



WCMRI 2026

**5th World Conference on
Multidisciplinary Research & Innovation**

 **25th July, 2026**  **Singapore**

Organized by



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5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026), Singapore

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Conference Theme

“

Crossing
Boundaries:
Multidisciplinary
Research and
Innovation for
A Sustainable
Future

”



Preface

We are delighted to extend a warm welcome to all participants attending 5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026), taking place in Singapore on 25th July, 2026. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in the field of Research & Innovation. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for WCMRI-2026 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Research & Innovation. All submitted papers were subject to rigorous peer-reviewing by 2–4 expert referees, and the papers included in these proceedings have been selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results in Research & Innovation but also serve as a valuable summary and reference for further research in this field.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the many professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also extend our appreciation to the external reviewers for providing additional support in the review process and to the authors for contributing their research results to the WCMRI-2026.

Since May 2026, the Organizing Committees have received more than 50+ manuscript papers, covering all aspects of WCMRI-2026. After review, approximately 25+ papers were selected for inclusion in the proceedings of WCMRI-2026. We would like to thank all participants at the conference for their significant contribution to its success.

We express our gratitude to the keynote and individual speakers and all participating authors for their dedication and hard work. We also sincerely appreciate the efforts of the technical program committee and all reviewers, whose contributions made this conference possible. Finally, we extend our thanks to all the referees for their constructive comments on all papers, and we express our deepest gratitude to the organizing committee for their tireless work in making this conference a reality.

About WCMRI-2026

5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026) explores Collaborative Intelligence as a catalyst for uniting research, technology, and sustainability. The conference fosters global collaboration, interdisciplinary dialogue, and innovative solutions to address complex challenges, drive responsible innovation, and create a resilient, sustainable future for society.

Purpose of the Conference

“Crossing Boundaries: Multidisciplinary Research and Innovation for a Sustainable Future”

The purpose of the 5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026) is to bring together researchers, academics, and industry professionals from diverse fields to exchange knowledge, explore emerging trends, and foster collaboration. The conference aims to drive innovation in research, technology, and sustainability, promoting interdisciplinary solutions to global challenges.

Objective of the Conference

5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026) aims to provide a dynamic global platform for researchers, academicians, industry experts, and policymakers to exchange knowledge and foster collaborative intelligence across disciplines.

The conference seeks to promote innovative research, emerging technologies, and sustainable practices that address global challenges. It encourages interdisciplinary partnerships, knowledge transfer, and practical solutions that bridge theory and application. WCMRI also focuses on nurturing young researchers, strengthening academia-industry collaboration, and supporting evidence-based strategies that drive inclusive growth, technological advancement, and long-term sustainability for a resilient global future.

By aligning with the United Nations’ Sustainable Development Goals (SDGs), WCMRI-2026 reaffirms its commitment to advancing quality education, promoting inclusivity, and driving digital transformation in learning



About IFERP Academy

IFERP Academy stands at the forefront of promoting innovation, collaboration, and knowledge dissemination in the fields of engineering, science, technology and more. As a professional association, IFERP is dedicated to advancing the academic and industrial landscape through various initiatives.

At its core, IFERP drives change and progress through various initiatives designed to foster cross-disciplinary exchange, empower researchers and professionals, and thus contribute significantly to the evolution of these fields. Through strategic partnerships, conferences, workshops, and publications, IFERP continues to shape a future where cutting-edge ideas, collaborative endeavors, and insightful knowledge flourish.

What We Do?

- ◆ We encourage convenient access to academic resources and support for all the aspirants and research scholars in urban and rural areas.
- ◆ IFERP Academy organizes public education programmes, Workshops, Conferences, Webinars, Seminars, Guest Lectures, Short Term Training Programme, Faculty Development programme in the field of Engineering, Science & Technology.
- ◆ IFERP Academy is dedicated to inquisitiveness, innovations and recent trends and developments in the field of Engineering & Technology.
- ◆ IFERP Academy believes in knowledge sharing by collaborating with other Universities, organizations/Associations, to bring a better tomorrow.



Mission

Upskilling the knowledge hub through technological innovation and excellence for the benefit of humanity.



Vision

A Digitally equipped robust, dynamic & swift professional community integrating academics & industry for upgraded technical knowledge implementation.



Value

IFERP values the restoration of highlevel technological research, learning, collaboration, resource sharing & community-building traditions.



Goal

To serve as the foundation for all technological progress and advancement activities around the world.

IFERP's Director Message



**Mr. Siddth Kumar
Chhajer**

MD & Founder,
IFERP, Technoarete Group



We were honored to have you all at WCMRI 2026!

On behalf of IFERP and the Organizing Committee, I expressed my heartfelt gratitude to the participants, keynote speakers, delegates, reviewers, and researchers for their valuable contributions.

The 5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026) successfully achieved its goal of enriching knowledge and fostering innovative technical exchange among international researchers, scholars, academicians, industry professionals, and practitioners in the field of research and innovation. The conference created opportunities to develop solutions through collaborative discussions and facilitated the sharing of innovative ideas across diverse disciplines.

WCMRI-2026 provided a world-class platform for researchers, professionals, scientists, academicians, and students to engage in thought-provoking discussions, evaluate the existing body of research, and identify knowledge and capability gaps. The conference explored new horizons of innovation through insightful presentations and contributions from distinguished researchers, scientists, and eminent authors from academia and industry across the globe, all working toward advancements in research and innovation.

WCMRI-2026 successfully served as an ideal platform for participants to strengthen their professional careers and progress toward becoming globally recognized specialists in the field of research and innovation.

IFERP's Director Message



**Mr. Rudra Bhanu
Satpathy**

CEO & Founder,
IFERP, Technoarete Group



**We were really excited
to have you all at
WCMRI 2026!**

IFERP Academy successfully hosted the 5th World Conference on Multidisciplinary Research & Innovation (WCMRI-2026) in July 2026.

The primary objective of WCMRI-2026 was to provide participants with an exceptional opportunity to learn about groundbreaking developments in modern industry, discuss challenging workplace scenarios with peers facing similar issues, and achieve significant professional growth and development. The conference featured numerous networking opportunities and informative sessions that enabled participants to gain valuable insights from widely respected experts in their respective fields.

The conference also encouraged meaningful interactions among professionals, allowing them to share their experiences, showcase the achievements of their organizations, build strong professional relationships, and establish themselves as thought leaders.

I expressed my heartfelt gratitude to all my colleagues, staff members, professors, reviewers, and members of the Organizing Committee for their unwavering dedication, commitment, and wholehearted support in making WCMRI-2026 a grand success.

We were also sincerely thankful to all our delegates for their tireless efforts, active participation, and valuable contributions, which played a vital role in the successful completion of the conference.

Invited Keynote Speaker



Dr. Xavier Gopi

Published Author, Researcher & Academic
Governance Thought Leader, Singapore



Biography

Dr Xavier Gopi is a published author, researcher, and senior academic governance professional with more than 25 years of experience in higher education quality assurance, programme validation, and institutional governance across Singapore and the APAC region. His work focuses on academic governance frameworks, university partnerships, programme articulation, and regulatory compliance

He has extensive experience working with international universities across the UK, Europe, and Asia, supporting validation and revalidation processes, academic audits, and the long term sustainability of academic and professional programmes. His expertise spans governance under CPE EduTrust, SkillsFuture Singapore, and aligned international quality systems.

Dr Xavier's research and publications examine digital transformation, sustainability, and organisational adaptation in a rapidly changing knowledge economy. His authored books are catalogued in Singapore National Libraries and referenced in postgraduate programmes, reflecting the academic relevance and applied value of his work.

He is recognised for his ability to bridge research, policy, and practice, translating academic and regulatory requirements into practical frameworks that support institutional integrity, innovation, and educational quality. Dr Xavier was featured in the Successful People in Singapore publication, issued by British Publishing House in 2022.

