



WCASET 2025



48th World Conference on Applied Science, Engineering & Technology

 17th–18th November, 2025
 Kuala Lumpur, Malaysia

Organized By



Academic Partners





48th World Conference on Applied Science, Engineering & Technology (WCASET-2025),
Kuala Lumpur, Malaysia

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Conference Theme:

“ **Advancing Applied
Science, Engineering &
Technology
for Sustainable
Development**

– 48th WCASET-2025 ”



Preface

We are delighted to extend a warm welcome to all participants attending “48th World Conference on Applied Science, Engineering & Technology (WCASET 2025)” on November 17th-18th, 2025 at Kuala Lumpur, Malaysia organized by G.Pullaiah College of Engineering and Technology-India, Multimedia University (MMU)-Malaysia and IFERP Academy-Malaysia Society. 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 Applied Science, Engineering & Technology. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for WCASET 2025 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Applied Science, Engineering & Technology. 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 Applied Science, Engineering & Technology but also serve as a valuable summary and reference for further research in these fields.

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 WCASET 2025.

Since August 2025, the Organizing Committees have received more than 150+ manuscript papers, covering all aspects of Applied Science, Engineering & Technology. After review, approximately 50+ papers were selected for inclusion in the proceedings of WCASET 2025. 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 **WCASET-2025**

Welcome to the 48th World Conference on Applied Science, Engineering & Technology (WCASET 2025). Taking place in vibrant Kuala Lumpur, Malaysia on November 17th & 18th, 2025, it's a place where Science, Education, and Technology combine for global progress! You can think of it as a place where groundbreaking scientific discoveries spark transformative ideas, leading to innovative technologies that propel humanity forward.

This year's theme is "Advancing Applied Science, Engineering, and Technology for Sustainable Development" which aims to promote collaboration among scientists, educators, and technologists from various fields to address global challenges and drive progress worldwide.

As we gather for this worldwide conference, we urge you to explore the latest sessions and tracks — all of which are focused on harnessing the power of synergy between science, education, and technology. You also get a chance to present your findings to a worldwide audience and publication opportunities in renowned Journals like Scopus, SCIE, WoS and others. At this International conference in Kuala Lumpur, we'll explore how science, engineering, and technology can collaborate to solve global challenges and create a brighter future.

Objective of the WCASET

At WCASET 2025, we want to bring together brilliant minds to come up with new ideas and use the latest technology to tackle big problems around the world. Here's what we're aiming for:

Spark Meaningful Discussions: Get experts talking about important topics, like challenges we're facing now and new things happening in science, education, and technology.

Shape the Future Together: Look at new ideas and major issues, and figure out how they'll shape the future of science, education, and technology & come up with collaborative ways to solve them.

Celebrate Game-Changers: Give a big round of applause to people who come up with new ideas and ways to use science, education, and technology to make a real difference.

Safeguarding Our Present: We'll address ethical issues on how to make sure that when we use science, education, and technology together, we do it in a way that's fair and helps everyone.

Inspire the Leaders of Tomorrow: We'll encourage students and professionals to try new ways of doing research, which can lead to exciting discoveries in their areas of interest.

Solve Global Challenges: We'll discuss big problems facing the world and come up with clever solutions by using science, education, and technology all together.

Aim Excellence: Share best practices and optimize existing systems, helping us make smarter choices and drive progress.

Form Lasting Connections: Create a place where people can network, exchange knowledge, and form potential collaborations that accelerate growth and development.

Synergize for Global Progress: By bringing together science, education, and technology, we aim to find solutions that propel humanity forward, creating a brighter future for all.

About IFERP Academy

IFERP Academy advances engineering, science, and technology on a global scale. Their mission is to bridge the gap between the scientific community and the ever-evolving industrial landscape through the power of digital innovation. Their reach is extensive, spanning across Europe, the Middle East, Asia, and beyond. From Iraq and Malaysia to Australia, they empower researchers, scientists, students, and professionals with a suite of valuable resources like

- Publications opportunities in renowned databases like Web of Science and Scopus.
- Networking opportunities to forge meaningful connections with peers from diverse backgrounds.
- Offering research support, aid and guidance to propel projects forward.

At IFERP. Industry-Institute Interaction and Youth Empowerment are at the heart of their initiatives. They actively promote:

- Collaboration between academia and industry
- Empowerment of the next generation

IFERP is a gateway to a vibrant global network of scientific minds to pave the way for a brighter future.



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.

What We Do?

IFERP believes that there is always a better way to treat the professionals by providing them a world class stage by organizing conferences. We are committed to doing the following activities:

- We encourage convenient access to academic resources and support for all the aspirants and research scholars in urban and rural areas.
- IFERP 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 is dedicated to inquisitiveness, innovations and recent trends and developments in the field of Engineering & Technology.
- IFERP believes in knowledge sharing by collaborating with other Universities, organizations/Associations, to bring a better tomorrow.



Welcome Message

Director, IFERP



Mr. A. Siddh Kumar Chhajer

Founder & Managing Director,
IFERP Academy, Technoarete Group, India

On behalf of IFERP & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers. The goal of the 48th WCASET 2025 is to provide knowledge enrichment and innovative technical exchange between international researchers or scholars and practitioners from the academia and industries in the field of Applied Science, Engineering & Technology.

This conference creates solutions in different ways and to share innovative ideas in the field of Applied Science, Engineering & Technology. 48th WCASET 2025 provides a world class stage to the Researchers, Professionals, Scientists, Academicians and Students to engage in very challenging conversations, assess the current body of research and determine knowledge and capability gaps.

48th WCASET 2025 will explore the new horizons of innovations from distinguished Researchers, Scientists and Eminent Authors in academia and industry working for the advancements in Science and Engineering from all over the world.

48th WCASET 2025 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in the field of Applied Science, Engineering & Technology.

Welcome Message

Chief Executive, IFERP



**Mr. Rudra Bhanu
Satpathy**

Founder & CEO, IFERP Academy,
Technoarete Group, India

IFERP is hosting the 48th World Conference on Applied Science, Engineering & Technology (WCASET 2025) this year in month of November, 2025. The main objective of WCASET 2025 is to grant the amazing opportunity to learn about groundbreaking developments in modern industry, talk through difficult workplace scenarios with peers who experience the same pain points and experience enormous growth and development as a professional. There will be no shortage of continuous networking opportunities and informational sessions.

The sessions serve as an excellent opportunity to soak up information from widely respected experts. Connecting with fellow professionals and sharing the success stories of your firm is an excellent way to build relations and become known as a thought leader. I express my hearty gratitude to all my Colleagues, Staffs, Professors, Reviewers and Members of Organizing Committee for their hearty and dedicated support to make this conference successful. I am also thankful to all our delegates for their pain staking effort to make this conference successful.



Welcome Message

Principal, GPCET



Dr. C. Srinivaso Rao

Principal,
G.Pullaiah College of Engineering and
Technology,
Kurnool, Andhra Pradesh, India.

Good morning to all distinguished delegates, esteemed researchers, academicians, and respected guests.

It is an honour and privilege to warmly welcome you to the 48th World Conference on Applied Science, Engineering & Technology (WCASET 2025), being held in the vibrant and innovative city of Kuala Lumpur, Malaysia on November 17th and 18th, 2025.

This global platform stands as a powerful convergence of science, education, and technology, where ground-breaking research inspires transformative ideas and innovations that propel humanity forward. The theme for this year “Advancing Applied Science, Engineering, and Technology for Sustainable Development” reflects our collective responsibility to create solutions that not only advance technology but also ensure long-term sustainability for future generations.

In a world where interdisciplinary collaboration is the key to progress, WCASET serves as an essential bridge between visionary thought, practical innovation, and real-world societal impact. As Principal of G.Pullaiah College of Engineering and Technology, India, I am proud to witness such remarkable global synergy among scholars, industry leaders, and change makers.

I extend my heartfelt gratitude to the organizers, speakers, and participants for your invaluable contributions and presence. May this conference ignite new collaborations, inspire responsible innovation, and strengthen our united pursuit of sustainable global development.

Wishing everyone a highly rewarding and impactful conference experience.

Thank you!

Welcome Message

Multimedia University



**Prof. Ts. Dr. Mardeni
Bin Roslee, FASc**

General Chair
48th WCASET

Good day to everyone!

Distinguished all authors and co-authors, Keynote Speakers, Session Speakers and Session Chairs, of 48th World Conference on Applied Science, Engineering & Technology (WCASET-2025).

Welcome to the 48th World Conference on Applied Science, Engineering & Technology (WCASET-2025) which will be held on November 17th & 18th, 2025 at Kuala Lumpur, Malaysia. It's a place where Science, Engineering, and Technology combine for global progress where groundbreaking scientific discoveries spark transformative ideas, leading to innovative technologies that propel humanity forward.

