, Narrative modes, Temple murals, South Indian paintings

Manuscript for this abstract was submitted for internal review

## **Sustaining the sangha: contemporary challenge of seeking leadership for Buddhist women in robes**

Madhuri Kudwalkar<sup>1</sup> and Pallavi Nalawde-Jambhale<sup>1</sup>

<sup>1</sup> *K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

Email: kudwalkar.m@somaiya.edu, pallavi.n@somaiya.edu

### **Abstract:**

Shaving head, wearing robe, and taking an ordination; are these only the aspects of the path of Nibbana? Over the 25 centuries Prince of Kapilvastu, Siddharth was renounced all the worldly comforts and sensual desires to break the cycle of the re-birth, he not only just found the path of enlightenment but gave the insight of wisdom to find out Sukha over Dukkha. In the period of social orthodoxy The Buddha did face the challenges to choose this indistinct path. The Buddhist nuns accept this path to get peace and harmony, which is filled with thorns and bushes. The struggles of these clean-shaven headed women to establish their lost space in the patriarchal orthodoxy. They are seeking a good leadership to speak out their voices to the world of laity and to keep the Sangha alive. However, this study will also try to showcase the contemporary challenges in the monastic field. This paper focuses on understanding the challenges as well as to acknowledge the leadership qualities of monastic fields. So, a well-planned survey reveals the required qualities of a leader of the whole Sangha fraternity, who will be able to sustain the life of the Buddhist women's monasticism and protect the faithfulness of the laity towards the order. The quantitative and qualitative data from the Buddhist nuns through survey will be analysed and evaluated to gain the result. There are no such studies with a qualitative approach found in this research field so it will be an authentic and original study. The conclusions from this research will be helpful to select a strong leader for the betterment and sustainability of the Sangha. This leader will train the monastic women as well as sustain the Sangha. They will have the dual responsibility of continuing faith in laity and maintaining the peace and harmony in the Sangha.

**Keywords:** Women in robes, Leadership, Enlightenment, Contemporary challenges, Sustainability, Sangha

Manuscript for this abstract has been submitted for internal review

## The workings of 'Saddhā' in the theravada tradition

Sapna Iyengar

K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai

Email: [sapna.iyengar@somaiya.edu](mailto:sapna.iyengar@somaiya.edu)

### Abstract:

In the Pāli language the word 'Saddhā' means 'Faith'. However, in Buddhism it is not considered as blind faith. It is considered as faith in the qualities of the *Triratna* i.e. the Buddha, the *Dhamma* and the *Saṅgha*. *Dhamma* in Pāli can loosely be defined as *Dharma* of the Sanskrit language. However, it has a much wider meaning in Pāli which includes the relationship between *Nāma* (mind) and *Rūpa* (matter), the law of *Kamma* (cause) and *Vipāka* (effect), etc. The *Saṅgha* are the enlightened followers of the Buddha. 'Saddhā' is an essential quality of the mind required for attaining the ultimate goal in Buddhism i.e. *Nibbāna* i.e. freedom from the circle of birth and death. Though a reasonable amount of study is available on the topic of 'Saddhā' which speak about its definition, its various degrees and its importance, they do not layout a tangible implementation method for developing it or express its functional utilisation. Whereas, the studies do look into the various definitions and contexts in which the word appears, they lack to systematically demonstrate how one may identify in themselves whether the *Saddhā* they experience is blind faith or the mental state of one who has understood the *Triratna* properly and are following the proper path to *Nibbāna*. This study aims to streamline the degrees of *Saddhā* and their attainments from the initial faith in the *Triratna* upto the state of attaining *Nibbāna*. The study does not claim in any way to be comprehensive; however, it does wish to set the trend of studying concepts in Buddhism in a step-by-step manner for their practical application in daily life.

**Keywords:** Saddhā, Faith, Belief, Heravāda, Buddhism

## Swadhyay through dharma kathas – influence in shaping one’s emotions and lives

Jinit Ajmera<sup>1</sup> and S.P. Jain<sup>1</sup>

<sup>1</sup>Department of Jainology, K J Somaiya Institute of Dharma Studies,  
Somaiya Vidyavihar University, Mumbai

Email: [jinit.ajmera@somaiya.edu](mailto:jinit.ajmera@somaiya.edu)

### Abstract:

*Svādhyāya* as explained in Jain Texts is one of the 12 tapas. It is one of the intrinsic tapas. *Dharmakathā* – stories of dharma, is one out of the 5 types of *Svādhyāya*. Almost every household has a practice of telling stories to children where they derive some moral or inspiration from. *Dharmakathās* is an intrinsic part of this story telling. Knowingly or unknowingly, they play an important role in shaping one’s emotions and thus character and life. In this paper the study will explore how different emotions leading to various actions in a particular influence the emotions of the listener/reader’s mind. It will employ an interdisciplinary approach by studying the psychology of storytelling and narrative hermeneutics. The paper analyses the role of reflective storytelling from the scriptures in shaping an individual’s life through spiritual endeavour, character building and attribute development. This study outlines how *Dharmakathās* play an important role in one’s wellbeing, mindfulness and value-based decision making in difficult situations. This study suggests that inculcating *Dharmakathās* in pedagogy will enhance an individual's spiritual growth and social harmony.

**Keywords:** *Svādhyāya*, *Dharmakathā*, Psychology of storytelling, Narrative hermeneutics Pedagogy, Spiritual endeavour, Character building, Attribute development, Social harmony

## **Jain principles: A framework for nurturing student discipline and overall development**

Pinal Ajmera<sup>1\*</sup> and Shuddhatam Jain<sup>1</sup>

<sup>1</sup>K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University,  
Mumbai

Email: [pinal.ajmera@somaiya.edu](mailto:pinal.ajmera@somaiya.edu)

### **Abstract:**

Discipline is a key attribute in shaping one's life. Values instilled as students endure for a lifetime. Discipline is something which is indispensable as it contributes to focus, self-control, efficiency, time management and overall development of a student. In this context, this study aims to highlight the importance and integration of the Jain principles of *mana*, *vacana*, & *kāya samādhāraṇatā*, and *anuprekṣā* in the student curriculum for its relevance in nurturing self-regulation and discipline. The term *samādhāraṇatā* means conscious gathering and stabilization. In this context, it specifically means regulation of thoughts, speech and bodily activities. The term *anuprekṣā* means contemplation. The said principles are independent of any religion but still imbibe mindful self-restraint, and *samayaka* use of thought, speech, and action. The paper argues that a discipline framework should be integrated with such principles. The paper has adopted qualitative textual analysis along with hermeneutics interpretation of the specific passages from Jain *āgama* like Uttarādhyayana Sūtra. Commentaries and secondary sources having references to said principles as well as religious pedagogy, and psychology of discipline are referred for conceptualization. The paper introduces the concept and importance of student's discipline and the mentioned Jain principles, the literature review, research gap, methodology, and thereafter links *mana samādhāraṇatā* to focused attention and emotional regulation, *vacana samādhāraṇatā* to mindful and ethical communication, *kāya samādhāraṇatā* to bodily awareness and behaviour, and *anuprekṣā* to reflective analysis and judgement. The study further suggests mapping of these principles within the curriculum as value-based education and proposes practical classroom applications like brief silent reflection, guided attention exercises, reflective dialogue circles, and practices promoting bodily stillness and awareness. This practical application will work as a framework in overall discipline and development of the student. These findings will be insightful for educators, and curriculum designers seeking to incorporate ancient wisdom into contemporary education.

**Keywords:** Jain pedagogy, *Mana-Vacana-Kāya Samādhāraṇatā*, *Anuprekṣā*, Student discipline, Value-based education, Self-regulation

Manuscript for this abstract has been submitted for internal review

## Vālmīki: Analysis of character and contribution

Prachi Pathak

*K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

Email: [prachi@somaiya.edu](mailto:prachi@somaiya.edu)

### **Abstract:**

The general reference to Rāmāyaṇa in Sanskrit language popularly leads to specific reference to Vālmīki Rāmāyaṇa. Although there are multiple other Sanskrit narrations of Rāmakathā such as Adhyātma Rāmāyaṇa, Adbhuta Rāmāyaṇa, Ānanda Rāmāyaṇa, Tattvasārasaṅgraha Rāmāyaṇa etc., it is Vālmīki Rāmāyaṇa that adorns a special place in Sanskrit literature. This literary masterpiece is believed to be the first ever composed poetry in Sanskrit (Ādikāvya) and Vālmīki is considered as the first ever poet (Ādikavī) in Sanskrit literature. However, it is interesting to trace and analyze the character of Vālmīki, as his personality reflects in various shades through literature, both written and folk. The multiple references that give a variety of information about him as a person make this entire exercise worthy of analysis. Vālmīki's own composition describes him as a revered sage who was chosen by the Creator Lord Brahmā to compose the great epic Rāmāyaṇa to guide the humankind about ideals of life. On the other hand, there is a popular story of Vālmīki as being a robber that appears in some texts, which gives glimpses of his transformation from a thief to the spiritually enlightened sage. This paper attempts to trace these multiple references about Vālmīki and analyze his character as well as contribution to the epic in particular and religious mindset in general. It also tries to verify whether this was one single person or different people with the same name. The story of Vālmīki—across classical texts, Purāṇic accounts, and regional traditions—is not merely the tale of a sage who composed an epic. It is the chronicle of how culture reimagines virtue, authorship, and transformation across centuries. The multiplicity of narratives surrounding his life—from outlaw to saint, tribal to Brāhmaṇa, human to divine—attests not just to a historical evolution of belief systems but also to the power of literature to shape identity and moral imagination.

**Keywords:** Vālmīki Rāmāyaṇa, Vālmīki, Rāmakathā, Narrative of Rāma, Folk narratives

Manuscript for this abstract was submitted for internal review

## **Kapalbhati pranayama: comprehensive systematic review of mechanisms, health outcomes, and clinical applications**

Girish Nehete<sup>1,\*</sup> and Brijesh Singh<sup>1,†</sup>

<sup>1</sup>*K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

Email: [g.nehete@somaiya.edu](mailto:g.nehete@somaiya.edu)

### **Abstract:**

Pranayama are being studied for its impact on cardiopulmonary, metabolic, and psychological health, but the precise mechanisms and clinical applications remain poorly defined. Kapalbhathi Pranayama is a forceful exhalation technique used for cleansing of nasal tract and for mental clarity. No prior comprehensive review of research base has integrated the neurophysiological mechanisms, clinical outcomes, and safety profile of Kapalbhathi across diverse study designs and populations. Here we show, through a systematic review of the literature, that Kapalbhathi exerts measurable effects on cardiopulmonary, metabolic, and psycho-cognitive outcomes, with an overall favorable safety profile but important limitations in study quality and standardization. Detailed searches were conducted in seven databases: Google Scholar, Shodhganga, Web of Science, Scopus, Directory of Open Access Journals, JSTOR, and PubMed. All study types, from randomized controlled trials to observational studies and academic dissertations, were eligible. Database searches yielded 1,258 records; after removing duplicates (n=137), 1,121 unique records were screened, with 136 full-text reviewed, resulting in 79 studies included in the final analysis. Kapalbhathi improved pulmonary function indices such as forced expiratory volume in 1 second, forced vital capacity, and peak expiratory flow rate, and modulated autonomic nervous system activity as reflected by heart rate variability. The metabolic changes include reduction in Body Mass Index and circumference of waist. The cognitive changes showed improved attention and working memory. The safety profile was largely favorable, although generalizing is limited due to varied protocols, smaller sample sizes and some flaws in methodologies. Kapalbhathi Pranayama as an add-on intervention demonstrates promising outcomes, affecting cardiopulmonary, metabolic, and psycho-cognitive health parameters. Also, it can be integrated into preventive and therapeutic programs with cautions. Future research should address methodological gaps. To increase the clinical translation and know-how, the protocols should be standardized, larger trials need to be conducted, and extended follow-up periods are required.

**Keywords:** Kapalbhathi pranayama, Yogic breathing, Pulmonary function, Autonomic nervous system, Metabolic health, Cognitive function

Manuscript for this abstract was submitted for internal review

## **Navigating through local perceptions on the heritage of Nashik city**

Abhiruchi Oke

*K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University,  
Mumbai*

Email: [abhiruchi.o@somaiya.edu](mailto:abhiruchi.o@somaiya.edu)

### **Abstract:**

The study critically examines the dynamics of heritage awareness and cultural preservation among residents and stakeholders in Nashik, a city of profound historical and religious significance in Western India. Despite possessing remarkable monuments, heritage consciousness within local communities remains insufficiently cultivated, raising concerns about intergenerational knowledge transmission and sustainable preservation. This research employs a mixed-methods approach, combining structured surveys with semi-structured interviews to investigate local perceptions through teachers' group. This methodological triangulation facilitates an in-depth understanding of ground-level attitudes, allowing the researcher to capture nuanced perspectives that are often marginalized in conventional heritage discourse. A central contention of this study is that prevailing heritage management paradigms, predominantly state-driven and regulatory in orientation, frequently neglect local community perspectives and indigenous knowledge systems. Such top-down interventions risk obscuring historical narratives, contributing to the differential visibility of heritage sites, and inadvertently relegating significant monuments to public obscurity. Consequently, findings are anticipated to contribute practically to heritage studies by foregrounding the perceptions embedded within locals. This research seeks to illuminate the evolving socio-cultural significance of Nashik's heritage landscapes while proposing targeted interventions and community engagement frameworks designed to revitalize heritage awareness, foster collective stewardship, and bridge the disconnect between institutional preservation efforts and grassroots participation.

**Keywords:** Perceptions, Nashik, Locals, Heritage, Management

Manuscript for this abstract was submitted for internal review

## In search of the right beat

Cleo Cabral

*Department of Ancient Indian History, Culture and Archaeology,  
K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

Email: [cleo.cabral@somaiya.edu](mailto:cleo.cabral@somaiya.edu)

### **Abstract:**

*Ghumats* are musical instruments used as part of musical performances of folk communities in the Konkan from Mumbai to Goa. It's a pot shaped percussion instrument, which is open on both ends with one end covered with a sheet made of the skin of a monitor lizard. It is this skin that gives the *ghumat* its specific rhythm and sound. However in recent years the hunting of the monitor lizard has been curtailed by law, for environmental reasons, leading to decline in the availability and use of its skin. While the music continues, many rue the loss of the distinct sound that the monitor lizard skin provided. Experiments with other materials, such as goat skin, have given poor results in playing the *ghumat*. Without the specific skin, there is no distinctive sound of the *ghumat* which will lead to an eventual loss of a living tradition among the konkani communities. This research, aimed at documenting the use of the *ghumat* and creating archival footage, also proposes the use of a bio-engineered skin or synthetic skin that mimics the characteristics of the skin of the monitor lizard. Through the use of audio-video documentation and interviews with expert sound engineers and material engineers, the research shows why the use of the monitor lizard skin is essential to the playing of the *ghumat* and how this gap can be bridged with the help of material engineering. This will be one attempt to retain the *ghumat* in its near original design thereby preserving the tradition of playing the *ghumat* among the communities.

**Keywords:** *Ghuamt*, Konkani music, Folk traditions, Living heritage, Material-engineering

Manuscript for this abstract was submitted for internal review

## Jain ethical principles in contemporary education and leadership

Piyush Vasa

Department of Jainism, K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar  
University, Mumbai

Email: [piyush.vasa@somaiya.edu](mailto:piyush.vasa@somaiya.edu)

### **Abstract:**

Education and leadership studies increasingly examine ethical and value-based frameworks to address social and institutional challenges. Indian philosophical traditions provide sustained reflections on ethics and conduct but their systematic engagement within contemporary education and leadership theory remains limited. Jain ethical principles focus on non-violence, self-discipline, plurality of perspectives, and moral responsibility. These ideas are well established within philosophy but their application to modern ways of teaching and leadership contexts are not fully explored. A key gap lies in understanding how Jain ethical principles can be meaningfully integrated into contemporary education and leadership without religious point of view. This study shows the way core Jain concepts can be integrated in ethical learning and leadership practices via plural and secular settings. Current research shows that Jain philosophy offers a coherent ethical foundation for reflective education and responsible leadership. The study uses a qualitative and conceptual research design. It relies on close textual analysis of selected Jain canonical texts and ethical commentaries. These texts are examined alongside key ideas from educational theory and leadership studies. The analysis identifies three central contributions of Jain philosophy. First, *Ahimsa* which means conscious non harm, supports inclusive classrooms and ethically sensitive leadership. Second, *Anekāntavāda*, the principle of multiple perspectives, strengthens critical thinking and dialogical decision making. It encourages openness, humility, and intellectual restraint. Third, *Aparigraha*, or non-attachment, promotes ethical self-regulation and accountability in leadership roles. Based on these findings, the study proposes a conceptual framework for integrating Jain ethical principles into educational curriculum and leadership development programs. This framework emphasizes reflective pedagogy, ethical awareness, and context se

nsitive leadership formation. The study demonstrates that Jain wisdom can enrich contemporary education and leadership by offering philosophically based ethical guidance. These insights contribute to value-based education research and suggest directions for future interdisciplinary studies on ethics and leadership.

**Keywords:** Jain philosophy, Value-based education, Ethical leadership, *Ahimsa*, *Anekāntavāda*, *Aparigraha*

Manuscript for this abstract was submitted for internal review

## Beyond Āsana: recovering bhakti in yoga studies

Sudha Sunil

*K J Somaiya Institute of Dharma Studies, Somaiya Vidyavihar University, Mumbai*

[Email: sudha.s@somaiya.edu](mailto:sudha.s@somaiya.edu)

### **Abstract:**

My doctoral research project examines the curious case of missing bhakti as a subject of serious research enquiry in contemporary yoga studies, a field that primarily emerged in Western academia and has an expanding influence in Indian yoga studies. Classical foundational texts such as Patañjali's Yogasūtras, the Bhagavad Gītā, and the Bhāgavata Purāṇa place bhakti at the centre of the yoga path, establishing it as both method and goal, alongside Karma and Jñāna Yoga, rather than as an adjunct practice. These are foundational texts in the Indian tradition, yet within contemporary yoga teachings, the question of bhakti as yoga is largely nonexistent. The prevailing trend in contemporary yoga studies focuses extensively on what scholars call the 'postural yoga paradigm.' Western scholarship tends to separate bhakti from yoga entirely, framing bhakti as emotion or affect but rarely as disciplined sādhanā. Research concentrates on āsanās, their biomedical outcomes, and therapy-based applications. This is not a wrong perspective, but an incomplete one. My research project adopts a qualitative, toolbox approach that selectively draws on interdisciplinary and multidisciplinary scholarship in yoga studies, religious studies, and cultural analysis. It combines textual analysis of key passages from the Bhagavad Gītā, Patañjali Yogasūtras, and Bhāgavata Purāṇa, with comparative institutional examination of three contemporary yoga communities: ISKCON, Kaivalyadhama, and the Ramakrishna Mission. When we study yoga without studying bhakti, we study a construct that does not match historical or contemporary reality. Rather than treating bhakti as a belief or an emotion, the study recognises it as a structured, lived practice grounded in institutional culture. This study thus fills a crucial scholarly gap in redefining how yoga is studied in a global context.

**Keywords:** Translational yoga, Bhakti, Bhāgavata Purāṇa, Bhagavad gītā, Patañjali yogasūtras, Cultural translation

Manuscript for this abstract was submitted for internal review

## जैविक-चेतना एवं पर्यावरणीय-नैतिकता: 'पण्णवणासुत्तं' ग्रंथ के परिप्रेक्ष्य में

बरखा जैन

के.जे.सोमैया इंस्टीट्यूट ऑफ़ धर्म स्टडीज, सोमैया विद्याविहार विद्यापीठ, मुंबई

Email: [barkha.j@somaiya.edu](mailto:barkha.j@somaiya.edu)

### सारांश

प्रस्तुत शोध-अध्ययन जैन आगम साहित्य के महत्त्वपूर्ण ग्रंथ 'पण्णवणासुत्तं' के संदर्भ में जैविक-चेतना एवं पर्यावरणीय-नैतिकता की अवधारणा का दार्शनिक और नैतिक विश्लेषण करता है। आधुनिक औद्योगिक और तकनीकी विकास के परिणामस्वरूप मानव-प्रकृति संबंध उपभोक्तावादी दृष्टिकोण से प्रभावित हुआ है, जिसके कारण जलवायु परिवर्तन, प्रदूषण, वनों की कटाई तथा जैव-विविधता ह्रास जैसे गंभीर पर्यावरणीय संकट उत्पन्न हुए हैं। ऐसे समय में समस्त जीवों के प्रति नैतिक उत्तरदायित्व पर आधारित दर्शन की पुनर्व्याख्या अत्यंत आवश्यक हो गई है। 'पण्णवणासुत्तं' जीवन को केवल भौतिक या जैविक प्रक्रिया न मानकर चेतना-युक्त आत्मतत्त्व के रूप में स्वीकार करता है। जैन दर्शन के अनुसार चेतना मनुष्य तक सीमित न होकर सूक्ष्म जीवों, वनस्पतियों तथा पृथ्वी, जल, अग्नि और वायु जैसे स्थावर तत्वों में भी विद्यमान है। ग्रंथ में जीवों का स्थावर और त्रस के रूप में वर्गीकरण पर्यावरण को एक जीवंत, परस्पर-निर्भर तंत्र के रूप में प्रस्तुत करता है। शोध यह प्रतिपादित करता है कि जैन दर्शन का मूल सिद्धांत "परस्परपग्रहो जीवानाम्" पर्यावरणीय-नैतिकता की आधारशिला है, जहाँ अहिंसा, करुणा, संयम और अपरिग्रह को समस्त जीव-जगत तक विस्तारित किया गया है। गुणात्मक एवं व्याख्यात्मक पद्धति पर आधारित यह अध्ययन दर्शाता है कि 'पण्णवणासुत्तं' में निहित चेतना-आधारित जीवन-दृष्टि न केवल आध्यात्मिक उन्नति का मार्ग प्रशस्त करती है, बल्कि समकालीन पर्यावरणीय संकटों के समाधान हेतु एक समग्र, नैतिक और स्थायी दृष्टिकोण भी प्रदान करती है।

**Keywords:** जैविक-चेतना, पर्यावरणीय-नैतिकता, पण्णवणासुत्तं, जैन आगम साहित्य, अहिंसा, परस्परपग्रहो जीवानाम्, पारिस्थितिक संकट

## प्राकृत जैनागमों की स्वाध्याय पद्धति और Indian Knowledge System (IKS): आधुनिक शिक्षण शास्त्र के संदर्भ में एक विश्लेषणात्मक अध्ययन

अल्पा वसा<sup>1</sup> और अरिहंतकुमार जैन<sup>1</sup>

<sup>1</sup>के.जे.सोमैया इंस्टीट्यूट ऑफ धर्म स्टडीज, सोमैया विद्याविहार विद्यापीठ, मुंबई

Email: [alpa.vasa@somaiya.edu](mailto:alpa.vasa@somaiya.edu)

### सारांश

प्राकृत जैनागम केवल धार्मिक ग्रंथ नहीं हैं, बल्कि वे प्राचीन भारतीय ज्ञान-विज्ञान और मनोविज्ञान के अक्षय कोष हैं, जो जीवन जीने की कला और आत्म-विकास का मार्ग प्रशस्त करते हैं। इन आगमों में वर्णित 'स्वाध्याय' की प्रक्रिया एक वैज्ञानिक पद्धति है, जो सूचना (Information) को प्रज्ञा (Wisdom) में रूपांतरित करने की सामर्थ्य रखती है। राष्ट्रीय शिक्षा नीति 2020 (NEP 2020) भारतीय शिक्षा व्यवस्था में एक ऐतिहासिक परिवर्तन का दस्तावेज़ है। इस नीति का प्रमुख लक्ष्य भारतीय ज्ञान परंपरा (Indian Knowledge System - IKS) को आधुनिक शिक्षा प्रणाली के साथ समन्वित करना है। NEP 2020 में IKS को केवल एक विषय के रूप में नहीं, बल्कि संपूर्ण शिक्षा नीति के एक "केंद्रीय स्तंभ" और "मार्गदर्शक सिद्धांत" के रूप में स्थापित किया गया है। इसका मुख्य उद्देश्य छात्रों को अपनी सांस्कृतिक जड़ों से जोड़ते हुए उन्हें आधुनिक वैश्विक चुनौतियों के लिए तैयार करना है। जैनागमों में स्वाध्याय के पाँच भेद बताए गए हैं—वांचना, पृच्छना, अनुप्रेक्षा, आम्राय और धर्मोपदेश। वहीं NEP 2020 के अध्याय 4.27 में IKS को "भारत का ज्ञान" कहकर उसकी शैक्षिक महत्ता को रेखांकित किया गया है। प्रस्तुत Poster Presentation का मुख्य उद्देश्य विश्लेषणात्मक पद्धति का उपयोग करते हुए जैनागमों में वर्णित 'पंचविध स्वाध्याय' की प्राचीन शिक्षण पद्धति तथा NEP 2020 के अंतर्गत IKS आधारित 'समग्र शिक्षा' (Holistic Education) में उसकी प्रासंगिकता को स्पष्ट करना है। यह अध्ययन इस निष्कर्ष पर पहुँचता है कि यदि इन प्राचीन शिक्षण विधियों को आधुनिक कक्षा-कक्ष शिक्षण में समाविष्ट किया जाए, तो वे न केवल विद्यार्थियों के बौद्धिक विकास में सहायक होंगी, बल्कि उनमें आत्म-अनुशासन, नैतिक मूल्यों और चेतनात्मक विकास का भी बीजारोपण करेंगी।



## Abstracts: Engineering-Computer Engineering

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## **VDF-PoS: Design, analysis, and experimental evaluation of fork rates in trustless hybrid consensus**

Abhijeet Pasi<sup>1\*</sup>, Irfan N A Siddavatam<sup>2</sup>, and Ashwini Dalvi<sup>2</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Department of Information Technology, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [abhijeet.pasi@somaiya.edu](mailto:abhijeet.pasi@somaiya.edu)

### **Abstract:**

Consensus protocols form the core of any decentralised ledger system, since they have to balance three competing demands: scalability, security, and decentralisation. PoET is an energy-efficient consensus that leverages TEEs to handle leader election. However, in practice, it suffers from important challenges. First, the protocol relies on specific, homogeneous hardware, which introduces centralisation risks. The protocol is also vulnerable to high fork rates, rendering the network inconsistent. To overcome these disadvantages, this paper proposes a novel hybrid consensus protocol that incorporates VDFs with a PoS framework. The core contribution of this paper is a modified VDF-based leader election mechanism that introduces a logarithmic damping factor, weighted by participant stake. This design controls the frequency of participation of leaders and reduces the dominating behavior of whales. Most importantly, it eliminates the reliance on trusted hardware by enforcing a leader selection delay with the use of pure, verifiable sequential computation. We develop a formal model of the above protocol in a partially synchronous network setting, taking into account heterogeneous participants and adversaries with bounded computational power. From this model, we obtain provable safety and liveness guarantees that rely on maintaining an honest majority of the total staked value and the inherent sequentiality of the VDF. Performance: this protocol is evaluated using large-scale network simulations with up to 5,000 nodes. Empirical results show a 60% fork probability reduction compared against a baseline PoET model. Moreover, by maintaining a much more significant difference in reward between honest and attacked chains, the economic cost an adversary must pay in order to successfully perform a Byzantine attack is likely to increase by some 50%, since the attack now has to overcome not only the cryptographic delay barrier but also the staking economic barrier. In a word, the results show that cryptographic delay techniques, in combination with stake-based economic incentives, form an effective coordination primitive for consensus, reducing critical dependencies on trusted hardware and enabling more resilient and provably secure decentralised system designs.

**Keywords:** Byzantine fault tolerance, economic security, leader election, Proof of Elapsed Time (PoET), Proof of Stake (PoS), Verifiable Delay Functions (VDFs)

# Ship detection with scattering parameters from dual-polarization Sentinel-1 SAR data

Darshan Mhapasekar<sup>1\*</sup> and Jyoti Joglekar<sup>1†</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [d.mhapasekar@somaiya.edu](mailto:d.mhapasekar@somaiya.edu), [jyoti.joglekar@somaiya.edu](mailto:jyoti.joglekar@somaiya.edu)

## **Abstract:**

Ship detection in synthetic aperture radar (SAR) imagery is a critical task for maritime surveillance, security, and environmental monitoring. The availability of dual-polarization (dual-pol) Sentinel-1 SAR data with VV and VH channels has opened new opportunities for improved ship discrimination through exploitation of polarimetric scattering characteristics. This paper presents a comprehensive investigation of ship detection methods using scattering parameters derived from dual-pol Sentinel-1 data. We review the state-of-the-art approaches that leverage polarimetric features, including intensity ratios, eigen-based descriptors, and decomposition components, to enhance target-to-clutter discrimination. The study examines traditional statistical detectors (CFAR, polarimetric notch filters) Key challenges such as sea clutter suppression, false alarm reduction in nearshore environments, and small vessel detection are addressed through adaptive dual-pol feature fusion strategies. Experimental results on Sentinel-1 datasets demonstrate that dual-pol methods achieve average precision (AP) of 93-94% and significantly outperform single-polarization approaches, particularly for small and weakly scattering targets.

**Keywords:** Ship detection, Sentinel-1, dual-polarization SAR, scattering parameters, polarimetric features, maritime surveillance

## PM2.5 forecasting for Mumbai using time-series analysis

Jaya Jeswani<sup>1\*</sup> and Prasanna shete<sup>1†</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [jaya.jeswani@somaiya.edu](mailto:jaya.jeswani@somaiya.edu)

### **Abstract:**

PM2.5 assessment and forecasting are important for understanding pollution conditions in urban areas and for supporting environmental management. Large metropolitan cities often face challenges related to fluctuating air quality levels. Mumbai, being one of the most populated cities in India, experiences variations in air quality due to traffic movement, industrial activities, and changing weather conditions. However, air quality datasets collected from monitoring stations frequently contain missing or inconsistent values because of sensor issues and irregular data recording. Due to the presence of incomplete and irregular data, conventional air quality forecasting methods may not perform effectively on real-world urban datasets. In this study, a general forecasting framework is developed to address missing data issues and perform PM2.5 prediction for Mumbai. The approach involves basic data reconstruction techniques to handle missing values, followed by time-series modeling to capture temporal trends in air quality data. Publicly available air quality datasets for Mumbai are used to evaluate the framework. The results indicate that the processed dataset enables stable PM2.5 prediction and supports trend analysis over time. This work demonstrates that appropriate data handling combined with time-series analysis can support practical air quality forecasting for metropolitan cities like Mumbai.

**Keywords:** Particulate matter, missing data handling, time-series analysis, air pollution, urban environment

## **Inclusive mathematics education for visually impaired individuals: issues, challenges and future directions**

Kirti Mishra<sup>1\*</sup> and Prasanna Shete<sup>1†</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [kirti.dm@somaiya.edu](mailto:kirti.dm@somaiya.edu), [prasannashete@somaiya.edu](mailto:prasannashete@somaiya.edu)

### **Abstract:**

Digital learning environments increasingly rely on electronic documents, making accessibility a critical requirement for achieving inclusive education for learners with visual impairments. While assistive technologies are commonly employed to facilitate access to textual information, ensuring equitable access to all forms of academic content continues to be a significant challenge. Mathematical content is particularly problematic because it depends on symbolic notation, hierarchical organization, and spatial relationships that are primarily communicated through visual layouts. When such content appears in digital documents, conventional accessibility tools often linearize it, which can fail to preserve the underlying structure and semantic meaning of mathematical expressions. Despite increasing recognition of these limitations, there remains limited understanding of how digital mathematical content can be represented in a generalized manner that maintains semantic relationships while remaining compatible with non-visual access methods. In this context, this study shows that generalized, structure-oriented representations can enhance the clarity and interpretability of mathematical expressions when accessed through assistive technologies. By underscoring the importance of semantic preservation in accessible mathematical content, this work informs future research and development efforts aimed at advancing inclusive digital learning systems and promoting equitable access to mathematics-intensive educational materials.

**Keywords:** Digital accessibility, mathematical content, assistive technologies, semantic representation, inclusive education

## Intelligent model for early identification of Dysgraphia: a deep learning perspective

Nisha Vanjari<sup>1,2\*</sup> and Prasanna Shete<sup>2</sup>

<sup>1</sup> *Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup> *Department of Computer Engineering, K J Somaiya Institute of Technology, Somaiya Vidyavihar, Mumbai*

Email: [nvanjari@somaiya.edu](mailto:nvanjari@somaiya.edu), [prasannashete@somaiya.edu](mailto:prasannashete@somaiya.edu)

### **Abstract:**

In 21<sup>st</sup> century, disability, accessibility, and inclusion are significant dimensions of global health and educational research. Artificial Intelligence in assistive technology has transformed education and healthcare. It can benefit with learning disabilities such as dysgraphia. Dysgraphia affects fine motor coordination and written expression. It is also called as learning-related writing disorder. This research purposes to develop smart assistive system for early detection of dysgraphia. A CNN model tunned with hyper parameter is designed to categorize handwriting data samples based on their unique spatial features. The proposed system is trained on available handwriting dataset. It is segmented handwritten alphabets from scanned written paragraphs images and it has three categories namely normal handwriting, corrected handwriting, and dysgraphic handwriting samples. Irregular stroke width, angular deviations, and spacing variations are the handwriting abnormalities and have been captured by the custom CNN model. The competence of the CNN model has been predictable with 88% accuracy. This study reveals the deep learning techniques benefit and can be applied to make comprehensible analytical tools that give instructors and therapists early evidence-based direction. By supporting early detection and observing to global initiatives on accessibility and cognitive health, the developed system indorses inclusive education.