Invited Keynote Speaker



**Dr. Khartic Rao
Manokaran**

Newcastle Australia Institute of Higher
Education, Singapore



Biography

Dr. Khartic Rao Manokaran is an award-winning academic and internationally recognised researcher in Corporate Social Responsibility (CSR), ESG strategy, corporate governance, sustainability assurance, and organisational risk management. A recipient of the International Teacher's Award 2024 conferred by the ITA International, he currently serves as Lecturer at Newcastle Australia Institute of Higher Education (Singapore) and holds adjunct and visiting appointments at leading regional institutions including Curtin University (Singapore) and Raffles University (Malaysia & Singapore).

Dr. Manokaran has an established portfolio of Scopus- and Web of Science-indexed publications, encompassing journal articles, scholarly book chapters, and edited volumes with reputable academic publishers. He is Editor-in-Chief of the IGI Global volume Navigating ESG in Global Entrepreneurial Ecosystems and contributes to the academic community as a reviewer and editorial board member for internationally indexed journals.

His research offers theoretically rigorous and empirically grounded insights into advancing ethical performance, institutional resilience, and sustainable value creation across diverse global contexts.

Keynote Speaker



Ts. Dr. Aidi Ahmi

Associate Professor,
Universiti Utara Malaysia (UUM),
Malaysia



Biography

Ts. Dr. Aidi Ahmi is an accomplished academic at the Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia (UUM), serving as Associate Professor of Accounting Information Systems.

He earned his Ph.D. in Information Systems and Computing from Brunel University London, UK (2013), MSc in Accounting Information Systems from Leeds Metropolitan University, UK (2001), and a Bachelor's in Accounting from UUM (1997). Before academia, he worked as an Internal Auditor at Asia Commercial Finance (M) Bhd. Dr. Aidi joined UUM in 1999 as a Tutor and became a Lecturer in 2001.

Renowned for his expertise in bibliometric analysis, he frequently conducts workshops and training across universities, associations, and training companies. He has authored four books and over 100 journal articles, and has supervised eight Ph.D. graduates in fields including accounting information systems, auditing, ICT, information sciences, and e-commerce.

A Certified Accountant (C.A.(M)) since 2007, he was also recognized as a Professional Technologist (Ts.) by MBOT in 2018. He is a lifetime member of MyAA and ISOC Malaysia, contributing significantly to academia and professional practice.

Keynote Speaker



Dr. Muazzam A. Khan Khattak

Director, Farabi Center for Artificial
Intelligence & Cyber Security,
Quaid-i-Azam University,
Pakistan



Biography

Prof. Dr. Muazzam A. Khan Khattak (SM IEEE, AAAI & Member Pakistan Academy of Sciences). Prof. Khattak (Member NADRA Authority Board) listed among top 2% highly cited scientists of the world in 2024 and 2025 and Gold Medalist of Pakistan Academy of Sciences-COMSTech Prize 2025. Currently he is serving as Director Farabi Center for Artificial Intelligence and Cyber Security, Director Science & Tech / Director ICESCO Chair Data Analytics and Edge Computing, Quaid-i-Azam University, Islamabad.

He is also Chairperson of UNESCO National IFAP Committee. Earlier he served as Associate Dean Computing and Head Postgraduate Program at SEecs, NUST. He received his PhD in a sandwich from IIUI and University of Missouri (UMKC), USA. He also completed his postdoc from University of Missouri (UMKC), USA in 2016 and joined them as an adjunct Professor.

He has published more than 230 publications, 03 books and 16 book chapters with total citations of 6440 and h-index of 44. His research interests include Artificial Intelligence based smart solutions for different research problems in Internet of Things, IoVs, IIoTs, Smart Cities, Information security, He is also serving as adjunct professor at USAK University, Türkiye, Baku State University, Azerbaijan, Harbin Institute of Technology, China and Margullan University, Kazakhstan.

He has been awarded with the Pakistan Academy of Science-COMSTech Gold Medal in Computer Science (IT), best performance award by the Minister of education in 2023 and Performance based awards at NUST from 2015 to 2019. In 2024 he was nominated for the prestigious civil award Tamgha-e-Imtiaz in 2024.

He has been awarded with grants of Rs. 1.7 billion by the Ministry of Education, Kazakhstan, British Council, University of Missouri, USA, USAK University, Türkiye, and Margullan University, Kazakhstan. He is also a member of the International advisory board, USAK University, Türkiye and Baku State University, Azerbaijan, Xidian University, China, Member Senate MUST University, AJK and senior member of Pakistan Academy of Sciences. He is a master trainer in IPFP and train in the trainers program by NAHE, Higher Education Academy, HEC Pakistan.

Keynote Speaker



**Dr. Mohd Hilmi
Hasan**

Associate Professor,
Chair of Department of Computing,
Universiti Teknologi Petronas (UTP),
Malaysia



Biography

Dr. Mohd Hilmi Hasan is an Associate Professor at Universiti Teknologi PETRONAS (UTP), Malaysia and is an active researcher at the Centre for Research in Data Science at the university.

He is also the Chair of the Department of Computing, UTP. He obtained his PhD in Information Technology from UTP in 2017 with a research in the area of artificial intelligence, specifically Interval Type-2 fuzzy.

He also graduated with a Master of Information Technology (eScience) from The Australian National University in 2004 and a Bachelor of Technology (Hons.) Information Technology from UTP in 2002. He has been teaching and being an active researcher at UTP since 2004.

His research interest covers areas of artificial intelligence, data science and data analytics. He has published research articles in various journals and conferences, and secured grants from the government agencies and industries.

Keynote Speaker



Dr. Siva Mahendran

Director,
Raffles Education Institute,
Singapore



Biography

Prof.Dr. Siva Mahendran is a professionally qualified counsellor, a workplace literacy trainer for the Workforce Development Agency and also an associate English lecturer in an Australian university based in Singapore.

He has been in the education field since the early 1980s and has taught in primary and secondary schools, private colleges and tertiary institutions for over 35 years. He has also been counselling and giving talks and workshops on socio-emotional matters to children, youth and adults from all walks of life, on an ad hoc basis, in schools, MNC's, private establishments, SINDA, etc. since 2000 and has run counselling courses up to Masters level in various private colleges and tertiary institutions.

armed with double Masters (Counselling and English Language) and double Bachelors degrees (English language and Literature), among other certifications and qualifications in fields as diverse as physical education and fitness, pastoral care and career development, socio- emotional matters, etc.

He obtained his doctorate in 2017 after publishing his research in the use of counselling in effective language teaching of spoken English. Siva Mahendran is a life-long learner and continues to do research in best practices and innovations in counselling, language and education. He received his fellowship in 2021 and an Honorary Professor in 2024.

He has been engaged from time to time in local and international conferences, discussion forums via radio and television programmes such as Ethiroli, Oli 96.8 FM channel, Starhub's Vannathirai Channel's Neengalum Pesalaam; among others. Having acted in an English drama (Fast Forward programme) to promote the English language and also in two Tamil dramas about familial socio-emotional issues in Mediacorp's Vasantham channel has added to his resume and kindled his aspiration for life-long learning.

Keynote Speaker



Dr. Sapto P. Putro

Director - Center of Marine Ecology and
Biomonitoring for Sustainable Aquaculture
(Ce-MEBSA), Diponegoro University,
Indonesia



Biography

Sapto P. Putro obtained his undergraduate degree from the Faculty of Biology at Jenderal Soedirman University, Purwokerto, Central Java, Indonesia, in 1992.