It gives me a great pleasure for this welcoming remark to all of you 48th WCASET-2025. My heartfelt gratitude to IFERP Academy-Malaysia Society and G.Pullaiah College of Engineering and Technology in co-organizing this conference. Indeed, it is my great honour to have Keynote Speakers, Session Speakers and Session Chairs would be with us for these 2 days conference despite their busy schedules. I believe their insights would significantly enable everyone to all the scientists and researchers to get exposure of the latest development and advancement in the technology, as well the future research in various fields.

World Conference on Applied Science, Engineering & Technology (WCASET-2025) is a well known global conference which aims to bring together related research scholars, educators, practitioners, policy makers, enthusiasts, fellow students, and industries to share and exchange their research experiences and results on all aspects of engineering technologies from various perspectives, disciplines, and fields. Having experience in hosting and organising conferences for many years, IFERP and MMU are pleased have received many participants from various organisations including universities, research institutions, and industries globally.



The participants from all over the world have presented their papers in WCASET before. It shows that WCASET has become more popular internationally and we will continue our efforts to make this Science, Engineering & Technology Conference as one of the well-known conferences in the future.

Thank you again to Institute for Educational Research and Publication (IFERP) as our main organizer and prominent publisher for this year conference. Also, thanks to our co-organizers and all over the world for your support towards this conference. You have all been chosen to be part of our family at IFERP and MMU. Before I end my welcoming remark, allow me to record my gratitude to the committee of this conference for the commitment in organising this event. Finally, I believe the conference session for these 2 days conference would have a fun and memorable one and impactful.

Thank you very much and see you all in 48th WCASET-25.

About Keynote Speaker



Dr. Noor Zaman

Department of Computer Science
(Cyber Security),
Taylor's University,
Malaysia.

Prof. Dr. Noor Zaman Jhanjhi is a distinguished Senior Professor of Computer Science at Taylor's University, Malaysia, where he specializes in Artificial Intelligence and Cybersecurity. As the Director of the Research Center, Center for Intelligent Innovation CII, and Program Director for Postgraduate Research Degree Programmes, he plays a pivotal role in shaping academic excellence and driving cutting-edge research initiatives.

Globally acclaimed for his scholarly contributions, Prof. Jhanjhi has been consistently ranked among the world's top 2% research scientists (2022, 2023, 2024, and 2025) and stands as one of Malaysia's top computer science researchers. He has been named amongst the top 0.05% of all scholars worldwide according to the 2025 ScholarGPS rankings. His exceptional work has earned him prestigious accolades, including the Outstanding Faculty Member Award (MDEC Malaysia, 2022) and the Vice Chancellor's Best Research Citations Award (Taylor's University, 2023).

A prolific author and editor, Prof. Jhanjhi has published over 80 research books with leading publishers such as Springer, Elsevier, IGI Global, Bentham, IET, and Wiley, etc., amassing 1,000+ impact factor points. His mentorship spans 45 postgraduate completions, and he has examined 70+ Ph.D. and Master's theses worldwide.

As an Editor-in-Chief, Associate Editor, and Editorial Board member for top-tier journals (PeerJ Computer Science, IEEE Access, CMC Computers), he advances scholarly discourse. His leadership extends to securing 40+ international research grants, underscoring his influence in innovation.

A dynamic keynote speaker, Prof. Jhanjhi, has delivered 100+ invited talks and chaired major conferences. His decade-long engagement with ABET, NCAAA, and NCEAC accreditation bodies highlights his dedication to global academic standards.

Combining research brilliance, academic leadership, and a passion for mentorship, Prof. Jhanjhi continues to inspire the next generation of computer scientists while shaping the future of AI and cybersecurity.



About **Keynote Speaker**



Ts. Dr. Aida Mustapha

Deputy Vice-Chancellor (Research & Innovation)
Department of Computer Science and AI
Universiti Malaysia Pahang Al-Sultan Abdullah
Pahang, Malaysia

Aida Mustapha received her B.Sc. degree in Computer Science from Michigan Technological University, Masters of Computer Science from Universiti Kebangsaan Malaysia, and Ph.D. in Artificial Intelligence from Universiti Putra Malaysia. At present, she is the Deputy Vice-Chancellor (Research & Innovation) at Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA). She is also the lead trainer for Akademi Intelek dan Data Analitik (AI.DA), responsible for Microsoft professional certification programs for both students, academics, and industry partners. She has published more than 450 refereed publications in the area of Soft Computing, Data Mining, Computational Linguistics and Software Agents. Her main passion is pursuing the area of natural language studies and application of natural language processing to holy texts, in particular the Quran. She is also the Chief Editor for Journal of Quranic Sciences and Research, Member of ISO/TC 204 Intelligent Transport Systems, Member of Malaysia Board of Technologist, and Member of International Association of Counselors and Therapists.

About Keynote Speaker



Dr. Sher Afghan Khan

Department of Engineering and Technology
International Islamic University Malaysia (IIUM)
Kuala Lumpur, Malaysia.

Prof. Dr. Sher Afghan Khan graduated from Z. H. College of Engineering and Technology, Aligarh Muslim University, Aligarh, India, in 1982 with a BSc.Engineering, and M.Tech from Indian Institute of Technology, Kanpur, India in 1984. He began his career as a senior scientific officer at the Armament Research and Development, Defense Research and Development Organization, Ministry of Defense, India, from 1984 to 1993. He has worked with the late former President of India, Dr. A. P. J. Abdul Kalam. Who was the scientific adviser to the Defense Minister and also the Director General of Research and Development? He was appointed as an Associate Professor in the Mechanical Engineering Department at Aligarh Muslim University, Aligarh, in 1993 and later promoted to Professor in 2001. He served as Principal/Dean of Research and Academic Director at P. A. College of Engineering, Mangalore, Karnataka, India, and also at Bearys Institute of Technology, Mangalore, Karnataka, India, from 2004 to 2014. He also served as the Principal of Z.H. College of Engineering & Technology, Aligarh Muslim University, from September 2014 to May 1, 2015. He has guided four Ph.D. students, and five are currently working under him. He has published research articles in national and international journals.



About **Keynote Speaker**



Ir. Ts. Dr. Sharifah Rafidah Wan Alwi

Faculty of Chemical and Energy Engineering
Universiti Teknologi Malaysia
Johore, Malaysia

Prof. Ir. Ts. Dr. Sharifah Rafidah Wan Alwi, FASc, is a Professor at the Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia (UTM) and co-founder of Optimal Systems Engineering Sdn Bhd. She is a leading expert in sustainable engineering, energy efficiency, and Pinch Analysis, having led over 80 research and 17 industrial projects, and trained engineers from more than 200 companies. She served as Director of UTM's Process Systems Engineering Centre (2011–2021) and is a certified AEMAS Energy Manager trainer and Registered Energy Manager (Type 1 & 2). Prof. Sharifah has received numerous national and international awards, including the ASEAN-US Science Prize for Women, Green Talents (Germany), and Malaysia's National Young Scientist Award. She has been recognized by Asian Scientist as one of Asia's top scientists and contributes as Associate Editor and board member for multiple international journals. She is also a Fellow of the Academy of Sciences Malaysia and actively promotes science leadership through various national platforms.

About **Keynote Speaker**



Dr. Intan Zaurah Mat Darus

Faculty of Mechanical Engineering
Universiti Teknologi Malaysia
Johore, Malaysia

Professor Dr. Intan Zaurah Mat Darus is a Professor at the Faculty of Mechanical Engineering, Universiti Teknologi Malaysia (UTM). She holds a First Class B.Eng. (Hons.) from the University of Wales College Cardiff (1998) and a Ph.D. in Automatic Control and Systems Engineering from the University of Sheffield (2004). Her research focuses on instrumentation and control, system modeling and simulation, thermal energy, automotive and robotic systems, and artificial intelligence. She has published over 250 papers, received more than 30 research grants and awards, and supervised over 60 postgraduate students, including 20 Ph.D. graduates. With over 25 years of teaching experience, Professor Intan has held several academic leadership roles at UTM, including Deputy Dean, Head of Department, and Director of the Centre of Academic Experiential Learning. She currently serves as Chair of the School of Undergraduate Studies, overseeing academic programs, internships, and experiential learning for over 16,000 students. She also contributes internationally as an editorial board member for journals in noise control and AI research.



About Keynote Speaker



Dr. Hakikur Rahman

Professor and Chairperson
Department of Computer Science &
Engineering
International Standard University
Dhaka, Bangladesh

Hakikur Rahman is a distinguished academic with over 30 years of experience serving leading educational institutions in Bangladesh and abroad. He is currently Professor and Chair of Computer Science and Engineering at the International Standard University (ISU), and Director at the Ansted University Sustainability Research Institute in Malaysia. Previously, he served as Professor and Dean of the School of Engineering at Presidency University, and before that, as Professor of CSE at the Asian University of Bangladesh. He also held the position of Associate Professor and Chair of CSE at BRAC University, and was a Post-Doctoral Researcher at the University of Minho, Portugal, under the Centro Algoritmi. Dr. Rahman has made significant contributions to ICT for Development (ICT4D), leading projects funded by ADB, EU, UNDP, and the World Bank. His research focuses on computer education, ICTs, knowledge management, open innovation, data mining, and e-government. He has authored and edited over 25 books, contributed more than 60 book chapters, and published over 200 articles in newspapers, journals, and conference proceedings. He is also actively engaged in the WSIS Forum and IGF sessions. He earned his Bachelor's degree in Engineering from BUET in 1981, a Master's in Engineering from the American University of Beirut in 1986, and holds two PhDs—one in Computer Engineering from Ansted University, BVI, UK (2001), and another in ICT from Empresarial University of Costa Rica (2011). Dr. Rahman currently serves as Editor-in-Chief of the International Journal of ICT and Human Development (IJICTHD) and the International Journal of Knowledge Management (IJKM).