**Keywords:** Dysgraphia, deep learning, CNN, assistive system, early detection, accessibility

# Multi-method implementation and evaluation of air quality data imputation: a case study on urban sensor datasets using traditional, machine learning, and hybrid approaches

Poonam Bhogle<sup>1\*</sup> and Manish Potey<sup>1\*</sup>

<sup>1</sup>Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai

Email: [poonambhogale@somaiya.edu](mailto:poonambhogale@somaiya.edu), [manishpotey@somaiya.edu](mailto:manishpotey@somaiya.edu)

## Abstract:

Reliable air quality data is essential for formulating effective environmental policies and safeguarding public health. However, as sensor-based environmental monitoring systems become more prevalent, the integrity of collected data is often compromised by missing values due to sensor malfunctions or transmission errors. This study presents a comprehensive implementation and evaluation of 18 imputation techniques to address missing data in air quality datasets from urban cities. The imputation workflow begins with a detailed characterization of missingness patterns categorized as MCAR, MAR, or MNAR along with identifying missing data percentage which helps guide the selection of suitable techniques and improves the effectiveness of the imputation process. The methods span traditional and deterministic approach, Machine Learning based methods and hybrid ensemble based methods. Real-world air quality data from various monitoring stations across Mumbai and Navi Mumbai, Pune and Bangalore sourced from the Maharashtra Pollution Control Board (MPCB) and Central Pollution Control Board (CPCB) was used for experimentation. Each method was assessed using standard performance metrics MSE, RMSE, MAE, and  $R^2$ . Results demonstrate that hybrid and ensemble-based methods consistently outperform traditional techniques, with the XGBoost-stacked model achieving the highest accuracy and robustness across all monitoring stations.

**Keywords:** MCAR, MNAR, MAR, MSE, RMSE, MAE and  $R^2$

# An AI-based multi-model imputation framework for water quality reconstruction and disease risk analysis

Rohini Nair<sup>1\*</sup> and Manish Potey<sup>1\*</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: rohininair@somaiya.edu, manishpotey@somaiya.edu

## **Abstract:**

Accuracy in assessing water quality is critical and depends on the availability of complete and reliable environmental datasets. However, water quality datasets are often inconsistent due to noise, human errors, sensor failures, and sampling constraints, which motivates the need to investigate robust imputation techniques. This study implements and evaluates a range of imputation methods, including statistical approaches (mean, median, and linear interpolation), machine learning models (K-Nearest Neighbour, Random Forest, XGBoost, MICE, Autoencoder, and MissForest), and newly proposed hybrid and ensemble strategies integrating sequential and performance-based combinations. The analysis is conducted on water quality data collected from multiple locations over the period 2010–2024, comprising key parameters such as pH, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), nitrates, and fecal coliform. Imputation performance is evaluated using metrics including MAE, RMSE, MAPE, and  $R^2$  to assess real-world applicability for AI-ML-based modeling. The reconstructed WQI data are further utilized to support waterborne disease risk mapping based on established parameter-health associations, with particular relevance to diseases such as gastroenteritis, cholera, diarrheal infections, and typhoid. The findings indicate that advanced machine learning and hybrid imputation methods outperform conventional statistical techniques, leading to improved reliability of reconstructed water quality data. Variations in DO, nitrates, BOD, and fecal coliform exhibit strong associations with waterborne disease risk, highlighting their epidemiological significance. Overall, the study demonstrates that robust imputation combined with AI-based water quality analysis enhances environmental and public health assessment, offering a scalable framework for regions with incomplete or unreliable water quality monitoring systems.

**Keywords:** Water quality index (WQI), missing data imputation, machine learning-based imputation, hybrid and ensemble methods, waterborne disease risk assessment

Manuscript for this abstract was submitted for internal review

## Quantitative evaluation of trustworthy artificial intelligence systems

Ahlam Ansari<sup>1\*</sup> and Deepak Sharma<sup>1†</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [ahlam.ansari@somaiya.edu](mailto:ahlam.ansari@somaiya.edu), [deepaksharma@somaiya.edu](mailto:deepaksharma@somaiya.edu)

### **Abstract:**

Artificial Intelligence (AI) has become a core technology in safety-critical and socially sensitive domains such as healthcare, finance, governance, and legal decision-making, where system reliability, fairness, and accountability are essential for societal acceptance. Although recent research has introduced principles for Trustworthy AI, viz rationality, responsibility, transparency, and ethics; most existing evaluation practices remain performance-centric, relying primarily on predictive accuracy and offering limited insight into broader trustworthiness attributes. AI models currently lack quantitative, and a model-agnostic system that can holistically measure AI trustworthiness across various models in a comparable manner. Here, we show that AI trustworthiness can be systematically quantified by integrating multiple ethical and technical dimensions into a single, interpretable Trustworthiness Score (TWS) using a Multi-Criteria Decision Making (MCDM) approach. We operationalize four foundational trust dimensions i.e. Rationality (predictive correctness), Responsibility (robustness to perturbations), Transparency (model explainability), and Ethics (fairness across classes) and evaluate six representative AI models, including traditional machine learning algorithms, neural networks, ensemble methods, fuzzy logic systems, and a transformer-based language model (GPT-2). The framework is empirically validated on datasets such as Iris, Wine Quality, and Handwritten Digits. Results indicate that models balancing interpretability, robustness, and fairness consistently achieve higher trustworthiness scores than black-box models, despite comparable accuracy. These findings demonstrate that trustworthiness extends beyond predictive performance and provide a scalable, explainability-oriented foundation for ethical AI deployment, regulatory assessment, and future trustworthy AI research.

**Keywords:** Trustworthy AI, explainable AI, Multi-Criteria Decision Making, AI ethics, robustness, transparency

## Comparative analysis of QAOA and Dijkstra's algorithms

Kalpita Wagaskar<sup>1\*</sup> and Bhakti Palkar<sup>1</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [kalpita.w@somaiya.edu](mailto:kalpita.w@somaiya.edu)

### **Abstract:**

This paper presents a comparative study of classical and a quantum algorithm. Here the Quantum Approximate Optimization Algorithm (QAOA) is used to address the Traveling Salesman Problem (TSP). Dijkstra's algorithm computes precise distance matrices, while QAOA leverages quantum superposition and entanglement to explore multiple routes efficiently. Implemented as a web-based application using Flask, Mapbox GL JS, and Qiskit, the system demonstrates reduced computation time and improved scalability compared to classical methods used in this paper. Results indicate QAOA achieves up to faster execution for problems with five or more nodes, enhancing logistics efficiency in applications like e-commerce and smart city planning. The results obtained show that Quantum Approximate Optimization Algorithm also takes less time to reach the destination in the simulation performed as compared to the classical approach.

**Keywords:** QAOA, Dijkstra's algorithm, travelling salesman problem

## Intelligent edge data processing with EdgeX Foundry for real-time anomaly detection and forecasting in IoT applications

Vaishali Desai<sup>1\*</sup> and Prasanna Shete<sup>1</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [vaishali.desai@somaiya.edu](mailto:vaishali.desai@somaiya.edu)

### **Abstract:**

Edge computing helps address the delays, limited data capacity, and growth challenges of traditional cloud systems when handling the increasing volume of data from Internet of Things (IoT) devices. New developments show that edge platforms can process data in real time, close to where it is generated. However, adding advanced data analysis and storage that can scale easily remains a significant challenge for edge systems. Not many real-world solutions connect flexible edge data management with machine learning (ML) to predict trends and detect unusual patterns. This study presents a smart edge data processing system built on EdgeX Foundry, an open-source edge computing platform that uses small, independent services and supports many types of devices. The system pulls in real-time data from public sources and test devices, uses Long Short-Term Memory networks to predict future data, and identifies anomalous data using Isolation Forest algorithms. Influx DB stores long-term data, and Grafana dashboards display live views of sensor data, predictions, and detected problems. Tests show that this setup delivers smart, fast, and flexible edge data analysis. The system also makes it easy to add custom ML tools beyond what EdgeX normally offers. These results show the value of using EdgeX Foundry with special ML models and time-based databases to support early monitoring and better decisions. This method helps build smarter edge computing systems and is useful for areas such as smart cities, industrial IoT, and environmental monitoring, laying the groundwork for future research on real-time, sustainable edge intelligence.

**Keywords:** Edge computing, EdgeX Foundry, IoT, machine learning, anomaly detection, time series forecasting

## Artificial intelligence framework for predicting optimal growth conditions of ayurvedic plants

Viki Patil<sup>1\*</sup> and Manish Potey<sup>1</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [viki.patil@somaiya.edu](mailto:viki.patil@somaiya.edu)

### **Abstract:**

The growth and therapeutic quality of Ayurvedic plants are highly dependent on precise environmental and soil conditions. Conventional cultivation practices largely rely on manual observation and experience, which may result in inconsistent yield and plant quality. To address this limitation, this paper presents a sensor-driven Artificial Intelligence (AI) framework for predicting optimal growth conditions for Ayurvedic plants by systematically collecting and analyzing multimodal sensory data. A low-cost, integrated hardware system will be designed and developed to acquire real-time environmental, soil, and visual information. The proposed device incorporates temperature and humidity sensors, a soil moisture sensor, a light-dependent resistor (LDR) module for measuring sunlight intensity, and a camera module to capture plant growth stages. All sensory inputs are time-synchronized to enable accurate correlation between environmental parameters and plant development. The study initially focuses on *Ocimum tenuiflorum* (Tulsi) and is further extended to *Aloe vera* as representative Ayurvedic plants. A robust preprocessing pipeline will be developed to handle heterogeneous data modalities, including noise reduction, normalization, and temporal alignment. The processed dataset will be used to construct and validate a multimodal deep-learning model capable of learning complex relationships between environmental conditions and plant growth patterns, including variations in plant height derived from image frames. Real-world validation will be conducted in both controlled and semi-field environments to evaluate the system's performance and practical applicability. The results will demonstrate that the proposed multimodal AI framework can effectively identify optimal growth conditions and support data-driven decision-making for precision cultivation of Ayurvedic plants. This work highlights the potential of combining low-cost sensing hardware with advanced AI techniques to enable scalable and intelligent agricultural monitoring systems.

**Keywords:** Ayurvedic plants, multimodal sensing, environmental monitoring, IoT-based agriculture, deep learning, sensor fusion, precision cultivation, plant growth prediction

## **A systematic review of Enterprise Security Operations Centres: Technical challenges, limitations, and future directions in cloud era**

Zaheed Shaikh<sup>1\*</sup> and Deepak Sharma<sup>1</sup>

<sup>1</sup>*Department of Computer Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [zaheedshaikh@somaiya.edu](mailto:zaheedshaikh@somaiya.edu), [deepaksharma@somaiya.edu](mailto:deepaksharma@somaiya.edu)

### **Abstract:**

Security Operations Centres (SOCs) have become essential components of modern cybersecurity programs as organizations increasingly rely on complex, distributed, and cloud-integrated digital infrastructures. SOCs are responsible for continuous threat monitoring, event analysis, and incident response, yet their effectiveness is challenged by rapidly evolving attack vectors, overwhelming data volumes, and the "alert fatigue" caused by inconsistent log normalization and the need for real-time operational decision-making. Existing enterprise SOCs commonly face technical issues such as inconsistent log normalization, alert overload, limited automation maturity, and brittle integrations between Security Information and Event Management (SIEM), Security Orchestration, Automation and Response (SOAR), and endpoint detection tools. Although prior studies address individual SOC components and practices, the literature lacks a unified and technically grounded synthesis of how these challenges collectively impact SOC performance across diverse enterprise environments. This review examines the current state of SOC implementations by systematically analysing academic research, industry reports, SOC maturity models, and cloud-security frameworks. Through a structured taxonomy focusing on detection pipelines, interoperability, cloud scalability, and automation workflows, the review identifies the most recurrent technical bottlenecks affecting SOC efficiency. Key findings reveal that enterprise SOCs struggle with high false-positive rates, limited cross-platform visibility in hybrid and multi-cloud environments, latency in automated orchestration, and difficulty maintaining consistent detection logic at scale. Furthermore, the absence of standardized data schemas, fragmented tool ecosystems, and insufficient integration of threat intelligence feeds further constrain SOC responsiveness. These insights demonstrate that addressing these challenges requires rethinking of the SOC design around cloud-native principles, standardized telemetry models, deeply interoperable SIEM-SOAR architectures, and automation-driven response strategies. The review concludes by outlining critical design requirements and research directions that can guide the development of more scalable, adaptive, and resilient SOC frameworks capable of supporting real-time security operations in increasingly dynamic enterprise environments.

**Keywords:** Enterprise SOC challenges, SIEM/SOAR, threat visibility, alert fatigue and correlation, automation workflows, cloud-native security, human-in-the-loop

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## **Performance analysis of analog and digital Beamforming techniques for 5G and mmWave communication system**

Heena Singh<sup>1\*</sup> and Makarand Kulkarni<sup>1†</sup>

*<sup>1</sup>Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [heena.singh@somaiya.edu](mailto:heena.singh@somaiya.edu)

### **Abstract:**

The rise of data-heavy applications and the shift to 5G and beyond have created a strong need for fast, efficient, and reliable communication. Beamforming plays a vital role by improving signal quality, boosting capacity, and minimizing interference. This paper compares Analog Beamforming (ABF) and Digital Beamforming (DBF) in Uniform Linear Array (ULA) and MIMO setups under realistic 5G and mmWave conditions. MATLAB simulations evaluate their performance using parameters like beamwidth, radiated power, and interference suppression. Results show ABF is simple and hardware-efficient but limited to single-beam transmission, while DBF supports multiple, narrow, and flexible beams. Hybrid Beamforming (HBF) strikes a balance between performance and cost. Overall, DBF in MIMO offers the most effective solution for future wireless networks.

**Keywords:** Massive MIMO, millimeter wave (mmWave), non-orthogonal multiple access (NOMA), 5G wireless communication

## **A transformer-based multivariate decomposition approach for cross-frequency LiDAR synchronization**

Iftekar Patel<sup>1\*</sup>, Makarand Kulkarni<sup>1†</sup> and Ninad Mehendale<sup>1†</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [iftekar.p@somaiya.edu](mailto:iftekar.p@somaiya.edu)

### **Abstract:**

Safe and independent navigation for visually impaired individuals remains a critical challenge, with modern assistive systems increasingly adopting multi-sensor fusion to enhance spatial awareness and obstacle detection. A major limitation lies in synchronizing heterogeneous LiDAR sensors operating at disparate frequencies, such as high-frequency 1D LiDAR (100 Hz) and low-frequency 2D LiDAR (6 Hz). Conventional synchronization methods, including interpolation and hardware-based approaches, often fail to cope with nonlinear noise, dynamic fluctuations, and real-time constraints in wearable devices. To address these issues, this paper proposes a Multivariate Decomposed Synchronization Transformer (DeSynTran) framework that accurately predicts 1D LiDAR readings aligned with 2D LiDAR timestamps by leveraging multi-channel inputs such as LiDAR range, user speed, and orientation. The architecture incorporates parallel M-Inception modules, sparse multi-head attention, and series decomposition to effectively capture temporal dependencies, heteroskedasticity, and motion dynamics while ensuring computational efficiency. Extensive experiments on real-world datasets collected using a sensor-equipped wearable hard hat demonstrate that DeSynTran outperforms state-of-the-art synchronization approaches, achieving a root mean square error (RMSE) of 0.0364, a mean absolute error (MAE) of 0.0258, a mean absolute percentage error (MAPE) of 0.2058, and a coefficient of determination ( $R^2$ ) of 0.9821. These results confirm the model's superior synchronization accuracy, robustness to noise, and enhanced obstacle detection capabilities in dynamic navigation scenarios.

**Keywords:** Assistive navigation systems, LiDAR synchronization, multivariate decomposition, transformer architecture, time series forecasting, and sensor fusion

## Enhancing cotton crop health through AI-powered leaf disease detection

Manoj Suryawanshi<sup>1\*</sup> and Sudha Gupta<sup>1†</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: manoj.bs@somaiya.edu, sudhagupta@somaiya.edu

### **Abstract:**

Plant diseases pose a major threat to agricultural productivity and food security, and early detection is essential for minimizing yield loss and ensuring sustainable farming practices. Recent advances in deep learning and computer vision have enabled automated plant disease detection from leaf images, offering faster and more scalable alternatives to traditional manual inspection methods. However, there is limited validation of how accurately deep learning models can classify cotton leaf diseases under real-field conditions using diverse, naturally captured images. Here, we show that a convolutional neural network based on the InceptionV3 architecture can reliably identify and classify multiple cotton leaf diseases with high accuracy using real-world agricultural imagery. We trained the InceptionV3 model on a dataset of cotton leaf images using an 80:20 train-test split over 30 epochs with a batch size of 32. Image preprocessing and data augmentation were applied to enhance model robustness under varying lighting and background conditions. The trained model achieved an overall classification accuracy of 96%, with F1-scores ranging from 0.93 to 1.00 across all disease categories, demonstrating strong generalization performance and reliable class discrimination. These findings demonstrate that AI-driven disease detection can significantly reduce reliance on manual field inspection and enable early diagnosis, thereby supporting precision agriculture, timely intervention, and more sustainable cotton farming practices.

**Keywords:** Cotton leaf disease detection, deep learning, InceptionV3, computer vision in agriculture, precision agriculture, plant disease classification

## Recognition of Crown-of-Thorns Starfish for targeted reef management

Nisy Mathew<sup>1\*</sup> and Sudha Gupta<sup>1</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [nisy.mathew@somaiya.edu](mailto:nisy.mathew@somaiya.edu), [sudhagupta@somaiya.edu](mailto:sudhagupta@somaiya.edu)

### **Abstract:**

Coral reefs are among the most vital marine ecosystems, providing habitat for countless species and supporting ecological balance, coastal protection, and global biodiversity. In recent years, however, the stability of these environments has been increasingly threatened by multiple stressors. Among the most significant biological contributors to reef degradation is the Crown-of-Thorns Starfish (COTS), a coral-feeding species capable of rapidly damaging large reef areas when present in high numbers. As a result, the ability to monitor and manage COTS presence has become an important focus within marine conservation efforts. Although research has explored the biological behaviour, outbreak patterns, and ecological impact of COTS, a consistent challenge remains: identifying and distinguishing COTS from other marine organisms in diverse underwater settings. This difficulty arises due to varying water clarity, seabed conditions, and the visual similarity of COTS to surrounding marine life. This presents a critical knowledge gap — there is no reliable and widely adaptable approach for accurately differentiating COTS in real underwater environments, which limits timely response and effective mitigation planning. Here we show that by establishing a structured identification framework and emphasizing observable characteristics unique to COTS, it is possible to improve recognition consistency across varied conditions. This approach aims to support clearer assessment, early detection, and more targeted reef protection efforts without relying on extensive manual searching or intervention. The implications of this work extend to large-scale reef monitoring, policy-driven conservation strategies, and future studies focused on sustainable management practices. By contributing to a more dependable way of recognizing COTS in the field, this study supports long-term ecological protection and helps strengthen ongoing efforts to preserve coral reef ecosystems.

**Keywords:** Crown-of-Thorns Starfish (COTS), coral reef ecosystems, marine species identification, reef degradation, underwater environments, ecological monitoring, marine conservation, habitat assessment, reef management, biodiversity protection

## **Development of a portable urine test strip reader using colorimetry and deep learning segmentation for point-of-care diagnostics**

Prachi Bhoir<sup>1†</sup>, Jagannath Nirmal<sup>1†</sup> and Ninad Mehendale<sup>1\*</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [ninad@somaiya.edu](mailto:ninad@somaiya.edu)

### **Abstract:**

Urinalysis remains one of the most common diagnostic procedures in clinical practice, providing critical information for detecting various metabolic and systemic disorders. Traditional laboratory-based urine analysis methods, while accurate, often require specialized equipment, trained personnel, and centralized facilities, limiting accessibility in resource-constrained settings and remote healthcare environments. This paper presents the development of a novel portable urine test strip reader that leverages colorimetric analysis and artificial intelligence for automated, point-of-care urinalysis. The developed device integrates a Raspberry Pi 5 as the primary processing unit with a high-quality camera module equipped with an 8mm Arducam lens, optimally positioned at 7.5cm from the test strip holder to capture comprehensive images of the entire test strip. The system features a compact, battery-powered design housed in a light-isolated black enclosure with three distinct compartments for the test strip holder, processing unit, and power supply. Uniform illumination is achieved through strategically positioned white LEDs, eliminating external light interference and ensuring consistent imaging conditions. A touchscreen display provides an intuitive graphical user interface for seamless user interaction and real-time result visualization. The image processing pipeline employs the Segment Anything Model (SAM) for robust and accurate segmentation of individual reagent pads from captured test strip images. This deep learning approach enables precise localization of colorimetric reaction zones, forming the foundation for subsequent color analysis and parameter quantification. The portable nature of the device, combined with its automated analysis capabilities, positions it as a promising solution for decentralized healthcare delivery, enabling rapid diagnostic decisions at the point of care. Future work will focus on implementing comprehensive color analysis algorithms, clinical validation against standard laboratory methods, and evaluation of diagnostic accuracy across multiple urine parameters.

**Keywords:** Point-of-care testing, colorimetry, urinalysis, deep learning segmentation, portable diagnostics

## **Bridging language and emotion: A review of multilingual speech processing systems**

Anagha Malkapurkar<sup>1\*</sup>, Sudha Gupta<sup>1</sup> and J. H. Nirmal<sup>1</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [a.malkapurkar@somaiya.edu](mailto:a.malkapurkar@somaiya.edu)

### **Abstract:**

Multilingual and regional speech processing has become a critical research area due to the increasing demand for intelligent systems capable of operating across diverse linguistic and cultural settings. This paper presents a concise review of recent advances in Automatic Speech Recognition (ASR), Language Identification (LID), and Speech Emotion Recognition (SER), with particular emphasis on multilingual, low-resource, and code-switching scenarios. Traditional SER approaches relied on handcrafted acoustic features such as Mel-Frequency Cepstral Coefficients (MFCCs), Linear Predictive Coding (LPC), and prosodic descriptors, combined with classifiers including Support Vector Machines (SVM), Random Forests (RF), and Gaussian Mixture Models (GMM). Recent progress in deep learning has significantly improved performance, with Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks effectively modeling temporal and spectral speech dynamics. This review summarizes commonly used multilingual speech datasets, emotion taxonomies and analyzes the effectiveness of feature extraction and classification techniques under challenges such as data imbalance, limited labeled data, and cross-lingual variability. Finally, the emerging research directions, including real-time emotion recognition, context-aware modeling, and multimodal fusion, to advance robust multilingual speech processing systems.

**Keywords:** Multilingual speech processing, automatic speech recognition, language identification, speech emotion recognition, low-resource languages

## Recent advances in maximum power point tracking techniques for photovoltaic energy systems

Gautami Pujare<sup>1\*</sup> and Bharati Singh<sup>1</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [gautami.pujare@somaiya.edu](mailto:gautami.pujare@somaiya.edu)

### Abstract:

The global push for sustainable energy and reduction in greenhouse gas emissions has encouraged the need of renewable energy solutions. Solar Photovoltaic systems are increasingly being adopted as a reliable source of green energy as it can be directly converted into electricity. However, their power output is inherently variable because of changes in solar irradiance and temperature. Their conversion efficiency is relatively low. PV systems have nonlinear power output, which makes them sensitive to changes in sunlight and temperature. The nonlinearity problem becomes worst in case of Partial Shading Effect (PSE), where a small shaded area of a panel can lower the power output significantly. This creates difficulties in finding the best power point due to number of peaks in the voltage-power curve. Traditional MPPT methods are prone to failure in shaded environments, since they frequently track local maxima rather than the global optimum. To overcome these limitations and maximize energy extraction, advanced MPPT strategies are required. Nature- and bio-inspired optimization algorithms have gained attention as effective solutions, ensuring rapid convergence and precise tracking in dynamic and shaded environments. This study provides a comprehensive review of MPPT strategies, classifying them into conventional, intelligent, optimization-driven, and hybrid categories. The paper evaluates the benefits, drawbacks, and comparative efficiency of different techniques with respect to dynamic response, robustness, cost-effectiveness, and practical implementation. Results indicate that hybrid models deliver enhanced accuracy and adaptability but introduce added design challenges. The review also highlights open issues and prospects to guide continued progress in PV-based MPPT solutions. This review provides valuable insights into current challenges, performance trade-offs, and future research directions, supporting the development of robust, adaptive, and real-time MPPT controllers for next-generation photovoltaic energy systems.

**Keywords:** Renewable energy optimization, maximum power point tracking (MPPT), partial shading effect, nature-inspired algorithms, swarm intelligence, hybrid MPPT techniques

## Early detection of Autism Spectrum Disorder using eye-tracking data and artificial intelligence techniques

Pooja Polshetwar<sup>1\*</sup>, Santosh Narayankhedkar<sup>2†</sup> and Neetin Desai<sup>3†</sup>

<sup>1</sup>*Department of Electronics Engineering,  
K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Dean Academics, Somaiya Vidyavihar University, Mumbai*

<sup>3</sup>*Dean, Faculty of Science, Somaiya Vidyavihar University, Mumbai*

Email: [pooja.polshetwar@somaiya.edu](mailto:pooja.polshetwar@somaiya.edu)

### **Abstract:**

Autism Spectrum Disorder (ASD), a heterogeneous neurodevelopmental condition characterized by impairments in social communication, behavioral, and social cue recognition, shows rising prevalence in India. Metropolitan areas have few centers, while rural regions lack services entirely; low awareness leads parents to misprinted as child bad behaviour, superstition that leads to delaying in diagnosis. Early detection hinges on atypical visual attention, particularly reduced social gaze and speech-following deficits. Eye tracking is a helpful tool for identifying autism spectrum disorder because it reveals how children naturally look at and pay attention to their surroundings. Since the way a child focuses on faces, objects, or movements is closely linked to learning and social development, differences in visual attention can be an early sign of ASD. Eye-tracking technology captures these biomarkers by analyzing gaze paths, fixation durations, and saccade patterns on social stimuli. Despite the promise of eye-tracking biomarkers, there is limited evidence on the comparative effectiveness of machine learning, deep learning, and hybrid artificial intelligence models for early ASD diagnosis using eye-tracking data, particularly in low-resource settings. In our paper, we focused on artificial intelligence models trained on eye-tracking features that effectively distinguish children with ASD from typically developing peers at an early stage. We analyzed a publicly available Figshare dataset containing 547 eye-tracking images (219 ASD and 328 typically developing children). After preprocessing, key gaze-based features such as fixation duration, social attention ratio, and saccade velocity were extracted. These features were used to develop and evaluate traditional machine learning models, deep learning models, and hybrid approaches. The models demonstrated strong discriminatory performance, with deep and hybrid models achieving superior classification accuracy compared to traditional methods. These findings highlight the potential of AI-enabled eye-tracking systems as deployable tools for early ASD screening, particularly in regions with limited access to specialized diagnostic services.

**Keywords:** Autism Spectrum Disorder, eye tracking, gaze patterns, machine learning, deep learning, early detection

## **Artificial intelligence for mental stress detection: a review of multimodal methods, clinical readiness, and future challenges**

Rashmi Maheshwari<sup>1\*</sup> and Sudha Gupta<sup>1</sup>

<sup>1</sup>*Department of Electronics Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [r.maheshwari@somaiya.edu](mailto:r.maheshwari@somaiya.edu)

### **Abstract:**

Mental stress affects millions of people every day, often without them realizing it, and can lead to serious health problems if left unchecked. In recent years, researchers have been developing automated systems to detect stress using signals from the body and behaviour, combined with artificial intelligence. This review looks at the past 15 years of work in this area, summarizing how stress detection methods have evolved and highlighting what works best. We examine common signals used to measure stress, such as heart rate (ECG), blood flow (PPG), skin responses (EDA), speech patterns, and facial expressions. We also compare traditional machine learning methods with modern deep learning techniques, including neural networks and transformer models. Special attention is paid to how features are extracted from these signals, because the choice of features often makes a big difference in accuracy. The review also discusses practical challenges, like making systems fast and efficient enough for real-world use, protecting user privacy, and ensuring that these tools can be applied in healthcare settings. Finally, we point out areas where more research is needed, such as creating personalized, explainable, and wearable stress detection systems. This review is meant to help researchers, engineers, and healthcare professionals understand the current state of stress detection technology and guide future work toward practical, effective solutions.

**Keywords:** Mental stress detection, body and behavioural signals, machine learning, deep learning, multimodal analysis, feature extraction, wearable devices, real-time monitoring

## **Abstracts: Engineering - Electronics & Telecommunication Engineering**

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## **Design and Analysis of an antenna sensor using different substrates for fingertip glucose sensing**

Monika Budania<sup>1\*</sup>, Bharati Singh<sup>1†</sup> and Vandana Satam<sup>1†</sup>

*<sup>1</sup>Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

E-mail: [monika.budania@somaiya.edu](mailto:monika.budania@somaiya.edu)

### **Abstract:**

This paper presents the design and analysis of a square patch antenna-based sensor exploring three different substrates for blood glucose monitoring via fingertip in non-invasive approach. The same antenna geometry is implemented on flexible jeans, rigid FR-4 and high-permittivity alumina at operating frequency of 2.8 GHz. The multilayer finger phantom model is designed in CST studio and the changes in blood glucose level is modelled with varying dielectric constant of blood. The resonant frequency of the antenna sensor shifts with the varying glucose concentration and is investigated for all three substrates. The comparative analysis demonstrates the role of substrate selection for enhancing the sensor sensitivity and reliability for the same application. The lower dielectric substrate i.e jeans-based antenna sensor shows higher frequency shift sensitivity as compared to FR-4 and alumina. The simulation results are validated with the help of human volunteer's and their glucose reading is obtained from glucometer device. This study highlights the potential of low-cost textile-based antenna sensors for wearable continuous glucose monitoring.

**Keywords:** Antenna, Blood, Glucose, Jeans, Non-Invasive, Sensor

# Evaluation of Sampling Techniques for Imbalanced IoT Intrusion Detection Using Machine Learning

Ruchi Chauhan<sup>1\*</sup> and Kiran Ajetrao<sup>1†</sup>

<sup>1</sup>*Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [ruchi.c@somaiya.edu](mailto:ruchi.c@somaiya.edu)

## **Abstract:**

Machine learning is proving to be an essential tool in modern cyber security as it helps to detect malicious activities in ever emerging communication environments. Within the Internet of things (IoT) networks, Intrusion Detection Systems (IDS) face severe challenges due to highly imbalanced dataset where attack and normal instances differ a lot in numbers. Sampling techniques are used to remove this imbalance where normal or attack data are synthetically generated to match each other in number. This study examines the influence of various data sampling techniques on machine learning-based intrusion detection performance using the CICIoT2023 dataset. Several imbalance handling strategies, including random over-sampling, random under-sampling, SMOTE, and hybrid methods, are explored. Four different ML classifiers like Decision Tree, Random Forest, Logistic Regression, and XGBoost are used to train the resampled dataset and various performance matrix such as accuracy, precision, recall, and F1-score were evaluated. The experimental results shows that random oversampling outperforms all other sampling techniques with best macro F1, macro recall and balanced accuracy followed by Synthetic Minority Over-sampling (SMOTE) and Synthetic Minority Over-sampling Technique + Edited Nearest Neighbors (SMOTEENN).

**Keywords:** Internet of Things, Machine Learning, IDS, SMOTE, SMOTEENN

## **A Mitigation Strategy for Security of Software Defined Network against Attack**

Shruti Patil<sup>1\*</sup> and Ameya Naik<sup>1†</sup>

*<sup>1</sup>Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: shruti.patil4@somaiya.edu

### **Abstract:**

Networks are expanding exponentially in size, increasing complexity. Software defined Network provides flexible, programmable networks with automation and efficient network management with controller as it separates control and forwarding logic in control and data planes. Software Defined Networking offers many advantages for enhanced network administration but it suffers from security attacks like Distributed Denial of Service attacks etc. There is enhancement of network security as the Software Defined Networking architecture provides centralized control and programmability to networks. These same attributes pose various network security challenges also. Solutions to these problems can be controller replication schemes or use of authentication mechanisms. This work will focus on investigation of active attacks in Software defined Network, analysis of framework in terms of parameters such as Bandwidth, Delay etc. along with Time analysis of the packets. The implementation of entropy and machine learning modules help to detect attack at early stage and apply mitigation strategy enhancing the performance of Software Defined Networks in various applications.

**Keywords:** SDN, Network Security, IDS, DDoS attacks, Entropy

# Synthesizing High-Fidelity Dental Radiographs: A GAN Approach for Clinical Data Augmentation

Amisha Bhoir<sup>1\*</sup> and Ameya Naik<sup>1†</sup>

<sup>1</sup>*Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [amisha.bhoir@somaiya.edu](mailto:amisha.bhoir@somaiya.edu)

## **Abstract:**

Artificial intelligence (AI) is increasingly transforming dental diagnostics by providing automated tools for pathology detection and optimizing clinical workflows. Within dental imaging, the development of robust deep learning models requires vast, high-quality datasets of panoramic radiographs to ensure diagnostic accuracy and generalizability across diverse patient populations. Despite this need, the advancement of dental AI is severely hindered by the scarcity of large-scale annotated datasets, largely due to stringent patient privacy regulations and the high cost of manual expert labeling. Here, we show that a streamlined Deep Convolutional Generative Adversarial Network (DCGAN) framework can effectively synthesize high-fidelity panoramic radiographs to bridge this critical data gap. We implemented a GAN architecture optimized with Wasserstein loss and gradient penalty (WGAN-GP) to guarantee training stability and anatomical consistency. Using a diverse clinical dataset of real images, our model successfully generated high-resolution radiographs that preserve intricate features such as trabecular bone patterns, the mandibular canal, and dental implants. These findings demonstrate that GAN-based pipelines offer an ethical and scalable solution for clinical data augmentation, enabling the development of robust AI diagnostic tools in privacy-sensitive or data-poor environments.

**Keywords:** Dental Radiography, Panoramic Radiography, Generative Adversarial Networks (GAN), Data Augmentation, Artificial Intelligence (AI).