He subsequently pursued a Master's degree in Ecology at the Postgraduate Program of the Bandung Institute of Technology, West Java, Indonesia, and graduated in 1999. In 2007, he earned his Doctorate (Ph.D.) in Marine Ecology and Aquaculture from the School of Biological Sciences, Faculty of Science and Engineering, Flinders University of South Australia. His professorship in Marine Biology was conferred in 2021. Dr. Putro has dedicated numerous years to the study of aquatic ecology, focusing primarily on biomonitoring aquaculture activities in diverse aquatic environments, including lakes, rivers, coastal areas, offshore regions, and coastal aquaculture systems, both in tropical and temperate ecosystems.

He is currently a Senior Lecturer specializing in ecology and aquaculture at the Department of Biology, Faculty of Science and Mathematics, Diponegoro University, Indonesia. Actively engaged in both national and international scientific forums, he is a member of professional organizations such as the Indonesian Biological Association (PBI), the Indonesia Aquaculture Society (IAS), and the World Aquaculture Society (WAS). Additionally, he serves on the editorial boards of several international scientific journals and as an international keynote speaker in the scientific conferences in Marine Ecology and Aquaculture.

Dr. Putro has published numerous articles in reputable international journals and has authored several books. His ongoing research emphasizes the development of smart, productive, and sustainable aquaculture practices by employing Integrated Multi-Trophic Aquaculture (IMTA) systems, including his patented innovation, the Stratified Double Net Cage (Patent No. IDS000001488, August 8, 2016; Trademark "KJABB-IMTA SP01" No. IDM000661772, August 24, 2017; DJKI RI). The KJABB-IMTA product was recognized among the "110 Most Prospective Indonesian Innovation

Works" in 2018 and has since received several accolades, including the 2023 Award for the Smart Dashboard System to support Smart Modern Aquaculture and Ecoedutourism, as well as the 2024 Award for the Smart Robotic IMTA Cage to support Productive Sustainable Mariculture, granted by the Business Innovation Center (BIC).

Moreover, Dr. Putro has developed innovative software for biomonitoring applications that integrates abiotic and biotic data (macrobenthic structure), which has been registered with copyright (No. 000143025, EWS- 3SWJ software, January 16, 2019, DJKI RI). He has also established and currently leads the Center of Marine Ecology and Biomonitoring for Sustainable Aquaculture (Ce-MEBSA), which serves as a hub for advancing research and innovation in sustainable aquaculture practices.

Session Speaker



Dr. Zhyldyzai Ozbekova

Associate Professor,
Kyrgyz-Turkish Manas University,
Kyrgyzstan



Biography

Dr. Zhyldyzai Ernazar Ozbekova is an Associate Professor (PhD) in the Department of Food Engineering at Kyrgyz-Turkish Manas University, Bishkek, Kyrgyzstan. She holds a PhD in Food Engineering (2016) from the same institution.

With extensive academic and research experience, she has published 35 works, including articles indexed in Web of Science and Scopus, and has presented over 20 papers at international and national conferences.

Her research focuses on food engineering, spectroscopy-based food analysis, dairy and meat product characterization, and sustainable food technologies. She is fluent in Kyrgyz, Turkish, Russian, and English.

Session Speaker



Dr. Achyut Trivedi

Chairperson
Ganpat University
India



Biography

Dr. Achyut Trivedi is a distinguished expert in the field of Additive Manufacturing, currently serving as the Chief Investigator for the National Additive Manufacturing Centre - West Project under the Ministry of Electronics and Information Technology (MeitY), Government of India.

Dr. Trivedi is also an advisory board member of Additive Manufacturing Society of India. With a PhD in Additive Manufacturing and over a decade of experience in both teaching and research, Dr. Trivedi has made significant contributions to the advancement of innovative manufacturing technologies. In his role as Chairperson at the GUNI - Centre of Excellence (CoE) for Additive Manufacturing, Dr. Trivedi as a founding member of CoE, leads and shapes the center's initiatives to drive high-impact outcomes through research excellence, technological innovation, and collaborative partnerships. His leadership is marked by a strong focus on advancing the field and fostering meaningful collaborations that push the boundaries of what is possible in Additive Manufacturing.

Dr. Trivedi's expertise spans a wide range of areas within Additive Manufacturing, including material development, process optimization, and industry applications. His extensive research has not only contributed to academic advancements but also has practical implications in realworld scenarios. This dual focus on theoretical and applied research highlights his ability to bridge the gap between academia and industry. In addition to his research endeavours, Dr. Trivedi has demonstrated an exceptional commitment to education. Over the past decade, he has shaped the minds of numerous students and professionals through his teaching. His pedagogical approach combines theoretical rigor with practical insights, providing a holistic learning experience that prepares his students for successful careers in Additive Manufacturing. With a track record of accomplishments and a deep-rooted passion for Additive Manufacturing,

Dr. Achyut Trivedi continues to be a driving force in shaping the future of manufacturing technology and education. His dedication to both research and education ensures that the field remains at the forefront of technological advancement, benefiting both academia and industry alike.

Session Speaker



**Dr. Saleh Hamed
Mohammed Al-Brashdi**

Dean,
Sultan Qaboos University,
Oman



Biography

Dr. Saleh Albarashdi is an Associate Professor at the College of Law, Sultan Qaboos University. He graduated with high honours from the same institution in 2005. He holds a Doctor of Laws (LL.D.) from the University of Exeter, UK (2015), and a Master of Laws (LL.M.) from the University of Aberdeen, UK (2009).

He currently serves as the Dean of the College of Law at Sultan Qaboos University. In addition to his academic leadership, he has been appointed by Royal Decree as a member of the Oman Human Rights National Commission. He is also a member of the Oman International Humanitarian Law Committee.

Session Speaker



**Dr. Ahmad Humaizi
bin Hilmi**

Dean,
Sultan Qaboos University,
Oman



Biography

Associate Professor Dr. Ahmad Humaizi Hilmi is a researcher and academic at Universiti Malaysia Perlis (UniMAP), specializing in manufacturing systems, materials science, and ergonomics. He is actively involved in advanced research areas such as flexibility analysis, surrogate modeling, and sustainable manufacturing.

Dr. Ahmad is also the creator of SoftwareTheses, a platform designed to assist students in writing research papers and theses. Passionate about education and innovation, he develops lecture materials, publishes academic books, and explores emerging technologies.

His work bridges theory and industry applications, contributing to both academic advancement and practical engineering solutions in modern manufacturing systems.

Panel Discussion Members

Title:
Multidisciplinary and
Interdisciplinary Research
for New Breakthroughs



Dr. Teik-Cheng Lim

Head, PhD (Engineering) and
Master of Engineering Programmes
School of Science and Technology,
Singapore University of Social
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Dr. Siva Mahendran

Faculty,
College of Education,
East Asia Institute of Management,
Singapore.



**Dr. Amila N.K.K.
Gamage**

Director,
Raffles Education Institute,
Singapore.