About **Keynote Speaker**



Dr. Hassanudin Mohd Thas Thaker

Kulliyyah of Economics and Management Sciences, International Islamic University Malaysia (IIUM), Malaysia

Associate Professor Hassanudin Mohd Thas Thaker, Ph.D., International Islamic University Malaysia (IIUM), Malaysia. Dr. Hassanudin Mohd Thas Thaker is an Associate Professor of financial economics at the Department of Economics, Kulliyyah of Economics and Management Sciences, and Research Fellow at the Centre for Islamic Economics, International Islamic University Malaysia (IIUM). His expertise includes international trade, crowdfunding, financial economics, Islamic finance, fintech, ESG, and affordable housing. He holds a Postgraduate Certificate in Academic Practice (PGCAP) from Lancaster University, UK, and actively engages in research and industry grants. With more than 100+ research articles, he received numerous accolades, including Best Paper, Distinguished Paper Award, the Emerald Literati Outstanding Paper Award, and the Vice-Chancellor's Research Award. In addition, he has co-organized the Foundations of Islamic Finance Conference since 2019. With sustainability and inclusivity as his primary research focuses, he is currently looking at the potential by linking Islamic finance and economics in bridging these gaps.



About Keynote Speaker



Ts. Dr. Mardeni Bin Roslee

CEO, Armada Tech Sdn Bhd
Chairman, CWT, Multimedia University
Malaysia

Prof. Mardeni is a Chief Executive Officer (CEO) and main founder of Armada Smart Tech MR Sdn Bhd and Chairman of Centre of Wireless Technology, Centre of Excellence, Multimedia University, Malaysia. His current research interests are 5G/6G telecommunication, Artificial Intelligence, Internet of Things and radar communication. In professional association, he was a Chairman of Institute of Electrical and Electronics (IEEE) Communication Society/Vehicular Technology Society. He is a registered Chartered Engineer with Engineering Council United Kingdom, and Member with The Institution of Engineering and Technology (IET), UK and a Senior Member IEEE (SMIEEE). He appointed as a Visiting Professor at 10 abroad Universities and at national and international level and has been involved in industry Consultation with some companies locally and internationally. He was invited as Keynote Speaker for 30 International conferences at 16 countries such as at Thailand, China, Australia, Korea, Indonesia, Singapore, Japan, French, United Kingdom, Spain, Canada, New Zealand, Romania, India and Turkey for 2009–2024. At international conferences, he hold position as General Chair of 11 conferences globally. His contributions to academic and the engineering professional over the years have earned him recognitions nationally and internationally, He is the recipient of more than 100 research awards locally and internationally including Top Research Scientist in Malaysia in 2020 from Academy of Science Malaysia.

About **Keynote Speaker**



Dr. Sufian Mousa Ibrahim Mitani

Director of Academic Business
Telekom Malaysia Research & Development
Malaysia

Dr. Sufian Mitani has completed his Ph.D. from Microelectronic and Nanotechnology lab, University Malaya, Kuala Lumpur in 2000. He has joined TM Research & Development Innovation Center in 2001. He has Several years of experience combined between industrial applications, teaching, academic and industrial research in the field of Mobile Communications, LTE, Passive Optical Networks & Optoelectronics, 5G, SDN/NFV Network; specializing mainly in the area of Wired & Wireless Connectivity Technology. His experience also includes Optical Components and Radio Over Fiber at different frequencies ranging from mm-wave to low frequency and an excellent background in physical, optical, structural and electrical analysis instrumentation. Currently, he is leading the strategy of Intelligent Network at TM R&D Innovation Center. He has been leading a very well established and qualified teams at various fields of connectivity technology where many of his projects have been adopted and employed at Telekom Malaysia as a service provider. Dr. Sufian has over 20 patents, 300 international papers and more than 30 international awards. His interests now in 5G Network.



About **Keynote Speaker**



Dr. Farman Ali

Head of the Department of Electrical
Engineering
Qurtuba University of Science and
Information Technology
Pakistan

Dr. Farman Ali serving as an Associate Professor and Head of the Department of Electrical Engineering at Qurtuba University of Science and Information Technology, Pakistan, where he also oversees the Office of Research, Innovation and Commercialization (ORIC) and serves on the Occupational Safety and Health (OSH) Committee. Dr. Ali's research expertise lies in 6G, UAV communications, optical networks, AI integration in wireless systems, and free-space optics, with over 70 peer-reviewed international publications and numerous IEEE conference contributions to his credit. He has led and contributed to several internationally funded research projects, including those supported by the China National Key R&D Program, Polish Ministry of Science, Najran University (Saudi Arabia), Silesian University of Technology (Poland), Taif University (Saudi Arabia), Marie Skłodowska-Curie Actions (EU), and the Korean Ministry of SMEs. Actively engaged in global research collaborations across China, Saudi Arabia, Korea, Poland, Spain, and Malaysia. His ongoing research encompasses advanced modulation techniques, 6G channel modeling, UAV-to-ship/ground communication, and AI-enabled optical systems.

About Keynote Speaker



Ts. Dr. Goh Wei Wei

Head of Department
School of Computer Science
Taylor's University,
Malaysia

Associate Professor Ts Dr Goh Wei Wei is currently the Digital Health and Innovations Impact Lab Deputy Director and Programme Director of Bachelor of Information Technology, senior lecturer at the School of Computer Science at Taylor's University. She received her Ph.D. major in E-learning from the University of Derby, UK. She has been in the academic for the past 20 years. Dr Goh Wei Wei has been working on learning, teaching and assessment design strategies, online learning technologies, social media technologies, knowledge management, Machine Learning and Internet of Things research. She emphasised her familiarity with online technologies due to her experience of using them in teaching as she likes to develop technology-rich classrooms. She has been working on various multi-disciplinary projects with the Design School too. Dr Goh Wei Wei has recently won 2 gold medal awards, and 1 bronze medal award in International University Carnival on E-learning (IUCEL) 2022, 1 bronze medal award in Econdex 2022 for her experience in developing technology- rich classrooms initiatives. She introduced Engage VR platform to create an immersive presence in the virtual learning environment to her students. She also let her students have the hands-on experience of using the Oculus Quest 2 and HoloLens to experience Augmented Reality and Virtual Reality. Dr Goh Wei Wei also won a total of 4 silver medals award in Malaysia Technology Expo (MTE) in year 2021 and 2022 for her innovative Internet of Things prototype development related to digital health and innovations. She also won silver medal for Smart Medication Management and Medicine Delivery System in 32nd International Invention, Innovation and Technology Exhibition in 2021. Dr Goh Wei Wei has the practical skills, the hands-on experience and the educational credentials to make a significant difference to the university.



About Session Speaker



Dr. Kiran C. More

Professor
Department of Mechanical Engineering
DY Patil University
Pune, India

Dr. Kiran C. More is an accomplished academic and researcher in Mechanical Engineering, currently serving as a Professor at D.Y. University, Pune. With a Ph.D. from Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, Dr. More specializes in thermal systems, mechanical design, and engineering optimization. He has guided multiple Ph.D. scholars, published over 50 peer-reviewed papers, authored books and book chapters, and holds several patents. He has been recognized internationally, including the Singapore International Educational Excellence Award in 2024 and the Young Achiever Award in 2019. Dr. More has served as a reviewer for reputed journals from Elsevier, Springer, Taylor & Francis, Wiley, and others. He is actively involved in academic leadership, curriculum development, and fostering research and industry collaborations. Dr. More's professional memberships include ISTE, IAENG, InSc, IFERP, and SCRC. His contributions to the field continue to impact both academic and industrial sectors, particularly in the areas of heat exchanger optimization, electric vehicle technologies, and computational design.

About Session Speaker



Dr. Karanam Pushpanadham

Professor and Head, Department of
Educational Administration
Faculty of Education and Psychology
Officer on Special Duty – MSU Ph.D Programs
Coordinator – NEP (2020) Implementation
The Maharaja Sayajirao University of Baroda
Vadodara, Gujarat, India

Prof. Karanam Pushpanadham is a distinguished professor of Educational Management at the Maharaja Sayajirao University of Baroda, Gujarat, where he leads the Department of Educational Administration. With over 30 years of experience, he has contributed extensively to research, teaching, and educational leadership. He serves as the Officer on Special Duty for Ph.D. Programs and as the Coordinator for the implementation of the National Education Policy (2020) at the university, liaising with the Ministry of Education, Government of Gujarat. A native of Vizianagaram, Andhra Pradesh, he completed his education at Andhra University, the Regional Institute of Education (NCERT), Mysore, and earned his M.Phil. and Ph.D. from MSU Baroda. Prof. Pushpanadham has held visiting professorships at several international institutions, including those in Sweden, Denmark, Ireland, Portugal, and Southeast Asia. He coordinates international research on digitalisation in higher education under the ASEM LLL Hub and has represented India in expert groups on AI and digitalisation. His current work includes global citizenship education, rural transformation, and leadership development. He is a member of national academic bodies like NCTE, NAAC, and NCERT, and has played key roles in curriculum development and policy-making. He has guided ten Ph.D. scholars and continues to supervise doctoral research in Education and Educational Management.