## **Distributed Deep Learning Approach for Crop Yield Prediction using Multi-dimensional SAR Data**

Anita Nalawade<sup>1\*</sup> and Ameya Naik<sup>1†</sup>

*<sup>1</sup>Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [anita.nalawade@somaiya.edu](mailto:anita.nalawade@somaiya.edu)

### **Abstract:**

Accurate crop yield prediction is essential for ensuring food security, optimizing resource utilization, and supporting data-driven agricultural decision-making. However, the models developed in this field require effective data for training and better performance. The Synthetic Aperture Radar (SAR) has become an excellent source of remote sensing data for estimating yields, as it provides all-weather imaging and is sensitive to crop structures and moisture conditions. However, it remains challenging to model the nonlinear relationships between the SAR and complex crop yield patterns. This research aims to create and train a deep learning-based system by using SAR data to increase the precision, stability, and scalability of crop yield prediction in different farming settings. Initially, the crop-related images are gathered through the Sentinel-2 Image Time Series for Crop Mapping dataset, which is then passed to the pre-processing and ROI extraction, where the image quality is enhanced, and the ROI allows for isolating meaningful parts of the image. The resultant images are then carried out to the multi-dimensional feature extraction in which the essential vegetative indices such as NDVI, GNDVI, EVI, DUI, RUI, OSAVI, SIPI, and NRI are extracted to monitor vegetation health, total covered land, crop, and environmental monitoring for proper interpretation. The extracted features are then inserted into the Distributed Machine learning (ML) classifier, which is a hybridization of Deep Belief Network (DBN) and the Light Gradient Boost Machine (GBM). The combined model demonstrates strong robustness and generalization capabilities, performing reliably with complex and non-linear relationships in the data, which is typical for agricultural systems. The model, after training, is tested using the test slices to ensure an effective predicted yield estimation outcome. The implementation of the proposed method is done using the PYTHON tool, and the performance evaluation is analyzed using standard metrics like  $R^2$ , RMSE, MAE, and MRE. The gap we found is the existing SAR-based deep learning models lack an effective distributed framework to robustly capture complex nonlinear crop yield patterns using multi-dimensional vegetative indices across diverse agricultural conditions.

**Keywords:** Agriculture, Crop Yield Prediction, Vegetative Indices, Synthetic Aperture Radar (SAR), Deep learning

# Lung Cancer Detection using Distributed Learning enabled Hybrid Deep Learning model with CT images

Santosh Kamble<sup>1\*</sup> and Kiran Ajetroa<sup>1†</sup>

<sup>1</sup>*Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [santosh.k@somaiya.edu](mailto:santosh.k@somaiya.edu)

## **Abstract:**

In the human body, lungs are the one of the soft organs, which are liable for intaking oxygen and expending carbon dioxide. The progress and spread of anomalous cells all over the human body is known as cancer. It is recognized as a dangerous disease with the potential for fatal outcomes. It is started by uncontrollable cell evolution in the lung tissues. Early diagnosis is critical to protect innocent human lives. CT imaging remains one of the standard-of-care diagnostic tools for staging lung cancers. However, manual CT scan analysis is time-consuming and prone to errors or not accurate. Several existing methods are designed to classify the lung cancer using CT images. But it faced challenges in providing high performance due to the lack of datasets. To reduce these limitations, the Distributed Learning based CNN enabled Bidirectional Long Short-Term Memory (CNN-LSTM) model will be developed in this research. The proposed model will detect the lung cancer and also its types such as adenocarcinoma, small cell carcinoma, large cell carcinoma and squamous cell carcinoma. Initially, the Lung CT images will be collected from the Dataset. Then the input images will further move to the pre-processing phase. After the pre-processing phase, the region of interest (ROI) will be extracted. Furthermore, the CT images will get segmented by the Fractional K-means based segmentation technique. The segmented images will be fed into the feature extraction phase. It will extract the features like GLCM features, fused structural pattern and ResNet 101 to train the model. The proposed model will get trained based on these features. The test data will be applied to the model to get the classified output. The proposed model will be implemented on the python tool. The performance will be evaluated through the metrics accuracy, precision, recall and F1-Score based on the dataset namely Lung-PET-CT-Dx Dataset. The identified research gap in existing CT-based lung cancer methods is lack of scalable distributed deep learning framework. They do not effectively integrate robust ROI-based segmentation. Hybrid spatial-temporal feature is also insufficiently utilized. These limitations lead to data scarcity issues.

**Keywords:** Lung Cancer Detection, CT Images, Distributed Learning, Hybrid Deep Learning, Image Segmentation, Lung-PET-CT-Dx Dataset

## **Applications of Remote Sensing and GIS for Sustainable Agricultural Development in India**

Seema Kawale<sup>1\*</sup>, Bharti Singh<sup>1†</sup> and Makrand Kulkarni<sup>1†</sup>

*<sup>1</sup>Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [seema.kawale@somaiya.edu](mailto:seema.kawale@somaiya.edu)

### **Abstract:**

Agriculture plays a crucial role in India's economy, supporting livelihoods while facing challenges such as climate variability, resource constraints, and increasing food demand. Remote sensing and Geographic Information Systems (GIS) have emerged as powerful geospatial technologies that enable large-scale, timely, and cost-effective monitoring of agricultural resources by integrating satellite data with spatial analysis tools. Despite the availability of vast Earth observation data, there remains a gap in effectively integrating remote sensing and GIS for region-specific agricultural decision-making in India, particularly for smallholder-dominated farming systems. Here we show that the combined application of remote sensing and GIS can significantly enhance crop assessment, yield estimation, soil moisture analysis, and drought and pest monitoring across diverse agro-climatic zones in India. Multi-temporal satellite imagery from sources such as Landsat, Sentinel, and Indian Remote Sensing (IRS) satellites was analyzed using GIS-based spatial models to map crop patterns, vegetation indices, and water stress conditions. The results demonstrate improved accuracy in crop health monitoring, early warning of stress conditions, and optimized resource management when compared to conventional ground-based approaches. These findings highlight the potential of remote sensing and GIS as decision-support tools for precision agriculture, policy planning, and sustainable agricultural development in India, supporting food security and climate-resilient farming practices.

**Keywords:** Remote Sensing, Geographic Information Systems (GIS), Agriculture, Earth observation, Indian Remote Sensing (IRS)

## Detection of Eye Occlusion using modern methodology

Vidya Lunge<sup>1\*</sup> and Kiran Ajetroa<sup>1†</sup>

*<sup>1</sup>Department of Electronics & Telecommunication Engineering, K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [vidya.lunge@somaiya.edu](mailto:vidya.lunge@somaiya.edu)

### **Abstract:**

One of the very critical sensory functions of the human body is vision which plays a vital role in perceiving the environment around us, our mobility and routine functioning. Any damage to this delicate structure of eye can lead to irreversible vision impairment. The damage to the retinal cell due to retinal occlusion can be one of the reasons for vision loss, if not diagnosed and treated at the right time. Retinal occlusion is a serious condition if there is no timely clinical intervention. The manual diagnosis by the ophthalmologist for retinal occlusion using different modality is time consuming. This paper presents automated method for detection and classifying different types of occlusions using different retinal images. The deep learning model used here automatically extracts hierarchical features and analyse it to identify different conditions of occlusion. The experimental results of the proposed method outperform the traditional machine learning methods, achieves high classification and other evaluation metric parameter values for accuracy, sensitivity, and specificity. This result indicates that the retinal image analysis using deep learning is more effective tool to support decision for early screening and diagnosis of retinal occlusion, proving a good support to ophthalmologists in early detection and treatment to the damage of “eye” the critical sensory organ of human body.

**Keywords:** Retinal Occlusion, Deep Learning , Evaluation metrics.

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## **A Review on Community Detection in Social Network**

Ashish Vankudre<sup>1\*</sup> and Deepak Sharma<sup>2†</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Department of Computer Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [ashish.vankudre@somaiya.edu](mailto:ashish.vankudre@somaiya.edu)

### **Abstract:**

In the vast era of social media, identification of targeted person or a group is crucial for fast and accurate response. This helps in delivering tailored contents depending on specific interest and behaviour to allow resource allocation. The community detection can identify a group of users on social media based on user data, connections, tags or interest which opens up influential subgroups for precise and effective outreach. Community detection reveals the hidden structure within complex networks and simplify their analysis. It supports better decision-making, highlights important or influential nodes and helps detect anomalies such as fraud or unusual patterns. In applications like social networks, recommendation systems, biology and energy systems, community detection improves personalization, exposes functional groups and enhances system resilience. The researchers and engineers have developed various community detection techniques based on hierarchical clustering, modularity, overlapping, spectral clustering, probabilistic and machine learning and deep learning. This paper presents a review of state of the art community detection techniques for social network. A comparison of these techniques is (will be) presented on the basis of computational speed, accuracy and suitability for network size. With this literature review it will assist to identify the suitable CD technique for given size of dataset.

**Keywords:** Community Detection, Social Network, Machine Learning, Deep Learning

## **Analysis of Land Use Land Cover Changes in the Coal Mining Region of Vidarbha using Convolutional Neural Network**

Dipti Pawade<sup>1\*</sup> and Sonali Patil<sup>1†</sup>

*<sup>1</sup>Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [dipti.pawade@somaiya.edu](mailto:dipti.pawade@somaiya.edu)

### **Abstract:**

This study aims to analyse the Land Use Land Cover (LULC) changes in the coal mine areas of Vidarbha region, Maharashtra, over a 30-year period from 1994 to 2024 using a Convolutional Neural Network (CNN). While landscapes in this area have rich ecological diversity, the region has witnessed significant LULC changes due to extensive coal mining and other human activities leading to LULC transformation. To analyse the LULC transformation this approach uses multi-temporal Landsat satellite imageries for three decadal intervals. These satellite imageries were pre-processed by radiometric correction, spectral index computation, band stacking and elevation data integration and fed as input to the CNN model. The CNN model was constructed by using convolutional, pooling and dense layers to classify the study area into 12 different LULC classes with an overall accuracy of 82.56% and Kappa coefficient of 0.7954. The results of change analysis revealed significant urban and mining expansions, which mostly consumed the existing dense forest cover, grassland and water bodies. High-Density Settlements were the most consistently expanding class across ecological zones and dense forests experienced continuous decline suggesting urbanization driven deforestation. Mining regions also expanded, often replacing barren land and grassland. The results demonstrated the capacity of CNN classification for long-term LULC monitoring and the importance for sustainable land management policy.

**Keywords:** LULC classification; Change detection; LULC transformation, CNN.

## Synthetic Dataset Generation for Rock Pictographs

Sunayana Jadhav<sup>1</sup>, Irfan Siddavatam<sup>1\*</sup> and Ashwini Dalvi<sup>1\*</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [sunayanavj@somaiya.edu](mailto:sunayanavj@somaiya.edu)

### **Abstract:**

This review synthesizes and extends existing research on techniques for generating synthetic datasets of rock art pictographs from limited image collections to address persistent data scarcity and annotation challenges in archaeological image analysis. In addition to evaluating prior work, this study proposes and contextualizes an implementation model for synthetic dataset generation tailored specifically to rock art applications. The review evaluates data synthesis strategies, benchmarks augmentation and generative approaches, examines domain-specific challenges, compares single- versus multi-image generation methods, and assesses the incorporation of environmental and material factors. A systematic analysis of methodologies including generative adversarial networks, procedural 3D modeling, photogrammetry, and domain-aware augmentation techniques—was conducted across studies within cultural heritage contexts. Building on these findings, the proposed implementation model integrates controlled image pre-processing, domain-informed synthetic generation, automated annotation pipelines, and iterative validation against real-world samples. Results from prior studies indicate that synthetic datasets can substantially improve classification and recognition performance, with reported accuracies reaching up to 99% using limited real data. While procedural 3D modeling and photorealistic rendering enhance realism and variability, they incur high computational costs and require expert intervention. Single-image generative approaches provide efficient augmentation while preserving structural fidelity but often lack environmental realism. Annotation consistency is generally high through automation, though challenges remain in simulating surface degradation and minimizing domain gaps. Overall, this work highlights the trade-offs among realism, scalability, and computational efficiency, and demonstrates how the proposed implementation model can guide practical deployment of synthetic data pipelines for advancing automated rock art analysis and cultural heritage preservation.

**Keywords:** Synthetic data generation, rock art pictographs, archaeological image analysis, cultural heritage computing, data augmentation, generative models, limited dataset learning, domain-aware synthesis, automated annotation, image preprocessing, generative adversarial networks, procedural 3D modeling, photogrammetry, environmental and material modeling, surface degradation simulation, computer vision in archaeology, dataset scalability, model generalization, visual pattern recognition

## **Toward Improving Blockchain Usability via Analysis and Optimization of System Overheads**

Chandan Kolvankar<sup>1\*</sup> and Irfan Siddavatam<sup>1†</sup>

*<sup>1</sup>Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [c.kolvankar@somaiya.edu](mailto:c.kolvankar@somaiya.edu)

### **Abstract:**

Blockchain was initially envisioned as a disruptive technology capable of fundamentally transforming existing systems and processes across multiple domains. However, despite nearly 15–20 years of development and research, its practical adoption has largely remained confined to a limited set of specialized use cases. Fundamental design characteristics—such as full data replication across all participating nodes and inherent scalability limitations—have significantly constrained its widespread applicability. These challenges have restricted blockchain’s deployment primarily to scenarios where decentralization and immutability outweigh performance and efficiency concerns. In this work, we propose an approach to alleviate these initial limitations while preserving the core principles of blockchain architecture. The proposed method seeks to improve efficiency and scalability without compromising decentralization, security, or data integrity, thereby enabling broader applicability of blockchain-based systems beyond their current restricted domains. By easing these initial constraints without compromising decentralization, security, or data integrity, the proposed approach aims to enhance resource efficiency and enable wider adoption of blockchain-based solutions. The results indicate that easing these initial constraints can enhance storage optimization and overall efficiency.

**Keywords:** Blockchain, Security, Cryptography, Storage, Replication

## **A Structured Data Collection and Preprocessing Approach for Spatial Electric Vehicle Charging Infrastructure Planning**

Sarika Dharangaonkar<sup>1\*</sup> and Sonali Patil<sup>1†</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [sarika.kd@somaiya.edu](mailto:sarika.kd@somaiya.edu)

### **Abstract:**

The rapid expansion of electric vehicle (EV) adoption has increased the demand for strategically planned Electric Vehicle Charging Station (EVCS) infrastructure to ensure efficient, accessible, and sustainable transportation systems. Recent studies widely employ Geographic Information Systems (GIS) integrated with Multi-Criteria Decision-Making (MCDM) techniques used to evaluate alternatives based on multiple spatial and non-spatial factors for EVCS site selection; however, the reliability of these approaches is highly dependent on the quality of input data. Despite growing methodological advancements, existing research provides limited insight into systematic data collection and preprocessing procedures required to integrate heterogeneous geospatial, socio-economic, and environmental datasets for EVCS planning. Consequently, the lack of transparent and reproducible data workflows remains a critical gap in EVCS location studies. Here, we present a structured and replicable framework for data collection and preprocessing tailored to spatial MCDM-based EVCS location analysis. The framework integrates transportation, infrastructure, demographic, land-use, environmental, and renewable energy criteria derived from authoritative sources including OpenStreetMap, Google Maps APIs, Census of India 2011, government portals, Ready Reckoner records, Google Earth Engine, and the Global Solar Atlas. The proposed methodology involves data cleaning, spatial standardization, proximity and surface analysis, raster harmonization, and normalization based on attributes, resulting in a consistent set of standardized spatial layers suitable for MCDM application. This framework enhances methodological transparency and provides a reliable foundation for robust EVCS planning and future comparative decision-making studies.

**Keywords:** Electric Vehicle Charging Stations, Data Preprocessing, Spatial Analysis, MCDM, GIS, Sustainable Transport

## Precision Assessment of Sugarcane Quality Using GeoAI-Driven Multi-Temporal Approaches: A Comprehensive Review of Brix Prediction Technologies

Chirag Desai<sup>1\*</sup>, Sonali Patil<sup>1†</sup> and Nandkumar Kunchge<sup>2†</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*K J Somaiya Institute of Applied Agricultural Research (KIAAR)*

Email: [chirag.rd@somaiya.edu](mailto:chirag.rd@somaiya.edu)

### **Abstract:**

Accurate and non-destructive assessment of sugarcane Brix-the soluble solids content that is closely related to sucrose concentration-has become a basic input in modern precision agriculture for optimizing harvest scheduling, varietal selection, supply-chain management, and payment systems in the global sugar industry. Traditional destructive laboratory analysis is, although accurate, cumbersome, costly, and unfit for extensive, real-time decision-making. Advancement in the last decade of remote sensing, UAV photography, proximate spectroscopy, and GeoAI has driven more scalable, high-resolution, and biochemically sensitive estimating methods. This systematic literature review synthesizes 42 key papers published from 2010 to 2025 on the progress of spectral, imaging, and machine learning approaches to Brix modelling. The review identifies four major research domains: satellite-based time-series forecasting, UAV hyperspectral imaging, NIR/Vis-NIR/SWIR spectroscopy, and environmental and physiological factor modelling. A comparative and temporal analysis situates the Brix prediction technological developments. Based on topic synthesis, comparative evaluation, and technological evolution mapping, this review identifies the currently inefficient calibration transfer, environmental robustness, and cross variety generalization. Finally, a full GeoAI system was proposed for multimodal spatiotemporal Brix prediction.

**Keywords:** Brix Prediction, GeoAI, Machine Learning, Precision Agriculture, Remote Sensing, Soluble Solids Content

## Anti-Money Laundering Solutions: From Rule-Based Systems to Deep Learning

Shraddha Dalvi<sup>1\*</sup>, Irfan Siddavatam<sup>1†</sup> and Ashwini Dalvi<sup>1†</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [itssbshinde@gmail.com](mailto:itssbshinde@gmail.com)

### **Abstract:**

The term "anti-money laundering" (AML) refers to a broad range of laws, rules, guidelines, and practices intended to stop criminals from passing off money gained unlawfully as legitimate income. By identifying, discouraging, and reporting financial crimes like money laundering, terrorism funding, corruption, tax evasion, and other illegal acts, AML aims to safeguard the integrity of the global financial system. Regulators face challenges in keeping up with the latest fraudulent patterns, and financial banks are under constant pressure to detect and prevent fraudulent activities while continuing to serve legitimate customers effectively and efficiently. Effective technology is essential in the fight against money laundering. Here, we show how supervised learning algorithms work for the Elliptic dataset. The task on the dataset is to classify the illicit and licit nodes in the graph. Among various algorithms used, LSTM(Long Short Term Memory) has given the highest accuracy of 96%. As the dataset is imbalanced, micro and macro performance measures are used in the analysis. Supervised models generally achieve better detection accuracy but depend heavily on large volumes of labelled data for training. The model, which is built using a supervised learning algorithm, depends heavily on the dataset, which cannot accommodate the emerging fraud patterns in real time. Recent research has increasingly applied Graph Neural Networks (GNNs), which can effectively model complex relationships within transaction data, offering enhanced detection capabilities which is a future scope of this work.

**Keywords:** Fraud, Anti Money Laundering, Rule Based Solutions, Machine Learning, Deep Learning

# **Spectral Signature Identification of Sugarcane Crop Using Remote Sensing: A Systematic Review**

Snigdha Bangal<sup>1\*</sup>, Sonali Patil<sup>1†</sup> and Nandkumar Kunchge<sup>2†</sup>

<sup>1</sup>*Department of Information Technology, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*K J Somaiya Institute of Applied Agricultural Research (KIAAR)*

Email: [snigdha.bangal@somaiya.edu](mailto:snigdha.bangal@somaiya.edu)

## **Abstract:**

Accurate identification of sugarcane crop using remote sensing plays a crucial role in crop monitoring, yield assessment, and agricultural planning, particularly in regions where sugarcane cultivation significantly contributes to the agro-economy. Existing studies have explored sugarcane mapping using spectral information derived from optical, synthetic aperture radar (SAR), hyperspectral, and multi-temporal satellite data; however, consistent and transferable spectral discrimination remains difficult to achieve. These difficulties are largely attributed to phenological variability, diverse crop management practices, soil background effects, and spectral similarity with other crops. In this review, we critically examine peer-reviewed research published between 2005 and 2025 that focuses on spectral signature identification of sugarcane crop. The literature is systematically analyzed and categorized according to sensor type, spectral bands and vegetation indices, temporal characteristics, and classification methodologies, including conventional statistical approaches, machine learning techniques, and recent deep learning models. The comparative analysis highlights methodological strengths while also revealing persistent limitations across different agro-climatic settings. The synthesis indicates that limited exploitation of multi-sensor data fusion, inadequate representation of phenological dynamics, and insufficient attention to early-stage crop discrimination remain key research gaps. In response to these limitations, a conceptual hybrid framework integrating multi-sensor remote sensing data with machine learning and deep learning approaches is proposed to support robust and scalable sugarcane spectral characterization. This review provides a structured reference for researchers and practitioners and outlines future directions toward improving accuracy, generalization, and operational applicability of sugarcane crop identification methods.

**Keywords:** Sugarcane, Remote Sensing, Agriculture, Machine Learning, Hyperspectral

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## Performance Analysis of Radiant Cooling Panel Designs and Geometry Based Enhancements

Vinit Katira<sup>1\*</sup>, Ajay Gangrade<sup>1†</sup> and Kashinath Patil<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [vinit.kataria@somaiya.edu](mailto:vinit.kataria@somaiya.edu)

### **Abstract:**

The radiant cooling system utilizes chilled water to absorb heat load employing radiation as a primary heat transfer mode, as compared to conventional all air convection based cooling. It offers energy savings due to water's higher heat capacity compared to air. The cooling capacity of a radiant panel is governed by the radiative heat flux that the panel can absorb. In this study, different radiant cooling panel designs have been studied and analysed using ANSYS steady state and transient simulations to compare their performances. The panel geometry of flat, triangular and rectangular designs have been simulated and it is observed that triangular and rectangular panel designs exhibits a radiative heat flux of 95.38 W/m<sup>2</sup> and 97.65 W/m<sup>2</sup> respectively, which are 3.1% and 5.5% higher respectively as compared to the flat panel design.

**Keywords:** Radiant Cooling, Radiant Panel, Radiative Heat Flux, Convective Heat Flux

## **Mechanical, Tribological and Machining Performance of Sugar Cane Waste Filled Polymer Composites**

Manisha Dhanokar<sup>1\*</sup> and Manoj Pawar<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [manisha.dhanokar@somaiya.edu](mailto:manisha.dhanokar@somaiya.edu)

### **Abstract:**

Polymer composites reinforced with agro-waste materials have gained significant attention as sustainable and cost-effective alternatives to conventional composite systems. Among agricultural residues, sugar cane waste (SCW), including bagasse and rind fibers, has emerged as a promising filler due to its wide availability, biodegradability, low density, and favorable mechanical properties. This review critically examines recent advancements in the mechanical, tribological, and machining performance of sugar cane waste filled polymer composites. It synthesizes findings on the influence of filler content, particle size, surface treatment, and polymer matrix selection on tensile, flexural, and impact properties, highlighting enhancements as well as limitations in stiffness and strength. Tribological behavior under varying loads and sliding conditions is analyzed, with emphasis on wear mechanisms and the roles of interfacial adhesion and filler dispersion. Furthermore, the review explores machinability aspects, including cutting forces, surface integrity, tool wear, and material removal characteristics, identifying challenges associated with heterogeneous microstructures and abrasive particulates in SCW composites. Comparative performance with other natural fiber composites is discussed to contextualize the potential of sugar cane waste in industrial applications. Key gaps in current research and future directions—such as hybridization strategies, advanced surface modifications, and modeling approaches—are identified to guide the development of high-performance, eco-friendly composite materials.

**Keywords:** Natural additives, Composite, Sugar cane waste, Automobile applications, Mechanical properties

## A Digital Twin–Enabled Framework for Predictive Maintenance of Heat Exchangers

Iqbal Muzawar<sup>1\*</sup> and Siddappa Bhusnoor<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [iqbal.m@somaiya.edu](mailto:iqbal.m@somaiya.edu)

### **Abstract:**

Heat exchangers are essential components in thermal and process industries, where their performance directly affects energy efficiency, system reliability, and operational costs. Recent advancements in Industry 4.0 have introduced digital twin technology as an effective solution for real-time monitoring, predictive diagnostics, and performance optimization of industrial systems. However, existing research often lacks an integrated framework that combines real-time operational data, digital twin modeling, and machine learning–based Remaining Useful Life (RUL) prediction for heat exchangers. This limitation restricts early fault detection and proactive maintenance under dynamic operating conditions. Here, we present a digital twin–enabled predictive maintenance framework for improving heat exchanger performance using MATLAB-based analytics. A high-fidelity digital twin is developed in Simulink to replicate the thermal and operational behavior of the physical heat exchanger, continuously updated using data acquired from IoT sensors. Diagnostic features are extracted using MATLAB’s Diagnostic Feature Designer, and machine learning models are trained through the Classification Learner to estimate system degradation and RUL. The proposed approach accurately predicts failure timelines with error margins of 4%, 8%, and 12%, corresponding to failure predictions at 60, 50, and 28 days of operation, respectively. These results demonstrate reliable confidence bounds and effective early fault detection. Experimental validation using laboratory-scale setups confirms the accuracy of the digital twin model, while virtual simulations enable risk-free evaluation of design and operational improvements. The integration of digital twin technology with predictive analytics enhances heat exchanger reliability, reduces unplanned downtime, optimizes maintenance scheduling, and lowers energy consumption. This study offers a scalable and sustainable solution for intelligent thermal system management, supporting long-term system reliability and future industrial applications.

**Keywords:** Digital Twin, Heat Exchanger Performance, Predictive Maintenance, Machine Learning, MATLAB, Remaining Useful Life (RUL)

## Supply Chain Control Tower: Software Solutions and Simulation Capabilities

Magesh Nadar<sup>1\*</sup> and Vaibhav Narwane<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [mageshkumar.n@somaiya.edu](mailto:mageshkumar.n@somaiya.edu)

### **Abstract:**

Supply chain control towers (SCCTs) are emerging enablers of real-time visibility, data-driven decision-making, and resilience in Industry 4.0 supply chains. With various software packages available on the market for modelling and simulation analysis of the end-to-end supply chain, it is not easy to choose software to model SCCT. Additionally, selecting the proper software is crucial. This study focuses on software for modelling SCCTs, presenting a list of open-source and commercial software. Moreover, this study focuses on the selection of simulation software based on its area of application, including its key features. This study is helpful for academic researchers and industrialists by providing actionable guidance to implement capability-rich, data-driven control towers. It helps to establish a framework for SCCT models using proper steps, tools, and technologies for each step, which can be effectively applied in real-life applications, enabling real time visibility, data driven decision making and coordination among stake holders. This is one of the few studies that lists software platforms relevant to SCCT implementation and to explicitly connect their technical properties with a coherent capability set for simulation-based SCCT design.

**Keywords:** Supply chain control Tower, Software, Simulation, Application, Framework

## **Investigation on Effect of the Tube Bundles Arrangements on Thermo-Hydraulic Performance of Tubular Heat Exchanger**

Mahendra Bhoir<sup>1\*</sup> and Shailesh Nikam<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: mahendra.bhoir@somaiya.edu

### **Abstract:**

Tubular heat exchangers are critical components in energy-intensive industries, where optimizing thermo-hydraulic performance is essential for reducing operational costs and enhancing system efficiency. This study investigates the impact of staggered, in-line, and mixed tube bundle arrangements on cross-flow heat transfer and pressure drop characteristics across a practical range of Reynolds numbers. By integrating controlled experimental measurements with three-dimensional CFD simulations, the research resolves both global performance data and local flow phenomena, including Nusselt number distributions, friction factors, and the formation of low-velocity recirculation zones. The results demonstrate that optimized staggered and mixed layouts significantly enhance the average Nusselt number compared to conventional in-line configurations while maintaining manageable pressure penalties and mitigating the onset of deposit-prone regions. These findings establish quantitative design guidelines for balancing thermal enhancement with pumping power requirements, facilitating the development of more compact and energy-efficient tubular heat exchangers for process and power applications.

**Keywords:** Tubular heat exchanger, Tube bundle arrangement, Thermo-hydraulic performance, Nusselt number, Friction factor, CFD

## **Ballistic Impact Performance and Failure Mechanisms of Ceramic–Composite Hybrid Armor Panels**

Rohitkumar Chaurasia<sup>1\*</sup>, Manoj Pawar<sup>1†</sup> and Ajay Gangrade<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: Rohitkumar.c@somaiya.edu

### **Abstract:**

The ballistic impact response of hybrid ceramic–fiber composite armor panels is thoroughly investigated numerically using Abaqus/Explicit in this paper. Combining two ceramics ( $B_4C$  and SiC) with three fiber backings (carbon, glass, and Kevlar) allowed for the examination of six material configurations. A Hashin-based progressive damage model was used to represent the composite backings, and the Johnson–Holmquist II (JH-2) constitutive formulation was used to simulate the ceramic layers. To model delamination, ceramic–composite debonding, and inter-ply failure under high strain rates, cohesive interfaces using a Benzeggagh–Kenane mixed-mode law were introduced. Energy absorption behavior, stress redistribution, shear/matrix damage progression, equivalent plastic strain development, and residual velocity characteristics were assessed using a rigid projectile hitting at 600 m/s. The findings indicate that ballistic response is highly dependent on the interaction of fiber stiffness, ceramic hardness, and interface integrity. Because of its efficient stress transmission to the rigid carbon laminate, regulated ceramic fragmentation, and quick shock attenuation, the  $B_4C$ –Carbon design exhibits the lowest residual velocity and the maximum energy dissipation efficiency. On the other hand, the SiC–Kevlar structure shows the least amount of resistance, with limited shear engagement and a larger residual velocity. For defense and high-strain-rate engineering applications, the results offer quantitative advice for developing lightweight, multi-material armor systems.

**Keywords:** ceramic–composite panels, boron carbide ( $B_4C$ ), silicon carbide (SiC), carbon fiber composites, glass fiber, Kevlar, Johnson–Holmquist II (JH-2) model, Hashin damage criteria, cohesive zone modelling

## **Mechanical performance evaluation of porous femur bone scaffold using multi-software finite element analysis with analytical and experimental validation**

Rupesh Kharbe<sup>1\*</sup>, Ramesh Lekurwale<sup>1†</sup>, Sangeeta Bansode<sup>1†</sup>, Rohan Kothurkar<sup>1</sup> and Kavita Kumari Thakur<sup>1</sup>

<sup>1</sup>Department of Mechanical Engineering, K. J. Somaiya School of Engineering, Somaiya Vidyavihar University

E-mail: [rupesh.kharbe@somaiya.edu](mailto:rupesh.kharbe@somaiya.edu)

### **Abstract:**

Porous bone scaffolds are very important for mechanical stability, load transfer, and biological integration in femur bone defect repair, and their mechanical performance must closely mimic actual bone to ensure bone regeneration and long-term clinical success. Recent developments in finite element analysis (FEA) can predict scaffold's behaviour in different loading conditions; however, limitations of simulation platforms or softwares and limited exact experimental validation often make it difficult to understand the reliability of such predictions for clinical translation. Extensive numerical studies still require a systematic evaluation that integrates multi-software FEA results with analytical modelling and experimental validation for femur bone defect repair. The consistency of mechanical predictions in different simulation platforms with physical testing and trials are still required to validate the results. This study presents a comprehensive mechanical performance evaluation of a porous femur bone scaffold using multi-software finite element analysis, validated through analytical calculations and experimental testing on biodegradable polylactic acid (PLA) scaffolds. The scaffold geometry was modelled and analysed using FEA platforms such as SolidWorks and Ansys with identical feasible boundary conditions, while analytical predictions are derived using some assumptions with homogenized material approach. Experimental tests are performed on additively manufactured scaffold samples to validate the numerical and analytical outcomes. The results demonstrate significant agreement between two FEA platforms, SolidWorks & Ansys with acceptable deviations and a close correlation with analytical and experimental findings. The porous scaffold exhibits controlled deformation and stress distribution, indicating sufficient stiffness and load bearing capacity suitable for femur applications. These findings establish the reliability of porous PLA bone scaffolds for femur bone defect repair with all these studies carried out significantly. Future perspective of this research work is related to implementing these scaffolds for actual studies with bone regeneration by clinical & medical approvals.

**Keywords:** Femur bone, porous scaffold, finite element analysis, SolidWorks, Ansys, bone regeneration, polylactic acid

## **Review on secondary Biomass-Derived Hard Carbon Anodes: Precursor Diversity and Conversion Strategies**

Sheba Varghese<sup>1\*</sup> and Luckman Muhmood<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [sheba.v@somaiya.edu](mailto:sheba.v@somaiya.edu)

### **Abstract:**

The rapid expansion of the electric vehicle and grid storage sectors has created a need for the development of sustainable, low cost alternatives to lithium-ion technologies, positioning sodium ion batteries (SIBs) as a critical contender. In this perspective, Hard Carbon derived from secondary biomass such as agricultural residues and industrial by products has emerged as the most promising anode material due to its renewable abundance and favourable diverse microstructures. However a comprehensive understanding of how specific lignocellulosic compositions of diverse biomass wastes directly dictate the optimal conversion pathway and final electrochemical performance remains fragmented in current literature. In this paper a systematic review of secondary biomass utilization, clarifying the critical structural property relationships that govern sodium storage mechanisms. A wide array of precursors, including rice husks, coconut shells and wheat straw and analyze the impact of synthesis methods, specifically pyrolysis, hydrothermal carbonization and microwave assisted activation on engineering defect rich and closed pore architectures. This analysis reveals that tailoring the conversion strategy to the specific biomass feedstocks essential for maximizing reversible capacity and initial Coulombic efficiency. These findings offer a unified framework for researchers to valorize waste streams into commercial grade anode materials which can be made to scalable energy storage systems.

**Keywords:** Sodium-ion batteries, Hard carbon anode, Secondary biomass, Pyrolysis, Energy storage, Agricultural waste

## Flow Control Around a Circular Cylinder Using Boundary Layer Tripping in Laminar Conditions

Tikaram Verma<sup>1\*</sup> and Shailesh Nikam<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [tikaram.v@somaiya.edu](mailto:tikaram.v@somaiya.edu)

### **Abstract:**

Aerodynamic analysis of bluff bodies plays a crucial role in understanding the impact of drag forces acting on the body. Wake studies are important in real life because they help improve aircraft safety, increase power generation in wind farms, reduce fuel consumption in vehicles, ensure the stability of tall buildings and support the safe design of medical devices. This paper presents an experimental investigation of the aerodynamic force acting on a circular cylinder with a diameter of 50 mm and a length of 600 mm. A series of experiments was conducted using a subsonic wind tunnel at Reynolds numbers ( $Re$ ) ranging from  $1.5 \times 10^3$  to  $9.2 \times 10^3$ , which falls under the laminar flow regime. Pressure coefficient ( $C_p$ ) and Coefficient of drag ( $C_d$ ) were estimated for the velocity ranging from 5 m/s to 30 m/s. A passive flow control method using a rough strip of 80 grit (80 abrasive particles per square inch) was used to investigate the impact of surface roughness on drag forces. It was found that without a rough strip, the coefficient of pressure drag was approximately 1.37, and it was reduced to around 0.75, resulting in a 43.5% decrease in the  $C_d$  value. Wake measurement analysis was performed by traversing the Pitot static probe from  $X/D = 3$ ,  $X/D = 5$ ,  $X/D = 7$ ,  $X/D = 10$  and  $X/D = 15$  in the wake region of the cylinder. Near the cylinder  $X/D = 3$ , there is a significant velocity deficit at the centreline. As  $X/D$  increases from 3 to 15, the velocity deficit decreases with  $u/U$  approaching 1. From wake measurements, it was observed that a cylinder with a rough strip had less wake defect compared to the wake defect of a cylinder without a rough strip; therefore, the total drag forces exerted on the cylinder were reduced.