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Achieving Operational Excellence in Glass Manufacturing through an Integrated Lean-TPM Framework Based on OEE, FMEA, and Value Stream Mapping

Farhan Fabianto

Master of Technology Management Program, Interdisciplinary School of Interdisciplinary Management and Technology, Sepuluh Nopember Institute of Technology, Indonesia

Moses Laksono Singgih

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Abstract

Operational efficiency in glass manufacturing requires a disciplined diagnostic system because disruptions in the Cold End area affect process flow, production output, and product quality. This study develops an integrated *Lean Manufacturing* and *Total Productive Maintenance (TPM)* framework to identify dominant operational losses and translate them into proposed improvement controls for the 400T/B1 Cold End line. The research was conducted as a non-implementation case study using operational data from 15 January to 31 March 2026. The analysis followed a sequential approach consisting of *Overall Equipment Effectiveness (OEE)*, *Six Big Losses* mapping, *Pareto* analysis, *Vital Few* identification, operational MTBF/MTTR estimation, *Root Cause Analysis (RCA)*, *Failure Mode and Effects Analysis (FMEA)*, Lean-TPM action planning, and *Value Stream Mapping (VSM)*. The baseline OEE was 83.24%, formed by Availability of 97.28%, Performance of 88.28%, and Quality of 96.92%. The Current State VSM recorded 3,812 minutes of mapped losses across 714 events. The prioritized loss groups were quality detection and process defect, robot handling and vacuum transfer, Y-Bridge/long cut instability, cutting bridge/cross cut/emergency drop, tail pack/changeover/order-spec loss, and upstream carryover defect. The operational MTBF/MTTR analysis identified 80 core breakdown events with 946 minutes of failure duration, resulting in an MTBF of 1,330.88 minutes per event and an MTTR of 11.82 minutes per event. The proposed improvement design consists of a Lean-TPM Action Plan, 15 PM Calendar items, 15 Job Plans, Standard Work Changeover, Quality Feedback Loop, and Future State VSM. Analytical projection indicates a mapped loss reduction to 2,603 minutes and 491 events, with projected OEE increasing to 87.52%. These future-state values require validation through implementation and subsequent monitoring.

Index Terms

Glass Manufacturing; Lean Manufacturing; Total Productive Maintenance; Overall Equipment Effectiveness; Six Big Losses; FMEA; Value Stream Mapping; Operational Efficiency.

Mitigating Database I/O Bottlenecks in High-Velocity Event Ingestion via Dual-Buffered Asynchronous Microservice Architectures

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Abstract

High-throughput distributed microservices encounter severe performance degradation when real-time event streaming pipelines interact synchronously with persistent relational databases. This paper presents a performance analysis of a decoupled, dual-buffered asynchronous microservice architecture engineered to eliminate disk-bound database I/O bottlenecks during high-velocity data ingestion. The system isolates ingestion and compute workloads into a lightweight edge API Gateway cluster and a distinct backend worker ecosystem. To safeguard internal thread spaces under volatile load spikes, a bounded in-memory shock absorber is established at the ingestion boundary. Furthermore, computational processing is entirely isolated from persistence layers by deploying a secondary asynchronous transaction memory buffer governed by an independent, threshold-driven batch-draining daemon. Empirical stress testing demonstrates that the architecture maintains a 100% request processing retention rate during bursts up to 200,000 concurrent requests on commodity consumer hardware... Finally, this work investigates architectural performance boundaries up to 200,000 requests, identifying OS-level client port depletion and blocking console logging frameworks as core design limits.

Index Terms

Asynchronous Processing, API Gateway, Microservices, Database Bottlenecks, Non-blocking Concurrency, Batch Persistence

Professionalism and Innovation in TVET: How Instructors Harness EdTech for Effective Learning

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Abstract

Industry 4.0, digitalization, and Education 4.0 have transformed Technical and Vocational Education and Training (TVET), requiring institutions to strengthen digital teaching practices and prepare future-ready graduates for technology-driven workplaces. In this context, Educational Technology (EdTech) serves as an important enabler of technology-enhanced teaching, instructional innovation, instructor professionalism, and student-centred learning in TVET. This study examines the relationships among institutional support, EdTech utilization, instructor professionalism, and student learning outcomes among TVET instructors in Pahang, Malaysia. A quantitative survey design was employed involving 110 instructors from four selected TVET institutions. Data were collected using a structured questionnaire and analysed using descriptive statistics and Pearson correlation analysis. The findings revealed high levels of institutional support ($M=3.8164$), instructor professionalism ($M=3.7217$), EdTech utilization ($M=3.6955$), and student learning outcomes ($M=3.6709$). Pearson correlation results indicated significant positive relationships between institutional support and EdTech utilization ($r=.421, p<.001$), EdTech utilization and instructor professionalism ($r=.593, p<.001$), and instructor professionalism and student learning outcomes ($r=.466, p<.001$). The study contributes empirical evidence that effective TVET digital transformation depends not only on technology availability, but also on institutional readiness, active EdTech engagement, and professional teaching practices. These findings provide practical implications for strengthening digital teaching competencies, promoting instructional innovation, and advancing EdTech-enabled learning for future-ready TVET graduates.

Index Terms

Industry 4.0, Digitalization, Education 4.0, Educational Technology, TVET, Instructor Professionalism, Institutional Support, Student Learning Outcomes

Performance Optimization of Long-Haul 10 Gbps Optical Networks Using Balanced Symmetric Dispersion Management and Dual-Stage EDFA Configurations: A Technical Review and Simulation Study

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Abstract

This paper presents a comprehensive publication-view analysis combining an exhaustive literature survey (2015–2026) with detailed engineering validation of an optimized, long-haul single-channel transmission link operating at 10 Gbps. Chromatic dispersion, manifesting as Group Velocity Dispersion (GVD) and Polarization Mode Dispersion (PMD), remains a fundamental physical bottleneck in high-capacity fiber networks, inducing severe Inter-Symbol Interference (ISI). To overcome these limitations, we design and model a 125 km optical fiber loop utilizing a balanced symmetric dispersion management configuration divided across dual-segmented Dispersion Compensating Fiber (DCF) spans, supplemented by inline Erbium-Doped Fiber Amplifiers (EDFAs). The proposed topology is systematically evaluated alongside recent advancements including Chirped Fiber Bragg Gratings (CFBG), electronic dispersion compensation, and digital signal processing (DSP) driven by fuzzy clustering and machine learning regression algorithms. High-fidelity OptiSystem simulations demonstrate complete mitigation of linear GVD while heavily suppressing intensity-dependent Kerr non-linearities, yielding a peak Quality Factor of 181.556 and a mathematically absolute Minimum Bit Error Rate (BER) of 0. Finally, critical research gaps regarding system scalability beyond 125 km and on-chip integration limits are examined to outline future implementation pathways.

Artificial Intelligence in Higher Education Applications Challenges Governance and Future Directions

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Abstract

Artificial intelligence (AI) is rapidly revolutionising higher education, redefining teaching, learning, research, evaluation and institutional administration [1]. Recent advancements in machine learning, natural language processing, and generative AI have expedited the deployment of intelligent technologies throughout institutions to enable personalised learning, automated assessment, data-driven decision-making, and improved research productivity. Nonetheless, the ubiquity of AI also poses enormous issues in data privacy, cyber security, algorithmic bias, academic integrity, intellectual property, transparency, and ethical governance [2]. This paper discusses the evolution of AI in higher education and its primary applications in academic and administrative domains and critically assesses the problems connected with its deployment. The paper also discusses governance techniques and best practices for responsible AI deployment, including institutional regulations, ethical frameworks, AI literacy, data governance, and ongoing human monitoring. The paper further analyses the current situation of AI adoption in Indian higher education in the context of national initiatives like the National Education Policy (NEP) 2020, SWAYAM, NPTEL and other digital learning platforms and its prospects and implementation issues. Finally, the review highlights new concepts such as multimodal AI, autonomous AI agents, explainable AI and intelligent learning environments that will affect the future of higher education. It concludes that successful implementation of AI depends not just on technological innovation but also on responsible governance, interdisciplinary collaboration and a human-centred strategy that preserves academic integrity, inclusion and educational quality. The review provides a broad framework to empower educators, researchers, institutional leaders and policymakers to design ethical and sustainable AI-enabled higher education.