About **Session Speaker**



Dr Fazla Rabby is a successful entrepreneur, researcher, and academic leader, currently serving as Director at the Stanford Institute of Management and Technology, where he provides strategic oversight of academic programs and ensures compliance with regulatory standards. With extensive experience in teaching and research, he has authored publications across multiple domains, demonstrating a strong engagement with emerging trends and innovative practices. Renowned for cultivating interactive and stimulating learning environments, Dr Fazla integrates lectures, workshops, and seminars to enhance critical thinking and student development. He is an active member of esteemed professional bodies, including the Australian Computer Society, IEEE, and the Australian Marketing Association, contributing significantly to both academia and industry."

Dr. Fazla Rabby

Academic Director,
Stanford Institute of Management and
Technology, Australia

About Session Speaker



Dr. Karabi Sikdar

Professor & HoD
Department of Mathematics
BMS Institute of Technology and
Management
Bangalore, India

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About Session Speaker



Dr. Richard Self

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Richard Self is a Senior Lecturer in Governance of Advanced and Emerging Technologies at the University of Derby in the UK. He gained his business background during 30 years at Rolls-Royce before changing to academia in 2002. His approach to students is not to teach answers, rather he inspires, challenges, mentors and guides his students to find important questions and then how to research to find relevant answers for the specific context using interdisciplinary approaches. He guides the students into their own experiences in order to find the insightful questions that motivates them to their best work. His focus is on inspiring students to evaluate their personal and employability skills and then to develop their full range of skills in order to become the most employable graduates in the market. This is based on applying the research into a range of teaching and assessment approaches that can demonstrate measurable improvements in their academic skills and in their transferable skills. This research is published at conferences and in journals. His focus, in terms of governance, is to understand how technology should be selected in order to solve specific business problems based on a careful analysis of the business requirements. He has been researching the development and trustworthiness of GenAI with his postgraduate and undergraduate students ever since ChatGPT burst onto the scene. This has led him to carefully consider the business case for Generative AI and the questions that must be asked before starting on the adventure of implementing it into businesses and the consequences of LLMs in an educational setting. Richard is a regularly invited keynote speaker at UK and international business and academic conferences where he always provides the audience with the important questions for evaluating their business needs and technologies.

About Session Speaker



Dr. C. Ranjeeth Kumar

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Dr. C. Ranjeeth Kumar is a seasoned academician and researcher with over 15 years of teaching and leadership experience in Computer Science and Artificial Intelligence. He currently serves as Dean of Innovation & Entrepreneurship and Professor at G. Pullaiah College of Engineering and Technology, Kurnool. Dr. C. Ranjeeth Kumar earned his Ph.D. in Information and Communication Engineering from Anna University, Chennai, and specializes in AI, machine learning, deep learning, and computer vision applications. A prolific researcher, he has authored numerous publications in SCI and Scopus-indexed journals and holds two granted patents with additional patents filed. He has successfully led industry-funded projects with organizations such as Rolls-Royce, Hindustan Aeronautics Limited, GE Healthcare, and L&T Technology Services, contributing to AI-driven innovations in manufacturing and healthcare. Dr. C. Ranjeeth Kumar is a certified NVIDIA Deep Learning Instructor and an advocate for innovation, entrepreneurship, and interdisciplinary collaboration. His contributions extend to mentoring students for international hackathons, guiding start-up initiatives, and delivering workshops and training programs in emerging technologies. Recognized with multiple awards, including the Faculty of the Year Award and NVIDIA accolades, Dr. C. Ranjeeth Kumar remains committed to advancing technology education and driving impactful AI solutions.



About Session Speaker



Dr. Ali A. Taani

Al Balqa Applied University
Jordan

Prof. Dr. Ali Taani is a distinguished Professor of Astrophysics and Space Science, currently serving as the Deputy Dean of the Faculty of Science for Graduate Studies and Scientific Research Affairs at Al- Balqa Applied University in Jordan. His extensive experience spans diverse academic and research collaborations in China, Europe, and the UAE, enabling him to contribute significantly to both national and international scientific organizations and initiatives. Prof. Taani earned his Ph.D. in Astrophysics and Space Science in 2013 from the National Astronomical Observatories (NAOC), University of the Chinese Academy of Sciences, becoming the first Arab and international student to achieve this distinction. His remarkable research accomplishments earned him a one-year seniority in promotion to Full Professor Rank in 2023 due to his distinguished contributions at Al- Balqa Applied University. He was also awarded the prestigious third place in the Best Research Paper in Physics competition by COMSTECH and received the esteemed EARG Award for Excellence in Research and Development from the MathTech Thinking Foundation in 2024, further highlighting his impact on the field. In 2018, Prof. Taani was granted the PIFI Fellowship by the Chinese Academy of Sciences, allowing him to serve as a visiting scientist at the Institute of High Energy Physics and the NAOC. He has authored over 65 publications in internationally peer-reviewed journals and conference proceedings, covering diverse topics in astronomy and space science. Prof. Taani has actively participated in and organized over 50 workshops and public lectures on astronomy and space science across Jordan, the UAE, Tunisia, and Egypt. His efforts to popularize science have inspired many aspiring astronomers in the Arab world. Moreover, he has been featured in over 200 TV and radio interviews and numerous newspaper articles, addressing public topics related to astronomy and space science both locally and internationally. Beyond his academic endeavors, Prof. Taani is dedicated to community engagement, particularly supporting underprivileged groups such as Syrian refugees in Jordan. He has led comprehensive education programs that combine fun and educational activities, one notable success being the mentoring

of Abbas Faouri, a Syrian refugee who developed STEM skills under Prof. Taani's guidance. This mentorship helped Faouri secure a position as a lab instructor at a private school in Amman, despite lacking formal teaching qualifications. Prof. Taani also supervised teams of students in the prestigious NASA Space Apps Challenge 2023 and 2024. Their projects focused on designing eco-friendly, reusable tools for astronomy enthusiasts, including special eclipse glasses that protect the eyes from radiation while emphasizing sustainability. To date, Prof. Taani has supervised and co-supervised over 40 M.Sc. and B.Sc. graduation projects in astronomy and space science. Many of his students have pursued advanced studies abroad, further extending the impact of his mentorship and research in the field.



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Efficacy of the Antibiotics Benzylpenicillin and Streptomycin Dissolved in Ethanol and Applied in the Form of a Mist on Non-Spore-Forming (*Staphylococcus aureus*) and Spore-Forming (*Bacillus subtilis*) Microorganisms

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The aim of this study was to investigate the antimicrobial efficacy of penicillin and/or streptomycin applied in an ethanol mist and to examine their effect on the surface integrity of model and historical textiles from the collections of the Auschwitz-Birkenau State Museum (A-BSM) in Oświęcim, Poland.

Bacillus subtilis and *Staphylococcus aureus* bacteria, previously found on historical textile objects at the A-BSM, were inoculated onto samples of model and historical textiles. The disk diffusion method was used to determine effective antibiotic doses. Penicillin and streptomycin, either separately or in combination, were applied to the materials suspended in an ethanol mist. Disinfection efficacy was assessed using culture-dependent microbiological methods, and surface changes were analyzed using SEM, confocal microscopy, and XPS. The developed method of applying antibiotics in an ethanol mist proved to be ineffective biocidal properties, resulting only in a temporary inhibition of the growth of the tested bacteria. However, this did not negatively impact the surface morphology of the textiles. In summary, disinfection of historical textile objects in A-BSM using antibiotics applied in an ethanol mist can be used to reduce the total number of microorganisms, but it is not effective in eliminating spore-forming *Bacillus*. Nevertheless, this study indicates that further research into the use of antibacterial molecules in disinfecting cultural heritage objects would be necessary and valuable.



Smart Health Companion: A Mini Robot for Vital Signs Tracking

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This study presents the design and development of a smart health companion robot that can monitor heart rate and body temperature in real time. The system is built using cost-effective components such as the Arduino Uno, MAX30102 heart rate sensor, and DS18B20 temperature sensor. Housed in a mini car platform, the robot is Bluetooth-controlled through a mobile application, allowing it to move to different users for vital signs monitoring. This makes it useful in settings where contactless or mobile health screening is needed, such as schools, clinics, and remote communities.