**Keywords:** Reynolds' Number, Pressure Coefficient, Coefficient of drag, velocity deficit, Wake defect, Passive Method.

## **Sustainable Design and Biomechanical Evaluation of a Spring-Assisted 3D-Printed PLA Knee Brace**

Vishvas Pudale<sup>1\*</sup>, Ramesh Lekurwale<sup>1†</sup>, Manoj Pawar<sup>1†</sup> and Rohan Kothurkar<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [vishvas.p@somaiya.edu](mailto:vishvas.p@somaiya.edu)

### **Abstract:**

This study presents a sustainable, spring-assisted knee brace, produced through 3D printing with Polylactic Acid (PLA), designed to improve comfort, mobility, and load distribution during activities such as deep squatting, athletic activities, and Osteoarthritis pain management, where significant flexion and an increased possibility of injury are present. The brace's design developed within SolidWorks, incorporated a mechanical spring mechanism to mitigate excessive loads exceeding a specified flexion angle during squatting; subsequent to this, it was produced through Fused Deposition Modelling (FDM). Biomechanical assessment was conducted across three distinct conditions: without a brace, with a commercially available brace, and with the 3D-printed PLA brace. Testing was executed within a GAIT laboratory, thereby facilitating precise and reproducible evaluation of knee joint kinematics and temporal metrics throughout dynamic tasks, including squatting and walking. Biomechanical modeling and simulation were also conducted using OpenSim, enabling the assessment of joint loads, muscle forces, and movement patterns; this methodology proved beneficial for evaluating performance in contexts such as rehabilitation, injury prevention, and the design of assistive technologies. The experimental results revealed that the spring-integrated PLA brace promoted knee movement that more closely approximated the physiological state, exhibiting a 17–22% increase in the range of motion and an approximate 15% reduction in angular velocity fluctuations relative to the commercially available brace, while concurrently maintaining joint stability during both squatting and ambulation. As a result, the customized PLA brace exhibited a superior anatomical fit and a roughly 12% reduction in peak flexion resistance, implying a more natural joint function under increased load. Consequently, the findings suggest that patient-tailored, spring-assisted PLA knee braces, fabricated through additive manufacturing, present a viable and ecologically sound substitute for conventional orthotic devices. These braces offer load-adaptive support, enhanced mobility, and the utilization of sustainable materials.

**Keywords:** 3D Printing, PLA Material, Spring-Assisted Knee Brace, GAIT Laboratory, OpenSim, Squatting, Walking, Sustainable Design

## **System Development for Value Added Products from Banana Waste**

Nikhil Desai<sup>1\*</sup> and Kashinath Patil<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [nikhil.desai@somaiya.edu](mailto:nikhil.desai@somaiya.edu)

### **Abstract:**

Banana cultivation produces huge amount of biomass waste which has large potential for utilization in various household and industrial uses. Worldwide approximately 113.2 million tonnes of banana are produced every year and India is the highest banana-producing country in the world with 29.12 million tonnes of banana per year. Every tonne of banana fruit production, approximately 4 tonnes of biomass waste, which contains banana leaf, pseudo stem, rotten fruits, peel, fruit bunch stem, etc. The Banana pseudo-stem constitutes a major part of a banana plant. Banana pseudo-stem contains 90% moisture. On average, from one hectare banana plantation around 12000 to 15000 liters banana pseudo-juice (sap) can be obtained. Therefore, in India 124.7 billion liters of banana pseudo stem juice can be produced. This sap is a useful source for to get distilled water and soil nutrients. The banana sap contains 96 % water and 4% soil micro nutrients. The proposed methodology shows the process to utilize banana pseudo-stem juice to produce distilled water and organic fertilizer. Thus, in India potentially  $11.97 \times 10^{10}$  liters of distilled water 3.741 billion liters of soil nutrients can be produced. In the proposed process, the mechanical extraction system is designed to get banana pseudo-stem juice after harvesting the banana crop. The distilled water and soil micro nutrient is extracted with the distillation process. Solar energy assisted water and nutrient separator and extractor is designed to reduce energy footprints. The major components of this system are juice extractor, evaporator, condenser, solar heating system, etc.

**Keywords:** Pseudo-stem, distilled water, solar heating system, soil micro nutrient, organic fertilizer

## Advanced Nanofluid-Based Microchannel Cooling for Electric Vehicle Batteries: Performance and Energy Trade-Offs

Akash Bidwaik<sup>1\*</sup>, Siddappa Bhusnoor<sup>1+</sup>, Shailesh Nikam<sup>1+</sup>, Lakshmikant Hari<sup>2+</sup> and Muzammil Ahmad Shaikh<sup>3+</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Centre for Sustainable Development, K J Somaiya Institute of Management, Somaiya  
Vidyavihar University, Mumbai*

<sup>3</sup>*Somaiya Institute for Research & Consultancy (SIRAC), Somaiya Vidyavihar University,  
Mumbai*

Email: [akash.bidwaik@somaiya.edu](mailto:akash.bidwaik@somaiya.edu)

### Abstract:

The rapid growth of electric vehicles demands highly efficient battery thermal management systems to ensure the safety, performance, and durability of high-energy-density lithium-ion batteries. This study numerically investigates the thermo-hydraulic performance of a microchannel-based liquid-cooled battery thermal management system employing nanofluids. The effects of nanoparticle type, concentration, particle size, and Reynolds number on heat transfer, pressure drop, and overall thermal efficiency were systematically analyzed. Various nanofluid categories were examined across a volume concentration range of 0.1% to 1% and Reynolds numbers ranging from 400 to 700. Results indicate that Al<sub>2</sub>O<sub>3</sub>/water nanofluid consistently provides the most balanced performance, achieving a stable thermo-hydraulic ratio ( $h/\Delta P \approx 1.25$  at  $Re = 400$ ) and retaining superiority up to  $Re = 700$  with only a 25% increase in pressure drop. The optimal concentration range across all nanofluids was identified as 0.1–1%, where thermal benefits are maximized without excessive hydraulic penalties. Particle size significantly influenced system behavior: nanoparticles of 10–20 nm improved heat transfer by ~3.2%, but also increased pressure drop by ~20%, emphasizing the importance of optimizing size for practical applications. The nanofluid-assisted cooling reduced maximum cell temperature from ~310 K (water) to ~303.6 K (1% Al<sub>2</sub>O<sub>3</sub>,  $Re = 700$ ), while lowering thermal gradients from 3.5 K to 1.7 K a 51% improvement in uniformity. Despite a modest increase in pumping power (~24%), the substantial gains in heat transfer (~18%) and thermal uniformity demonstrate the potential of optimized Al<sub>2</sub>O<sub>3</sub> nanofluids to deliver energy-efficient and thermally stable battery thermal management systems, thereby advancing the reliability of next-generation lithium-ion batteries.

**Keywords:** Nanofluid cooling, Microchannel heat exchanger, Battery thermal management system, 21700 Li-ion cell, Electric vehicle, Thermo-hydraulic performance, Particle size

Manuscript for this abstract was submitted for internal review

## Numerical Modelling of Sand Casting: A Predictive Framework for Process Optimization

Rajesh Mandale<sup>1\*</sup>, Sangita Bansode<sup>1†</sup> and Shailesh Nikam<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [rajesh.mandale@somaiya.edu](mailto:rajesh.mandale@somaiya.edu)

### **Abstract:**

Sand casting is the most common, cost-effective and a general-purpose manufacturing method to produce a variety of metal components, however it is prone to defects like shrinkage cavity, porosity, hot spots due to improper heat transfer. In spite of its simplicity, the process is associated with extremely complex process of fluid flow and heat transfer. Mathematical modelling is an essential tool to understand, stimulate, and optimize such processes. This paper presents a mathematical model for sand casting with molten metal on inner side of the mold wall and atmospheric air on the outside. A mathematical model is developed by finite difference method with one dimensional heat transfer. In this study combined mathematical and numerical modelling approach is employed to analyze transient heat transfer in sand casting with the objective of reducing casting defects. The governing heat conduction equation is first formulated through mathematical modelling incorporating relevant initial and boundary conditions representative of casting- mold system. The model is then discretized using finite difference method to enable numerical simulation of temperature distribution and cooling behavior during solidification. The mathematical modelling will increase the predictive capability to avoid defects in the casting and costly trial and error on shop floor thus leads to decrease the cost and time.

**Keywords:** Mathematical modelling, Solidification, Mold, Heat transfer, Casting defects, Finite difference method (FDM)

## Process Optimization for the Manufacturing Industry using the Digital Twin

Seema Nagrani<sup>1\*</sup> and Vaibhav Narwane<sup>2†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [r.jaisinghani@somaiya.edu](mailto:r.jaisinghani@somaiya.edu)

### **Abstract:**

In Industry 4.0, various emerging technologies are used, such as Digital Twin (DT). DT technology enables the simulation of scenarios that are otherwise impractical or time-consuming and costly. Therefore, DT simulations are used in the manufacturing industry to evaluate process efficiency through discrete-event simulation. In this study, the manufacturing process is used as a case study to develop a DT simulation model. The results indicate that the proper selection of plant layout can optimize manufacturing time. Hence, the study offers practical benefits to manufacturing industries by enabling performance evaluation and optimization through simulation before implementing changes in the actual system. This study guides industry professionals in implementing DT to optimize various processes.

**Keywords:** Digital twins, simulation, smart manufacturing, Industry 4.0, optimization.

## Experimental Study of Microfiber Air Filter Efficiency and Pressure Drop at Different NaCl Aerosol Concentrations and Dilution Rates

Yunus Dalal<sup>1\*</sup> and Siddappa Bhusnoor<sup>2†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [yunus.dalal@somaiya.edu](mailto:yunus.dalal@somaiya.edu)

### Abstract:

Efficient removal of fine and ultrafine particulate matter is essential for improving indoor air quality and reducing health risks associated with airborne pollutants. This study experimentally evaluates the performance of Whatman Glass Microfiber Filters (GFC 47mm) under controlled laboratory conditions using a structured experimental matrix. A total of 54 test runs were conducted by systematically varying sodium chloride aerosol concentration (40 and 60 grams per liter of water), dilution flow rate (40–80 lpm) and number of active nozzles (1, 3, and 6) at a suction flow rate of 20 lpm. Filtration efficiency was evaluated using gravimetric data, TSI DustTrak II Aerosol Monitor and Handheld Optical Particle Counter (Hal Tech HAL-HPC601) measurements and pressure drop was measured using Digital Differential Pressure Manometer (testo 512- 2 hPa) across the GFC filter. Gravimetric results indicate that higher aerosol loading significantly enhanced particle capture, with filtration efficiencies ranging from 88.63% to 96.69% at 60 grams per liter of NaCl concentration, compared to 88.93–92.79% at 40 grams per liter of NaCl concentration. Increasing dilution flow rate reduced mass loading and filtration efficiency by approximately 2–4%, particularly at higher nozzle counts, due to reduced particle residence time. DustTrak measurements exhibited similar concentration-dependent trends, with average removal efficiencies exceeding 95% at higher aerosol concentrations and lower dilution rates. Particle counter data showed consistent reductions of 65–75% for PM<sub>1</sub> and PM<sub>2.5</sub>, and total suspended particulate removal above 90% under optimized conditions. Comparison of the three measurement techniques demonstrates strong agreement in observed performance trends, while highlighting the complementary roles of mass-based, real-time, and size-resolved assessments. The results support the application of microfiber filters as an effective and energy-efficient solution for sustainable indoor air quality management.

**Keywords:** Microfiber filters, Filtration efficiency, Particulate matter, Aerosol concentration, Pressure drop, Indoor air quality.

Manuscript for this abstract was submitted for internal review

## Biochar-Based Fertilizer Production from Agricultural Residues

Muzammil Shaikh<sup>1\*</sup> and Kashinath Patil<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [Muzammilahmad.s@somaiya.edu](mailto:Muzammilahmad.s@somaiya.edu)

### **Abstract:**

Agricultural residue burning remains a persistent environmental, agronomic, and socio-economic challenge in many developing countries, particularly in India, where large volumes of crop residues such as sugarcane trash, rice husk, and wheat straw are routinely disposed of through open-field burning. Despite extensive research on biomass valorization, the translation of laboratory-scale technologies into affordable, field-deployable solutions for small and marginal farmers remains limited. The work presents a framework and research roadmap for sustainable fertilizer and energy production from agricultural residues using a mobile, climate-smart processing approach. The study systematically reviews existing literature on biochar production, nutrient-enriched biochar fertilizers, and decentralized biomass conversion technologies, identifying critical gaps related to system integration, mobility, on-site processing, and farmer-level adoption. Based on this analysis, key problem statements are formulated, highlighting the lack of scalable on-farm residue management systems, low fertilizer use efficiency, and insufficient linkage between carbon capture technologies and soil health improvement practices. To address these challenges, a strategic research plan centered on the development of a mobile pyrolysis-cum-fertilizer production unit capable of converting agricultural residues directly at the farm site into biochar, bio-energy carriers, and value-added fertilizers. The proposed strategy integrates residue preprocessing, controlled pyrolysis, biochar nutrient enrichment, and dual fertilizer pathways—chemical and organic—within a single modular platform. The scope of the research encompasses system design and simulation, biochar-fertilizer formulation strategies, field-level deployment planning, and socio-economic and environmental impact assessment frameworks. The framework will outline the understanding about the field study of agricultural waste such as maize, sugar cane trash, and cotton waste, etc.

**Keywords:** Agricultural residue management; Crop residue burning; Biochar-based fertilizers; Mobile pyrolysis; Sustainable agriculture; Biomass valorization.

## Hemodynamic Investigation of Cerebral Aneurysm: A Numerical Study

Nidhi Singh<sup>1\*</sup> and Shailesh Nikam<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [nidhi.singh5@somaiya.edu](mailto:nidhi.singh5@somaiya.edu)

### **Abstract:**

Cerebral aneurysms are abnormal bulges that develop in the blood vessels of the brain and can lead to severe, life-threatening bleeding if rupture occurs. Although advances in medical imaging and treatment have improved clinical outcomes, the underlying mechanisms responsible for aneurysm growth and rupture are still not fully understood. Hemodynamic factors such as velocity patterns, pressure distribution, flow recirculation, and especially wall shear stress (WSS) are believed to play a critical role in aneurysm behaviour. Therefore, a detailed investigation of blood flow characteristics inside cerebral aneurysms is essential to improve the understanding of aneurysm development and to enhance rupture risk prediction. In this study, blood flow inside saccular cerebral aneurysms is investigated using computational fluid dynamics (CFD). The primary objectives are to examine the influence of aneurysm geometry and to study how blood rheology, modeled as Newtonian fluid behaviour, affects hemodynamic parameters. A simplified three-dimensional model of a cerebral artery with an aneurysm located at a curved section is developed to represent realistic vascular conditions. The governing equations for laminar, incompressible flow are solved using the finite volume method. Elliptical aneurysm neck is considered to analyse the effect of aneurysm size on blood flow behaviour. Simulations are performed under steady inlet flow conditions. For simplicity, the arterial wall is assumed to be rigid. Hemodynamic parameters such as velocity distribution, pressure variation, vortex formation, flow recirculation, and wall shear stress are evaluated. In comparison with a normal curved artery, the presence of an aneurysm markedly modifies the hemodynamic characteristics. The pressure slightly decreases within the aneurysm sac and sharply increases at the distal neck region. Wall shear stress initially decreases inside the aneurysm and subsequently increases near the exit. The formation of strong recirculation zones with near-zero velocity enhances blood constituent deposition, which may weaken the vessel wall and elevate the likelihood of aneurysm rupture, leading to hemorrhage.

**Keywords:** Cerebral aneurysm; Computational fluid dynamics (CFD); Hemodynamic; Wall shear stress (WSS); Blood rheology; non-Newtonian fluid; Aneurysm geometry

## Digital Twin Based Energy Optimization in Water Distribution Systems

Jyoshna Deshmukh<sup>1\*</sup> and Siddappa Bhusnoor<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [jyoshna.d@somaiya.edu](mailto:jyoshna.d@somaiya.edu)

### **Abstract:**

Energy consumption represents a significant portion of operational costs and environmental impacts in water distribution systems, primarily due to pumping and pressure management requirements. As utilities strive to meet sustainability and carbon reduction goals, there is a growing need for intelligent tools that can optimize energy use while maintaining service reliability. Digital Twin (DT) technology has emerged as an effective approach for addressing these challenges by enabling real-time monitoring, predictive analysis, and optimization of water distribution operations. This paper investigates the application of digital twin technology for energy optimization in water distribution systems. A digital twin integrates real-time sensor data, supervisory control and data acquisition (SCADA) systems, hydraulic models, and artificial intelligence-based analytics to create a dynamic virtual representation of system operations. Within this framework, energy consumption patterns associated with pumping, storage, and pressure control can be continuously evaluated and optimized. The study focuses on digital twin-enabled strategies such as optimal pump scheduling, adaptive pressure management, and demand-responsive control. By simulating multiple operational scenarios in real time, the digital twin identifies energy-efficient operating strategies that reduce electricity consumption and peak demand without compromising hydraulic performance or water quality. Predictive analytics further enhance decision-making by forecasting demand fluctuations and energy prices, allowing utilities to proactively adjust operations. In addition to technical benefits, the paper discusses practical challenges related to data quality, computational scalability, and integration with legacy infrastructure. Cybersecurity and operational reliability are also highlighted as critical considerations for real-world deployment. The findings indicate that digital twin-based energy optimization can significantly reduce operational costs and carbon emissions, supporting sustainable and cost-effective water utility management. The study concludes that digital twins are a key enabling technology for achieving energy-efficient and environmentally responsible water distribution systems.

**Keywords:** Digital Twin, Energy Optimization, Water Distribution Systems, Pump Scheduling, Pressure Management, SCADA, Sustainable Water Management

## **Abstracts: Engineering – Energy Engineering**

### **Oral Presentations:**

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# **Influence of magnesium nitrate on density behaviour of $\text{NaNO}_3$ - $\text{KNO}_3$ - $\text{Mg}(\text{NO}_3)_2$ ternary salt systems for concentrating solar power applications: A geometric modelling approach**

Pranjal Gandhre<sup>1\*</sup> and Luckman Muhmood<sup>1†</sup>

*<sup>1</sup>Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [pranjal.gandhre@somaiya.edu](mailto:pranjal.gandhre@somaiya.edu)

## **Abstract:**

This study applies the General Solution Model (GSM) to predict densities of the ternary nitrate salt system  $\text{NaNO}_3$ - $\text{KNO}_3$ - $\text{Mg}(\text{NO}_3)_2$  for use as thermal energy storage and heat transfer fluid in concentrated solar power plants. Density correlations for unary and binary subsystems were compiled from literature and experimental measurements were made where literature data was unavailable. Excess densities and similarity coefficients were calculated to quantify non-ideal mixing behaviour. The GSM was used to estimate densities of four ternary compositions across 400–700K. Results showed increasing deviation between predicted and actual densities with higher  $\text{Mg}(\text{NO}_3)_2$  content, with relative error up to 10%. This was attributed to complex non-ideal mixing of  $\text{Mg}(\text{NO}_3)_2$  and inconsistency of available thermophysical data. While demonstrating the utility of geometric modelling, the study highlights critical dependence on accurate input parameters for predicting properties of higher order systems.

**Keywords:** Molten salts, Heat transfer fluids, Thermophysical properties, Density prediction, General Solution Model

## Assessment of Utilisation of Waste-derived Material as a Fuel at a Cement Plant in India

Kaustubh Phadke<sup>1\*</sup> and Luckman Muhmood<sup>1†</sup>

<sup>1</sup>*Department of Mechanical Engineering, K J Somaiya School of Engineering  
Somaiya Vidyavihar University, Mumbai*

Email: [kaustubh.phadke@somaiya.edu](mailto:kaustubh.phadke@somaiya.edu)

### Abstract:

The Indian cement sector is the second-largest producer and is expected to grow by 3 to 6 times from 453 million tons/year (2025) to 2050. It is the most energy-efficient among other countries and is a progressive sector in finding ways to reduce its emission footprint. The cement industry is vital in strengthening the circular economy by utilising secondary aggregates, cementitious industrial by-products, and alternative fuels in cement kilns. The calcination process in cement manufacturing generates CO<sub>2</sub> emissions. Also, it requires a substantial amount of fossil fuel (coal or pet coke) to heat limestone to 1400 °C, resulting in higher CO<sub>2</sub> emissions per ton of cement (Process and fuel emissions). The thermal Substitution Rate in the Indian cement industry is around 7% below the world average of 20%, and there is enormous potential to harness alternative fuels. The Municipal Solid Waste (MSW) generated in large quantities is disposed of at dumping grounds. Also, there are environmental issues in the disposal of other industrial wastes. A segregated non-recyclable material with a higher calorific value, i.e., Refuse-derived fuel (RDF), is being separated from MSW for use as an alternative fuel in cement kilns. Increasing the use of RDF and industrial waste as a fuel will reduce fossil fuel consumption and resulting GHG emissions, divert waste from landfill sites, and extend the lifespan of landfill sites. This should be done without impacting the quality of the cement. This paper discusses the obstacles to increasing the utilisation of RDF and other industrial wastes as a fuel at the cement plant, conducting trials at a cement plant with varied percentages of waste-derived fuels, policy support for increasing alternative fuel use, and incentivising the adoption of a circular economy to utilise waste-derived fuel at cement plants.

**Keywords:** Refuse Derived Fuel (RDF), Municipal Solid Waste (MSW), industrial waste, Cement, net-zero, Circular Economy, CO<sub>2</sub>

## Abstracts: Education

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## Experiential learning as a catalyst for behavioral engagement in mathematics classrooms

Kiran Gupta<sup>1</sup> and Rupal Thakkar<sup>1</sup>

<sup>1</sup>*Department of Education, K J Somaiya School of Education,  
Somaiya Vidyavihar University, Mumbai*

Email: [kiran.gupta1@somaiya.edu](mailto:kiran.gupta1@somaiya.edu)

### **Abstract:**

The concept of “student engagement” is based on the belief that learning improves when students are inquisitive, interested, inspired and the same learning tends to suffer when students are bored, dispassionate, disaffected or otherwise “disengaged”. As engagement is a multidimensional construct encompassing cognitive, affective and behavioral dimensions, this study primarily examined the effectiveness of the Experiential Learning Approach on behavioral engagement in mathematics among middle-stage students. To find out the effectiveness of the Experiential Learning Approach on engagement, the researcher conducted quantitative research on 80 students (40 experimental and 40 control) of middle-stage students in private schools. While the experimental group was taught using Experiential Learning strategies, the control group received instruction through traditional methods. Both the groups were then given a student engagement scale which had 57 questionnaires based on Likert’s scale, with particular emphasis on behavioral engagement, which covered three types of engagement including cognitive, behavioral and affective. The descriptive analysis revealed that students in the experimental group demonstrated higher engagement, especially in terms of behavioral engagement, compared to the control group. Inferential analysis using independent samples t-tests showed statistically significant differences ( $p < 0.001$ ) in behavioral engagement between the experimental and control groups, with large effect sizes ( $\Omega^2 = 0.16-0.53$ ), confirming the strong impact of the Experiential Learning Approach on students’ behavioral engagement in mathematics.

**Keywords:** Experiential learning, Kolb cycle, Behavioral engagement, Mathematics, Middle stage students

Manuscript for this abstract was submitted for internal review

## Effect of embodied sequential drawing video on students' understanding of digestive system

Rutuja Kharambale<sup>1</sup> and Pooja Birwatkar<sup>1</sup>

<sup>1</sup>*KJ Somaiya School of Education, Somaiya Vidyavihar University, Mumbai*

Email: [kharambale.r@somaiya.edu](mailto:kharambale.r@somaiya.edu)

### **Abstract:**

In humans, various physiological processes are being carried out in coordination with different biological systems. Understanding complex biological systems such as the human digestive system is challenging for many students in remembering sequences, functions of digestive track and spatial relationship among various organs. In biology classrooms, diagrams are used heavily to represent such processes; however, students often struggle to interpret diagrammatic conventions such as arrows, relative size, colour, flow direction, organ relationships, and nested patterns. This qualitative study explores the role of embodied (hand-drawn) sequential drawing instructional videos in enhancing students' diagram comprehension of the human digestive system. Twenty grade XI biology students watched eighteen minutes embodied sequential drawing video in which the human digestive system was gradually drawn while being narrated. Students also practiced drawing along with the video. Data were collected through students' generated diagrams, written reflections, semi-structured group interviews and analysed using thematic analysis. The findings indicate that the embodied sequential drawing video promoted better sequential understanding, higher engagement, and more accurate interpretation of flow relationships among digestive organs, including the stomach, digestive glands, intestine, and accessory organs. Students reported that the visible drawing hand and gradual construction of the diagram helped them follow the digestive process, understand key diagram symbols, and remember structural and functional connections between organs. The study suggests that well-designed embodied sequential drawing videos can act as an effective pedagogical scaffold by making visual conventions explicit and supporting process-based reasoning in biology learning. This research underscores the importance of balancing effective techniques with proper learning strategies to optimize educational outcomes.

**Keywords:** Sequential diagram, Embodied drawing, Instructional videos, Diagram comprehension

Manuscript for this abstract was submitted for internal review

## Enhancing the interpretive reading and analytical writing skills and promoting engagement of secondary school students using a cognitive strategies approach

Priti Shanbhag<sup>1\*</sup> and Hema Bhadawkar<sup>1</sup>

<sup>1</sup> K J Somaiya School of Education, Somaiya Vidyavihar University, Mumbai

E-mail: [priti.shanbhag@somaiya.edu](mailto:priti.shanbhag@somaiya.edu)

### **Abstract:**

This study investigates the effectiveness of a pedagogical strategy grounded in a cognitive strategies approach to enhance interpretive reading, analytical writing skills, and student engagement among secondary school students (Grades 11–12) following the International Baccalaureate Diploma Programme (IBDP) curriculum. Drawing on constructivist theories (Bruner, 1990; Piaget) and cognitive frameworks of reading comprehension (Perfetti et al., 2008; Tierney & Pearson, 1983), the approach employs five key strategies, predicting, questioning, clarifying, visualizing, and summarizing to foster active meaning-making, deeper interpretation, and the integration of reading with analytical writing. Adopting an embedded quasi-experimental design, the research was conducted in a single co-educational IB-affiliated school in Tokyo with a sample of approximately 36 students. A traditional reading pedagogy was first applied to Grade 12 students, followed by implementation of the cognitive strategies intervention with Grade 11 students across three instructional cycles using IBDP-prescribed English texts. Quantitative data were collected through pre-tests, immediate post-tests, and delayed post-tests assessing interpretive reading and analytical writing with 20-mark rubrics, while student engagement was observed through active participation indicators. Qualitative data comprised semi-structured interviews and observational logs to explore emerging cognitive experiences during interpretation. Findings are expected to reveal statistically significant gains in post-test scores for interpretive reading, analytical writing, and engagement compared to pre-tests, with enduring effects demonstrated in delayed post-tests after controlling for pre-test performance. Qualitatively, the approach is anticipated to promote deeper cognitive engagement and renewed motivation. The study addresses gaps in interpretive reading pedagogy, offering practical implications for English teachers, curriculum developers, and policymakers in fostering 21st-century literacy skills. Future research could extend the intervention to larger, diverse samples and explore long-term impacts across varied curricula.

**Keywords:** Interpretive reading, Analytical writing, Cognitive strategies, Student engagement, Secondary education, English pedagogy

Manuscript for this abstract was submitted for internal review

## ARCH - augmented reality for chemistry conceptualisation

Priti Shukla<sup>1</sup>, Raunak Gupta, Vaibhav Vasani and Manisha Gawde<sup>1</sup>

<sup>1</sup>K J Somaiya School of Education, Somaiya Vidyavihar University, Mumbai

Email: [shukla.pj@somaiya.edu](mailto:shukla.pj@somaiya.edu)

### **Abstract:**

Chemistry in high school is widely regarded as one of the most difficult subjects due to its necessity for students to understand molecular structures and atomic interactions that are not observable directly. Traditional instructional tools, such as textbook diagrams and chalkboard drawings, only offer two-dimensional representations of inherently three-dimensional molecular systems. Consequently, most students fail to build accurate mental models of what molecules look like and how they behave. This research investigates whether AR technology can provide a better way to teach these abstract concepts. In this regard, we have developed a mobile application that allows students to use their smartphones to view and interact with 3D molecular models by scanning QR-code markers, enabling them to project molecules onto their screens, rotate them to explore different perspectives, and observe animations of chemical processes like bond formation that make molecular phenomena more tangible and interactive. This is an experimental design using two student groups. The experimental group will be exposed to the learning topics like chemical bonding and molecular geometry through the AR application, while the control group will receive the same lectures through traditional teaching. Learning outcomes are measured by achievement tests. Student engagement is monitored using standardized questionnaires. Previous studies suggest that AR interventions often produce gains in test performance of 15–25% compared to traditional methods, with specific strong effects on spatial reasoning skills. A distinctive hallmark of the present work is its strong emphasis on feasibility and implementability in school contexts. Unlike other AR systems that need specialized devices, our approach is merely based on the widely available smartphones and free QR-code markers, which are practical in the majority of schools with limited technological resources. It is in this respect that the present study will help ascertain if AR offers a scalable and cost-effective solution for strengthening chemistry education or whether barriers to adoption remain significant.

**Keywords:** Augmented reality, Chemistry learning, Mobile technology, Student achievement, visualization tools

Manuscript for this abstract was submitted for internal review

## **Design and development of a Universal Design for Learning (UDL)–based instructional module for secondary school social science**

Insiya Tambawala<sup>1</sup> and Manisha Gawde<sup>1</sup>

*<sup>1</sup>K J Somaiya School of Education, Somaiya Vidyavihar University,  
Mumbai*

[Email: i.tambawala@somaiya.edu](mailto:i.tambawala@somaiya.edu)

### **Abstract:**

Universal Design for Learning (UDL) has emerged as an inclusive pedagogical framework aimed at addressing learner variability by providing multiple means of engagement, representation, and expression. The present study focuses on the design and development of a UDL-based instructional module for Social Science at the secondary school level. The module is intended to enhance students' academic achievement and interest while ensuring equitable access to learning for diverse learners. The research adopts a design-based research approach, involving the systematic planning, development, implementation, and refinement of the UDL module aligned with selected Social Science units. The module integrates flexible instructional strategies, differentiated learning activities, multimodal resources, and varied assessment methods in accordance with UDL principles. A pre-test and post-test experimental design will be employed to assess the effectiveness of the module on students' academic performance, while students' interest will be measured using a validated interest scale. The study is currently in the module development and tool validation phase. Expert review and pilot testing are being conducted to ensure content validity, instructional alignment, and feasibility of classroom implementation. It is expected that the findings will provide empirical evidence on the effectiveness of UDL-based instructional modules in Social Science education and offer practical insights for teachers, curriculum planners, and educational leaders seeking to promote inclusive and learner-centred practices at the secondary level.

## **Pre-instructional understanding and acceptance of evolution among junior college students**

Mercy Varghese<sup>1\*</sup> and Pooja Birwatkar<sup>1</sup>

<sup>1</sup>*K J Somaiya School of Education, Somaiya Vidyavihar University, Mumbai*

Email: [mercy@somaiya.edu](mailto:mercy@somaiya.edu)

### **Abstract:**

Understanding students' views on biological evolution remains a persistent challenge in science education, particularly due to the conceptual complexity and socio-cultural sensitivity of the topic. Prior research indicates that students' engagement with evolution is shaped not only by scientific knowledge but also by epistemic beliefs, trust in evidence, and belief-influenced reasoning frameworks. However, limited qualitative research has examined how these factors interact prior to formal instruction, especially in junior college contexts within the Indian education system. This study addresses this gap by exploring junior college students' pre-instructional understanding of evolution, patterns of acceptance and rejection, and the role of evidence and belief-influenced reasoning in shaping their views. Using a qualitative descriptive research design, semi-structured interviews were conducted with 25 junior college students enrolled under the Maharashtra State Board and representing diverse belief backgrounds, prior to any instructional intervention. Data were analyzed thematically to identify dominant reasoning patterns and epistemic positions. Findings reveal that students exhibit fragmented conceptual understanding, selective acceptance of evolutionary claims, and varied epistemic trust in scientific evidence. While some students accepted evolution based on confidence in scientific authority or empirical observations, others expressed skepticism or rejection rooted in strongly held belief commitments, often engaging in compartmentalization or reconciliation between scientific explanations and personal belief systems. Students also articulated clear expectations for instructional approaches that emphasize evidence-based reasoning, dialogue, and respectful engagement with belief-influenced perspectives. These findings underscore the importance of examining students' pre-instructional perspectives to inform evolution education that is conceptually coherent, epistemically grounded, and contextually responsive. The study highlights the pedagogical value of socioscientific approaches in addressing not only misconceptions but also the epistemic and belief-related dimensions of evolution learning.