Index Terms

Artificial Intelligence, Higher Education, Generative AI, Responsible AI, Educational Technology, AI Governance, Learning Analytics, Digital Transformation

Subchronic Polypropylene Microplastic Exposure Induces Progressive Multi-Organ Somatic Index Alterations and Histopathological Damage in Nile Tilapia (*Oreochromis niloticus*)

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Abstract

Polypropylene microplastics (PP-MPs) are increasingly detected in freshwater environments, yet their subchronic effects on fish organ physiology across multiple organs remain insufficiently characterized. This study evaluated organ somatic index alterations and histopathological responses in Nile tilapia (*Oreochromis niloticus*) following 35-day dietary PP-MP exposure (3%, 5–30 µm) in a completely randomized design. Fish were sampled destructively at Days 0, 7, 14, 21, 28, and 35, and four somatic indices were calculated: Gill Somatic Index (GSI), Hepatosomatic Index (HSI), Intestinosomatic Index (ISI), and Stomach Somatic Index (SSI). Group comparisons used Mann-Whitney U tests with rank biserial correlation as effect size, and Friedman tests for temporal trend assessment. The organ with the highest directional consistency of somatic index differences was selected for semi-quantitative histopathological scoring using the Histopathological Alteration Index (HAI; Bernet et al., 1999). Among the four indices, ISI showed the most consistent and progressive elevation in PP-MP-exposed fish across all post-exposure sampling days, with the greatest divergence at Day 35 (PP-MP: $3.24 \pm 0.78\%$ vs. control: $1.90 \pm 0.85\%$), indicating cumulative intestinal loading and inflammatory burden. GSI also increased progressively in exposed fish over time, suggesting time-dependent gill involvement under continued particulate exposure. HSI exhibited a paradoxical pattern with control values exceeding treatment at Days 21–28, consistent with hepatocyte degeneration rather than compensatory growth, while SSI remained negligible throughout. The consistent ISI elevation across sampling periods (4 out of 5 timepoints, highest among all organs) identified the intestine as the primary target organ. Histopathological HAI scoring of intestinal tissue confirmed progressive mucosal damage in exposed fish, including epithelial disruption, inflammatory cell infiltration, and lamina propria alterations — directly corroborating the somatic index trajectory and establishing a macroto-microscopic evidence linkage. Among all organs assessed, the intestine emerged as the primary target of subchronic PP-MP toxicity in Nile tilapia, evidenced by the most consistent ISI elevation and confirmed by progressive histopathological damage. GSI trends further suggest secondary gill involvement, while the HSI paradox and negligible SSI reflect organ-specific vulnerability under this exposure regime. These findings highlight the value of integrating longitudinal somatic indices with histopathological confirmation for detecting and characterizing subchronic microplastic toxicity in aquaculture species.

Index Terms

Polypropylene Microplastics, Intestinosomatic Index, *Oreochromis Niloticus*, Histopathological Alteration Index, Subchronic Exposure, Multi-Organ Assessment

Integrative Bioinformatics Analysis Identifies Immune Cell-Associated Biomarkers in Systemic Lupus Erythematosus

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Abstract

Systemic lupus erythematosus (SLE) is an autoimmune disease that encompasses multiple organs and organ systems. The development of SLE is affected by multiple factors, including genetic, environmental, ecological and epigenetic factors. It was hypothesised that scRNA-seq and artificial intelligence can be used to uncover immune-cell-level mechanisms driving SLE. This study began with a literature review and collection of relevant data sets in order to perform data analysis. The data sets were analysed using the GEO2R tools to obtain a combined gene list of significantly differentially expressed genes across the selected SLE studies. A network analysis using software was carried out to find the 10 most central and connected genes within the gene list. A pathway analysis was then carried out to identify the most significant gene pathways associated with SLE. Then a search was carried out to determine which of the top 12 genes were found within the top 25 pathways previously identified. The genes that were successfully found within the pathways were further analysed to identify which of them exhibited high immune cell specification. The top 10 significantly differentially expressed genes identified were STAT1, DDX58, IFIH1, IFI35, ISG15, MX1, IFIT3, IRF7, IFI44 and RSAD2. The top 5 pathways established and their reactome IDs are R-HSA-909733 (Interferon alpha/beta signalling), R-HSA-913531 (Interferon signalling), R-HSA-877300 (Interferon gamma signalling), R-HSA-1280215 (Cytokine signalling in immune system) and R-HSA-168256 (Immune system). It found that all of the top 10 genes that were present in the top 25 pathways. Then a search for immune and cell specificity took place. Out of the top 12 genes that were searched IFIT3, IRF7, RSAD2 and OAS1 were the 4 genes that presented enhanced or enriched immune cell specification. Thus these 4 genes were determined as strong immune cell based bio markers for SLE. In conclusion, the immune specific genes or bio-markers identified in this study highlight the molecular mechanisms associated with SLE and provide insight that can be used for the diagnosis and treatment of SLE in the future.

Index Terms

Systemic Lupus Erythematosus (SLE), Bioinformatics, Differential Gene Expression, Biomarker Discovery, Immune Cell Profiling

Evaluation of Dual Busduct Electrical System of Plaz@ C Building, Northgate Cyberzone

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Abstract

Business Process Outsourcing (BPO) facilities require reliable electrical system to ensure uninterrupted operations and minimize downtime during maintenance activities. This study evaluated the capability of the proposed Dual Busduct Electrical System of Plaz@ C Building, located in Northgate Cyberzone, Filinvest City, Alabang, Muntinlupa City, Philippines, to provide continuous electrical service while supporting preventive maintenance without the need for a building-wide shut down. A comprehensive electrical system assessment was conducted using Load Flow Analysis, Short Circuit Analysis, and Harmonics Analysis to determine the system's performance and compliance with applicable standards. The Load Flow Analysis, limited to voltage drop evaluation, recorded a maximum voltage drop of 4.1%, which is within the 5% allowable limit prescribed by the Philippine Electrical Code (PEC). Short Circuit Analysis indicated a maximum available fault current of 164.22 kAIC at the MERALCO Common Bus, with all calculated fault currents remaining within the interrupting capacities of the installed protective devices, confirming the adequacy of the selected kAIC ratings. Harmonics Analysis revealed a maximum Total Harmonic Distortion (THD) of only 1.5%, significantly lower than the 8.0% limit specified in IEEE Std 519, indicating that the system is suitable for sensitive electronic equipment commonly used by BPO tenants. In addition, standardized operating procedures and idiot-proofing materials were developed to guide facility engineers and maintenance personnel during preventive maintenance and emergency manual load transfer operations. The findings demonstrate that the proposed Dual Busduct Electrical System is technically viable, electrically safe, and capable of providing continuous and reliable electrical service. Furthermore, the system complies with the Philippine Electrical Code, applicable IEEE standards, and the operational reliability requirements expected of PEZA accredited facilities, making it suitable for high-availability commercial buildings and critical BPO operations.

Index Terms

Dual Busduct Electrical System, Electrical Reliability, Load Flow Analysis, Short Circuit Analysis, Harmonics Analysis, BPO Facilities, Preventive Maintenance

An End-To-End Hybrid Transformer-CNN Framework with Feature Optimization for Automated Liver Tumor Segmentation and Classification in CT Images

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Abstract

Liver cancer still remains one of the major causes of death due to cancer around the world. This highlights the need to have diagnostic techniques, which are both accurate and automated. Most of the existing deep learning (DL) methods for liver tumor segmentation and lesion classification have been developed independently. This leads to increased computational complexity of the process and error propagation over stages. Here, we propose a novel end-to-end hybrid Transformer-CNN framework for simultaneous liver tumor segmentation and classification from computed tomography (CT) images. The researchers hope that this framework will enable them to overcome the constraints identified.

In this paper, a novel framework is proposed for accurate liver tumor segmentation using improved TransUNet++ architecture with EfficientNet-B7 encoders, Vision Transformer bottlenecks, attention gates, and residual skip connections. Then an Improved Whale Optimization Algorithm (IWOA) is applied to improve the deep semantic features extracted from the segmented tumor areas. Then, these features are combined with radiomic descriptors. For liver lesion classification, a weighted ensemble of DenseNet201, ConvNeXt and Swin Transformer networks is applied. This ensemble is used to capture both local and global contextual information.