The main goal of the project is to create an accessible, user-friendly device that supports proactive healthcare and early detection of possible health concerns. The robot displays results on an LCD screen, providing quick feedback on a user's vital signs. Testing was conducted within the Polytechnic University of the Philippines – Lopez Quezon Campus. A total of 50 respondents, including students, faculty members, and a healthcare professional, participated in the evaluation. Results from surveys and interviews showed high levels of satisfaction in terms of functionality, usability, accuracy, and accessibility.

Although the system currently does not store data or send information wirelessly to external platforms, it effectively demonstrates the potential of combining robotics and health technology for real-world applications. Users noted its ease of use and portability, which are important for adoption in community and educational settings.

The study highlights how simple, mobile robotic tools can assist in monitoring health metrics, reduce manual workload, and improve response time in detecting early signs of illness. With further development—such as adding data storage, wireless connectivity, and AI features—this health companion robot can become an even more powerful tool for modern healthcare systems.

Keywords— Mobile Health Robot, Real-Time Monitoring, Heart Rate, Body Temperature, Arduino, Vital Signs, Smart Healthcare

A Simplified Design of Bamboo Connectors for Bamboo Space Frame

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Two Indian bamboo species namely *Bambusa balcooa* and *Bambusa tulda* has been graded based on different characteristics like diameter, wall thickness, length and density use for bamboo space frame. The loads which resulted from self-weight, dead load, live load, wind load and seismic load either individually or from their possible combinations has been taken on bamboo members and the supports. Structural design of 3D bamboo space frame and determination of loads on a typical connection has been carried out as per Indian Standards. Cylindrical steel connector with provision of bamboo having diameter ranging from 70mm to 85mm were designed and using LFRD method and STAAD Pro as they are used for 2D and 3D structural frames ensuring modularity and saving of time. They are having a ball and socket which are connected to a circular ring for 360 deg rotation with maximum angle of incidence 32 degree. They are fixed on box type connector of size of 180 mm x 180 mm for bamboo columns. 3D Space frame of grid 6 m x 6 m has been taken as prototype bamboo space frame structure with bamboo members of length (horizontal member of 3m and inclined member of 1.95 m having two connectors at the end and circular ring connector at junction nodes has been constructed. Incremental load upto 88 kg has been vertically hanged at four nodal joints and nodal displacement has been noted at all the incremental load assigned after 12 hrs and 24 hrs of loading. This has been carried out two types of bamboo species as structural member for comparison. It has been observed that *Bambusa balcooa* sustained more load than *Bambusa tulda* having nodal displacement within the allowable limit (Span/240). Hence this ensured structural integrity of the bamboo frame using ball socket bamboo connector and preventing the damage that could lead to cracking and breakage due to movement of nodes. By analyzing the displacement behavior of these two bamboo species, it becomes evident that species selection plays a crucial role in the structural integrity and performance of bamboo-based systems. The experiment underscores that *Bambusa balcooa* offers superior structural efficiency under gradually increasing loads due to its stiffer nature and better dimensional control. These insights are critical for engineers and architects involved in designing bamboo structures, as they guide material choice based on required strength, stiffness, and long-term stability. It is hoped that these innovative connectors could inspire and promote local people, designers, engineers and architects to gain more interest of making bamboo architecture in the future.

Keywords— Cylindrical Bamboo Connector, Bamboo Space Frame, LFRD, Analysis of Covariance, Nodal Displacement, Hanging Load



Progressive Web Application (PWA) for Sustainable Tourism in Mexico

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This paper presents the design and implementation of an intelligent Progressive Web Application (PWA) for sustainable tourism in Mexico. The proposed system, which utilizes an Ant Colony Optimization (ACO) algorithm to generate the best solution for itineraries, provides personalized and eco-conscious travel recommendations for four key Mexican states, based on the country's Sustainable Development Indicators. The PWA analyzes visitor preferences to generate optimized travel routes and suggest destinations, focusing on sites of interest. A core component of this research is the integration of a sustainability heuristic within the ACO model, which prioritizes accommodation with certified sustainability credentials.

The PWA novelty lies in its dual focus on user personalization and environmental responsibility. It offers users a choice between a standard itinerary and a more sustainable one, providing transparency by calculating and displaying the carbon footprint generated by using the application itself. The PWA is designed for seamless cross-platform access, offering an efficient and user-friendly platform. Our results demonstrate that the system effectively delivers tailored recommendations while actively promoting responsible travel practices, making it a valuable tool for advancing sustainable tourism in Mexico.

Food Quality Evaluation of *Manihot esculenta* Crantz Gluten-Free Noodles

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Gluten-free noodles often have less acceptable cooking behavior and appearance compared to gluten-containing counterparts. In this study, the cooking and color characteristics of *Manihot esculenta* Crantz flour-based GF noodles fortified with xanthan gum, guar gum, whey protein, and egg were investigated. The effects and interactions among the ingredients were estimated using a fractional factorial design. The optimized formulation demonstrated good cooking characteristics, with rapid optimum cooking time (3.33 min), minimum cooking loss (1.53%), a high yield (103.05%), and acceptable swelling index (2.47). Yellowness (b^* 10.13) was an acceptable value in color measurements. Egg was the main contributor to the yellow colour. Validation of the model confirmed good predictability performance and is comparable to commercial noodles, which contributes to sustainable food production and diversity in diet.



Improvement of the Methodology of Processing Digitalized Figure Images for 3D Clothing Design

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Three-dimensional clothing modeling has been on the market for many years. At first, most users found it difficult to transfer traditional analog processes to the digital world. The advent of technical systems for contactless measurement and high-speed digitization of human figures – body scanners – is the first stage of a revolutionary change in the content of the initial base of the clothing design process. The experience of equipping specialized automated clothing design systems with various modifications of three-dimensional design modules has shown that the user tools of some programs need to be improved. Virtual fittings may be unreliable if the system base is insufficiently filled with three-dimensional avatars or if their personalized correction is impossible. The article presents a study on parametric and 3Dscanned digital twins of typical figures for clothing design.

Keywords— Three-Dimensional, Digital, 3D Scanning, CAD Systems, Body Scan, Digital Avatar, Free Rotation

Perception of Knowledge about Smart Agriculture among Technical Agricultural Students in the Amazon

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This work comprises a descriptive study of the perception that students in the Technical Agriculture program have regarding the use of solutions related to Smart Agriculture within the context of their academic training. Smart Agriculture is an approach that integrates the use of emerging technologies (drones, Artificial Intelligence, etc.) with the aim of improving productivity and environmental sustainability.

It is important to note that agricultural activities in the Peruvian Amazon face a series of limitations (climate, soil quality, pests, scarce cold chain systems, etc.) that restrict productivity. To date, there are only a few and discontinuous successful experiences. Agricultural activities in the Amazon are of great importance to ensure food security for both urban and indigenous populations, as well as to catalyze economic dynamics.

The study revealed the limited knowledge and use of technologies related to Smart Agriculture, despite the fact that all students use the Internet, mobile technology, and even Artificial Intelligence on a daily basis. At the same time, it is important to highlight their interest and demand for experimenting with technologies related to Smart Agriculture.



Perception of the Use of Information Technologies as Educational tools Among University Students in Loreto, Peru

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This study provides a descriptive analysis of the perception held by students from the Faculty of Education and Humanities at the National University of the Peruvian Amazon (UNAP) in Iquitos, Peru, regarding the use of information technologies as educational tools.

Prior to 2023, the quality of internet services in the region was highly deficient, which limited the use of various digital platforms and tools that could have supported teaching and learning processes across different educational levels. It is also worth noting that, before the Covid-19 crisis of 2020, the use of online systems for educational purposes in the Peruvian Amazon was minimal.

At present, improvements in internet services have brought about changes in how technologies are perceived as tools that can be integrated into curricula and classroom activities. Among the most relevant findings, the study highlights a notable increase in the use of digital tools and computational processes in recent years. However, despite this progress, the actual content and mechanisms applied in classrooms have scarcely been updated, underscoring the urgent need to modernise curricular plans.

Data-Driven Query Execution and Resource Provisioning in Dynamic Distributed Cloud Environments

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This paper introduces a novel AI-driven framework for autonomous performance optimization in dynamic distributed cloud database environments. Traditional database management systems, relying on static configurations and manual tuning, are ill-equipped to handle the fluctuating workloads and unpredictable resource availability of modern cloud ecosystems. Our proposed approach leverages machine learning (ML) algorithms to enable data-driven query execution and resource provisioning. The core of our framework is a multi-agent reinforcement learning (RL) system. One agent, the Query Optimizer Agent, learns from a vast historical dataset of query plans to predict and select the most efficient execution strategy in real time, factoring in current system load and data distribution. Concurrently, a separate Resource Provisioning Agent uses time-series forecasting models (e.g., LSTM networks) to predict future resource demands and dynamically scale database instances, CPU, and memory allocations. These agents operate in a feedback loop, where the Query Optimizer Agent's decisions inform the Resource Provisioning Agent's actions, and vice versa, creating a continuously self-tuning system. Our experimental validation on a representative distributed database benchmark shows that this integrated approach achieves a 30% reduction in average query latency and a 25% improvement in resource utilization efficiency compared to state-of-the-art static and rule-based methods.