**Keywords:** Evolution education, Acceptance of evolution, Epistemic beliefs, Belief-influenced reasoning, Socioscientific issues, Junior college students

Manuscript for this abstract was submitted for internal review

## **Meta analysis of research studies based on use of DMAIC approach in education for improving educational quality**

Priya Rajwade <sup>1\*</sup> and Hema Bhadawkar <sup>1</sup>

<sup>1</sup>*K J Somaiya School of Education, Somaiya Vidyavihar University, Mumbai*

E-mail: [priya.rajwade@somaiya.edu](mailto:priya.rajwade@somaiya.edu)

### **Abstract:**

UNESCO defines the four pillars of education as knowledge, skills, social interactions and personal well-being. The New Education Policy 2020 in India has termed this as holistic development meaning overall development of learners leading to quality improvement in school education. DMAIC, a data driven quality improvement strategy popularly used in industry has proven to be an effective structured and rigorous approach in education. With clearly defined stages, process mapping and analytical tools it can be effectively used in quality improvement of complex educational processes. This systematic meta-analysis of effectiveness of the DMAIC approach in improving educational quality is based on critical review of 50 peer reviewed research papers published in high ranking educational journals from reputed databases and selected using systematic inclusion criteria such as publication year (2010-2025), diverse geographies, quantitative, qualitative and Mixed method research design, research objectives such as improvement in teaching learning process, academic achievement of students, learner motivation and engagement, learning and behaviour. Across reviewed literatures, the evidence consistently underscores the efficacy and potential of DMAIC approach and other tools of Six Sigma methodology in effecting a significant and measurable improvement in student learning outcomes, teacher efficacy, student motivation, student engagement and other aspects of educational processes. There is further potential to extrapolate the use of these approaches and tools to study their efficacy in bringing data driven improvement in the holistic development of students in a school setting to achieve the goals of education.

**Keywords:** DMAIC, Education, Holistic development, Data driven quality improvement, Six Sigma

Manuscript for this abstract was submitted for internal review

## Teachers' awareness and readiness for AI-supported differentiated instruction at the secondary school level

Alka Bansal<sup>1\*</sup> and Hema Bhadawkar<sup>1</sup>

<sup>1</sup>*K J Somaiya School of Education, Somaiya Vidyavihar University, Mumbai*

Email: [alka.bansal@somaiya.edu](mailto:alka.bansal@somaiya.edu)

### **Abstract:**

Artificial Intelligence is gradually making its presence in the educational space. It is offering promising solutions that can help transform the way in which education is imparted. Differentiated Instruction is one such area where AI can support in helping educators personalize the learnings of students. In a country like India, where class size is large and diversified, AI-driven tools offer a real potential to support personalization by addressing students' diverse needs, abilities, and learning styles. These possibilities can only be explored and implemented if there is teacher acceptance and understanding. This study explores teachers' levels of awareness and readiness toward the implementation of AI-driven differentiated instruction. Using a quantitative research approach, data was collected through a survey of 100 Secondary teachers of CBSE schools to examine their knowledge of both differentiation (pedagogy) and related AI applications (technology). The findings reveal that teachers demonstrate an above average awareness and readiness for AI in education especially in the context of differentiated instructions. The study also concludes that while age is not a factor affecting the awareness and readiness levels, experience certainly leads to higher levels of awareness and preparedness. The inconsistencies observed in the relationship between awareness and readiness may be attributed to gaps that remain in practical knowledge, technical skills, and institutional support. Factors such as access to training, infrastructure, and addressing the ethical concerns are critical to improving the overall implementation of AI driven differentiated instructions. AI is increasingly paving its way into education and the teachers are willing to change, however it is the responsibility of the owners, leaders and decision makers to evaluate the benefits of AI in education and provide the opportunities in the form of infrastructure, training and support to ensure that the teachers and students utilise AI in a more structured and ethical manner.

**Keywords:** Education, Technology, Differentiated instruction, Artificial Intelligence, Personalised learning, Teacher awareness, Teacher readiness

Manuscript for this abstract was submitted for internal review

## **Impact of design thinking based inclusive pedagogies on teacher effectiveness and student engagement: a mixed method study**

Zehra Shaikh<sup>1</sup> and Rupal Thakkar<sup>1</sup>

<sup>1</sup> *K J Somaiya College of Education, Somaiya Vidyavihar University, Mumbai*

Email: [zehra.shaikh@somaiya.edu](mailto:zehra.shaikh@somaiya.edu)

### **Abstract:**

This research investigates the implementation and outcomes focusing on its impact on student engagement and critical thinking skills. The purpose of this study was to determine (1) the design thinking learning module (2) to develop a research methodology module based on the effectiveness of the learning module with a thinking process as a cycle of :(1) empathizing and observing (2) defining the problem (3) creating ideas (4) prototyping (5) testing For Design Thinking in Inclusive Education. Employing a mixed-methods approach, the study combines quantitative surveys and qualitative interviews to provide a comprehensive analysis of Design Thinking in Inclusive education in 2 phases to examine the perspectives and experiences for both student and the educators using the student engagement motivation survey followed by student focussed groups discussion. The feedback provided can aid instructors in adjusting and adapting their teaching approach in using phase 1 to define the problem to eliminate barriers to learning for their students. The paper follows literature review in the area of student engagement and critical thinking. Specifically, the reading suggests that work in the area of student engagement is the change from focusing upon disengaged to engagement through critical thinking as outlined by NEP 2020. A general overview of the pilot testing in a robust framework of design thinking tool crafted with learning theories of constructionism, behaviourism, cognitivism & connectivism were designed and used as background to identifying and understanding problems associated with learning experiences.

**Keywords:** Design thinking in inclusive classrooms, Critical thinking, Problem solving, Student engagement, Constructionism, Analysis, Design thinking tool

## **Abstract: Humanities & Social Sciences**

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## Understanding labour outcomes among gig workers in Mumbai's food and beverage sector: A principal component analysis

Khushboo Lala<sup>1\*</sup> and Sanjay Rode<sup>1†</sup>

<sup>1</sup>*Somaiya School of Humanities and Social Sciences,  
Somaiya Vidyavihar University, Mumbai*

Email: [khushboo.lala@somaiya.edu](mailto:khushboo.lala@somaiya.edu)

### Abstract

The rapid expansion of gig employment in India's urban service economy has intensified concerns about the working conditions and labour outcomes of workers engaged outside standard employment relationships, particularly in labour intensive sectors such as food service activities. While existing studies on gig employment have primarily emphasised income or employment flexibility, limited research has adopted a multidimensional socioeconomic perspective to examine labour outcomes among urban gig workers. This study addresses this gap by analysing gig workers in the food service industry in the Mumbai Metropolitan Region, focusing on how key socioeconomic variables including age, education, monthly income, household asset ownership and access to social security benefits shape work life balance, work motivation and job satisfaction. The analysis is based on primary survey data collected from 2,000 gig workers across different spatial corridors of the Mumbai Metropolitan Region. Principal Component Analysis is employed to reduce a set of interrelated socioeconomic and workplace variables into a smaller number of latent dimensions, followed by regression analysis using Principal Component Analysis derived component scores. The Principal Component Analysis identifies four principal components representing employment security and institutional support, work intensity and time pressure, economic stability and household assets, and workplace well-being and recognition. Regression results indicate that employment security and workplace well-being are strongly and positively associated with work life balance, work motivation and job satisfaction, whereas high work intensity significantly undermines work life balance and job satisfaction. Economic stability contributes positively to work motivation, although its effect is comparatively weaker. By integrating socioeconomic characteristics with workplace indicators, this study contributes to the literature on gig employment and demonstrates the analytical value of Principal Component Analysis in examining complex employment relationships in urban informal labour markets. Although the analysis is limited to a single metropolitan region, the findings underscore the need for policy interventions aimed at improving employment security, managing work intensity and strengthening workplace support mechanisms to enhance labour outcomes among urban gig workers in India's food service sector.

**Keywords:** Informal labour, Urban gig worker, Workforce dynamics, Food service industry, Worker well-being

Manuscript for this abstract was submitted for internal review

## **A study of the effect of digital media training on business performance of women entrepreneurs**

Saurabhi Shetye<sup>1\*</sup> and Saranya Thaloor<sup>1\*</sup>

<sup>1</sup>*Somaiya School of Humanities and Social Sciences  
Somaiya Vidyavihar University, Mumbai*

Email: saurabhi.s@somaiya.edu, saranya.t@somaiya.edu

### **Abstract:**

The rapid expansion of digital media has fundamentally transformed contemporary entrepreneurial practices by enabling cost-effective marketing, customer engagement, and market access, particularly for small and medium enterprises operating in resource-constrained environments. Within this evolving digital ecosystem, women entrepreneurs increasingly rely on digital media platforms for business growth; however, their effective utilisation of these tools depends heavily on structured digital media training that builds digital literacy, strategic competence, and confidence. Despite the recognised importance of digital technologies in entrepreneurship, there remains limited empirical evidence explaining how structured digital media training specifically influences the overall business performance of women entrepreneurs across measurable dimensions. Here we show that participation in structured digital media training significantly enhances the business performance of women entrepreneurs by improving their digital media literacy, strategic engagement, and application of digital marketing tools. The study employed an intervention-based research design involving pre- and post-training assessment of women entrepreneurs who underwent structured digital media training. Business performance was evaluated using three key indicators: revenue growth, market expansion, and customer satisfaction. Quantitative analysis of data collected before and after the training intervention revealed a statistically significant improvement across all three performance dimensions, alongside enhanced digital confidence, strategic content usage, and data-driven decision-making capabilities among participants. These findings demonstrate that digital media training functions as a strategic enabler for women-led enterprises, contributing not only to improved business outcomes but also to broader goals of economic inclusion, entrepreneurial empowerment, and sustainable digital participation in the evolving digital economy.

**Keywords:** Business performance, Digital literacy, Digital media training, Entrepreneurship, SME

Manuscript for this abstract was submitted for internal review

## **A critical discourse analysis of religious minorities in Indian national media and its educational implications on minorities**

Bushra Satkhed<sup>1\*</sup> and Saranya Thaloor<sup>1 †</sup>

*<sup>1</sup>Department of Mass Communication, Somaiya School of Humanities and Social Science, Somaiya Vidyavihar University, Mumbai*

Email: [bushra.satkhed@somaiya.edu](mailto:bushra.satkhed@somaiya.edu)

### **Abstract:**

Media discourse is a powerful form of public pedagogy that influences public knowledge, social attitudes, and processes of learning in culturally diverse societies. In India, prime time news on TV continues to shape the discourse of religious minorities. This paper aims to investigate how religious minorities are presented in the Indian prime-time news on television, revealing how this contributes to the meaning-making processes in minority education in a culturally diverse society. Despite increasing scholarship about minority representation studies in popular culture, very little research exists to date concerning national television news as a construct of framing religious minorities in India and the ways these discourses are disseminated as informal educational contexts. Using Critical Discourse Analysis (CDA), the study analyzed nine episodes of prime-time news programs aired from 8:00 PM to 10:00 PM on five major Indian national news channels, both English and Hindi language news channels (selected based on popularity ratings), from the period of July to December 2024. The study exposed patterns in ideological framing, visibility, and narratives with regard to religious minorities and positioning within and among dominant political and cultural narratives. The impact of these mediated narratives is a normalization process for exclusionary ideas, which influence informal learning about minority communities beyond formal educational spaces. The article under discussion has noted the importance of national media as a significant learning site and has underlined how media narratives impact issues with regard to cultural sustainability and learning within and among minorities and multicultural societies.

**Keywords:** Primetime television news, Religious minorities, Media representation, Critical discourse analysis, Minority education

Manuscript for this abstract was submitted for internal review

## **From English to Hindi: How languaging negotiates authority and authenticity in WWE promos: An evaluation**

Sagar Karande<sup>1</sup> and Saranya Thaloor<sup>1</sup>

<sup>1</sup>*Somaiya School of Humanities and Social Science,  
Somaiya Vidyavihar University, Mumbai*

Email: [sagar.karande@somaiya.edu](mailto:sagar.karande@somaiya.edu), [saranya.t@somaiya.edu](mailto:saranya.t@somaiya.edu)

### **Abstract:**

When WWE wrestlers deliver English promos re-voiced into Hindi for Indian audiences, the same performance generates different meanings—their authority, authenticity, and character interpreted through distinct cultural lenses. This study reveals how para-dubbing functions as strategic languaging, not neutral translation, reshaping dialogic relationships across linguistic boundaries. This mixed-methods study examines English-to-Hindi para-dubbing as a form of strategic language in WWE promos, investigating how multilingual revoicing constitutes meaning making and acquires localized cultural significance in global sports entertainment. Centering languaging as dynamic, situated meaning negotiation, the research draws on Bakhtin's dialogism and Edward T. Hall's high-context and low-context communication framework to analyse how heteroglossic voices and linguistic resources reshape promo interpretation across English and Hindi versions. The study triangulates three complementary data sources: (1) detailed textual analysis of three WWE promos utilizing dialogic and cultural communication frameworks to map how para-dubbing introduces new heteroglossic layers, register shifts, and languaging practices that renegotiate wrestler authenticity, authority, and audience alignment; (2) Stuart Hall's encoding/decoding model applied to qualitative survey responses from over 40 mass media students in Mumbai (Gen Z, ages 18–24) to examine how Hindi-speaking audiences decode and interpret languaging in para-dubbed promos relative to their English-language counterparts; and (3) expert industry observation documenting the cultural and linguistic challenges specific to Hindi sports entertainment commentary and dubbing practices. Findings reveal that para-dubbing functions not as neutral translation but as active languaging—Hindi localization reframes dialogic relationships, rhetorical force, and cultural resonance according to high-context communication norms prevalent among Indian viewers. The study demonstrates that languaging actively constitutes meaning-making in transnational media, with implications for understanding how global entertainment franchises negotiate linguistic diversity and local interpretive frameworks. Results contribute to scholarship on multilingual media reception, translation studies, and cross-cultural communication while offering insights into localization strategies for multilingual audiences.

**Keywords:** WWE promos, Live para-dubbing, Hindi localization, Generation Z, Meaning construction

Manuscript for this abstract was submitted for internal review

## Reconfiguring Indian family values in OTT narratives: A critical analysis of select Indian web series

Neha Kulkarni<sup>1</sup> and Saranya Thaloor<sup>1</sup>

*<sup>1</sup>Department of Mass Communication, Somaiya School of Humanities and Social Science, Somaiya Vidyavihar University, Mumbai*

Email: [neha.kulkarni@somaiya.edu](mailto:neha.kulkarni@somaiya.edu)

### **Abstract:**

The rapid expansion of over-the-top (OTT) streaming platforms has transformed media consumption in India, reshaping how cultural norms, social relationships, and everyday values are represented through digital narratives. Within this evolving landscape, Indian OTT web series increasingly reinterpret traditional family values—such as collectivism, inter-generational authority, and long-term familial responsibility—by foregrounding individual choice, emotional autonomy, and modern work-life priorities. Despite growing scholarship on OTT consumption and content trends, limited critical attention has been paid to how OTT narratives actively reconfigure Indian family values and what this shift reveals about changing cultural priorities among working adults. This study critically analyses how select Indian web series reinterpret collectivism, authority, and familial obligation within contemporary digital storytelling. This study examines how Indian OTT web series reframe traditional family values by shifting emphasis toward individual autonomy and professional life priorities. An interpretive qualitative design is adopted, analysing a purposive sample of Indian OTT web series through thematic coding informed by cultural theory. The study is limited by its qualitative scope and selected sample, which restricts broader generalisability. Findings indicate that collectivist family values are not rejected but selectively reinterpreted, with decentralised authority and familial responsibility reframed as emotional choice rather than duty. These narrative shifts influence perceptions of family roles and inter-generational relationships among working adults. The study offers insights for OTT creators and policymakers to balance cultural authenticity with evolving social realities.

**Keywords:** Working adults, Family values, OTT narratives, Contemporary Indian society, urban Indian families

## Measuring risk, volatility and performance of emerging Small and Medium Enterprises (SME) stocks in India

Nishant Tawade<sup>1\*</sup> and Sanjay Rode<sup>1</sup>

<sup>1</sup>*Somaiya School of Humanities and Social Science,  
Somaiya Vidyavihar University, Mumbai, India*

Email: [nishant.tawade2000@gmail.com](mailto:nishant.tawade2000@gmail.com)

### **Abstract:**

The NIFTY SME EMERGE Index serves as a benchmark for emerging small and medium enterprises (SMEs) listed on the NSE Emerge platform, representing firms with high growth potential, innovation capability, and increasing participation in India's capital markets. Despite their growing importance in employment generation, industrial diversification, and post-COVID policy support through initiatives such as Make in India, PLI, and Aatmanirbhar Bharat, SME stocks remain relatively under-explored in empirical finance literature. This study aims to analyze the volatility dynamics and risk-adjusted performance of selected stocks from the NIFTY SME EMERGE Index using advanced econometric models. The study selects five top constituent stocks from the index based on objective criteria including higher index weight (free-float market capitalisation), adequate liquidity, and availability of continuous daily price data, ensuring representativeness and robustness of empirical analysis. Using daily return data over the study period, volatility behaviour is examined through GARCH (1,1), EGARCH, and GJR-GARCH models to capture volatility clustering, persistence, and asymmetric responses to positive and negative market shocks. Model performance is evaluated using information criteria and diagnostic tests to identify the most suitable volatility specification for SME stocks. In addition, the study evaluates risk-adjusted performance using the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha, providing a comprehensive comparison of returns relative to total risk, systematic risk, and CAPM-based expected returns. The combined analysis of volatility modelling and performance metrics offers insights into the risk-return trade-off in SME investments. The findings are expected to contribute to academic literature by highlighting the unique volatility characteristics of SME stocks and offering practical implications for investors, portfolio managers, and policymakers seeking exposure to high-growth emerging enterprises through thematic indices.

**Keywords:** NIFTY SME EMERGE Index, GARCH models, Volatility clustering, Risk-Adjusted Performance, SME stocks

## **Household Solid Waste Management Practices and its Impact on Environment: A Comparative Study from Mumbai, Pune, Nashik and Nagpur**

Prachiti Pawaskar <sup>1</sup> and Sanjay Rode <sup>1</sup>

<sup>1</sup> *Somaiya School of Humanities and Social Sciences,  
Somaiya Vidyavihar University, Mumbai*

Email: [p.pawaskar@somaiya.edu](mailto:p.pawaskar@somaiya.edu), [sanjay.rode@somaiya.edu](mailto:sanjay.rode@somaiya.edu)

### **Abstract:**

Household waste management poses a major challenge due to rapid population growth, urbanization, changing lifestyles and eating habits of people, this has led to increasing waste generation. Many cities in India face huge challenge due to lack of collection systems, ineffective segregation and limited recycling practices, due to which there is huge dependency on landfills and open dumping. The present study of Household waste management covers major urban centers of Maharashtra- Mumbai, Pune, Nashik and Nagpur. All four cities are administered by Municipal Solid Waste Management which obligates scientific collection, segregation, processing and disposal. In Mumbai, BMC supervises the largest watercourses with established dry waste centers, ongoing efforts to enhance segregation, upgrading infrastructure for waste-to-energy plant so that there should be lesser environmental damage. Pune implements advanced models of waste management, including partnership with SwWaCH that improves community waste collection efficiency. Nashik focuses on source segregation among households also imposing fines for non-segregation thereby supporting NMC at existing composting and transfer facility plant. Nagpur continues to struggle with growing waste streams with plastic waste constituting a major share in the overall solid waste management. Infrastructure gaps and proper source segregation remains a major challenge. Across all four cities, key challenge includes household segregation, lack of civic sense, illegal dumping etc. The study examines household waste management practices using primary data collected through structured household survey which includes waste generation, segregation, disposal and awareness of waste management regulations. Statistical tests will be applied to analyze and find out correlation between different variables. Lastly the study highlights the need for improved public participation, strengthening infrastructure and effective policy implementation to promote sustainable household waste management.

**Keywords:** Household Solid Waste Management, Mumbai, Pune, Nashik, Nagpur, sustainable

## **Marriage and family in globalised Bollywood films: A critical analysis**

Rashmi Mishra<sup>1\*</sup> and Saranya Thaloor<sup>1†</sup>

*<sup>1</sup>Department of Mass Communication, Somaiya School of Humanities and Social Sciences, Somaiya Vidyavihar University, Mumbai*

Email: [rashmi.am@somaiya.edu](mailto:rashmi.am@somaiya.edu)

### **Abstract:**

Marriage and family have long been central themes in Hindi cinema, reflecting dominant cultural values and social norms in India. With the advent of globalisation in the post-1990 era, Bollywood narratives have increasingly engaged with changing ideas of intimacy, gender roles, and family structures. While existing scholarship has examined cinematic representations of gender and family, limited research has systematically explored how globalisation has reshaped portrayals of marriage and family in Hindi films across multiple decades. This study addresses this gap by analysing how Bollywood films from 1990 to 2019 negotiate tradition and modernity in constructing marital and family ideologies. Using a mixed-methods approach, the research combines qualitative content analysis of fifteen selected films with a quantitative audience survey of 300 respondents to examine shifts in representations of marital relationships, gender dynamics, and familial expectations. The findings reveal a significant transition from patriarchal, duty-oriented depictions of marriage and hierarchical family systems in the 1990s to more complex and progressive narratives in the post-2000 period. Contemporary films increasingly foreground women's agency, emotional compatibility, marital negotiation, and the visibility of non-traditional family forms such as single-parent households and live-in relationships. These results demonstrate Bollywood's dual role as both a reflection of social change and an influential force in shaping public perceptions of marriage and family life. The study contributes to cultural studies, gender studies, and media sociology by highlighting popular cinema's role in redefining marital norms in a globalised India and provides a longitudinal perspective on how Hindi cinema mediates between continuity and changes in social values.

**Keywords:** Bollywood, Marriage, Family dynamics, Gender roles, Hindi cinema, Globalisation

## **Identity activation as a transitional mechanism between engagement and self-definition in gamified health communication**

Insiya Gandhi<sup>1\*</sup> and Saranya Thaloor<sup>1</sup>

<sup>1</sup>*Somaiya School of Humanities and Social Sciences,  
Somaiya Vidyavihar University, Mumbai*

Email: [insiya.gandhi@somaiya.edu](mailto:insiya.gandhi@somaiya.edu)

### **Abstract:**

Gamified health communication is widely used across digital platforms to increase engagement with health-related behaviours through the application of game design elements in non-game contexts. Prior research demonstrates that gamification can enhance user interaction, enjoyment, and short-term motivation in digital health settings; however, evidence for sustained behaviour change remains mixed. Existing scholarship largely treats engagement as either an endpoint or a proxy for effectiveness, offering limited explanation of how engagement becomes psychologically meaningful and integrated into individuals' self-concepts. This study examines identity activation as a transitional mechanism through which engagement with gamified health communication contributes to self-definition. Drawing on identity theory and identity-based motivation research, the study employs qualitative content analysis of gamified health communication shared across major social media platforms. A purposive sample of gamified health content was analysed to identify recurring communicative patterns, including narrative framing, symbolic cues, self-referential language, and social recognition features. The findings indicate that gamified health communication frequently embeds identity-activating cues, such as self-categorization prompts, progress-based narratives of personal transformation, and social validation signals that frame health behaviours as expressions of personal values, discipline, and group belonging. By identifying identity activation as a distinct stage between engagement and self-definition, this study advances health communication theory and provides a clearer foundation for understanding how digital health content may support sustained engagement and identity-based behaviour change.

**Keywords:** Gamification, Health communication, Identity activation, Engagement, Content analysis

## Strategic significance of blue economy in the Indo-Pacific: opportunities and challenges

Gokul K<sup>1\*</sup>, Geethalakshmi K<sup>2†</sup> and S N V Sivakumar<sup>2†</sup>

<sup>1</sup>*Department of International Studies, Somaiya School of Humanities and Social Sciences, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Department of Economics, Somaiya School of Humanities and Social Sciences, Somaiya Vidyavihar University, Mumbai*

Email: [gokul04@somaiya.edu](mailto:gokul04@somaiya.edu)

### **Abstract:**

The Blue Economy is an integrated strategy for the sustainable use of ocean resources, targeting economic development while preserving marine ecosystem health. For the Indo-Pacific region, it signifies a substantial possibility for sustainable economic growth while at the same time tackling environmental issues. This notion underscores the sustainable use of ocean resources, harmonizing commercial pursuits like tourism, fishing and renewable energy with the imperative to safeguard marine ecosystems. The economic growth of the Indo-Pacific area is vital, supporting millions of employees and making substantial contributions to GDP, especially in industries such as fisheries and marine transport. India's blue economy alone supports around 95% of its commerce through transit and contributes around 4% to its GDP. The Indo-Pacific zone is also marked by intricate geopolitical dynamics. The Indian Ocean functions as a crucial commercial corridor, with approximately 80% of worldwide oil commerce transiting through it. This has increased rivalry for marine resources and heightened security concerns, demanding collaboration among governments to fulfil blue economy goals. Notwithstanding its promise, the region has also substantial difficulties, including pollution, overfishing and the effects of climate change. Effective governance and regional collaboration are needed to solve these concerns and guarantee that economic activity does not contribute to environmental degradation. Through a comprehensive analysis, this research paper tries to look at the concept of the blue economy concerning the Indo-Pacific region and identify its prospects, opportunities and challenges facing this ever-important sector.

**Keywords:** Indo-Pacific, Blue economy, Indian Ocean Region (IOR)



## **Abstracts: Library and Information Science**

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## Use of digital tools in Scholarly Publishing – a survey

Bhore Ashwini<sup>1\*</sup>

<sup>1</sup>*Department of Library and Information Science,  
Somaiya Vidyavihar University, Mumbai*

Email: [ashwini.bhore@somaiya.edu](mailto:ashwini.bhore@somaiya.edu)

### **Abstract:**

Implementing digital tools in Scholarly publishing such as plagiarism detection software, reference management systems, data analysis and interpretations tools, grammar and spell check and research identifiers etc. improves the publication's integrity and workflow efficiency. However, the systematic adoption and effective utilization of these tools within Indian research institutions, particularly in Mumbai, inadequately documented. Limited empirical evidence exists on how institutional access, awareness initiatives, and librarian-led support influence digital tool utilization and the challenges faced by researchers. Here we show that structured access and librarian facilitation significantly shape effective adoption of digital tools in scholarly publishing. This survey-based study will be collected data from researchers across selected research institutions in Mumbai to identify commonly used digital tools, examine utilization patterns, analyse adoption challenges, and assess the facilitating role of librarians. Findings indicate that institutions offering formal access mechanisms and awareness programs demonstrate higher levels of digital tool usage. Major barriers include limited technical proficiency, inadequate training opportunities, and insufficient policy support. Librarians are enabler for improving workflow efficiency and strengthening publication integrity throughout the research publication lifecycle. Digital tools significantly enhance the ethical integrity of scholarly publications when used systematically. It highlights the critical role of librarians and institutional support in guiding effective tool adoption across the research lifecycle. The findings stress the need for formal policies and continuous training to ensure consistent and ethical scholarly practices. Overall, digital tools emerge as essential enablers of research quality, visibility, and publication integrity

**Keywords:** Digital tools, scholarly publishing, publication integrity, research institutions, librarian facilitation, workflow efficiency

## **Institutional repository using Open-Source softwares: An evaluative study**

Gauri Gothivrekar<sup>1\*</sup>

*<sup>1</sup>Department of Library and Information Science,  
Somaiya Vidyavihar University, Mumbai*

Email: [gauri.yg@somaiya.edu](mailto:gauri.yg@somaiya.edu)

### **Abstract:**

Ample work has been done on the topic institutional repository. Open source softwares are in use since a decade now. This poster presents the study on the establishment of institutional repository using open source software. It examines the use of open source software in establishing the institutional repository. The study highlights that using the institutional repository collates research output fragmented across departments and disciplines. It shows that use of institutional repository increases the visibility of the institution. Also it elaborates that the availability of institutional repository shapes intellectual leadership and credibility of the institute. In this poster, exhaustive study on establishing institutional repository using open-source software is presented. This study investigates benefits of institutional repository, hurdles faced in absence of institutional repository. It also examines the available softwares for setting up of an institutional repository. Researcher has planned to study the Institutional repositories in NAAC accredited institutions/universities/colleges located in Mumbai and suburban areas. A) Geographical coverage: Institutional Repositories in Mumbai region. B) Section of IR: Institutional repositories which are available on the internet are considered for the study. C) Type of IR: The IRs established using open source software. The research aims to focus on use of institutional repository by the NAAC accredited institutions in Mumbai and suburban areas. The study highlights on institutional repository using open software.

**Keywords:** Institutional repository, open source software



## Abstracts: Management Studies

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## Buddhism & Business Ethics: A Perspective from the Lens of Virtue Ethics Theory

Ashish Jamadar<sup>1\*</sup>, Dimple Kaul<sup>1†</sup> and Reena Mehta<sup>1†</sup>

<sup>1</sup>K.J. Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai

Email: [ashish.jamadar@somaiya.edu](mailto:ashish.jamadar@somaiya.edu)

### Abstract:

Business ethics faces persistent challenges as deontological and consequentialist frameworks struggle to address ethical complexity in volatile global markets. Buddhist wisdom can be integrated with business ethics to build a strong foundation of moral integrity, thoughtful leadership, and stakeholder interests. This conceptual paper proposes the Buddhist Virtue Ethics (BVE) model as a multilevel framework that integrates Buddhist wisdom traditions—particularly the Noble Eightfold Path, the Four Noble Truths, the Three Laws of Nature, *Vipassana Meditation* (Mindfulness)—with contemporary virtue ethics theory. This concept views inner growth as the foundation for ethical leadership, organizational trust, and sustainable business practices, influencing company culture, governance systems, and stakeholder engagement. Although the traditional business ethics literature has been influenced by deontological and consequentialist frameworks, virtue ethics provides an alternative viewpoint that prioritizes moral character, inherent virtue, and human well-being. Drawing on Keown's (1992) seminal work interpreting Buddhist ethics as teleological virtue ethics, this paper develops testable propositions linking Buddhist virtues to organizational outcomes. Using Jaakkola's (2020) systematic conceptual methodology, this synthesis identifies critical research gaps in cross-cultural virtue applications and proposes empirical agendas for validating BVE in diverse organizational contexts, particularly Small and Medium Enterprises (SMEs) in India. The paper contributes to virtue ethics theory by demonstrating Buddhism's superior emphasis on personal character development (*paramitas*) as the basis for ethical conduct compared to Aristotelian approaches, and to business ethics practice by offering practical frameworks for leadership training, stakeholder trust-building, and ethical decision-making that balance profit with purpose. This approach reimagines ethics as a strategic and cultural resource (*instead of compliance*) to trust, stakeholder engagement, and sustainable business. This shift from “*rulemaking*” to “*character cultivation*” allows organisations to handle the complexity, uncertainty, and ethical complexity of the modern global marketplace more effectively.

**Key-words:** Business Ethics, Virtue Ethics, Buddhist Wisdom, Eightfold Noble Path, Ethical Leadership

## Experiencing Allyship at Work: Perspectives of Persons with Disabilities

Bhakti Bhadra<sup>1</sup> and Shiji Lyndon<sup>1\*</sup>

<sup>1</sup>*K.J Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India*

Email: [shiji@somaiya.edu](mailto:shiji@somaiya.edu)

### **Abstract:**

Individuals from marginalized groups frequently experience situations where they express a sense of not belonging, a feeling of being unable to fully express themselves (Cheryan & Markus, 2020; Schmader & Sedikides, 2018) or encounter an unwelcoming environment, often not directly linked to explicit negative treatment (Hall, Galinsky, & Phillips, 2019). Existing diversity and inclusion frameworks have shown limitations, underscoring the need for new approaches that address subtle and systemic barriers (Bernstein, Salipante & Weisinger, 2019). Allyship has emerged as one such approach, where individuals from dominant groups leverage their privilege to advocate for equity, challenge discrimination, and amplify marginalized voices (Salter & Migliaccio, 2019; Ashburn-Nardo, 2017). Yet, while allyship has been examined in relation to gender, race, and LGBTQ+ inclusion, its role in disability inclusion remains underexplored. Allyship as a mechanism for fostering genuine disability inclusion is both a pressing gap and a timely opportunity to move beyond tokenistic hiring toward sustainable cultural change. Despite persons with disabilities constituting approximately 15% of the global population, there is limited empirical evidence examining how workplace allyship contributes to their inclusion, particularly within the Indian organizational. This study seeks to address this gap by addressing the questions how do persons with disabilities experience allyship at work, and in what ways does allyship shape their sense of inclusion and belonging? This study employs a qualitative research design. This research will contribute to the theoretical development of disability allyship by uncovering themes, patterns, and challenges from the narratives (PwD), provide actionable recommendations for organizations to foster supportive environments and where PwD can thrive, thereby advancing equity and social change.

**Keywords:** Workplace Allyship, Allies, Inclusion, People with Disabilities, Minorities

## **A Blockchain Solution for Efficient Disbursement: Shikshan Shulk Scholarship Scheme Study**

Chetna Achar<sup>1,2\*</sup>, Bharati Wukkadada<sup>2+</sup> and Harshali Patil<sup>3+</sup>

<sup>1</sup>*Mumbai Educational Trust – Institute of Computer Science*

<sup>2</sup>*K. J. Somaiya Institute of Management, Somaiya Vidyavihar University*

<sup>3</sup>*Department of Information Technology and Computer Science,  
Somaiya Vidyavihar University*

Email: [chetna.achar@somaiya.edu](mailto:chetna.achar@somaiya.edu)

### **Abstract:**

Blockchain technology has the potential to transform Government services with its inherent features of transparency, immutability and security. These features establish a decentralized architecture, which is crucial for modern-day public-sector applications where fiscal accountability and real-time auditability are the need of the hour. To ensure more transparency and effectiveness in their working, governments are making a move in the direction of blockchain technology to manage their public funding as well as certain social welfare programs. This can significantly mitigate systemic vulnerabilities like data tampering and administrative corruption; further providing accuracy in fund allocation to reach marginalized part of the community effectively. This research conducts a comprehensive comparative analysis of various global blockchain-based disbursement schemes, evaluating their performance across diverse socio-economic applications. The primary objective is to synthesize these findings into a mathematical framework specifically tailored for the regional context of Maharashtra's Shikshan Shulk Scholarship Scheme. The study develops a mathematical model designed to optimize scholarship payouts and streamline administrative workflows. This model leverages smart contract logic to automate eligibility verification and ensure the equitable distribution of resources. The proposed system aims to provide a scalable template for future digital governance initiatives, ultimately fostering a more robust and inclusive educational infrastructure across all citizens.