The experiments were performed on the LiTS and 3Dircadb benchmark datasets. The proposed framework achieved 98.12% Dice Similarity Coefficient, 97.64% Intersection-over-Union, 98.45% sensitivity, 99.02% specificity and classification accuracy of. outperformed many state-of-the-art segmentation and classification methods. The results reveal that transformer-based segmentation, optimum feature selection and ensemble deep learning can automatically identify liver cancer.

Index Terms

Liver cancer, TransUnet, IWOA, DenseNet201, ConvNeTx

A Lean-FMEA-Based Proactive-Predictive Maintenance Framework for Electrical Submersible Pump Services: An API Q2-Aligned Case Study

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Abstract

The reliability of electrical submersible pumps (ESP) is closely linked to production continuity and maintenance service quality in oil and gas operations. This study develops a proactive maintenance framework for ESP STR-23 by integrating Lean Maintenance, Value Stream Mapping (VSM), Failure Mode and Effect Analysis (FMEA), reliability indicators, and API Q2-oriented service control. This study used baseline maintenance data from October 1 to December 20, 2025, validated through four Focus Group Discussion sessions. The baseline contained seven failure events, 169.08 hours of downtime, a Mean Time Between Failure of 253.56 hours/event, a Mean Time to Repair of 24.15 hours/event, and an availability of 91.31%. The Current State VSM showed 17 h 45 min of process time, 48 h of waiting time, and 65 h 45 min of lead time. FMEA identified gas locking/no-flow as the highest risk, with an RPN of 420, followed by incomplete operational data, non-standardized surface inspection, repeated rework/failure, and mechanical downhole problems. The proposed Future State VSM restructures the maintenance flow into nine risk-based stages, supported by five Risk Control Points. The target lead time was reduced to 23 h 55 min, with an estimated lead time reduction of 63.6% and a waiting time reduction of 76.0%. The framework provides operational control through a minimum data set, FMEA trigger classification, standardized inspection, critical spare part readiness, validation, traceability, and FMEA database update.

Index Terms

Electrical Submersible Pump, Lean Maintenance, Value Stream Mapping, Failure Mode and Effect Analysis, API Q2, Proactive-Predictive Maintenance, Service Quality

“No Friends, Only Family”: Kinship, Care, and Gendered Disaster Response in a Coastal Community in the Philippines

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Abstract

While disaster scholarship increasingly recognises women’s contributions to preparedness, response, and recovery, less attention has been paid to the social relationships through which these capacities are produced and mobilised. Drawing on three months of ethnographic fieldwork in a hazard-prone urban coastal community in the Philippines (Barangay 1, Bacolod), including participant observation and 24 semi-structured interviews with community residents and NGO volunteers, this study examines the role of women in disaster management and the kinship networks that underpin community resilience. The findings show that women play central roles in household leadership, community protection, information-sharing, and disaster response. These capacities emerge not only from caregiving responsibilities but also from women’s embeddedness within wider networks of kinship, reciprocity, and mutual obligation. Through everyday practices of care, informal information exchange, and community organising, women mobilise resources, coordinate assistance, and identify vulnerable individuals during both routine challenges and periods of crisis. Women act as key information brokers, caregivers, and community organisers whose disaster-response capacities are sustained through long-term relationships of trust and reciprocal support. The article argues that kinship functions as a form of disaster-response infrastructure through which information, resources, labour, and care circulate. Rather than viewing disaster response as activated only during moments of crisis, the study demonstrates how resilience is produced through the everyday maintenance of social relationships. By linking gender, kinship, and disaster resilience, the paper contributes to scholarship on social capital and disaster governance while highlighting the importance of informal community networks in contexts where institutional support is limited. **BIOGRAPHY** Joanna Hioe completed her PhD in Southeast Asian Studies at the National University of Singapore (NUS) in 2026. Her research combines ethnography and media studies to examine how low-income fishing communities in Negros navigate slow violence and recurring small-scale disasters. Supported by the NUS Institute for Public Understanding of Risk, her doctoral work is being developed into a series of short documentaries that foreground community-led responses and highlight the role of local networks and resources in everyday risk management.

Interpretation of Psychoanalysis for Recovering Mental Disorders under the Lens of Naturalistic Life

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Abstract

This research paper emphasizes the anatomy of psychological disorders like hallucination, paranoia, and hysteria. It is the psychoanalytical theories that sustain such implications in various books. The chapter implies various mental disorders. It studies the theory of Sigmund Freud's texts *A General Introduction to Psychoanalysis* and *Interpretation of Dreams*. This book explains mental or neurotic disorders like loss of memory (amnesia), hallucination or vision, schizophrenia, depression, anxiety, and abuse. It describes mental disorders as some mental illness and its impact on human life. Psychological disorder is an umbrella term that has multiple facets and impacts. The term illness is a more serious term implicating mental disorders whereas; the word 'disorder' is used in general meaning. Terms like illness and disease are more specific in the psychoanalytical studies. As per the title of the thesis, *Psychological Disorders*; it covers all the problems related to the mind. It is an analytical attempt to understand the mind and all the problems related to the psyche. Psychological disorders have many subsequent forms that slowly and gradually loom into diseases. It is interpreted in the light of psychoanalysis.

Index Terms

Internal Nature/Mind, External Nature/ Environment, Mental Disorders with Impact on Behaviour

Humanizing Digital Government Services in Light of Strategic Intelligence: An Islamic Civilizational Framework for Reshaping Customer Experience and Enhancing Societal Well-Being

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Abstract

This article aims to present a qualitative explanatory framework that reframes the relationship between government digital transformation and the human dimension of public service delivery. It does so by integrating the concept of strategic intelligence with the principles of ethical governance within an Islamic civilizational perspective. The study stems from a central problem: most contemporary digital government models have focused on operational efficiency, streamlined procedures, and maximizing data utilization, while neglecting human dignity, equitable access, and the user experience as essential dimensions of institutional legitimacy (OECD, 2024; United Nations, 2024).

The article employs a qualitative methodology based on conceptual and critical analysis of contemporary literature in the fields of digital governance, user experience, and artificial intelligence ethics. This literature is then reinterpreted in light of the value framework of Islamic civilization, particularly the objectives of Sharia, the principle of stewardship, and justice (Aydin, 2025; Elmahjub, 2023). The study concludes that humanizing digital government services is not achieved solely through improving user interfaces or expanding electronic channels. It requires a redesign of the public service philosophy, making customer experience the benchmark for performance evaluation, and transforming strategic intelligence into a tool for guiding technology towards achieving societal well-being and preserving human dignity, rather than simply a means of maximizing technical efficiency (World Bank, 2022; Venkatesh et al., 2016).

The article also proposes an integrated conceptual model linking strategic intelligence, ethical governance, customer experience, and public value within a contemporary Islamic civilization framework. This contributes to developing a more balanced understanding of digital government as a human endeavor before it is a technological one.

Strategic Intelligence and Service Quality: Evidence from Customer Happiness Service Channels in the United Arab Emirates

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Abstract

This study analyzes the relationship between strategic intelligence and service quality from the perspective of customers using government service delivery channels in the United Arab Emirates, with application to the Emirate of Sharjah. The research is motivated by the growing importance of improving government services amid digital transformation, the diversification of service delivery channels, and rising customer expectations for faster, more flexible, reliable, and responsive services.