Keywords— Distributed Systems, Cloud Computing, Query Optimization, Resource Provisioning, Reinforcement Learning, Autonomous Systems, Performance Tuning



Comprehensive Characterizations and Comparative Performance Analysis of Crude Oil Grades Processed at Iraqi Oil Refining

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This study analyses and compares the physicochemical properties of two Iraqi crude oils—Crude A (a blend of Hassira and Sarsang) and Crude B (By Hassan)—to assess their refining potential and operational challenges. Samples were analyzed at the Department of Chemistry, University of Sulaimani, employing conventional American Society for Testing and Materials (ASTM) and Institute of Petroleum (IP) methodologies. The primary parameters examined included water content, sulfur percentage, flash point, density, API gravity, pour point, viscosity, total acid number (TAN), and vanadium and nickel as the trace metals. The findings indicated that Crude A is a lighter crude oil (API 41.48) with a reduced sulfur content (1.08 wt%) and excellent cold-flow characteristics. However, it contains a higher concentration of vanadium and nickel. Conversely, Crude B possesses a higher density (API 25.7) and contains greater sulfur content (3.25 wt%) and water, necessitating enhanced procedures for sulfur and salt removal. In addition, a high percentage of light cuts was also distilled from the light crude oil and the heavy crude oil has a lower pour point than that of the light crude oil. It was also observed that with increasing the percentage of the fractions volume, the boiling point of the distillates was increased. Moreover, naphtha has a lower boiling point than Kerosene, which in turn has a lower boiling point than Diesel for all of the fractions. Sulfur content is low in light fractions; however, it is increasing with increasing carbon number of refinery's products. These findings offer critical insights for selecting refinery feedstocks, blending techniques, and policy development, underscoring the importance of crude-specific characterization for efficient and sustainable refining processes.

Keywords— Blended Crude Oils, Crude Oil Properties, Distillation Curve, Refinery Process, Properties of Produced Fraction

Analysis of Gradient-Based Minimization with Finite Difference Method and Automatic Differentiation on Double-Lane Roundabout

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To ensure the double-lane, four-arm roundabout model can effectively represent real traffic performance, parameter estimation is carried out using two optimization approaches: partial exact gradient minimization via the Finite Difference Method and full exact gradient minimization via Automatic Differentiation, a tool available in MATLAB for machine learning applications. In the partial gradient approach, linear interpolation is applied to generate new data for the Finite Difference Method, addressing the mismatch between data sets' size caused by varying time steps determined by the Courant-Friedrichs-Lewy (CFL) condition. To enhance model realism, entry and exit rates for both inner and outer lanes are incorporated, resulting in the estimation of sixteen parameters. Six pseudo-experiments are initially conducted for result analysis, acknowledging the potential non-uniqueness of the estimated parameters. Simulation results are evaluated based on two key criteria: computational time and accuracy. The partial exact gradient minimization shows strong accuracy but is time-consuming due to slower convergence. In contrast, the full exact gradient minimization demonstrates both faster convergence and higher robustness, making it more suitable for fitting process with estimating the large quantity of parameters. Finally, the fitting process is successfully implemented, enabling the roundabout model to study the real traffic flow performance in case there are actual Total Travel Time and Total Waiting Time data.

Keywords— Double-lane Roundabout, Parameter Estimation, CFL Condition, Finite Difference Method and Automatic Differentiation



Mobile App for Personalized Tourist Itinerary Generation Based on a Genetic Algorithm

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Mexico has established itself as the leading tourist destination in Latin America, recognized for its vast cultural heritage, natural diversity, and wide range of modern attractions. However, this richness poses a challenge for travelers when planning itineraries that efficiently integrate the most relevant destinations according to their personal preferences, available time, and travel objectives.

This paper presents the design and implementation of a mobile application capable of generating personalized travel itineraries in Mexico through the use of a Genetic Algorithm (GA). The algorithm evaluates multiple combinations of destinations, optimizing factors such as place diversity and user interests to produce balanced and coherent itineraries. The system architecture integrates a modular backend and a cross-platform mobile application (iOS and Android), ensuring scalability and a seamless user experience. Experimental results demonstrate the effectiveness of the Genetic Algorithm in automatically generating optimized itineraries that assist travelers in decision-making, highlighting the potential of artificial intelligence —particularly the use of genetic algorithms— in enhancing the functionality and personalization of tourism recommendation systems.

An Enhanced Ensemble Model For Cervical Cancer Prediction Using Machine Learning With XGBoost Integration

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Cervical cancer is among the main causes of death for women all over the world, particularly in areas with low access to frequent screening by medical specialists. Early detection by using machine learning (ML) has been found to have favourable outcomes in determining high-risk patients from non-invasive characteristics. This project suggests a better ensemble model for the prediction of cervical cancer through the incorporation of XGBoost into a current multi-classifier ensemble. The conventional model, which utilized equal-weight majority voting among classifiers such as SVM, DT, NB, KNN, LR, J48, Multi-layer Perceptron, and RF, is enhanced by using a weighted voting system. This modification favors top-performing classifiers, enhancing overall model accuracy and dependability. The UCI Cervical Cancer Risk Factors dataset was employed, and preprocessing involved missing value handling, data balancing, and feature selection. The developed system attained higher accuracy, precision, recall, and F1-score than the baseline. This paper shows the usage of the state-of-the-art ML techniques assistance in the prompt diagnosis of cancer and improve healthcare decision-making.

Keywords— Cervical Cancer, Machine Learning, Ensemble Models, XGBoost, Weighted Voting, Healthcare Analytics



Has Walking Improved? Behavioural and Perceptual Evidence from Jakarta's Complete Street Implementation

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Since 2022, several key pedestrian corridors in Jakarta have undergone major revitalisation using the Complete Street concept. Originally developed in North America, the approach was formally adopted by Jakarta through Governor Regulation No. 58/2022. It aims to create more pedestrian-friendly urban spaces that support walking and public transport use. However, limited evidence exists on whether such design interventions effectively influence travel behaviour and user perceptions, particularly in cities like Jakarta, where car dependency and informal street practices reduce walkability. This study investigates the behavioural and perceptual impacts of the Complete Street implementation in Blok M, one of Jakarta's most active mixed-use and transit-oriented districts. A questionnaire survey of 120 respondents was conducted using a retrospective approach to compare travel modes before and after the intervention and assess walking environment quality via a Likert scale. The results then are analysed through descriptive and inferential statistical methods. The results reveal a substantial increase in walking trips to both local destinations and nearby transport hubs, accompanied by a decline in private vehicle and ride-hailing use. Positive perceptions of safety and connectivity were found to be strongly associated with the likelihood of walking, indicating that improved perceived quality of the environment can encourage behavioural change. Despite challenges such as limited parking management, most respondents viewed the redesigned street environment positively. These findings demonstrate that well-planned street interventions can successfully encourage behavioural change and improve user perceptions on walking. The study also highlights the importance of incorporating behavioural understanding and context-sensitive design into adopting Complete Street policies developing cities.

Estimation of Land Value Uplift Impacts of Thorpe Park Station Using Evidence from the North of England Model

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This research examines the potential land and property value uplift resulting from the proposed Thorpe Park Station in East Leeds, UK. The study identifies the key variables influencing land and property value changes, evaluate how the station will affect these factors, and estimates the magnitude of value uplift in the surrounding area. Using the North of England Model, an ex-ante quantitative analysis was conducted based on five variables: accessibility, place quality, building and plot characteristics, neighborhood socio-economic context and supply-demand balance. The finding indicate that Thorpe Park Station will generate significant spatial and economic impacts. Improved accessibility to major employment centers nearby, particularly Leeds and York, is projected to reduce travel times by up to 10.4 minutes, leading to an estimated 6.15% property value uplift within 400 meters of the station. Additional factor such as enhanced place quality from proximity to The Springs retail hub (10%), new-build housing premiums (18.1%), and generation effects (2.76%) are expected to further enhance the value growth. Collectively, these factors suggest a potential property value increase of approximately 40% in the closest catchment zone. This research contributes to the understanding of transport-triggered land value uplift in emerging suburban areas and provides insights for applying land value capture mechanisms to support sustainable transport financing.



The Potentials of Telraam Systems for Cycling Infrastructure Planning and Studies

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Active travel data remains sparse in many monitoring regimes, limiting evidence-based cycling planning. Telraam, an affordable, citizen science-based, AI-enabled image counter offers a scalable alternative, yet independent validations in mixed-traffic settings are limited. This study assesses Telraam's bicycle-count accuracy against manual ground truth on an urban mixed-traffic corridor and observed in 15-minute intervals for 3 hours in morning peak hour time from 7am to 10am in Leeds, UK. Linear regression between Telraam and manual counts shows strong agreement ($R^2 = 0.974$, $p < 0.001$), with slope $[\beta \pm 1.007]$ and intercept $[\alpha \pm 0.25]$. Error analysis indicates $MAE = 0.75$ bicycles per hour ($\approx 98\%$ of the mean flow) and $RMSE = 1.041$; Bland Altman plots display solid concurrence with bias/LoA $[-0.17 \pm 2]$. Accuracy is robust across daytime conditions. However, further examinations should be performed for different situations such as low-light, rain and seasons which this study does not cover. These results suggest Telraam can reliably complement traditional manual counts and enable large-scale, cost-efficient bicycle monitoring where permanent counters are infeasible. We discuss deployment guidelines (camera height/angle, siting away from occlusions) and data governance considerations. Further work should examine night-time, seasonal effects, and class misclassification (bicycle vs motorcycle) to define boundaries for operational use.