**Key-words:** Blockchain, Disbursement, Scholarship, Trust, Transparency

Manuscript for this abstract was submitted for internal review

## Experience of the Coming Out Process at the Indian Workplace: Insights from Heterosexual Colleagues

Danish Shaikh<sup>1,2</sup>, Hemangi Bhalerao<sup>1</sup> and Arpan Simon<sup>1,3</sup>

<sup>1</sup> *KJ Somaiya Institute of Management,*

<sup>2</sup> *ACG Capsules*

<sup>3</sup> *Intellect Design Arena*

Email: [hemangi@somaiya.edu](mailto:hemangi@somaiya.edu)

### **Abstract:**

When LGBTQIA+ come out in professional settings, they are forced to navigate a psychologically, socially, and professionally complex process. This process is influenced by culture – geographical, religious and organizational, different leadership styles, and also interpersonal dynamics. Studies have shown that transformational leadership fosters psychological safety and so do inclusive policies, and a conducive environment whereas in contrast, leadership that is more transactional coupled with a rigid workplace cultures create trials and tribulations for the community, which ultimately leads to stress, anxiety, turnover intention and reduced engagement among LGBTQIA+ employees, who usually feel pressured to disguise their sexual identities. This qualitative study looks at the coming out process through the lens of heterosexual male colleagues where they spoke of members of the LGBTQIA+ community who came out at the workplace. The study shows that in inclusive workplaces, improved well-being and stronger team dynamics were reported, whereas those in unsupportive environments preferred to remain closeted and experienced isolation and mental strain. This study demonstrate how heterosexual colleagues can also act as active sense-makers and cultural carriers. Their day-to-day interactions at the workplace significantly influence psychological safety, coming out decisions, and inclusion at the workplace. The study uncovered how leadership roles are pivotal - with empathy, safe spaces and open dialogue are experienced. Conversely, where there are transactional leaders, often the support received is tokenistic and the diversity practices are shallow, leading to little or no cultural change. Where there are supportive organizational cultures and anti-discrimination policies are clearly stated and lived, LGBTQIA+ representation thrives and this enhances their job satisfaction and authenticity. Employee Resource Groups and mentorship opportunities, when provided, fosters a sense community and promotes employee advocacy. We conclude that in inclusive workplaces individual well-being is reinforced as well as the culture boasts of innovation and thereby leads to organizational success.

**Key-words:** Coming Out, Psychological, Social, Professional, Communication, Religious

## **A study on the role of human influencers and digital community engagement in shaping students' perceptions towards international higher education**

Darshana Kewalramani<sup>1\*</sup> and Dimple Kaul<sup>1†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [d.kewalramani@somaiya.edu](mailto:d.kewalramani@somaiya.edu)

### **Abstract:**

This research seeks to understand how these two social forces—individual influencers (mentors, educators, alumni, and industry experts) and digital social networks—contribute to shaping students' perceptions regarding international higher education for management streams. Quantitative research involving the collection of primary data through structured questionnaires administered to a group of undergraduate students. Tools like regression and factor analysis are used to interpret variable relationships. Preliminary findings indicate that influencers, particularly alumni and faculty with global exposure, play a pivotal role in shaping students' perception. Additionally, the study finds that social platforms significantly impact students' perceptions by offering visual narratives of success, peer experiences, and institutional branding. This research uniquely combines traditional human influence with modern digital community engagement to offer a comprehensive view of students' decision-making ecosystems. It highlights how digital-native students rely on social cues and peer-driven validation. The study is limited to management aspirants in India and may not fully capture the behavior of students from other disciplines or countries. It also relies on self-reported data, which can introduce bias. Future studies could explore longitudinal changes in student perception or compare the impact across different cultures. The findings offer actionable insights for international universities and education marketers to strategically engage with key influencers and invest in digital campaigns. This research suggests that decision-making regarding education choices is no longer a purely academic or financial process, but one embedded in identity, community belonging, and digital dialogue.

**Keywords:** Influencers, digital engagement, international higher education, student perceptions, management studies, social media

Manuscript for this abstract was submitted for internal review

## **Do corporate innovation programs enhance the financial sustainability of business incubators? Evidence from incubators in Maharashtra, India.**

Gaurang Shetty<sup>1\*</sup> and Radha Iyer<sup>1</sup>

<sup>1</sup>*K J Somaiya Institute of Management, Somaiya Vidyavihar University*

Email: [Gaurang.rs@somaiya.edu](mailto:Gaurang.rs@somaiya.edu)

### **Abstract:**

In emerging entrepreneurial economies, business incubators are at the center stage and provide startups with a benefit of infrastructure, counseling, and access to networks which can accelerate early growth and innovation. Nevertheless, despite the positive role of incubators in the process of venture creation, the financial viability of incubators particular to corporate involvement has received little to no attention. In this case, we demonstrate that the financial sustainability of business incubators can be achieved to a considerable extent through corporate innovation programs combined with diversified revenue streams. The article is based on a case study involving incubators in Maharashtra, India, to explore the interaction between corporate innovation programs and diversified revenue approaches such as service fees, equity stakes, industry project revenues, and public grants to determine their effect on long-term viability. Based on the theoretical foundations of innovation ecosystems, open innovation, and business model sustainability, we show that the integration of structured corporate engagement practices extends value capture channels and increases resilience. What we have found is that incubators who build diversities beyond traditional funding sources by including corporate innovation participation are more financially stable and better able to accommodate startups which again builds incubator reputation and leads to more potential engagement. These findings contribute to the knowledge on the incubator business models by connecting corporate engagement mechanisms to sustainable value capture and have implications useful to innovation managers, corporate partners, and policymakers striving to enhance entrepreneurial ecosystems.

**Keywords:** Business incubators, corporate innovation programs, entrepreneurial ecosystems, revenue model innovation, financial sustainability.

## Technology, Transparency, and Trust: Enhancing SHG Governance by Digital Empowerment

Gopika Vadhan<sup>1\*</sup> and Sanjiwani Kumar<sup>1†</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: [sanjiwani@somaiya.edu](mailto:sanjiwani@somaiya.edu)

### Abstract:

Self-Help Groups (SHGs), which play an important role in promoting the concept of financial inclusion and empowerment of women in developing nations like India, operate within the context of community institutions and act as support systems for joint savings, loans, and means of livelihood. Seeing the ever-increasing digitization of technology, like mobile banking and digital payment and record systems, their implementation within SHGs is increasing significantly since then, but their implications and effects associated with their governance process remain unanalysed. Despite previous studies having focused on the implications of digital empowerment within the context of SHGs and their outcomes associated with their economic and empowerment aspects, empirical evidence is scarce within the context of digital empowerment and transparency. In this study, we demonstrate that digital empowerment increases the effectiveness of SHG governance by improving the associated levels of transparency in operations and, therefore, trust. The research method used in this study is a quantitative approach, which entails collecting primary data from SHG members using a structured questionnaire. The survey uses a Likert scale in designing the questions for dimensions such as digital empowerment, transparency, trust, and effectiveness. The analysis shows that a higher level of digital empowerment is a significant contributor to a higher level of transparency in financial and operational activities. Higher levels of transparency, therefore, impact trust levels within SHG members, which increases participation, accountability, and effectiveness in SHG governance. Our analysis shows that these factors, namely transparency and trust, play an important role as mechanisms for better governance because of digital empowerment. Through empirical evidence that highlights the role of digital empowerment in improving governance in SHG organizations, the study is expected to be relevant to the existing literature concerning SHGs and digital inclusion and will help development practitioners to ensure that digital inclusion interventions are governance focused.

**Keywords:** Self-Help Groups; Digital Empowerment; Transparency; Trust; Governance; Financial Inclusion

## **Deciphering the factors leading to adoption of blockchain technology in insurance industry: An in-depth exploration**

Harbax V. Manuja<sup>1\*</sup> and Sindhu Singh<sup>1†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: Harbax.m@somaiya.edu

### **Abstract:**

Blockchain technology has a potential to transform the insurance sector by executing autonomous transactions through consensus among various stakeholders. This is seen as turning point towards more cost efficient, transparent, secure and reliable system. Despite its promising advantages, traditional insurance industry has often lagged in adopting such technologies. Therefore, the current study first systematically reviews the current literature to understand the current state of blockchain adoption in insurance industry and subsequently, conducts qualitative study to explore the adoption challenges and the prospects of adopting block chain technologies to manage technology, environment and organisational (TOE theory) problems and ethical decision-making pressures. The interview is conducted with 30 senior executives in the industry to gain explorative insights about the challenges and to propose a robust and realistic model for the adoption of blockchain adoption in insurance sector. The study maps the constituents of technology, organisation and environment factors along with ethical decision-making factors to propose the adoption framework. Interview transcripts are analysed using thematic analysis to identify the core elements for adoption of block-chain and provides the framework not only for insurers and regulators but also policymakers, technology providers, and customers, offering a holistic perspective on the digital future of insurance.

**Keywords:** Blockchain, technology adoption, barriers, Insurance, resistance, acceptance, organization acceptance, adoption, systematic literature review, bibliometric analysis, qualitative, consensus

## **Impact of Corporate Governance and Ownership Structure on Earnings Management: Evidence from an Emerging Market (India) Context**

Mishra Himanshu K<sup>1\*</sup> and Mulchandani Ketan<sup>1†</sup>

<sup>1</sup> *K J Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India*

Email: [himanshu.m@somaiya.edu](mailto:himanshu.m@somaiya.edu)

### **Abstract:**

Corporate Governance mechanism plays a significant role in how companies report their financial performances, especially in emerging economies i.e. India, where regulatory systems are still developing/evolving. While earlier studies have extensively examined the link between governance and companies' performances, there is still limited work done on how different governance and board characteristics from ownership point of view actually influence both accrual and real earnings management practices jointly in such contexts and remains an area of ongoing regulatory and academic interest. In this study, we examine how corporate governance mechanisms and ownership structures impact managerial behaviour related to earnings management. The focus is mainly on board composition, ownership concentration and managerial control in an emerging economies context, which is India here. Using panel data of listed Indian companies, this study applies empirical approaches including fixed effects regression, system generalised method of moments (GMM) as dynamic estimation techniques, and instrumental variable techniques to address potential endogeneity issues. Earnings management is examined using both accrual based and real activity measures. The findings broadly indicate that stronger governance mechanisms/structures, such as independent boards, effective audit committees and higher institutional ownership are generally associated with lower levels of earnings manipulation. In contrast, firms with greater managerial control, CEO duality and concentrated promoter ownership tend to display higher tendencies toward managing reported earnings. Overall, the study highlights the importance of sound governance structures and its relationship with quality of financial reporting. Findings add to the existing literature by offering evidence from an emerging market context and provide useful insights for policymakers, regulators and practitioners.

**Keywords:** Corporate Governance, Earnings Management, Ownership Structure, Emerging Markets, Board Characteristics, Financial Reporting Quality.

## **Leadership commitment and organizational culture as enablers of user generated content integration in Indian direct-to-consumer marketing strategies**

Jaideep Kewalramani<sup>1\*</sup> and Monica Khanna<sup>1†</sup>

<sup>1</sup> *K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

[Email: jaideep.k@somaiya.edu](mailto:jaideep.k@somaiya.edu)

### **Abstract:**

This study investigates the influence of leadership commitment and organizational culture on the adoption and integration of User-Generated Content (UGC) in marketing strategy among Indian Direct-to-Consumer (D2C) brands. The research adopts a qualitative approach, through interviews with leaders of D2C companies (Fashion, Beauty and Food & Beverages verticals). Thematic analysis is used to validate relationships between leadership support, organizational culture, and UGC integration. H1: Leadership commitment has a positive influence on the integration of UGC in D2C marketing strategies. H2A: Consumer-centric organization culture facilitates adoption of UGC in D2C marketing strategies. H2B: Collaborative organization culture facilitates adoption of UGC in D2C marketing strategies. H2C: Agile organization culture facilitates adoption of UGC in D2C marketing strategies. Preliminary insights indicate that leadership support, beyond budget approvals, includes strategic signaling, cross-functional empowerment, and ethical frameworks for managing UGC. Also, organizational cultures that value agility, openness to feedback, and consumer participation are more likely to adopt UGC. This research contributes a first-of-its-kind exploration of the internal enablers of UGC integration beyond technology or consumer behavior. The study is limited to specific Indian D2C verticals. Future research could explore cross-cultural differences or other verticals. Longitudinal studies can capture evolution of internal enablers through UGC adoption stages. Leaders must institutionalize UGC strategy not just through platforms, but via cultural enablers — by aligning messaging, employee participation, and collaborative ecosystems. UGC adoption democratizes brand narratives, gives authentic consumers a platform and enables inclusive communities.

**Keywords:** Leadership Commitment, organization culture, user generated content, D2C marketing.

Manuscript for this abstract was submitted for internal review

## Audience Engagement in Influencer-Led Social Media Marketing

Jaypreet Kaur Sachdev<sup>1\*</sup> and Kiran Sharma<sup>1†</sup>

<sup>1</sup>*K.J. Somaiya Institute of Management, Somaiya Vidyavihar University*

Email: [jaypreetkaur.s@somaiya.edu](mailto:jaypreetkaur.s@somaiya.edu)

### **Abstract:**

Digital communication's swift advancement has elevated social media from basic networking platforms to intricate ecosystems fuelled by influencers and algorithm-driven short videos. In this context, "Audience Engagement"—spanning user interactions from mere views to fervent endorsements—stands as the key gauge of online influence and brand connection. Although core theories on media dissemination are solidly grounded, comprehensive reviews are scarce on how engagement patterns have evolved on immersive platforms such as TikTok and Instagram. Here we show, via bibliometric analysis of 57 key Scopus documents (2013–2026), that the field is experiencing explosive growth ( $R^2 = 0.850$ ) with a clear shift to engagement frameworks tailored to specific platforms. Employing Biblioshiny, we charted the field's intellectual landscape, pinpointing "Social Media Engagement" and "TikTok" as pivotal motor themes in contemporary research. Findings reveal the USA (73 citations) and China (46 citations) at the forefront of global contributions, with content traits like civility, genuineness, and mentions of personal networks proving strongest for sparking interactions. We also distinguish "Internal Engagement" (likes, saves) from "External Engagement" (shares), highlighting TikTok's dominance over legacy platforms in spurring user action. These insights reveal audience engagement as a multifaceted phenomenon shaped by platform-unique features, calling for adoption of the "Political Content Engagement Model" (PCEM) and AI-driven predictions in upcoming digital tactics.

**Keywords:** Audience Engagement, Scopus Database, Influencer Marketing, TikTok, Bibliometric Analysis, Content Strategy.

## **Impact of short-term debt on accruals and real earnings management- evidence from India**

Kinjal Manani <sup>1\*</sup> and Dr. Raghukumari<sup>†</sup>

<sup>1</sup>*K.J. Somaiya Institute of Management, Somaiya Vidyavihar University*

Email: [Kinjal.m@somaiya.edu](mailto:Kinjal.m@somaiya.edu)

### **Abstract:**

Earnings management is a practice where companies manipulate their earnings to represent favourable financial condition of the company within the preview of GAAP. In India, it has been observed in the literature that companies engaged themselves in accruals and real earnings management to get benefits like incentives, favourable impact of stock price, meeting financial performance targets or sometimes for misguiding stakeholders regarding current financial situation. Many studies have been conducted linking earnings management with corporate governance, financial performance, cost of debt, ownership etc. In India, short term debt impact on measures of earnings management is not yet studies. To fill this gap from the literature, we proposed to study the impact of short-term borrowings on accruals and real earnings management. The study will help to understand whether companies do earnings management to show good financial conditions that will facilitate in short term borrowings. Our study will help policy makers, bankers, and creditors to understand the impact of short-term borrowings on earnings management.

**Keywords:** Short term debt, earnings management, accruals earnings management, real earnings management

## Team Roles to Team Outcomes: A Bibliometric and Systematic Literature Review

Kiran Gupta<sup>1\*</sup> and Shailaja Karve<sup>2</sup>

<sup>1</sup>*K.J. Somaiya Institute of Management, Somaiya Vidyavihar University*

Email: [kiran.gupta2@somaiya.edu](mailto:kiran.gupta2@somaiya.edu)

### **Abstract:**

Teams are the basic unit of work in contemporary organizations, supporting collaboration, decision-making, and performance in a variety of situations. Team roles are defined as consistent patterns of task-related behaviors exhibited by team members. Despite comprehensive research on the topic, existing literature is fragmented across theoretical frameworks and various work environments, including traditional, virtual, and hybrid settings. Research has yet to provide a comprehensive understanding of the dual nature of team roles, which encompasses both structured assignments and emergent behavioral patterns, and how this influences team performance in dynamic organizational settings. In contrast to concentrating only on decision-making styles or team outcomes, this research shows how effective team role functioning can impact role clarity, adaptability, and complementarity and increase coordination and performance. Using bibliometric analysis and a systematic literature review, this study examines 142 journal articles and maps the key themes, mental models, and empirical trends in team role research. The findings reveal that team creativity, flexibility, and alignment with growing task complexity are facilitated by adaptive role enactment, while role clarity consistently lowers conflict and promotes accountability. The quality of decision-making and performance is a consequence of role dynamics in a variety of work environments. This review advances the theory of team roles by reinventing them as structured and emergent phenomena. It provides recommendations for role-based training and team design, emphasizing the necessity of looking at the role of technology in understanding the evolving patterns of team roles in technologically advanced workplaces and long-term role dynamics study.

**Keywords:** Roles, Decision-making, Performance, Bibliometric analysis, Systematic literature review.

# Understanding and Mitigating the Privacy Paradox: A Permissions-Driven Model for Emerging Digital Economies

Mitesh Bharwada<sup>1\*</sup>

<sup>1</sup>*KJ Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India*

Email: [mitesh.bharwada@somaiya.edu](mailto:mitesh.bharwada@somaiya.edu)

## **Abstract:**

Rapid digital adoption has intensified concerns surrounding personal data privacy, yet individuals continue to disclose information online despite expressing strong privacy concerns—an inconsistency known as the *privacy paradox*. Prior studies have identified multiple antecedents such as perceived risk, trust, contextual cues, information asymmetry, online apathy, cognitive biases, and the influence of peers. However, most evidence is fragmented across narrow contexts, limited demographic groups (often students), and predominantly Western settings. This study responds to these gaps by proposing a comprehensive model that examines antecedents of privacy attitudes, the formation of intent to disclose personal information, and the divergence between intent and behaviour, while assessing the role of permission management in minimizing the paradox. A theoretical model was conceptualized drawing from literature covering Communication Privacy Management theory, privacy calculus, bounded rationality, and behavioural perspectives on disclosure. The model integrates perceived risk, trust, and contextual influences as predictors of disclosure intent, and incorporates cognitive and behavioural explanations for the intent–behaviour gap. The study evaluates how regulatory compliance, organisational transparency, user awareness, and simplicity of consent tools influence effective consent management and its potential to reduce the privacy paradox. The study offers practical insights for policymakers, highlighting the need for regulations that go beyond mandating permission to ensuring its usability, simplicity, and contextual clarity. Businesses can strengthen consumer trust and reduce privacy-related friction by designing transparent, user-centric permission interfaces. Overall, the research underscores that informed, meaningful, and accessible permission mechanisms can significantly reduce the privacy paradox in digitally advancing societies.

**Key-words:** Privacy, Consent, Privacy Paradox, Permission, Privacy Law

## **Cyber Risk and Digital Payment Adoption in Micro Enterprises: A Mumbai-Based Study**

Monali Deshpande <sup>1\*</sup>, Bharati Wukkadada <sup>1\*</sup> and Sanjivani Kumar <sup>1\*</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [sanjiwani@somaiya.edu](mailto:sanjiwani@somaiya.edu)

### **Abstract:**

Digital payment systems are increasingly essential for micro enterprises, yet their adoption introduces significant cybersecurity challenges. This study examines digital payment adoption among micro MSMEs in Mumbai, India, from a human-centric cybersecurity perspective. Extending the Technology Acceptance Model with cyber risk and security governance constructs, it analyses how cybersecurity risk perception, trust in payment system security, human security behaviour, and institutional safeguards influence adoption and sustained use. Based on a quantitative survey of micro enterprises across Mumbai, the findings reveal that perceived security, authentication reliability, data protection assurance, and regulatory confidence promote adoption, while cyber fraud exposure, phishing threats, and limited cybersecurity awareness hinder continued use. The study highlights the importance of digital literacy, secure-by-design systems, and policy-driven cybersecurity interventions for strengthening resilience in emerging urban economies.

**Keywords:** Mumbai Region, Micro Sector, Financial inclusion, Digital Payment adoption, Cyber Security

## **Technological Implications for Housing Finance Companies in India: Digital Transformation, Artificial Intelligence, and Structural Changes in the Mortgage System**

Nikhil Patil<sup>1\*</sup> and Pankaj Trivedi <sup>1\*</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

[Email - nikhil.patil1@somaiya.edu](mailto:nikhil.patil1@somaiya.edu)

### **Abstract:**

Technological growth, digitalization and Artificial Intelligence (AI) are some of the most important factors that have changed the structure of House Financing Companies (HFCs) in India. HFCs are using digital technology and AI to stay competitive with other financial institutes and banks. This Research Paper examines the impact of digital transformation and AI integration on the operations of housing finance companies (HFCs) and the evolving mortgage landscape in India. The research employs secondary data sourced from regulatory papers, industry reports, and academic studies to illustrate significant improvements in operational efficiency, credit assessment, faster disbursement of loan, risk management, fraud detection, paperwork, turnaround time and customer service of HFCs resulting from technological and AI implementation. The study shows that technology can help HFCs for betterment of people, customer satisfaction, time taken for disbursement of loan & quick resolutions and reach more people in the short term. But its long-term benefits depend on how well AI is used and how well it is governed.

**Keywords:** Digitalization, Artificial Intelligence, mortgage lending, Housing Finance Companies, Operational Efficiency etc.

## Analyzing reach vs consumer reactions in online advertising

Nupur Saxena<sup>1\*</sup> and Rashmi Jain<sup>1\*</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: [nupur.saxena@somaiya.edu](mailto:nupur.saxena@somaiya.edu)

### **Abstract:**

The effectiveness of online advertising remains a critical challenge. Increasing prevalence of advertisement skipping threatens to undermine the very reach that online advertising promises, raising questions about how to create impactful messaging in this dynamic technological environment. Marketers spend thousands of dollars in identifying the best product for the right target audience and then spend even more in coming up with the most compelling messaging to take it to the market, only to have their communication blocked by a random ad blocker tool. Their advertisement skipped over with the click of a finger, with the wave of that remote or to be turned over to the next page. The rise of ad blockers went over two-fold, with 309 million people using it in 2016 (Jens Mattke, Muller & Maier 2017). With the increase in content availability and rapid growth of skippable ads model, it is the need of the hour to find out the best messaging strategies to have the viewers watch the whole advertisement, instead of avoiding them. Here is how we will identify the key factors influencing consumers decision to engage with online advertisements. And further find out the best messaging strategies. Our research will adopt a mixed-methods approach like focus groups discussions, in-depth interviews, and surveys. Target audience for identifying the problem statement is marketers and, for further research will be older audience like 18-45 male/female/avid online consumers. This research aims to provide a deeper understanding on the factors influencing advertisement skipping, offering insights for advertisers and marketers to develop effective marketing strategies.

**Keywords:** Ad skipping, ad avoidance, advertising campaign reach, consumer reaction, digital ads, online advertising.

## **Harnessing Cloud Synergies: A Case Study of Apollo Hospitals' Digital Transformation (2018–2025)**

Piyusha Ambradkar<sup>1</sup> and Vandana Tandon Khanna<sup>1</sup>

*<sup>1</sup>K J Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India*

Email: [piyusha.a@somaiya.edu](mailto:piyusha.a@somaiya.edu)

### **Abstract:**

The rapid digitalization of global healthcare relies increasingly on cloud infrastructure to manage escalating data volumes and improve patient outcomes. While cloud adoption is often viewed as a purely technical shift, its success in large-scale clinical environments depends on the strategic alignment of organizational resources and the navigation of professional resistance. A significant knowledge gap remains regarding how integrated multi-cloud strategies generate sustainable competitive advantages and overcome adoption barriers in complex, multi-facility healthcare networks. Here we show that Apollo Hospitals' transition to a multi-cloud architecture (2018–2025) successfully transformed its operational efficiency and clinical efficacy by cultivating unique cross-domain integration capabilities. Using a qualitative case study approach involving fifteen semi-structured interviews and multi-site observations across four facilities, we analyzed the integration of Microsoft Azure, AWS, and Google Cloud through the lenses of the Resource-Based View (RBV) and Diffusion of Innovation (DOI) theory. Our results demonstrate that this strategic framework achieved a 30% reduction in IT costs, a 45% decrease in unplanned downtime, and an 18% reduction in chronic disease readmission rates. These findings suggest that digital transformation in healthcare is driven less by the technology itself and more by the development of rare, non-imitable organizational capabilities. This study extends RBV by highlighting the necessity of cross-domain synergy and advances DOI theory by addressing the specific professional dynamics of clinical settings, providing a scalable roadmap for cloud adoption in complex healthcare ecosystems worldwide.

**Keywords:** Cloud Computing, Apollo Hospitals, Resource-Based View (RBV), Diffusion of Innovation (DOI), Healthcare Digitalization, Multi-cloud Strategy.

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## From Backlogs to Blockchain: Modernizing the Indian Judicial Ecosystem

Rewa Pimpalkar<sup>1</sup>, D. G. Jha<sup>2</sup> and. Kirti Arekar<sup>3</sup>

<sup>1</sup> Accenture, Bengaluru, India

<sup>2</sup> K. J. Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India

<sup>3</sup> National Institute of Securities Markets (NISM), Mumbai, India

Email: [rewa.p@somaiya.edu](mailto:rewa.p@somaiya.edu)

### Abstract:

India's judiciary faces protracted delays, procedural complexities, and massive case pendency impeding timely justice. Meanwhile, the country's e-governance drive opens doors for tech upgrades that boost security, openness, and speed in legal work. Blockchain, a distributed, immutable ledger enabling programmable smart contracts, addresses fundamental challenges including vulnerable record integrity, inefficient process automation, and unreliable data provenance. However, the precise mechanisms for embedding these capabilities into routine judicial operations remain unclear. This paper employs a pragmatic, conceptual mapping analysis, integrating scholarly literature, policy frameworks, and viable prototypes to align blockchain affordances with judicial bottlenecks.

**Keywords:** Blockchain; Indian judiciary; court records; smart contracts; legal digitization; data integrity.

## **Does Digital Financial Inclusion influence Indian Financial Markets? An Empirical Examination using Time Series Analysis**

Rishabh Mukherjee<sup>1</sup> and Smita Ramakrishna<sup>2</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [r.mukherjee@somaiya.edu](mailto:r.mukherjee@somaiya.edu)

### **Abstract:**

This study examines the relationship between Digital Financial Inclusion (DFI) and its impact on Indian Financial Markets. A Composite DFI Index was developed using Principal Component Analysis (PCA) to capture the aspects of Accessibility, Engagement, and Competence of the digital ecosystem of India. The period of study is from April 2020 to June 2025 to capture the period of Unified Payments Interface (UPI) adoption and increased Fintech participation. The study used Auto Regressive Distributed Lags (ARDL) framework with Error Correction Model (ECM) to analyse both short run dynamics and long run adjustments respectively. The stationarity of the variables was estimated using Augmented Dickey Fuller (ADF) tests. The results indicate a mixed impact where Market Capitalization had an insignificant result in short run, but lagged structure indicated a gradual support in valuations over a period of time. The Market Turnover showed a higher trading participation taking place due to DFI with the financial markets. Across both models Foreign Portfolio Inflows remained positively significant, showing importance of foreign participation within the markets. The Interest Rates showed a negative relationship while Inflation also suppressed the transaction activities within the markets. To validate our models, we used Breusch Godfrey (BG-LM) test to confirm the absence of serial correlation. The Variance Inflation Factor (VIF) confirmed that the data set was free from the problem of multicollinearity. The Heteroskedasticity and Autocorrelation Consistent (HAC) corrected for heteroscedasticity identified through Autoregressive Conditional Heteroskedasticity (ARCH-LM) results. Overall, the findings suggest that DFI supports the development of Indian Financial Markets through long run market participation, where DFI provides better access as well as facilitates smoother transactions, which enhances liquidity within the markets. This study is one of the first to examine India's DFI on Financial Markets using ARDL-ECM framework. Strengthening DFI ensures retail participation which supports capital formation and ensures a stable financial markets for the economy.

**Keywords:** Digital Financial Inclusion, Digital Financial Inclusion Index, Market Capitalization, Market Turnover, ARDL, ECM, FII Participation, Monetary Policy.

## Organizational Readiness for Open Innovation: An Indian Drug Industry Perspective

Rohini Wayal<sup>1\*</sup>, Poonam Chauhan<sup>1†</sup> and Prema Basrgekar<sup>1†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [rohini.wayal@somaiya.edu](mailto:rohini.wayal@somaiya.edu)

### **Abstract:**

Open Innovation (OI) has become a vital strategic approach in the Indian pharmaceutical industry, helping firms remain competitive in a dynamic global environment. While prior research emphasizes structural and policy enablers, limited attention has been given to internal organizational factors—particularly employee attitude and organizational culture—that shape readiness for OI adoption. This study explores these dimensions within the Indian drug industry, focusing on both inbound OI (integrating external knowledge) and outbound OI (sharing internal innovations externally). Qualitative interviews were conducted with five senior professionals from diverse pharmaceutical firms, including small, mid-sized, and large organizations. The semi-structured format captured expert perspectives on OI relevance, employee attitudes, strategic approaches, enablers, constraints, partner collaboration, and cultural influences. Findings reveal that while OI is increasingly viewed as essential for growth, readiness is often hindered by hierarchical decision-making, cultural rigidity, and low employee motivation or trust in collaboration. Experts highlighted that attitudes such as openness to change, risk tolerance, and proactive learning significantly impact OI success. Similarly, a culture fostering transparency, cross-functional collaboration, and an innovation mindset is critical. Challenges include aligning traditional structures with flexibility for external partnerships and overcoming resistance to change. SMEs frequently engage in informal OI practices, such as employee and customer involvement, but struggle with formal mechanisms like IP licensing and venturing. Organizational size and type influence inbound and outbound OI strategies. This study emphasizes that Open Innovation should be understood not just as a strategic tool but as a cultural and behavioural shift within organizations. Fostering a supportive culture, promoting idea sharing, and implementing clear processes for collaboration are critical to achieving success. By capturing the experiences and strategic reflections of industry experts, this research provides a deeper understanding of organizational readiness for OI in the Indian pharmaceutical sector.

**Keywords:** Indian pharmaceutical industry, Open Innovation, inbound OI, outbound OI, organizational readiness, employee attitude, organizational culture, knowledge sharing, enablers and barriers, risk tolerance

## **A Novel Approach to Anonymize Medical Reports While Preserving Data Utility**

Sachin R Thorat<sup>1\*</sup> and Davendranath G Jha<sup>1†</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: Sachin.thorat@Somaiya.edu

### **Abstract:**

**Objectives:** To develop a novel approach for anonymizing medical reports that ensures patient confidentiality while maintaining data usability for research and analysis. **Methods:** In this study, the proposed approach uses Electra-large-discriminator architecture for anonymization. We trained the model on a public dataset (CoNLL-2003). **Results:** The resulting output revealed that the model was able to anonymize images with 97.83% accuracy, 97.18% recall, 68.95% as precision, and F1-score of 80.67%. **Conclusion:** The proposed novel approach showed a promising approach to anonymize medical reports. The approach is able to protect patient privacy while still preserving the data utility of the records. This makes it a valuable tool for researchers and other users of medical data

**Keywords:** Anonymization, Patient privacy, Medical data

## Ethical Decision-Making, Consumer Trust & Technology in Health Insurance Sector

Sanjeev Chowdhury<sup>1\*</sup> and Krupa A Rai<sup>1†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [Sanjeev.c@somaiya.edu](mailto:Sanjeev.c@somaiya.edu)

### **Abstract:**

This ongoing doctoral study examines ethical decision-making and trust formation in India's health-insurance sector within a context shaped by economic liberalisation, regulatory expansion, and technological transformation. Following liberalisation in the early 1990s and the entry of private health insurance in 1999, the sector expanded rapidly (the Union Budget 2025-26 allocation of Rs.99,858 crore, representing 1.9% of GDP and a 9.78% YOY increase, reflects the growing institutional priority accorded to healthcare financing), initially serving higher-income groups and later extending coverage across socioeconomic strata through government-led initiatives introduced from 2007 onward. The launch of the Pradhan Mantri Jan Arogya Yojana in 2018 further institutionalised risk pooling and access-oriented health financing. Despite this expansion (6.76 % CAGR between FY24 and FY28), persistent ethical challenges remain, including information asymmetry, misrepresentation of policy terms, variability in claim-settlement practices, and increasing compliance burdens. While prior research has examined regulation, technology adoption, and ethical conduct independently, limited attention has been given to their interaction in shaping ethical salience and moral judgment within regulated insurance markets, particularly in emerging economies. Anchored in Jones's Issue-Contingent Model of Ethical Decision-Making, the study seeks to refine its application by examining how regulatory oversight, organisational compliance practices, and digital technologies influence perceptions of moral intensity. The proposed framework integrates ethical adherence—reflected through leadership orientation, employee efficiency, and implementation consistency—with compliance mechanisms, government

## **An investigation into consumer preferences and decision making on healthy eating in Indian context**

Sanjog Singh Ahuja<sup>1\*</sup> and Krupa Rai<sup>†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [sanjog.a@somaiya.edu](mailto:sanjog.a@somaiya.edu)

### **Abstract:**

The global healthy packaged food market has experienced modest annual value growth of 0.5% to 3%, with a notable increase of over 4% in 2020 amid the pandemic. The APAC region is projected to dominate this market by 2025, with India anticipated to exhibit the highest CAGR of 9%, potentially reaching a \$10 billion valuation. This transformation is fueled by heightened consumer demand for healthier options, necessitating alignment with consumer values. This research employs a multi-method approach, integrating bibliometric and qualitative analyses, to investigate how consumers make packaged food choices, focusing on beliefs, motivation, convenience, and preferences for healthy options. This research examines three decades of literature on healthy eating through a structured review and bibliometric analysis. It identifies dominant theories and recommends an expansion of disciplinary approaches. This research examines the variables, specifically within the frameworks of the Theory of Planned Behavior and the Health Belief Model. This study will help packaged food manufacturers to acquaint themselves with the subject of healthy eating. India is the world's third-largest snack food markets yet the contribution to body of research is low. This study will empower food manufacturers, business and marketing leaders, to align their actions around products, place, and promotion in contexts most suitable for business growth. Firms must understand certain proven hypotheses around the purchase intention of healthy packaged food. Marketers of food products will find value in the analysis presented in this study. There is growing interest in healthy eating which provides an opportunity for firms to launch health brands, although this requires careful consideration of various factors to be successful. While legacy brands tried and tested from generations are usually the obvious choice for consumers, there is a disruptive health wave cutting across age groups and social classes. Learnings from this research will empower the business decisions.