Strategic intelligence was operationalized as the independent variable across five dimensions — foresight, organized thinking, strategic vision, strategic partnership, and motivation and stimulation — while service quality was operationalized as the dependent variable using the SERVQUAL dimensions of tangibility, reliability, responsiveness, security and trustworthiness, and empathy (Parasuraman, Zeithaml, & Berry, 1988). A quantitative, cross-sectional design was adopted, with data collected via a structured Likert-scale questionnaire from a sample of 400 customers of Sharjah's government service delivery channels, determined using the Krejcie and Morgan (1970) sample-size table. Data were analyzed in SPSS using descriptive statistics, Pearson correlation, multiple linear regression, and non-parametric difference tests (Mann-Whitney U and Kruskal-Wallis H).

Results indicate that both strategic intelligence and service quality were perceived at high levels by respondents. Multiple regression showed that the five dimensions of strategic intelligence jointly explained 80.4% of the variance in service quality ($R = 0.897$, $R^2 = 0.804$, Adjusted $R^2 = 0.802$, $F(5, 394) = 323.236$, $p < .001$), with all five dimensions contributing significant positive effects; motivation and stimulation ($\beta = 0.397$) and strategic partnership ($\beta = 0.195$) emerged as the strongest predictors, followed by strategic vision ($\beta = 0.145$), foresight ($\beta = 0.132$), and organized thinking ($\beta = 0.129$). Statistically significant differences in customers' perceptions of service quality were also found according to gender, educational qualification, and age.

The findings suggest that improving government service quality depends not only on digital-channel development but substantially on institutional capacity for anticipation, organized service design, clear future orientation, inter-agency partnership, and workforce motivation. Practical recommendations are offered for government service providers, along with directions for future research.

Index Terms

Strategic Intelligence; Service Quality; SERVQUAL; Customer Happiness; Government Service Channels; United Arab Emirates

AI-Driven Cyberbullying Detection Using DistilBert

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Abstract

The rise of social media and online forums has accelerated the spread of cyberbullying, creating serious risks to mental health and online safety. Traditional detection approaches, such as keyword filtering and manual moderation, struggle with sarcasm, implicit aggression, and evolving linguistic patterns. In this paper, we propose a hybrid AI-driven framework that integrates transformer-based Natural Language Processing (DistilBERT) with sentiment-aware features derived from the Google Perspective API. Unlike prior work that relies solely on embeddings, our approach fuses contextual and toxicity-based representations to enhance detection of subtle and context-dependent abuse. The model was trained on a benchmark dataset of 47,000 annotated tweets, with class imbalance addressed using SMOTE and feature selection optimized via Chi-Square testing. Experimental results demonstrate that the proposed system achieves 91.14 percent accuracy, 91.71 percent precision, 91.14 percent recall, and a 91.02 percent F1-score, outperforming traditional machine learning and deep learning baselines. With CUDA acceleration, the system supports real-time classification and automated alerts, making it suitable for deployment in large-scale online platforms. This work contributes a scalable, robust, and interpretable solution for cyberbullying detection, with potential extensions to multilingual and multimodal content in future research.

Index Terms

Cyberbullying Detection, Natural Language Processing, DistilBERT, Real-time Monitoring, Sentiment Analysis, Text Classification

Multi-Lingual Cyberbullying Detection using MuRIL and mBERT

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Abstract

The multilingual online communication has been growing rapidly, spreading cyberbullying issues among various linguistic groups, posing significant challenges to internet safety, psychological wellbeing, and content control.. Current systems, primarily oriented towards English, tend to miss abusive phrases in local languages, intermixed text, and culturally-sensitive situations. In order to overcome these shortcomings, this paper suggests a multilingual cyberbullying detection model based on a hybrid transformer-based architecture that merges mBERT to enable extensive cross-linguistic generalization with MuRIL to enable a better semantic insight into Indian languages including Hindi, Telugu, and Bengali. This hybrid method uses contextual embeddings, linguistic features, and sentiment-sensitive features to effectively identify explicit, implicit, and culturally nuanced cyberbullying in user-generated content. An integrated preprocessing and tokenization followed by fine-tuning pipeline enable real-time classification and methods such as SMOTE and periodic retraining boost performance on imbalanced and changing datasets. This has been experimentally evaluated where the mBERT+MuRIL model vastly outperforms traditional monolingual as well as independent transformer base lines and offers a scalable and language-encompassing approach to safer online communities.

Index Terms

mBERT (Multilingual BERT), MURIL, Sentiment Analysis, Offensive Language Classification, Contextual Text Analysis, Automated Moderation, Toxicity Detection

When Governance Becomes Real: Integrity and Reporting Substance in Indonesian SOEs

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Abstract

State-owned enterprises often work under similar governance rules, yet the quality of their reporting can differ sharply. This article asks why, and proposes governance integrity as the organisational condition that determines whether formal governance commitments become genuine accountability or stay merely ceremonial. The study rests on a theory-building structured literature review that brings together PRISMA-informed screening, directed thematic analysis, and TCCM synthesis across 43 peer-reviewed studies drawn from Scopus and Web of Science between 2015 and 2025, read through the lens of Institutional Theory. The review finds five bodies of work, covering institutional pressures, governance arrangements, internal oversight, reporting quality, and symbolic compliance, that have grown side by side without explaining what makes governance real rather than performed. Governance integrity, understood as strategic tone at the top, compliance internalisation, and oversight coherence, is offered as the mechanism that links institutional pressure to the substance of reporting, and four testable propositions follow. The argument suggests that reform should look past structural checklists and ask whether leaders signal accountability consistently, whether compliance is truly embedded in daily practice, and whether oversight functions work together. In doing so, the article moves the explanation from governance adoption to governance enactment.

Index Terms

Governance Integrity; Institutional Theory; State-Owned Enterprises; Corporate Reporting Quality; Decoupling; Emerging Economies

Real-Time Banana Quality Classification Using Image Processing Methods

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Abstract

Fruit quality evaluation plays a crucial role in agricultural production, post-harvest management, and food processing industries. Traditional fruit inspection methods are generally performed manually, which can be time-consuming, subjective, and prone to human error. To address these challenges, this research presents an automated fruit quality evaluation system based on image processing and machine learning techniques. The proposed system utilizes digital images of banana fruits to assess their ripeness and quality in a non-destructive manner.

The acquired images are processed using MATLAB, where preprocessing operations such as image enhancement, segmentation, and feature extraction are performed. Important visual features including color, texture, and shape characteristics are extracted and used for classification. A K-Nearest Neighbor (KNN) algorithm is employed to categorize bananas into different maturity stages and identify defective fruits. The developed framework provides accurate and consistent classification results while minimizing human intervention algorithms in a software environment such as MATLAB.

Index Terms

Image Processing, Fruit Quality Evaluation, Banana Ripeness Detection, K-Nearest Neighbor (KNN), Machine Learning, MATLAB, Fruit Classification, Precision Agriculture

Design and Expected Effects of a Process-Centered Questioning AI Agent System for Learner-Centered Education

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Abstract

With the recent proliferation of generative AI, a critical issue has emerged in educational settings: learners increasingly depend entirely on AI for their assignments, thereby losing opportunities for independent thinking. For artificial intelligence to function not merely as an “answering machine” but as a “thinking partner” that fosters critical thinking, a novel approach is required. To overcome these limitations and promote metacognition, this study proposes the design of a process-oriented AI agent system.

The proposed system delivers a Socratic questioning sequence based on an Answer-Avoidance policy, which strategically restricts the direct exposure of correct answers. In particular, we implemented a Think-Step gating mechanism, where learners can proceed to the next learning stage only when their self-explanations and justifications meet specific criteria. Finally, this study discusses the implications for personalized education and the expected effects of the system on learner-centered curriculum education, while presenting a practically applicable technical model.