Implementation of School Streets Programme and Its Impact on Traffic and Air Emissions – Case Study in Leeds using SATURN

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This dissertation provides a comprehensive econometric analysis of the primary determinants of flight cancellations at UK airports, utilizing a longitudinal panel dataset covering the period from 2020 to 2024. Amidst a modern aviation ecosystem characterized by high demand and constrained capacity, flight cancellations have become a critical indicator of operational performance and system resilience. Moving beyond conventional analyses that often examine causal factors in isolation, this research adopts a holistic Input-Output framework to investigate the complex interplay between an airport's resources (inputs), its workload (outputs), and uncontrollable external factors such as weather. The study employs a multi-stage analytical strategy, progressing from an exploratory Pooled Ordinary Least Squares (OLS) model to a definitive Fixed Effects (FE) panel data model to ensure the validity and reliability of its findings. The results reveal that the primary drivers of flight cancellations are aggregate operational utilization pressure and specific weather conditions related to visibility. The final comprehensive model demonstrates that aircraft movements and cargo volume are the most significant components of utilization, highlighting that principal operational bottlenecks are located on the airside and apron, rather than the landside passenger terminal. Furthermore, the analysis identifies a significant and non-linear (inverted U-shaped) relationship between cloud cover (a proxy for visibility) and cancellations. Conversely, the study finds no statistically significant evidence that marginal annual changes in operational inputs, such as staff numbers or physical capacity, directly reduce cancellation rates. These findings carry significant implications, suggesting that strategies to enhance operational resilience should pivot from a singular focus on static infrastructure expansion towards a greater emphasis on dynamic efficiency, sophisticated air traffic flow management (ATFM), and targeted investment in technologies that mitigate the impact of low visibility.



An Econometric Analysis of Airport Performance: Modelling the Determinants of Flight Cancellations in the United Kingdom

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Air emissions from motor vehicles adversely impact public health, especially among students who are vulnerable to pollutants when commuting to and from schools located near busy roads. Various policies have been implemented to address this issue, including the School Streets programme, which restricts motor vehicle access around schools' areas at the beginning and end of the school day. This programme has been adopted in several cities across the UK, including Leeds, to improve safety and air quality in school environments. The SATURN traffic model and the DEFRA Emission Factor Toolkit were used to evaluate the impact of School Streets on private vehicle route changes and air emissions at four school corridors in Leeds, which located in Armley, Chapel Allerton, Weetwood, and Woodhouse. Moreover, five time-segment scenarios were simulated to analyse the effects of road closures on traffic flow and pollutant emissions. The results show that road closures successfully diverted traffic but increased congestion and travel costs on alternative routes. In School Streets' scenario, emissions of four pollutants: CO₂, NO_x, PM₁₀, and PM_{2.5} were significantly decreased at school located in Chapel Allerton and Weetwood but increased in Armley and Woodhouse. The study concludes that the effectiveness of School Streets is highly context-dependent and recommends micro-level evaluations and integration with complementary policies within local context, such as 20 miles-per-hour zones and park-and-stride schemes.

Analysing Public Preferences in Bringing Non-Folding Bicycles onto the Palembang LRT

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Integrating cycling with public transport is increasingly recognised as a key strategy for achieving sustainable urban mobility. This study investigates the feasibility of allowing non-folding bicycles on board the Palembang Light Rail Transit (LRT), Indonesia's first LRT system, which continues to face low ridership levels. A stated preference survey was conducted among 162 non-folding bicycle owners in Palembang to assess user preferences across three policy attributes: fare surcharge, reservation mechanism, and on-train storage provision. Using the Multinomial Logit (MNL) model, this study found that fare surcharges have a significant negative effect, while the availability of dedicated bicycle storage space has the strongest positive influence on users' willingness to bring their bicycles. Reservation mechanisms produce mixed responses; meanwhile, the no-reservation system has the highest preference among respondents. The estimated willingness to pay ranges between IDR 5,000 and 8,000 for improved storage and simpler procedures. Overall, the findings highlight that policies promoting affordability, convenience, and security are most effective, and that integrating non-folding bicycles into the Palembang LRT could play an important role in advancing sustainable urban mobility in Indonesian cities.



Architecture After Intuition: Traditional vs. AI-Driven Processes in Architectural Education in Bangladesh

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The upsurge of AI is beginning to convert architectural education, even in contexts such as Bangladesh where traditions of studio practice remain deeply rooted. This paper offers a critical comparison between conventional modes of design—rooted in intuition, precedent, and hand-drawing—and the emergent AI-driven approaches that assemble neural networks, generative platforms, and prompt engineering. What emerges is not a simple technological upgrade, but a thoughtful reconfiguration of the design process.

The answers suggest that AI enlarges the horizon of creativity, extending the capacity of students to imagine and problem-solve by generating outcomes beyond the limits of individual intuition. In doing so, AI not only hastens efficiency but also introduces new possibilities of innovation, aesthetics, and authorship. Crucially, it reframes the role of the architect from maker to curator, from one who produces singular visions to one who composes and filters among a production of machine-generated alternatives.

Grounded in literature and experimental studio projects, this paper argues that the integration of AI into architectural pedagogy in Bangladesh is not optional, but inevitable. The question is not whether AI should enter the studio, but how critically and creatively it can be integrated. The conclusion points toward a future in which design education must evolve into a dialogue between human and machine intelligence—an association that reshapes not only the tools we use, but the very meaning of design itself.

Keywords— Artificial Intelligence (AI), Architectural Design Process, Architectural Education, Design Studio, Prompt

Evaluating the Passenger Demand Forecasting Handbook (PDFH) Model for Great Britain Rail Demand Before and After the COVID-19 Pandemic

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The COVID-19 pandemic has fundamentally altered travel patterns, raising critical questions about the validity of pre-existing forecasting models. This study evaluates the post-pandemic accuracy of Great Britain's Passenger Demand Forecasting Handbook (PDFH) model, which is widely utilised in the UK to predict rail demand. Utilising open-source rail and socio-economic data from 2018 to 2023, the model's performance was first evaluated by comparing backcasted demand with actual journeys using a Mann-Whitney U (MWU) test. A fixed-effects panel regression was then employed to quantify 'elasticity gaps' (the difference between the PDFH's assumed elasticities and empirically observed values) for fare and socio-economic variables. The results demonstrate a significant deterioration in the PDFH's accuracy, with the model consistently overestimating post-pandemic demand. Crucially, the model was found to be statistically inaccurate for most non-London routes even before the pandemic began, highlighting pre-existing weaknesses. The regression analysis reveals a profound structural shift in passenger behaviour. Fare elasticity for non-London travel has become almost perfectly inelastic, a finding which contradicts conventional demand theory. Furthermore, socio-economic elasticities have significantly weakened and, in some cases, present theoretically implausible negative coefficients for employment and GDP, which might suggest underlying model misspecification. A diagnostic model confirmed this structural break in passenger response to fares. The study concludes that continued reliance on the current framework for policy and investment decisions is untenable. A comprehensive recalibration of the national rail demand model is therefore urgently required to ensure future transport strategies are based on robust, evidence-based forecasts.



Understanding the Impacts of Psycho-social Constructs on the Readiness to Adopt Autonomous Vehicles in the United Kingdom

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Grounded in established technology adoption theory, this study investigates autonomous-vehicle (AV) adoption readiness (AAR) by emphasizing the roles of perceived safety (AVS), perceived attractiveness (AVA), and mode-related attitudes pro-car (PCP) and pro-public transport (PPT). A theory-driven structural approach is employed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess measurement validity and relations among latent constructs, complemented by an ordered logit model applied to categorical readiness levels as a robustness check. Findings indicate that stronger perceptions of AV safety enhance perceived attractiveness, and that attractiveness serves as a principal pathway to readiness for adoption. Results remain consistent across analytical approaches, supporting a safety-driven mechanism by which perceived benefits translate into heightened early-adoption propensity. Practical implications point to communication strategies and feature design that credibly improve safety perceptions and highlight tangible advantages, while acknowledging boundary conditions linked to user attitudes toward competing modes. Limitations include reliance on self-reported data and a single-context sample, motivating external validation and longitudinal designs to examine stability over time and across settings. Overall, the evidence positions perceived safety and attractiveness as actionable levers for policy and product development aimed at accelerating responsible AV uptake.