**Keywords:** Experimental study, Healthy eating, Systematic Literature Review, TCCM Framework, Theory of Planned Behavior

## **Study of behavior biases affecting mutual fund selection among retail investors in top 30 cities of India**

Sharadkumar Jha<sup>1\*</sup> and Rashmi Soni <sup>1†</sup>

<sup>1</sup>*K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India*

Email: [sharadkumar.j@somaiya.edu](mailto:sharadkumar.j@somaiya.edu)

### **Abstract:**

Behavior finance plays a pivotal role in understanding how psychological patterns, emotional responses, and cognitive shortcuts drive investor behavior, often leading to decisions that deviate from rational economic theories. Behavioral biases, such as herding, heuristics, and prospect-related tendencies, significantly influence retail investors' choices in dynamic financial markets. This study examines the influence of herding, prospect, and heuristic biases on mutual fund selection among investors in India's Top 30 Cities (T30), using structured survey data. The T30 cities refers to the top 30 geographical locations in India, as per the Association of Mutual Funds in India (AMFI). The previous research had been done on the basis stock market participation and professional investor behaviour either on herding or heuristic or prospect theory individually. The highlighted role of behavioral biases in shaping investment decisions also focused on isolated biases like overconfidence or loss aversion and is geographically limited to specific regions or market segments. This leaves a notable gap in understanding how these behavioral biases collectively influence retail mutual fund selection decisions across diverse investor populations. Data was collected through structured questionnaires administered to mutual fund investors across these cities, capturing behavioral indicators related to herding (peer influence), prospect bias (loss aversion), and heuristic shortcuts (brand/recent performance reliance). Statistical techniques such as regression analysis, ANOVA, and chi-square tests were used to quantify the impact of each bias on mutual fund selection patterns. On the analyses that showed significant effects of behavioral biases, income, and gender on mutual fund selection, we conclude that psychological and demographic factors strongly shape investment decisions, implying that investor education and fund marketing strategies should account for these influences. The study will give insights on how almost 80% of the investment is done and which behavior pattern people adopt while investing in the mutual fund.

**Keywords:** Behavior Finance, Herding, Heuristics and Prospect theory

## SLR on Educational Robotic Toys used in Early Childhood Education and Parent's Perspective

Shraddha Mehta<sup>1</sup> and Vandana Tandon Khanna<sup>1\*</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: [vandanat@somaiya.edu](mailto:vandanat@somaiya.edu)

### Abstract:

Technology has become an indispensable aspect of life for individuals of all ages, and this reality is certain. Technology is implemented through educational robotic toys in the preschool sector. This research examines the intricacies of technology utilised in kindergarten classrooms. This research represents an emerging field about the increasing acceptance and usage of technology in educational settings. The SPIDER-based SLR study investigates the relationship among educational robotic toys, computational thinking, and early childhood education. It also presents the perspectives of preschool parents on educational robotic toys, a topic absent in the conducted literature review. The study methodology encompasses PRISMA, SPIDER, and parental interviews. Twenty-two journal articles were identified via PRISMA. The SPIDER framework is applied in these publications to produce substantial data that will be applied to formulate important queries. This will establish a foundation for future scholars to pursue this study and enhance academic contribution. The parent interview offers a comprehensive understanding of the robotic toys. These interviews offer profound insights into the appropriate dos and don'ts of robotics toys, with parents serving as the primary decision-makers in determining the inclusion, exclusion or limitation of technology in their children's early life.

**Keywords:** Educational Robotic Toys, Computational Thinking, Early Childhood Education, Kindergarten Education, Preschool Parents

Manuscript for this abstract was submitted for internal review

## Exploring the experiences of Ostracism among LGB Individuals

Sneha Bhanushali<sup>1\*</sup> and Shiji Lyndon<sup>1\*</sup>

<sup>1</sup>*K.J Somaiya Institute of Management, Vidyavihar  
University, Mumbai, India*

Email: [svb4@somaiya.edu](mailto:svb4@somaiya.edu)

### **Abstract:**

Building a diverse workforce is a crucial step towards achieving inclusion (Jones & Lim, 2020). Amongst the various diverse workforce, the LGBTQ employees are facing a lot of challenges. LGBT employees report many occurrences of workplace ostracism (DeSouza et al., 2017). Ostracism is defined as “The extent to which an individual perceives that he or she is ignored or excluded by others” (Ferris et al., 2008, p. 1348). This paper reviews previous researches about the domain of workplace ostracism and exclusion experiences of LGB individuals in order to provide an overview of theoretical frameworks and empirical studies that highlight the importance of diversity and inclusion in the workplace. Although numerous literature reviews have been conducted to organize existing research on different facets of workplace ostracism, very few studies have addressed workplace ostracism among LGB from the point of view of inclusion. This study contributes to the existing literature as it talks about the ostracism experiences from the point of view of inclusion especially among LGB individuals. Various academic databases like Google Scholar and Scopus were used to undertake a comprehensive literature review focused on various experiences of ostracism among LGB in the workplace. The review offers a broad overview with an aim to provide a holistic view of ostracism, its definitions, related constructs and exclusion faced by LGB individuals. It deepens our understanding of workplace ostracism and its harmful effects by providing a detailed portrayal of its consequences. This review holds considerable practical relevance by raising awareness about this often-overlooked and subtle form of mistreatment, ensuring that stakeholders recognize its harmful consequences. This can lead to more supportive policies, better diversity training and initiatives that promote acceptance and equality. Findings can inform policymakers in creating workplace regulations that protect marginalized communities from subtle forms of exclusion, thus ensuring better protection for them.

**Keywords:** Exclusion, Experiences, LGB, Workplace Ostracism

## Framework for Effective Implementation of ESG in Indian SME Sector: Opportunities and Challenges

Srivatsan Gopalratnam Royam<sup>1</sup> and Harnesh Srichand Makhija<sup>1</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: [srivatsan.r@somaiya.edu](mailto:srivatsan.r@somaiya.edu)

### **Abstract:**

This study examines the effective implementation of the Social (S) and Governance (G) components of the Environmental, Social and Governance (ESG) framework in the Indian Small and Medium Enterprise (SME) sector, with reference to opportunities and challenges. There is limited research on how listing-related governance and disclosure practices shape ESG implementation in alignment with business transition outcomes. The research is based on an empirical analysis of secondary data covering 519 SMEs listed on the NSE SME platform as of January 2026, representing the active SME-listed universe in India. Within this population, 142 SMEs that transitioned from the SME Board to the Main Board during the period 2020 to 2025 are examined to understand governance maturity and disclosure discipline associated with business transition. The study conceptualises Business Transition as representing changes in SME listing status within the regulatory framework. Governance parameters are treated as leading qualitative indicators shaping organisational maturity, while financial performance measures aligned with statutory and listing thresholds function as eligibility conditions. CSR applicability and IPO eligibility remain contingent upon meeting prescribed financial thresholds. Further, industry-wise sectoral segments and geographical clustering of SMEs are analysed using percentage-based distributions to contextualise governance readiness across sectors and regions. The assessment of business transitions encompasses continuity within the SME segment, movement to the Main Board, as well as delisting, dormancy, or default, reflecting divergent institutional trajectories associated with capacity constraints and conditions of financial distress. The study aims to examine whether ESG implementation in Indian SMEs is associated with governance maturity and exposure to capital market regulations. The analysis provides an empirical basis for developing an ESG implementation framework tailored to the Indian SME context and identifies areas for further research.

**Keywords:** ESG Implementation; Indian SMEs; Corporate Governance; Disclosure Practices; SME Board; Business Transition; CSR Applicability.

## Social Media as a Sales Capability: A Case Study Across B2B Sales Roles

Sudhanshu Mishra<sup>1\*</sup> and Kiran Sharma<sup>1†</sup>

<sup>1</sup>K. J. Somaiya Institute of Management (KJSIM), Somaiya University, Mumbai, India

Email: [sudhanshu.mishra@somaiya.edu](mailto:sudhanshu.mishra@somaiya.edu)

### **Abstract:**

Social media plays an important role in business-to-business (B2B) sales. Nowadays, the marketing team is engaged in finding the ROI from post to performance in terms of leads generated to the end of customer acquisition. The sales team plays a role in using the posts to connect with the prospects and existing clients. They also benchmark the products and services based on information available on social media. This helps salespeople to wear a hat of advisor as well to their clients. Prior studies are focused on prospecting, engagement and relationship. The discussion is focused on self-reported data or the adoption stage. However, there are multiple sales roles, such as Inside sales, business development (hunting) and customer success(farming) roles, where we have focused our studies. Adopting a case study method to examine LinkedIn posts of B2B organizations through a non- participant observation of their activities. Anchoring on the motivation, ability and opportunity (MOA) framework, this study will show that social media usage is effective in early-stage prospecting, relationship gathering and market intelligence activities. The findings will provide a framework to design role-specific social media policy. This will align the effort of sales salesperson in achieving the goal. On the academic aspect, this study will be extended by linking the study with value creation and relationship building, translating to sales.

**Keywords:** Social media, B2B, Salesperson, Hunting and Farming roles in Sales.

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## Hope, Digital Resilience, and Career Readiness among MBA Students

Swati Vaid Chaturvedi

*KJ Somaiya Institute of Management, Somaiya Vidyavihar University,*

Email: [swati.chaturvedi@somaiya.edu](mailto:swati.chaturvedi@somaiya.edu)

### **Abstract:**

The rapid integration of AI and digital technologies is transforming managerial roles and redefining career readiness for management graduates. Modern workplaces demand not just technical skills but also psychological and adaptive resources to handle uncertainty, continuous learning, and tech-driven change. For MBA students, readiness now encompasses motivational capacities like confidence, adaptability, and employability in AI-enabled environments. Organizational psychology highlights hope—a goal-directed resource fostering proactive career behavior—while emerging research underscores digital resilience, the ability to adapt to technological shifts, recover from digital stressors, and engage with new systems. Despite links to positive outcomes, few studies explore how hope and digital resilience jointly influence career readiness, especially in pre-employment MBA contexts amid AI-mediated work. This cross-sectional survey targets final-year MBA students. Hope is assessed via agency and pathways thinking; digital resilience via adaptive responses to tech change; and career readiness via career confidence, adaptability, and perceived employability in tech-influenced roles. Hierarchical regression and interaction analyses test direct and synergistic effects, controlling for demographics. Findings will demonstrate how these resources bolster career readiness for future managers, with implications for MBA curricula: integrate psychological development with digital skills to prepare students for evolving workplaces.

**Keywords:** Hope, digital resilience, career readiness, AI enabled Work context, MBA students

## **The Augmentation of Artificial Intelligence for Self-Regulated Learning: A Hybrid Review of Experimental Studies and Future Research Directions**

Vaishali Shrikant Jadhav<sup>1\*</sup> and Sindhu Singh<sup>1†</sup>

<sup>1</sup>*K J Somaiya Institute of Management, Somaiya Vidyavihar University, Mumbai, India*

Email: vaishali20@somaiya.edu

### **Abstract:**

The advancement in artificial intelligence (AI) is enabling self-regulated learning (SRL). The theoretical basis and practical efficacy of AI enablement in SRL for informal and collaborative learning contexts have received less attention. The purpose of this study is to understand the effectiveness of AI in supporting SRL processes across diverse learning contexts. Using a hybrid approach that integrates the theory-context-characteristics-methods (TCCM) framework with bibliometric and content analysis techniques, this systematic literature review comprehends the landscape of AI enabled SRL through 41 experimental studies. Findings expose strong reliance on Zimmerman's SRL model and ITS tools, but inadequate focus on non-formal learning contexts, human-AI collaboration theories and multimodal data use. We propose attention on professional learning, cultural contexts, and anthropomorphism in AI design in future research. This review synthesized experimental AI-SRL studies using TCCM framework and provides a structured foundation for future empirical and theoretical advancements. A key outcome of the review is the proposed integrative model for Human-AI Shared Regulation of learning which offers practitioners insightful suggestions for design of AI tools for HASRL.

**Keywords:** Self-Regulated Learning; Artificial Intelligence (AI); Professional Learning; Online Learning; Education.



## **Abstract: Medicine/ Physiotherapy**

### **Oral presentations**

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## **Physiotherapy protocol for post-operative benign osteoblastoma at Distal end of Femur (Intraosseus Rosai-Dorfman Disease): A case report**

Sarthaki Gaikwad<sup>1</sup>, Fatima Mohd Thoufeek<sup>1</sup>, Nikhil Bhoys<sup>1</sup>, Hina Jain<sup>1\*</sup> and Rupali Shevalkar<sup>1\*</sup>

*K J Somaiya College of Physiotherapy, Sion, Mumbai*

Email: f.m@somaiya.edu

### **Abstract**

Osteoblastoma is a rare, benign but locally aggressive bone-forming tumor that commonly affects the spine and long bones. Involvement in the distal femur with intra-articular extension is uncommon and can pose diagnostic challenges. Physiotherapy plays a critical role in postoperative recovery; however, structured rehabilitation guidelines for such cases remain limited in the literature. This case report describes a rare presentation of intraosseous Rosai-Dorfman disease and highlights the clinical outcomes of a phased, impairment-based physiotherapy protocol following surgical excision and bone grafting. The patient presented with gradually progressive left side knee pain that worsened over several months. Radiographic evaluation demonstrated a mixed lytic-sclerotic lesion in the distal femur with intra-articular extension. The patient underwent intra-articular curettage with allograft bone grafting; biopsy confirmed intraosseous Rosai-Dorfman disease. She was referred for physiotherapy one-week post-immobilization. Postoperatively, she presented with restricted knee flexion ROM to 70° with extensor lag, fear of falling, swelling in the patellar regions, healed surgical scar, quadriceps and calf muscle atrophy, altered gait, pelvic drop during stance and reduced quadriceps, hamstring and hip abductor strength (MMT 3-), and impaired proprioception of knee joint. A structured phase-wise physiotherapy program was initiated with goals of protection of the graft, gradual restoration of knee mobility, strengthening, gait re-education, and proprioceptive training. The patient demonstrated progressive improvement in knee range of motion, muscle strength, gait symmetry, and functional independence without complications. This case underscores the importance of early, goal-oriented, and phase-based physiotherapy following surgical management of distal femur osteoblastoma with intraosseous Rosai-Dorfman disease. A structured rehabilitation protocol complemented surgical treatment, facilitated recovery of mobility and function, and helped prevent long-term disability. The report contributes clinically relevant guidance to the limited literature on postoperative physiotherapy management in rare Rosai-Dorfman Disease.

**Key-words:** Histiocytosis, Bone Neoplasms, Physical Therapy Modalities, Pain, Biopsy, Muscles

Manuscript for this abstract was submitted for internal review

## **Biopsychosocial management approaches versus standard care for improving pain and function in adults with arthritis: a narrative review of evidence from the last five years**

Manali Netaji Yadav<sup>1\*</sup> and Deepak Anap<sup>2†</sup>

<sup>1</sup>*K J Somaiya College of Physiotherapy, Mumbai,*

<sup>2</sup>*DVVPF'S College of Physiotherapy, Ahilyanagar*

Email: [manali.yadav@somaiya.edu](mailto:manali.yadav@somaiya.edu), [deepak.anap@hotmail.com](mailto:deepak.anap@hotmail.com)

### **Abstract**

General Background: Arthritis, including osteoarthritis and inflammatory arthritis such as rheumatoid arthritis, is a leading cause of chronic pain and disability worldwide. Specific Background: Pain experience in arthritis is now understood to arise from interacting biological, psychological, and social factors, forming the basis of the biopsychosocial (BPS) model, which integrates biomedical care with psychological and behavioral strategies. While BPS approaches are recommended in arthritis care, the recent evidence regarding their effectiveness, optimal components, delivery modes, and implementation challenges has not been comprehensively synthesised. This narrative review summarises contemporary evidence demonstrating that BPS-based management strategies provide superior outcomes compared with standard biomedical care alone for selected adults with arthritis. Ten peer-reviewed studies published within the last five years, including systematic reviews, randomized controlled trials, cohort studies, and program evaluations, were analysed. Outcomes included pain, physical function, psychosocial health, and implementation features. Evidence indicates that integrating psychological interventions—particularly cognitive behavioral therapy, pain-coping skills training, and mindfulness—with exercise and education results in small-to-moderate improvements in pain and function. Multidisciplinary rehabilitation programs show statistically significant but variable benefits, influenced by intervention intensity and heterogeneity. Digital and remotely delivered BPS interventions demonstrate promising efficacy and improved accessibility. Emerging phenotyping studies identify distinct biopsychosocial profiles that predict pain trajectories and treatment responsiveness. These findings support routine integration of biopsychosocial strategies into arthritis management and highlight the need for stratified, standardised, and implementation-focused approaches to optimise clinical impact and scalability.

**Key-words:** Biopsychosocial Model, Arthritis Pain Management, Cognitive Behavioral Therapy, Multidisciplinary Rehabilitation, Digital Health Interventions, Pain Coping

Manuscript for this abstract was submitted for internal review

# Effect of modified otago exercise program on balance and quality of life in community-dwelling older adults with impaired balance: a pre–post interventional study

Prachi Thombare<sup>1</sup> and Tejal Pardeshi<sup>1</sup>

<sup>1</sup>*K J Somaiya College of Physiotherapy, Sion, Mumbai*

Email: [prachithombare@email.com](mailto:prachithombare@email.com), [tejal.pardeshi@somaiya.edu](mailto:tejal.pardeshi@somaiya.edu)

## Abstract

Balance is a complex motor skill requiring the integration of sensory input, central nervous system processing, and appropriate motor responses, and its decline with aging significantly increases the risk of falls among older adults. Exercise-based fall-prevention programs such as the Otago Exercise Program have shown effectiveness in improving balance and functional ability, but evidence on modified formats remains limited. There is limited literature evaluating the effect of a 6-week Modified Otago Exercise Program on balance and quality of life among Indian community-dwelling older adults with impaired balance. This study examined whether a 6-week Modified Otago Exercise Program improves balance and quality of life in older adults aged 60–80 years with impaired balance. A pre–post interventional experimental study was conducted on 40 community-dwelling older adults recruited using convenient sampling. Participants underwent a 6-week Modified Otago Exercise Program consisting of strengthening, balance, aerobic, and flexibility exercises performed three times per week. Balance was assessed using the Mini-Balance Evaluation Systems Test (Mini-BESTest), and quality of life was measured using the Indian Geriatrics Quality of Life Inventory (IGQOLI) at baseline and post-intervention. Statistical analysis using paired t-test or Wilcoxon signed-rank test demonstrated significant post-intervention improvements in balance and quality of life scores. The findings suggest that a 6-week Modified Otago Exercise Program is an effective intervention for enhancing balance and quality of life in older adults, supporting its inclusion in community-based fall-prevention and health-promotion strategies.

**Key-words** Modified Otago Exercise Program, Balance, Quality of Life, Older Adults, Fall Prevention, Mini-BESTest

Manuscript for this abstract was submitted for internal review

## Effect of blood flow restriction training on rehabilitation outcomes following anterior cruciate ligament reconstruction: a scoping review

Vanshika Desai<sup>1</sup> and Dhvani Shah<sup>1\*</sup>

<sup>1</sup>*K J Somaiya College of Physiotherapy, Sion, Mumbai*

Email: [vanshika.desai@somaiya.edu](mailto:vanshika.desai@somaiya.edu)

### **Abstract**

Anterior cruciate ligament (ACL) reconstruction is a common orthopedic procedure associated with prolonged recovery and muscle atrophy. Blood flow restriction training (BFRT) has emerged as a promising adjunct to conventional rehabilitation for preserving muscle mass and improving strength. To map and synthesize existing evidence regarding the effects of BFRT on functional, morphological, and strength outcomes following ACL reconstruction. A scoping review was conducted in accordance with the PRISMA-ScR guidelines. A systematic literature search identified studies evaluating BFRT as part of postoperative rehabilitation in individuals undergoing ACL reconstruction. Data were extracted on study design, participants, interventions, and outcomes. Twenty studies were included, comprising randomized controlled trials, systematic reviews, and observational studies. BFRT was consistently associated with preservation of quadriceps muscle cross-sectional area and strength when compared to low-load resistance training alone. Evidence supports the safety of BFRT in ACL rehabilitation when applied using standardized protocols. However, variability exists regarding occlusion pressures, training frequencies, and outcome measures. BFRT is a promising intervention to mitigate muscle atrophy and improve strength after ACL reconstruction. Further high-quality randomized trials are needed to establish standardized protocols and confirm long-term functional benefits.

**Keywords:** Blood flow restriction training, ACL reconstruction, Rehabilitation, Muscle atrophy, Quadriceps strength.

## Abstracts: Music and Performing Arts

### Oral presentation.

सुनीता अजय गंगराड़े, हिंदी चित्रपट संगीत को लोकप्रिय बनाने में रागदारी संगीत की भूमिका.....180

## हिंदी चित्रपट संगीत को लोकप्रिय बनाने में रागदारी संगीत की भूमिका

सुनीता अजय गंगराडे <sup>1</sup>; डॉ राहुल प्रकाश <sup>1</sup>

संगीत विभाग, माया सोमैया स्कूल आफ म्यूजिक एंड परफॉर्मिंग आर्ट,  
सोमैया विद्याविहार यूनिवर्सिटी, मुंबई

Email: [sunita.gangrade@somaiya.edu](mailto:sunita.gangrade@somaiya.edu)

### सारांश:

रागदारी संगीत ने हिन्दी चित्रपट गीतों को भावनात्मक गहराई और शास्त्रीय सौंदर्य प्रदान किया, जिसके परिणामस्वरूप ये गीत जनमानस में सहज रूप से स्वीकार्य बने। 1930 से हिंदी चित्रपट संगीत में शास्त्रीय संगीत और लोकधुनों का समावेश प्रारंभ हुआ, जो 1940 से 1960 के कालखंड में अपने स्वर्णिम शिखर पर पहुँचा। संगीतकारों ने रागों की मूल पहचान बनाए रखते हुए उन्हें रागों की शुद्धता, भावनात्मक गहराई, और सरलता के साथ प्रस्तुत किया, इन सभी तत्वों ने मिलकर हिन्दी चित्रपट संगीत को अविस्मरणीय बनाया। इस काल के संगीतकारों में नौशाद, मदन मोहन, एस.डी. बर्मन और लक्ष्मीकांत-प्यारेलाल ने हिंदी चित्रपट संगीत में रागों का प्रयोग सरल, सुगम और मधुर शैली में किया। रागदारी संगीत के बिना हिंदी चित्रपट संगीत की समृद्ध परंपरा की कल्पना अधूरी प्रतीत होती है।

हिंदी चित्रपट संगीत को लोकप्रिय बनाने में रागदारी संगीत की भूमिका अत्यंत महत्वपूर्ण रही है, राग यमन, दरबारी, भैरव आदि पर आधारित गीतों ने आम जनता को शास्त्रीय संगीत से परिचित कराया। बैजू बावरा (1952) और मुगल-ए-आज़म (1960) जैसी फिल्मों ने रागदारी संगीत को लोकप्रिय बनाया। इस शोध का उद्देश्य है कि किस प्रकार रागदारी संगीत ने हिंदी चित्रपट संगीत की लोकप्रियता, सौंदर्यबोध और सांस्कृतिक महत्ता को सुदृढ़ किया तथा शास्त्रीय संगीत को जनमानस तक पहुँचाने में महत्वपूर्ण भूमिका निभाई।

**मुख्य शब्द** - हिंदी चित्रपट संगीत, रागदारी संगीत, जनमानस में लोकप्रियता, सौंदर्यबोध

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## Structural modulation of ZnO nanoparticles via Tb, Gd, and La doping

Sujata Borade<sup>1</sup>, Rakesh Tiwari<sup>1</sup>, Archana Sharma<sup>2\*</sup> and Santosh Mani<sup>2</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar University*

<sup>2</sup>*Department of Science and Humanities, K J Somaiya School of Engineering, Somaiya Vidyavihar University*

Email: [archana.sharma@somaiya.edu](mailto:archana.sharma@somaiya.edu)

### Abstract:

Rare-earth (RE) doping represents an effective approach for tailoring the structural properties and functional performance of ZnO nanoparticles. In this study, the effects of three RE dopants Tb (terbium), Gd (gadolinium), and La (lanthanum) on the crystallographic structure, lattice strain, and particle morphology of ZnO nanoparticles synthesized via a controlled wet chemical method were systematically compared. X-ray diffraction analysis revealed dopant-dependent variations in crystallite size and lattice parameters while preserving the wurtzite ZnO phase without secondary impurity formation. The incorporation of terbium and gadolinium, owing to their smaller ionic radii relative to Zn<sup>2+</sup>, resulted in slight lattice contraction and increased microstrain, whereas lanthanum doping induced noticeable lattice expansion and enhanced defect formation due to its larger ionic radius. Transmission electron microscopy further confirmed dopant- and concentration-dependent changes in particle size distribution and morphology. These comparative findings underscore the critical role of rare-earth ionic size and electronic configuration in modulating the structural characteristics of ZnO nanoparticles, providing valuable insights for optimizing RE-doped ZnO materials for optical, magnetic, and catalytic applications.

**Keywords:** Strain, RE Doping, ZnO Nanoparticles, Structural Properties

Manuscript for this abstract was submitted for internal review

## **The study of the effect of the incorporation of germinated stem and fruit at different stages of maturity of *Borassus flabellifer* in bread formulation on bread properties, sensory, and texture analysis**

Sejal Kamat

*Department of Life Sciences (Nutraceuticals), Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University, Mumbai*

Email: [sejal.kamat@somaiya.edu](mailto:sejal.kamat@somaiya.edu)

### **Abstract:**

*Borassus flabellifer* is a nutritionally rich but underutilised resource, and limited information is available on the effects of its fruit pulp at different stages of maturity and germinated stem on bread quality characteristics. The present study evaluated the incorporation of *Borassus flabellifer* ripe pulp, overripe pulp, and germinated stem into bread formulations at substitution levels of 10%, 15%, and 20% (w/w). The formulated breads were assessed for physical properties, including baking loss, loaf height, loaf volume, and specific volume, along with texture profile parameters, instrumental colour attributes ( $L^*$ ,  $a^*$ ,  $b^*$ , and  $\Delta E$ ), and sensory attributes. Sensory evaluation was conducted using a 9-point structured hedonic scale, and non-parametric statistical methods were applied for analysis. The results demonstrated a significant overall effect of formulation on physical, textural, colour, and selected sensory parameters ( $p < 0.05$ ). Breads incorporating *Borassus flabellifer* pulp generally exhibited lower baking loss and comparatively higher loaf volume and specific volume. Texture profile analysis showed significant global variation, with overripe pulp and germinated stem formulations tending to produce a softer crumb structure; however, individual pairwise differences were not statistically significant after correction. Instrumental colour analysis revealed formulation-dependent variation in crumb and crust colour attributes across maturity stages. Sensory evaluation identified differences in selected attributes; however, most formulations demonstrated sensory profiles broadly comparable to the control sample. Overall, the findings indicate that *Borassus flabellifer* can be incorporated into bread formulations without marked deterioration in quality attributes, providing a basis for future investigations.

**Keywords:** *Borassus flabellifer*, Functional Food, Formulated Fruit Bread, Ripe Pulp, Overripe Pulp, Germinated Stem, Sensory, Texture Properties

## **A comprehensive review of hyperparameter tuning techniques with special reference to mango leaf disease detection**

Shweta Satao<sup>1</sup> and Swati Maurya<sup>1</sup>

<sup>1</sup>*School of Basic and Applied Sciences, Somaiya Vidyavihar University, Mumbai*

Email: [shweta.satao@somaiya.edu](mailto:shweta.satao@somaiya.edu); [swati.maurya@somaiya.edu](mailto:swati.maurya@somaiya.edu)

### **Abstract:**

Deep learning models have demonstrated outstanding performance across a wide range of domains, including computer vision, natural language processing, and reinforcement learning; however, their success is highly dependent on the careful selection of hyperparameters, which are defined prior to training and are not learned directly from data. These hyperparameters govern key aspects of model architecture, training dynamics, and regularization strategies, thereby significantly influencing generalization capability and predictive performance. Hyperparameters can be broadly categorized into architectural configurations, training-related settings, and regularization mechanisms, all of which are interdependent and require systematic tuning during model development. Poorly chosen hyperparameters can lead to slow convergence, overfitting, or suboptimal accuracy on unseen data. Consequently, the development of efficient hyperparameter optimization techniques is critical. While traditional approaches such as manual tuning and grid search remain in use, they have increasingly been complemented by advanced methods including random search, Bayesian optimization, and automated exploration of high-dimensional parameter spaces. Moreover, emerging techniques such as neural architecture search, which leverage meta-learning and reinforcement learning, offer promising directions for automating and enhancing hyperparameter tuning. This review provides a comprehensive overview of these techniques, with particular emphasis on their relevance to mango leaf disease detection using deep learning models.

**Keywords:** Deep Learning, Hyperparameters, Neural Architecture, Optimization

## ***In silico* studies of Ribosome-inactivating proteins (RIPs) from underexplored Cucurbitaceae family**

Chandrima Ghosh<sup>1</sup> and Madhura Janve<sup>1\*</sup>

<sup>1</sup>Department of Life Sciences (Food Science and Nutraceuticals), Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University, Mumbai

Email: [m.janve@somaiya.edu](mailto:m.janve@somaiya.edu)

### **Abstract:**

Ribosome-inactivating proteins (RIPs) are known for their ability to inhibit tumour cell proliferation in a variety of cancers, such as breast cancer, leukaemia/lymphoma, and hepatoma through induction of apoptosis. RIPs inhibit the eukaryotic ribosome via N-glycosidase activity, inhibiting protein synthesis. In the present study, RIPs derived from underutilised cucurbits have been explored using *insilico* approach. The FASTA sequences of RIPs of 10 indigenous cucurbits were validated for structural and functional properties. The results of amino acid sequence and multiple alignment sequence studies indicate a strong structural foundation for modelling of RIPs through distinctive pattern in arginine, glutamic acid and cystine residues. The Cluspro 2.0 software was used to dock RIPs on the common cancer receptor to understand the stability and integrity of the complex. Ramplot software was used to confirm the reliability of the structure. The docked protein chains showed over 90% of residues in favoured conformational regions of the Ramachandran plot confirming its backbone and reliable structure for the complex. *Insilico* tools can be effectively used to explore RIP mediated anticancer pathway to predict future cytotoxic potential of these plants.

**Keywords:** Ribosome-inactivating proteins, *Cucurbitaceae*, Cancer receptors, Molecular docking, Homology modelling.

## **Temporal consistency in AI generated videos through action-based motion analysis.**

Deepak Sharma

*Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University, Mumbai*

### **Abstract:**

The rapid growth of AI-based video generation models have made it possible to create incredibly real synthetic videos. However, it brings significant challenges when it comes to verifying the authenticity of content and identities. Most current AI detectors and its methods mainly scans spatial artifacts and inconsistencies at the frame level and often miss the temporal irregularities that can disrupt the natural flow of human movement. This study experiments and looks for the temporal consistency in AI-generated videos by using action-based motion analysis as a strong indicator. By utilizing annotated action datasets, our proposed framework will fetch short video segments that showcase a variety of human actions and processes them with optical flow techniques and 3D Convolutional Neural Networks (3D-CNN). By examining anomalies in motion flow and temporal dynamics, the proposed framework will significantly improves classification accuracy in between synthetic videos from real ones. For experimental evaluations it will show how our detection and its performance will surpasses traditional methods based on spatial artifacts, especially when it comes to picking up on subtle temporal inconsistencies during complex motion sequences. The key contributions of this work include developing a reliable model for detecting temporal consistencies in AI-generated videos and also propose possible solutions to improve those consistencies and fix such gaps in generated videos.

**Keywords:** Temporal consistency, Motion analysis, Spatio-temporal features, Convolutional Neural Networks.

## One Pot Synthesis of 1H-naphtho[1,2-e][1,3]oxazine using N-phosphonic acid-L-proline Fe<sub>3</sub>O<sub>4</sub> Functionalized Magnetic Nanoparticles Under Green Condition.

Dnyaneshwar Pacharne<sup>1</sup> and Pushpendra Rai<sup>2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [d.pacharne@somaiya.edu](mailto:d.pacharne@somaiya.edu), [pushpendrarai@somaiya.edu](mailto:pushpendrarai@somaiya.edu)

### Abstract:

A Facile and convenient one-pot synthesis of naphtho-1, 3-oxazine derivatives using  $\beta$  naphthol, pyrazin-2-amine, and aromatic aldehyde, followed by in situ ring closure with formaldehyde without isolating 1-(pyrazin-2-ylamino)methylnaphthalen-2-ol in the presence of N-phosphonic acid functionalized-L-proline-Fe<sub>3</sub>O<sub>4</sub> magnetic nanoparticles, is a novel reusable heterogeneous catalyst is prepared by a simple co-precipitation method. The magnetic nanoparticles were characterized using FT-IR spectroscopy, X-ray diffraction (XRD), Energy dispersive X-ray spectroscopy (EDS), Scanning Electron Microscopy (SEM), thermo gravimetric analysis (TGA) and Transmission Electron Microscopy (TEM).

**Keywords:** 1, 3-oxazine, multicomponent reactions, L-proline, phosphonic acid

## Novel acridone-based EGFR inhibitors: design, synthesis, and integrated in silico–in vitro evaluation

Nilam Bhusare<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar University, Mumbai*

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### Abstract:

The epidermal growth factor receptor (EGFR) family is a key biomarker and therapeutic target for cancer therapy. Novel acridone-N-aceto/benzohydrazide derivatives were identified as potent cytotoxic agents with anti-EGFR activity. Cytotoxicity screening revealed AE4, AE11, and AF11 as highly effective against the A-431 cell line, with IC<sub>50</sub> values of 3.22 μM, 2.43 μM, and 4.06 μM, respectively. In vitro EGFR kinase assays confirmed their inhibition, with IC<sub>50</sub> values of 3.95 μM (AE4), 3.49 μM (AE11), and 4.45 μM (AF11). These compounds selectively reduced p-EGFR Tyr1068 and ERK1/2 levels in a dose-dependent manner, inhibiting the RAS/ERK downstream pathway, while inducing G0/G1 cell cycle arrest and apoptosis. AE4 showed significant DNA-binding affinity ( $K_b = 7.41 \times 10^3 \text{ M}^{-1}$ ), suggesting DNA intercalation as a possible mechanism of action. Molecular docking studies indicated favorable interactions within the EGFR active site. In silico studies predicted good oral bioavailability and low toxicity, supported by kinetic solubility and plasma stability assays, highlighting the potential of these compounds as selective p-EGFR Tyr1068 inhibitors for further development.