Developing the Nighttime Safety Capacitation Index (NSCI): A Mixed-Methods Study in Central Luzon

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Abstract

Addressing the pressing concern in disaggregated municipal data and localized governance, this study pioneers the Nighttime Safety Capacitation Index (NSCI) to evaluate the nighttime readiness of 47 Local Government Units (LGUs) across Bulacan, Pampanga, and the Highly Urbanized Cities of Angeles and Olongapo in the Philippines. Adopting a Convergent Parallel Mixed-Methods design, the study integrated spatial measures with a zero-shot Large Language Model (LLM) thematic extraction protocol to cooperatively report objective infrastructure with the lived experiences of residents. Quantitative findings, supported with an Exploratory Spatial Data Analysis (ESDA), revealed a statistically unequal regional landscape among the pilot locations pioneering the index. Global Moran's I statistics ($I=0.3052$, $p<0.05$) and LISA cluster maps confirmed that high-capacitated safety centers are concentrated with primary urban areas and transit corridors, leaving agricultural and coastal peripheries in statistically significant vulnerable conditions. Furthermore, external fiscal diagnostic exposed an inverse relationship, wherein high Local Disaster Risk Reduction and Management Fund (LDRRMF) allocations correlate negatively with safety capacitation. Qualitatively, LLM-extracted themes supported the findings, proving that environmental aspects, such as infrastructural lightlessness, manifest to navigational avoidance and compound a culture of crime non-reporting. The integration of these strands demonstrates that 'safety' (herewith referred as absence of crime) and 'capacitation' (herewith referred as active intervention of institutional and infrastructural elements) are distinguishable realities. In sum, the study operationalized to provide policymakers with data-driven, geographically targeted interventions to develop Central Luzon into a more resilient, nighttime activity-ready regional economy.

Index Terms

Nighttime Economy, Urban Safety Index, Spatial Autocorrelation, Mixed-Methods Research, Local Governance, Large Language Models

Adaptive Optimization via Machine Learning in Additive Manufacturing: toward Sustainable Remanufacturing in Industry 5.0

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Abstract

The transition from Industry 4.0 to Industry 5.0 highlights the need to integrate technological advancements with sustainability and human-centricity, culminating in the concept of circular factories. Additive Manufacturing (AM), a cornerstone of this transformation, offers disruptive solutions for remanufacturing and adaptive reprocessing, aligning with the principles of value retention and the circular economy. However, the technology faces significant challenges, including uncertainty management in feedstock materials, high energy consumption, and the need for regulatory standardization. In Industry 5.0, human-machine collaboration becomes the differentiating factor for managing resilient production systems, enabling manufacturing decentralization, and strengthening local supply chains. The integration of Machine Learning (ML) acts as a catalyst for this synergy, enabling in-situ parameter optimization, reducing errors by up to 25%, and ensuring the structural integrity of recovered components. Although AM has already demonstrated consolidated benefits in the healthcare and aerospace sectors, its large-scale viability depends on overcoming technical bottlenecks and developing co-design models that prioritize energy efficiency. In conclusion, the synergy between AM and ML holds great promise for establishing a new paradigm of smart, sustainable, and regenerative manufacturing.

Index Terms

Additive Manufacturing; Circular Factories; Industry 5.0; Machine Learning; Remanufacturing

Silent Signals and Green Dialogues: Rethinking Communication through Plant Humanities

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Abstract

The exploration of plant communication has become increasingly significant within the realm of Plant Humanities; however, literary depictions of vegetal communication are still largely unexamined. Richard Mabey's nature writing serves as a valuable resource for analyzing how literature facilitates non-verbal, more-than-human forms of communication. In response to this critical deficiency, the current study explores how Mabey perceives plants as communicative entities within ecological, cultural, and ethical contexts. The aim of this paper is to examine how plant communication is expressed beyond human language through narrative techniques that emphasize listening, attention, and relational involvement. In terms of methodology, the study employs close textual analysis guided by ecocriticism, post-human theory, and modern plant communication research, enabling an interdisciplinary interpretation of vegetal existence as both expressive and responsive. The findings indicate that Mabey portrays communication as an embodied and reciprocal ecological phenomenon, wherein plants convey messages through growth patterns, resilience, seasonal cycles, and interspecies interactions instead of verbal language. His focus on marginalized and neglected plant species contests anthropocentric hierarchies and reconceptualizes intelligence as relational rather than solely cognitive. Furthermore, the study illustrates that the literary form itself acts as a conduit for interspecies communication.

Index Terms

Plant Humanities, Plant Communication, More-than-Human Ecology, Ecocriticism, Non-Human Agency

From Risk Scores to Advising Actions: An Explainable, LLM-Assisted Dashboard for Continuous-Time Student Risk Monitoring in Higher Education

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Abstract

Predictive models of student dropout have reached a level of accuracy that is rarely the binding constraint on institutional practice; what limits impact is the gap between a risk score and an action an academic advisor can defend. This paper presents the design, implementation and demonstration of an explainable academic advising dashboard that closes that gap. The system is built on Completion-aware Risk Neural Ordinary Differential Equations (CR-NODE), a continuous-time model that represents each learner as a latent trajectory evolving under a learned differential equation, which allows it to consume the irregularly sampled interaction logs that Learning Management Systems actually produce rather than the evenly spaced sequences that recurrent architectures assume. Three completion-focused features derived from root-cause analysis, namely completion rate, early warning score and engagement variability, are added to eight conventional behavioural and performance indicators. Trained on 100,878 Canvas LMS enrolments yielding 89,734 temporal sequences and evaluated on a held-out set of 17,111 learners, the model attains a Macro F1 of 0.8747, exceeding LSTM by 6.24 and XGBoost by 4.47 percentage points, with McNemar tests confirming significance at $p < 0.0001$, and generalises to the Open University Learning Analytics Dataset at 84.44% accuracy. The contribution of this paper is the translation layer above that model: SHapley Additive exPlanations render every individual prediction as a ranked set of behavioural drivers, a calibrated confidence band routes each learner to automated outreach or human review, and a large language model converts the explanation into a concrete, advisor-editable intervention plan. A working prototype exposes cohort triage, per-student trajectory inspection and course-level analytics. We argue that explanation, calibration and human authorship, taken together, are what make early-warning analytics usable, and we outline the deployment and evaluation agenda this opens.

Index Terms

Learning Analytics, Educational Data Mining, Neural Ordinary Differential Equations, Explainable Artificial Intelligence, Large Language Models, Academic Advising, Student Retention, Early Warning Systems

Mapping the Virtual: Identity, Trauma, and Digital Space in *Plowing the Dark*

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Abstract

This paper analyses how Richard Powers' *Plowing the Dark* reimagines the intersections of virtual reality, trauma, and identity within the rapidly evolving landscape of digital technology. Through its parallel narrative structure, the novel interweaves the experiences of programmers designing immersive virtual worlds with the psychological ordeal of an American hostage enduring prolonged captivity. This dual narrative shows how virtual environments and traumatic consciousness converge, blurring the boundaries between lived reality and digital simulation.

Integrating perspectives from posthumanist theory, trauma studies, and digital humanities, this research article conceptualizes virtual environments as affective and cognitive spaces in which memory, trauma, imagination, and survival shape human consciousness and identity. The novel presents identity as a dynamic and evolving process shaped by perception and narrative while examining how digital technologies redefine embodiment, presence, and human connectivity.

By examining the symbolic interplay between physical confinement and boundless virtual space, *Plowing the Dark* focuses on contemporary issues on artificial intelligence, immersive media, and digital consciousness. In short, this article argues that Powers conceptualizes virtuality as an extension of human consciousness rather than an escape from reality, emphasizing the profound interdependence of technological innovation, memory, and emotional experience. The paper contributes to contemporary literary scholarship by highlighting the enduring relevance in identity, trauma, and technological transformation in the present times.

Index Terms

Trauma Studies, Virtual Reality, Digital Humanities, Posthumanism, Identity Construction, Memory