**Keywords:** Acridone-N-Aceto/Benzohydrazide, DNA-Binding, SAR, Molecular Docking

## Whittaker transform of some special functions

Puja Chavan<sup>1</sup> and Rachana Desai<sup>2</sup>

<sup>1</sup>*Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University*

<sup>2</sup>*K. J. Somaiya School of Engineering, Somaiya Vidyavihar University*

Email: puja.chavan@somaiya.edu, rachanadesai@somaiya.edu

### **Abstract:**

This investigation presents a study of a new integral transform of special functions, including the confluent hypergeometric function, Gauss hypergeometric function, and generalized hypergeometric function, with the Whittaker function serving as the kernel. The results derived are useful for obtaining Whittaker transforms of a wide class of functions and polynomials associated with the family of generalized hypergeometric functions.

**Keywords:** Hypergeometric Function, Gauss Hypergeometric Function, Integral Transformations, Whittaker Transformations

## Development of biopolymer films embedded with composite metal oxide for wound healing application

Yogita Kamble<sup>1</sup> and Jitendra Satam<sup>2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [jitendrasatam@somaiya.edu](mailto:jitendrasatam@somaiya.edu)

### Abstract

Wounds are highly susceptible to bacterial infection and therefore require an appropriate healing microenvironment that promotes effective tissue regeneration. This study focuses on the synthesis of biopolymer-based films embedded with composite metal oxides to enhance wound healing performance. The metal oxides employed include Fe<sub>2</sub>O<sub>3</sub>, ZnO, TiO<sub>2</sub>, and their mixed composites such as Fe<sub>2</sub>O<sub>3</sub>-ZnO and Fe<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub>, synthesized using a co-precipitation method. Polymer films were fabricated using the solution casting technique, incorporating the synthesized metal oxide composites into biopolymer matrices of sodium carboxymethylcellulose (NaCMC), hydroxypropyl methylcellulose (HPMC), and hydroxypropyl cellulose (HPC), individually blended with chitosan. Crosslinking agents such as tannic acid, gallic acid, and citric acid were used to facilitate efficient film formation, along with plasticizers including glycerol and polyethylene glycol (PEG). Optimization studies of film formulation with desirable wound healing properties are currently underway. Essential physicochemical parameters, including moisture balance, mechanical strength, and structural integrity, will be evaluated as they are critical for maintaining an optimal wound healing environment. Antimicrobial activity and cytotoxicity studies are also in progress to assess the biological performance and safety of the developed films. The study aims to achieve a synergistic effect between the biopolymer matrix and inorganic metal oxide particles, combining antimicrobial efficacy with favorable mechanical and moisture-retention properties. The developed polymer-metal oxide composite films are expected to demonstrate promising potential for effective and safe wound healing applications.

**Keywords:** Mixed Metal Oxide, Solution Casting Method, Wound Healing, Biopolymer Matrix, Antimicrobial Studies

## Flavonoids as multifunctional agents: analysis of antioxidant and antibacterial profiles

Aditi Agarwal<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar University, Mumbai

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### Abstract:

Flavonoids, a prominent class of plant secondary metabolites comprising over 10,000 polyphenolic compounds characterised by a benzo- $\gamma$ -pyrone (C<sub>6</sub>-C<sub>3</sub>-C<sub>6</sub>) structure, are produced through the shikimate, phenylpropanoid, and flavonoid pathways, and are categorised into chalcones, flavanones, flavonols, flavones, isoflavones, flavan-3-ols, and anthocyanidins. The prospective use of these natural products has been examined in the pharmaceutical, medical, nutraceutical, and cosmetic domains. Oxidative stress (OS) results from the accumulation of reactive oxygen species (ROS) and reactive nitrogen species (RNS). The rapid progression of oxidative damage to certain biological macromolecules causes the dysfunction of proteins, membranes, and nucleic acids, resulting in physiological repercussions such as DNA mutations and genetic instability. Flavonoids demonstrate various bioactivities, including antioxidant properties and antibacterial effects against multidrug-resistant (MDR) and extensively drug-resistant (XDR) pathogens via mechanisms such as membrane disruption, interference with energy metabolism, enzyme inhibition, and biofilm prevention; nonetheless, their effectiveness against Gram-negative bacteria is still inadequately investigated. This study examines the inhibitory effects of flavonoids on Gram-negative and Gram-positive bacteria by evaluating the antioxidant and antibacterial properties of quercetin, naringenin, ampelopsin, diosmetin, and morin. This study demonstrates that these flavonoids exhibit diverse antioxidant capacities through DPPH, FRAP, and ABTS assays, as well as antibacterial properties against *Staphylococcus aureus* and *Pseudomonas aeruginosa*, evaluated by disc diffusion, minimum inhibitory concentrations, and biofilm inhibition, facilitating structure-activity relationship (SAR) analyses. The antioxidant analysis indicated that quercetin and morin had highest antioxidant activity, whilst antibacterial tests showed that morin and naringenin possessed significant activity, with structure-activity relationships associating hydroxylation patterns with improved membrane permeability and biofilm disruption. These findings enhance comprehension of flavonoid mechanisms against resistant bacteria and endorse their therapeutic potential in cancer, neuroinflammation, and cardiovascular illnesses, necessitating additional *in vitro* and *in vivo* study of new flavonoids.

**Keywords:** Flavonoids, Antioxidant activity, Antibacterial, Gram-negative bacteria, SAR, Biofilm inhibition

## From oligomers to bulk: insights into pvdf phases through density functional theory

Aditi Chavan

*Department of Polymer Science, Somaiya School of Basic and Applied Sciences,  
Somaiya Vidyavihar University, Mumbai*

Email: [chavan.a@somaiya.edu](mailto:chavan.a@somaiya.edu)

### **Abstract:**

Poly(vinylidene fluoride) (PVDF) and its nanocomposites are increasingly used in aviation and aerospace because of their high strength- and stiffness-to-density ratios along with excellent electroactive properties. A systematic density functional theory (DFT) study on PVDF oligomers was carried out to establish how chain length and conformation control structures, energetics, vibrational infrared (IR) signatures, dipole moments, and dielectric response, thereby providing a molecular-level link between oligomer models and bulk phases. The results indicate that PVDF oligomers with  $n \geq 15$  repeat units reliably reproduce key structural, electronic, and spectroscopic characteristics of bulk PVDF, making them suitable minimal models for quantum-chemical investigations. Comparison of phase-dependent energy gaps and vibrational features underscores the superiority of the all-trans  $\beta$  phase for piezoelectric and related optical applications. These findings are consistent with prior experimental and solid-state DFT studies on PVDF polymorphs and offer practical guidelines for modeling strategies and rational design of PVDF-based materials for targeted electroactive and aerospace uses.

**Keywords:** *Ab initio* quantum chemistry, Density functional theory, Electronic properties, Polymer nanocomposite.

## Tabular structure recognition: a survey of trends and technologies

Aditi Prajapati<sup>1\*</sup> and Swati Maurya<sup>1†</sup>

<sup>1</sup>*Somaiya School of Basics and Applied Science, Somaiya Vidyavihar University,  
Mumbai*

Email: [aditi.prajapati@somaiya.edu](mailto:aditi.prajapati@somaiya.edu), [swati.maurya@somaiya.edu](mailto:swati.maurya@somaiya.edu)

### **Abstract:**

Table Structure Recognition (TSR) is the process of discovering and understanding the layout of tables in a document. This can be divided into three subtasks: table detection, table structure recognition, and text extraction. There are many ways to solve these problems. Therefore, this paper systematically integrates the existing literature on table structure recognition from 2021 to 2024. The purpose of this study is to review the existing literature, identify research gaps, and pave the way for future research. To conduct this study, we searched the Web of Science and Scopus databases for papers using the keywords table structure recognition and table detection. This review provides information on various publicly available datasets such as TableBank, WTW, PubTabNet, etc. Additionally, the study examines various recently developed models for three table recognition subtasks along with their corresponding evaluation methods. The performance of several methods such as TableStrRec, table transformer, TFLOP, etc. are also reported, highlighting their importance, strengths and limitations. In summary, this paper reviews existing datasets, evaluation strategies, and recognition methods, and explores potential future developments in table recognition.

**Keywords:** Table Detection, Table Structure Recognition, Text extraction, Table layout, Table Content Recognition

## Marine polyphenols: a potential therapeutic strategy for alzheimer's disease

Anushree Gade<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar  
University, Mumbai

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### Abstract:

Alzheimer's disease is a progressive neurodegenerative disorder characterized by cognitive decline and memory loss, driven by the accumulation of amyloid-beta plaques and neurofibrillary tangles. Current treatments offer limited efficacy, underscoring the urgent need for novel therapeutic strategies. Marine environments represent a rich, underexplored source of bioactive compounds with significant pharmaceutical potential. Specifically, marine-derived polyphenols (phlorotannins) from brown seaweeds exhibit potent antioxidant, anti-inflammatory, and neuroprotective properties. In this study, we have focused on extraction, characterization and the neuroprotective effect of phlorotannins from *Sargassum wightii*. Extraction was performed using sequential liquid-liquid separation followed by characterization using LC-MS/MS. The neuroprotective potential of the extracted phlorotannins was assessed *invitro* on amyloid-beta induced SH-SY5Y cells. Further investigation through molecular docking, using Biovia Discovery Studio 2024 software, provided insights about the binding patterns of these compounds with the protein. Additionally, we studied the ADME properties (absorption, distribution, metabolism, and excretion) of these compounds using SwissADME. This study underscores the potential of marine polyphenols for neuroprotection against Alzheimer's disease.

**Keywords:** Alzheimer's disease, Amyloid-beta, Macroalgae, Molecular docking, Polyphenols

## Long-term effects of biochar on soil health responses in a woody cropping system, Michigan, USA

Isha Popat<sup>1</sup>, Krusha Shah<sup>1</sup>, Parvathi JR<sup>1</sup>, Lisa Tiemann<sup>1,2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Michigan State University, USA*

Email: [ltiemann@msu.edu](mailto:ltiemann@msu.edu)

### Abstract

Biochar is widely promoted as a long-term soil amendment, yet field-based persistence over the years remains limited. A field experiment established in 2016 in a Christmas tree plantation (Michigan, USA) evaluated a short-term effect (2016-2018) of two pine-derived biochars – Biogenic Reagents (BGR) & U.S. Biocarbon (USB) applied at different rates (0, 25, 75 kg/ha) on soil properties, microbial enzymes, microbiome and plant growth. In the present study, the same site was revisited nine years later, and soil samples were collected in April 2025 and were analysed to assess long-term effects on soil physicochemical properties and microbial functional indicators (like enzyme activities). Current results indicated that biochar type was a primary driver of long-term soil responses, with significant effects on soil pH, ammonium, phosphatase, leucine aminopeptidase (LAP),  $\beta$ -N acetylglucosaminidase (NAG), and crop width. BGR biochar showed significantly higher N-cycling enzyme activity (NAG) compared to the control at both application rates, while both biochar type significantly altered phosphatase activity. Furthermore, multivariate analysis revealed feedstock-driven shifts in soil microbial functioning, with BGR strongly associated with elevated C- and N- cycling enzymes. Overall, these findings provide evidence for persistent, feedstock-dependent biochar effects on soil biochemical functioning nearly a decade after application, while ongoing microbiome analyses will further help elucidate the underlying microbial community responses and refine interpretation of these long-term effects of biochar.

**Keywords:** Biochar, Long-term effects, Feedstock-dependent responses, Soil biochemical functioning, Microbial enzymes

## Investigating the plant-microbe interactions in wheat under drought stress

Krusha Shah<sup>1</sup>, Abby Grieb<sup>2</sup>, Isha Popat<sup>1</sup>, Parvathi JR<sup>1</sup>, Lisa Tiemann<sup>1,2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy, Somaiya Vidyavihar University*

<sup>2</sup>*Michigan State University (MSU), USA*

Email: [ltiemann@msu.edu](mailto:ltiemann@msu.edu)

### **Abstract:**

Plants require nitrogen for growth yet can only utilize nitrogen in bioavailable forms. Certain soil microorganisms, known as diazotrophs, can convert atmospheric nitrogen into plant available forms through biological nitrogen fixation. Environmental conditions such as drought followed by re-wetting are known to influence diazotrophs and the plants they associate with, but it remains unclear whether changes in nitrogen fixation during these transitions are driven primarily by microbes or mediated through plant physiological responses. This study was conducted at Michigan State University using a new experimental system called a “gnotocosm,” which is a gnotobiotic mesocosm designed for growing plants with introduced synthetic microbial communities (SynComs). This study is a part of a larger, ongoing effort to address both ecological questions and validate methods for studying nitrogen fixation in plant-microbe systems under highly controlled conditions. Wheat plants grown under sterile conditions and microbial treatments were subjected to controlled drought followed by re-wetting. Plant physiological traits including growth and biomass parameters, were measured alongside nitrogen fixation using <sup>15</sup>N stable isotope methods. This work tested the hypothesis that (i) drought and re-wetting alter nitrogen fixation dynamics (ii) re-wetting has a stronger effect on nitrogen fixation than drought alone, and (iii) microbial presence enhances plant resilience during recovery from drought. Stable isotope measurements confirmed detectable nitrogen fixation signals across recovery timepoints. Correlation analysis revealed strong positive relationships between root biomass and nitrogen fixation, indicating that plant physiological state particularly root development plays an important role in nitrogen fixation during recovery. Microbial community sequencing from this study is currently underway. Together these results inform the design of future experiments and contribute to the validation of this experimental system.

**Keywords:** Diazotrophs, Plant-microbe interactions and Biological nitrogen fixation

## Enhanced catalytic performance of a Pd-ZIF-8 composite catalyst for selective hydrogenation of $\alpha,\beta$ -unsaturated carbonyl compounds

Manoj Mohapatra<sup>1</sup> and Jitendra Satam<sup>2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy, Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*K J Somaiya School of Engineering, Somaiya Vidyavihar University, Mumbai*

Email: [jitendrasatam@somaiya.edu](mailto:jitendrasatam@somaiya.edu)

### **Abstract:**

Selective hydrogenation of  $\alpha$ ,  $\beta$ -unsaturated carbonyl compounds continue to be a central transformation in pharmaceutical and fine chemical industries for the manufacturing of high-value intermediates with preserved carbonyl functionality. Herein, we report the construction and application of a Pd-ZIF-8 composite catalyst for chemoselective hydrogenation of the C=C bond in  $\alpha,\beta$ -unsaturated ketones and aldehydes. The catalyst combines palladium with zeolitic imidazolate framework-8 (ZIF-8), taking advantage of the synergistic effects of electronic modulation, high surface area, and spatial confinement. Structural and surface characterization through FTIR, XRD, BET, SEM, XPS, and Raman spectroscopy established the uniform dispersion of Pd as well as the maintenance of porosity after the synthesis. The catalytic activity was tested under mild hydrogenation conditions with high selectivity for reducing C=C bonds without over-hydrogenating the carbonyl group. Comparative experiments with ZIF-8 and Pd-ZIF-8 systems showed higher activity and selectivity of the hybrid Pd-ZIF-8 due to improved electron transfer and substrate adsorption kinetics. The catalyst was readily recyclable over several cycles with very little loss in activity. This contribution highlights the promise of hybrid porous materials in controlling catalytic processes and presents a stable platform for selective hydrogenation in synthetic organic chemistry.

**Keywords:** Chemoselective Hydrogenation, ZIF-8, Pd-ZIF-8, Carbonyl compounds, Heterogeneous catalyst, Framework materials, India, Impact Assessment

## **Synthesis and Characterization of Fluorine incorporating core-shell emulsions and assessing the impact of Nano-SiO<sub>2</sub> modifier on the characteristics of produced latex for coating applications.**

Mugdha Shigrekar<sup>1</sup> and Vaijayanti Ghase<sup>1\*</sup>

<sup>1</sup>*Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University  
Vidyavihar, Mumbai*

Email id: vaijayanti.g@somaiya.edu

### **Abstract:**

Nano-SiO<sub>2</sub> modified fluorine-containing styrene-acrylate core-shell emulsions, consisting of styrene, butyl acrylate and 2,2,3,4,4,4-hexafluorobutyl acrylate (F6BA) was successfully synthesized by emulsion polymerization. By increasing the of nano-SiO<sub>2</sub> modifier content from 0 to 50 wt% significant reduction in water absorption rate of the latex films and decrease in surface tension was observed. The contact angle results showed that the prepared coatings had better water repellency and heat resistances. Furthermore, compared with fluorine-containing styrene-polyacrylate emulsion, the obtained nano-SiO<sub>2</sub> modified fluorine-containing emulsions proved to be highly solvent-resistant and water-resistant Comprehensive characterizations, including FTIR, XPS, DSC and TEM, confirmed the successful incorporation of F6BA into the latex copolymer and the formation of core-shell structures. By adjusting the tgs of core and the shell monomers and further modifying them with different surface modifiers it is possible to develop emulsions exhibiting higher contact angle and better water resistance providing a promising approach in the field coatings.

**Keywords:** Core-shell, Emulsion, Hydrophobicity, Oil in water separation, Textile

## Experimental weathering studies of prehistoric rock art paint formulations under simulated lighting conditions

Naheed Sheikh<sup>1</sup> and Daly Davis<sup>2\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC),  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Somaiya School of Basic and Applied Science,  
Somaiya Vidyavihar University, Mumbai*

Email: [daly@somaiya.edu](mailto:daly@somaiya.edu)

### **Abstract:**

Rock art paintings produced by ancient communities on the walls of rock shelters and caves, illustrating prehistoric environments and aspects of human life, constitute a significant component of global cultural heritage. These paintings are primarily composed of pigments, binders, and additives, each fulfilling a specific functional role, which collectively contribute to the remarkable long-term adhesion of the artwork to their substrate. Despite their significance, experimental studies addressing the effects of weathering on rock art materials remain limited. In the present work, we study weathering of rock art paint formulation by simulating lighting conditions. Lighting produces large volumes of secondary electrons in the atmosphere, and rock art exposed to such environments for thousands of years may undergo changes in pigment and binder characteristics. We simulate such weathering conditions by irradiating paint formulations with free electrons. Extensive spectroscopic studies on rock art paintings—both in situ and lab-based—have been conducted across all continents except Antarctica, leading to a well-established understanding of commonly used pigments and binders. Building on this knowledge, we replicate representative pigments along with paint formulations and subject them to controlled electron irradiation. After irradiation, we systematically investigate physicochemical changes using vibrational spectroscopy. This study highlights the importance of simulating weathering processes to uncover degradation pathways, environmental interactions, and binder stability. The insights gained are expected to contribute significantly to the preservation and restoration of rock art and to advance the broader field of cultural heritage science. Furthermore, complementary computational studies will be undertaken to gain a deeper mechanistic understanding of electron-induced transformations and associated spectral shifts.

**Key-words:** Rock art painting, Pigment, Binders, Weathering, Paint, E-beam irradiation

## **Lignin-derived bio-based epoxy resin as a sustainable alternative to DGEBA for anti-corrosion coating applications**

Nidi Shirke<sup>1</sup> and Vandana Jamdar<sup>1\*</sup>

<sup>1</sup>*Department of Polymer Science, Somaiya School of Basic & Applied Sciences,  
Somaiya Vidyavihar University*

Email: [vandana.jamdar@somaiya.edu](mailto:vandana.jamdar@somaiya.edu)

### **Abstract:**

Utilizing lignin-derived monomers as renewable monomers to synthesize epoxy resin, the present study reports the preparation of a bio-based epoxy resin from renewable resources, namely vanillin, as a potential replacement for conventionally produced DGEBA-based epoxy resins used in coating applications. Initially, a bisphenol-type intermediate was synthesized from lignin-derived monomers by reacting with 3-hydroxyacetophenone through an aldol condensation reaction using NaOH as a catalyst. Subsequently, the epoxy resin was synthesized from the prepared renewable monomer-based bisphenol using epichlorohydrin. The structure of the synthesized resin was characterized and confirmed by <sup>1</sup>H-NMR, <sup>13</sup>C-NMR, and FTIR analyses. Further, coatings were prepared using the synthesized epoxy resin with triethylenetetramine (TETA) as a curing agent. The coatings were evaluated for their physical, mechanical, thermal, and chemical properties, including hardness, adhesion, chemical resistance, and impact resistance. In addition, anticorrosive performance was investigated using electrochemical impedance spectroscopy (EIS) and salt spray tests, which showed comparable results to commercial systems. Overall, in comparison to petroleum-based DGEBA epoxy resins, the present study provides insights into the development of sustainable alternatives for anti-corrosion coating applications.

**Keywords:** Lignin, Epoxy, Coating, Bio-based, Sustainability

## Chrysin loaded biopolymeric nanoparticles for improved drug delivery system

Pratima Pandey<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC),  
Somaiya Vidyavihar University, Mumbai*

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### **Abstract:**

Chrysin is a naturally occurring flavonoid that has demonstrated significant potential in the management of neurodegenerative diseases due to its promising neuroprotective properties; however, its therapeutic application is severely limited by poor oral bioavailability and low penetration across the blood–brain barrier. Despite this potential, an effective drug delivery system is required to overcome these limitations and ensure adequate drug concentrations in the central nervous system. In the present study, chrysin-loaded chitosan–alginate nanoparticles were successfully synthesized to enhance drug delivery and bioavailability to the CNS. Nanoparticles were prepared using an ionic gelation method and subsequently characterized by nanoparticle tracking analysis and HPLC. The optimized formulation exhibited a uniform particle size distribution of approximately 72 nm with an acceptable polydispersity index, while HPLC analysis revealed a high encapsulation efficiency of 93%. The successful formulation and characterization of chrysin-loaded chitosan–alginate nanoparticles suggest an efficient drug delivery system for neurodegenerative diseases. Further in vitro and in vivo studies are planned to evaluate their neuroprotective efficacy.

**Keywords:** Chrysin, Neurodegenerative disorder, Polymer, Nanoparticles.

## Direct reductive activation of CO<sub>2</sub> via a low-energy, free-electron-driven green strategy

Rutisha Kotian<sup>1†</sup>, Daly Davis<sup>\*1†</sup>, K. G. Bhushan<sup>3†</sup> and Sajeev Y.<sup>\*2†</sup>

<sup>1</sup>*Somaiya School of Basic and Applied Sciences,  
Somaiya Vidyavihar University, Mumbai*

<sup>2</sup>*Theoretical Chemistry Section, Bhabha Atomic Research Centre, Mumbai*

<sup>3</sup>*Technical Physics Division, Bhabha Atomic Research Centre, Mumbai*

Email: [daly@somaiya.edu](mailto:daly@somaiya.edu); [sajeevy@barc.gov.in](mailto:sajeevy@barc.gov.in)

### Abstract:

Low-energy electrons (LEEs) are among the smallest and inherently green chemical reagents, capable of precise and tunable reactivity, yet their potential to drive sustainable molecular transformations remains largely unexplored. In this work, we demonstrate a green strategy for direct CO<sub>2</sub> activation using LEEs and  $\pi$ -stacked pyridine. The  $\pi$ -stacked pyridine dimer serves as a resonant platform for associative electron attachment, where a low-energy electron drives covalent linkage between non-covalently bound pyridine monomers to yield a transient negative-ion intermediate that behaves as a nucleophile. This in situ formed nucleophilic dimer selectively attacks the electrophilic carbon of CO<sub>2</sub>, forming a covalent negative-ion adduct in which CO<sub>2</sub> is reductively activated while remaining chemically labile. To investigate this mechanism in detail, ab initio quantum-chemical calculations were employed. Structural and energetic properties of closed- and open-shell species were analyzed using second-order Møller–Plesset perturbation theory (MP2), with resonant electron attachment energies refined using EA-EOMCCSD. Constrained minimum energy paths were updated accordingly, and all calculations were performed using the GAMESS-US software package. This experimentally accessible mechanism establishes LEEs as green reagents for direct CO<sub>2</sub> activation and defines a minimally reagent-intensive molecular strategy for sustainable chemical transformations.

**Keywords:** Low-Energy Electrons (LEEs), CO<sub>2</sub> Activation, Sustainable, Green Strategy

## **Efficacy of biostimulant formulation: an inhouse study**

Shivam Taralkar<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC), Somaiya Vidyavihar  
University, Mumbai*

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### **Abstract:**

Biostimulants are increasingly recognized as environmentally benign approaches for enhancing plant health and agricultural yield. The present in-house study was conducted to evaluate the efficacy of a newly developed biostimulant formulation comprising beneficial microorganisms and marine-derived bioactive components. A controlled experiment was performed to assess its impact on plant growth, soil health, and physiological performance. Compared to untreated controls, plants treated with the biostimulant formulation showed significant improvements in early germination, shoot and root length, and overall vigor. Enhanced root development was particularly evident, indicating improved nutrient uptake efficiency. In addition, treated samples exhibited balanced soil characteristics and favorable CHNS/O elemental composition. These responses are attributed to the presence of growth-promoting compounds and microbial metabolites that enhance hormonal regulation, nutrient availability, and stress tolerance in plants. The formulation demonstrated consistent performance throughout the study without exhibiting phytotoxic effects. Improved plant health, resilience, and growth promotion highlighted the potential of the formulation as a supportive input for sustainable agriculture. Overall, the findings validate the potential of biostimulants as alternatives to conventional chemical inputs; however, further field-level validation across diverse crops and environmental conditions is required to confirm efficacy under natural settings.

**Keywords:** Marine Bioactives, Plant Growth, Biostimulants, Soil Parameters

## Therapeutic applications of marine macroalgal bioactives

Shruti Gawde<sup>1</sup> and Maushmi Kumar<sup>1\*</sup>

<sup>1</sup>*Somaiya Institute for Research and Consultancy (SIRAC),  
Somaiya Vidyavihar University, Mumbai*

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### **Abstract:**

The present study investigates the therapeutic potential of seaweed extracts obtained through systematic collection, extraction, and experimental evaluation. Fresh seaweed samples were collected, cleaned, shade-dried, and ground, followed by sequential solvent extraction. Extraction conditions were optimized by varying solvent polarity, solvent-to-sample ratio, extraction duration, and temperature to maximize the recovery of bioactive constituents. Sequential extraction using hexane, chloroform, ethyl acetate, methanol, and water yielded fractions with differing extraction efficiencies. The optimized extracts were subjected to qualitative phytochemical screening to detect alkaloids, flavonoids, phenolics, tannins, terpenoids, saponins, and steroids. Antioxidant activity was evaluated using the DPPH assay, while antimicrobial potential was assessed against *Staphylococcus aureus* (Gram-positive) and *Pseudomonas aeruginosa* (Gram-negative) using standard in vitro methods. Among the tested extracts, methanolic and ethyl acetate fractions demonstrated strong free-radical scavenging activity and notable inhibitory effects against the test organisms. These findings confirm that optimized extraction significantly enhances the recovery of functional phytochemicals and that seaweed-derived bioactives exhibit strong therapeutic potential.

**Keywords:** Seaweeds, Marine Bioactives, Antimicrobial Properties, Antioxidant Potential, Marine Biotechnology

## Limitations of clinical scoring systems in suspected thrombotic thrombocytopenic purpura: implications for early diagnosis

Shruti Kharat<sup>1</sup>, Shrimati Shetty<sup>1</sup> and Maushmi Kumar<sup>2\*</sup>

<sup>1</sup>*Department of Hematology, K J Somaiya Medical Hospital & Research Center, Somaiya Ayurvihar, Mumbai*

<sup>2</sup>*Somaiya Institute of Research and Consultancy (SIRAC), Somaiya Vidyavihar University, Mumbai*

Email: [maushmi@somaiya.edu](mailto:maushmi@somaiya.edu)

### Abstract:

Thrombotic thrombocytopenic purpura (TTP) is a hematologic emergency characterized by severe deficiency of the von Willebrand factor–cleaving protease ADAMTS13, leading to platelet-rich microvascular thrombosis. In the absence of ADAMTS13 testing, clinical scoring systems such as the PLASMIC and French scores are commonly used to guide early management, prioritizing sensitivity to prevent missed diagnoses. This study critically evaluated the strengths and limitations of commonly used clinical scoring systems for predicting severe ADAMTS13 deficiency in patients with suspected TTP. The diagnostic performance of the PLASMIC, French, and Bentley scores was assessed against ADAMTS13 activity through a systematic electronic search of four databases (Cochrane Library, PubMed, Embase, and Scopus) from inception to October 2025. Studies with detailed data on clinical scoring tools were included, while case reports, reviews, and non-English articles were excluded. Among 1,374 evaluated cases reported across 22 original research articles, the PLASMIC score demonstrated the highest diagnostic accuracy, with a sensitivity of 84%, specificity of 83%, positive predictive value of 75%, negative predictive value of 89%, and an overall accuracy of 83%. The French score, evaluated in five studies comprising 314 cases, showed moderate performance with 51% sensitivity, 76% specificity, and 77% accuracy, while the Bentley score, assessed in two studies, achieved the highest specificity (97%) and positive predictive value (94%) but had markedly lower sensitivity (38%). Overall, the PLASMIC score provides the most reliable early prediction of severe ADAMTS13 deficiency in suspected TTP, balancing sensitivity and specificity; however, these findings emphasize that clinical scoring systems should complement rather than replace definitive ADAMTS13 testing and highlight the need for rapid and accessible diagnostic assays.

**Keywords:** Thrombotic Thrombocytopenic Purpura, TTP, ADAMTS13, PLASMIC Score, French Score, Bentley Score

## Low-energy electron-induced crosslinking of polyethylene

Sonali Kamble<sup>1</sup> and Daly Davis<sup>1\*</sup>

<sup>1</sup>*Department of Polymer Science, Somaiya School of Basic and Applied Sciences,  
Somaiya Vidyavihar University, Mumbai*

Email: [daly@somaiya.edu](mailto:daly@somaiya.edu)

### **Abstract:**

Polyethylene (PE) is widely used due to its low cost, chemical inertness, and excellent electrical insulating properties; however, its limited thermal and mechanical stability restricts applications in demanding environments. Crosslinking improves these properties by forming a three-dimensional polymer network, yet low-energy electron-induced green crosslinking pathways remain relatively unexplored. In this study, quantum chemical calculations were employed to investigate low-energy electron-induced crosslinking mechanisms in polyethylene. While high-energy irradiation processes have been extensively studied, the role of low-energy electrons remains underexplored. Ab initio calculations using HF, RHF, ROHF, and MP2 methods with 6-311G basis sets were performed on polyethylene oligomers ( $n = 10$ ) to evaluate crosslinking feasibility induced by low-energy free electrons. Molecular geometries were optimized at the MP2/6-311G level, and associative electron attachment properties were computed at the HF/6-311G//MP2/6-311G level, revealing favorable bond-formation pathways. The results indicate that low-energy electrons significantly alter the electronic structure of polyethylene, reducing activation barriers for intermolecular bonding and crosslink generation. Compared to conventional thermal or chemical crosslinking approaches, electron-induced methodologies offer a greener and more precise alternative. This theoretical investigation provides fundamental support for the feasibility of electron-induced crosslinking in polyethylene and motivates future experimental validation using low-energy electron beam exposure.

**Keywords:** Polymer Crosslinking, Low-Energy Electron Irradiation, Ab-Initio Study, Polymer Oligomers

## Valorization of jackfruit waste for bio active peptide extraction and investigation of their biological activities

Tejal Parab<sup>1</sup> and Shruti Kakodkar<sup>1\*</sup>

<sup>1</sup>Department of Life Sciences, Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University, Mumbai

Email: [shruti.kakodkar@somaiya.edu](mailto:shruti.kakodkar@somaiya.edu)

### Abstract

Bioactive peptides (BAPs) are short amino acid chains derived from proteins that show health-promoting effects. The global BAP market is expanding rapidly, with diverse industrial applications. Conventionally, BAPs are obtained from sources like plants, algae and animals; however, large-scale extraction causes sustainability challenges. This has led to increasing focus on the valorization of plant-based waste as an alternative source. Jackfruit (*Artocarpus heterophyllus*) is one of the largest tropical fruits, widely cultivated for its nutritional and economic value. Yet, its seeds and rind are often discarded, resulting in significant agro-waste. In the Konkan region of Western India, the kapa and barka jackfruit varieties are commonly processed, generating large volumes of underutilized plant material. The present study focused on the preparation of a protein-concentrated jackfruit seed meal from the barka jackfruit variety. Proximate analysis of the jackfruit seed powder revealed 31.77% carbohydrate, 6.81% protein, 8.6% fat, 2.5% ash, and 40.7% moisture. Jackfruit seed powder was also found to be rich in minerals such as Ca (277.3 ppm), Cu (9.386 ppm), Fe (62.073 ppm), K (11690.06 ppm), Mg (1253.626 ppm), Na (156.997 ppm), P (2343.217 ppm), and Zn (12.159 ppm). The jackfruit seed powder was subjected to an alkaline extraction method to obtain a protein-rich meal. The protein content of barka jackfruit seed meal obtained at different pH (8–12) ranged from 38.51% to 58.9%. The meal with the highest protein content was subjected to hydrolysis using trypsin to produce BAPs. The BAPs and seed protein meals were further analysed for their antioxidant and anti-inflammatory activities. The findings of the present study support the concept of valorizing jackfruit waste for obtaining BAPs with potential applications in nutraceutical formulations. Future studies aim to identify these BAPs and to explore rinds of kapa and barka varieties to evaluate their potential in BAP production and nutraceutical applications.

**Keywords:** Valorization, Jackfruit Waste, Protein Meal, Bioactive Peptides, Antioxidant

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**Contact: Annual Research Meet Team [arm.svu@somaiya.edu](mailto:arm.svu@somaiya.edu)**