Spatial Prioritisation Framework for Enhancing Pedestrian and Cyclist Safety: A Data-Driven Approach

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The rising road fatality involving vulnerable road users, especially pedestrians and cyclists, poses significant threat to active travel uptake. UK statistics recently highlighted the average of annual rise of 2% in pedestrian and cyclist fatalities during 2024. Safe system approach introduces new philosophy in road safety intervention, which accommodates human error in road collisions. In identifying hotspots, conventional road safety analysis often relies on casualty severity frequency, without incorporating contextual risk factors. To minimise this gap, this study aimed to develop an integrated framework that quantify severity and contextual risk. The research employed DBSCAN analysis to understand spatial pattern of road collisions, then by adapting Eisenhower matrix to prioritise clusters within limited road safety investment. Therefore, this approach is expected to help policymaker in deciding road safety enhancement. The research utilised UK road safety STATS19 dataset over last five years from 2020 to 2024 and vehicle safety rating protection provided by Euro NCAP. Furthermore, to obtain road characteristics, this study used OpenStreetMap package. The result of this study showed that pedestrian and cyclist collision formed 107 clusters across Leeds, capturing 24.8% or 651 casualties. These clusters were classified into four quadrants, where generated 18 Immediate Action, 53 Planned Improvement, 9 Alternate Intervention, and 27 Monitoring zone. The findings suggest that in high-risk score, especially immediate action clusters, priority intervention should focus on engineering updates to close infrastructure gaps such as providing signalized pedestrian crossings and segregated lanes. On the contrary, alternate intervention clusters have low risk-score, however, these clusters resulted high frequency of severity. Thus, these clusters need human factor intervention such as enforcement and road safety education due to the risk score could not captured human factor risk. Therefore, the proposed framework enables evidence-based to support more targeted strategies in enhancing pedestrian and cyclist safety in urban transport planning.



Who Gets Distracted? Exploring Psychosocial and Demographic Factors in Driving Behaviour in Greater Jakarta

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Distracted driving has become a critical safety issue in Indonesia's rapidly growing urban areas, particularly in Greater Jakarta. This study examines how psychosocial and demographic factors relate to distraction engagement (DE) among private car drivers, drawing on the Theory of Planned Behaviour (TPB). The psychosocial factors include Attitude Toward Distraction (ATD), Perceived Behavioural Control (PBC), Descriptive Norm (DN), and Injunctive Norm (IN), while demographic factors include gender, age, education, occupation, driving experience, and driving frequency. Data from 321 respondents were collected through an online survey and analysed using multiple linear regression in RStudio to assess moderation effects. The author found that most psychosocial factors are positively associated with distraction engagement. Drivers with more permissive attitudes toward distraction and higher perceived behavioural control tend to engage more frequently in distraction-related behaviours. Gender was identified as a significant moderating factor, revealing that the effects of ATD ($\beta = 0.111$, $p = .041$) and PBC ($\beta = 0.155$, $p = .004$) on distraction engagement were stronger among male drivers than female drivers. Other demographic characteristics such as age, education, occupation, driving experience, and driving frequency did not show significant moderating influences. These results highlight the importance of designing gender-sensitive road safety interventions. Addressing male drivers' overconfidence and challenging social norms that normalise distraction could contribute to safer road behaviour in Indonesia's increasingly congested urban transport system.

Keywords— Distracted Driving, Psychosocial Factors, Demographic Factors, Theory of Planned Behaviour, Indonesia

The Impact of Digital Transformation Disclosure Features in Annual Reports on the Cost of Debt Capital of A-Share Listed Companies in China

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With the rapid development of digital technologies, corporate digital transformation has become a key strategy for enhancing competitiveness and optimizing the financing environment. This paper explores the impact of digital transformation disclosure characteristics in annual reports on the debt capital costs of Chinese A-share listed companies. The aim is to quantify the disclosure of digital transformation information in annual reports in terms of quantity, quality, tone, and extent, and to reveal how these disclosure characteristics, under the moderating effects of the degree of digitalization in analyst reports, media reports, and digital strategy consistency, influence the company's debt capital cost. This study employs text analysis techniques combined with deep learning and natural language processing (NLP) methods. It extracts data from the annual reports of Chinese listed companies from 2013 to 2024 using Python, and utilizes Stata software for data processing, quantifying digital transformation disclosure information in the annual reports and conducting regression analysis. The empirical results show that the quality, tone, and extent of digital transformation disclosure in annual reports have a significant impact on the company's debt capital costs, with the degree of digitalization in analyst reports, media reports, and digital strategy consistency playing a moderating role. Robustness tests further validate the effectiveness of these results. The study finds that improvements in the quality and extent of digital transformation disclosures significantly reduce the company's debt capital costs, especially when digital strategy consistency within the company moderates this effect. This suggests that when a company's digital strategy is highly consistent across goal setting, resource allocation, and execution, the credibility and transparency of its disclosed information are enhanced, thereby further reducing investors' risk expectations and optimizing debt financing conditions. Furthermore, external information sources such as media reports and the degree of digitalization in analyst reports also play a key moderating role in this process. Specifically, the level of attention and depth of interpretation given to digital transformation by these external sources can influence market perceptions of the company's digital transformation and further amplify or strengthen the impact of digital transformation disclosure on debt capital costs. In summary, the empirical results of this paper reveal how internal and external factors interact to affect the company's debt financing environment and capital costs through the quality and transparency of digital transformation information disclosures. This paper not only provides empirical evidence for the relationship between digital transformation and debt financing costs, but also offers theoretical support and practical guidance for policymakers and business managers in optimizing information disclosure and reducing cost of debt capital.

Keywords— Digital Transformation, Disclosure Characteristics, Debt Capital Cost, Text Analysis, Natural Language Processing (NLP)

Scalable Synthesis of AgX (Cl, Br, I, PO₄) Nanophotocatalysts for Efficient Visible-Light Degradation of Persistent Antibiotics from Aqueous Environments

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The environmental persistence of nitrofurantoin antibiotics, particularly Nitrofurazone (C₆H₆N₄O₄) and Furagin (C₁₀H₈N₄O₅), poses a serious threat to aquatic ecosystems due to their bioactivity, chemical stability, and resistance to conventional treatment (Fig.1). In this study, we report the first mechanochemical synthesis of silver-based photocatalysts: AgCl, AgBr, AgI, and Ag₃PO₄ and evaluate their visible light driven degradation performance toward NFZ and FUR. The catalysts were characterized using XRD, Raman, SEM, TEM, and UV-Vis to determine structural and optical properties. All materials exhibited photocatalytic activity under visible light, with Ag₃PO₄ and AgCl showing the highest degradation efficiencies: ~95% for NFZ and ~99% for FUR within 90 minutes. Kinetic analysis confirmed pseudo-first-order behavior, with rate constants up to 0.05891 min⁻¹ for FUR (AgCl) and 0.03468 min⁻¹ for NFZ (Ag₃PO₄). The enhanced activity was attributed to efficient charge separation, visible light absorption, and reactive oxygen species (•OH, •O₂⁻), which promoted oxidative cleavage of nitro and furan groups. A compound specific reactivity trend was observed. This study introduces a green, scalable approach for synthesizing silver based photocatalysts and demonstrates, for the first time, their efficacy in degrading nitrofurantoin antibiotics. The findings offer insight into structure function relationships and highlight a promising strategy for solar driven pharmaceutical pollutant removal.

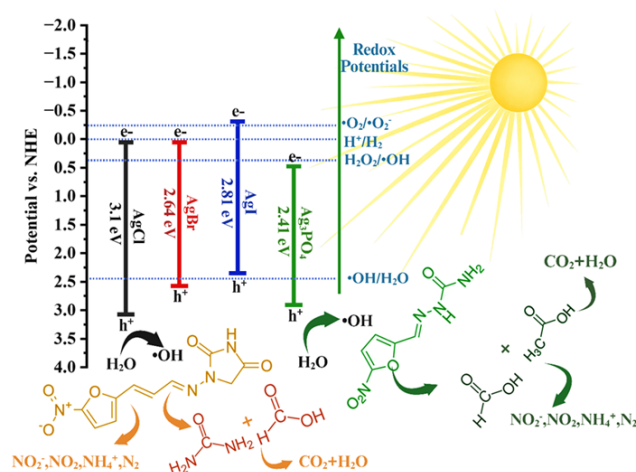


Figure 1. Schematic illustration band edge positions and hypothetical ROS-driven mineralization mechanism of nitrofurantoin antibiotics by AgX photocatalysts

Effect of Synthesis Conditions on the Morphology and Properties of Bismuth Sulfide Nanoparticles

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Bismuth sulfide (Bi₂S₃) is an earth-abundant, low-toxicity semiconductor that holds promise for thermoelectric, optoelectronic, and photocatalytic applications. However, its performance strongly depends on synthesis conditions, which govern both morphology and surface chemistry. In this work, Bi₂S₃ nanostructures were prepared via mechanochemical, thermal, and solvothermal routes and systematically characterized by XRD, SEM, TEM, FTIR, Raman, UV-Vis, XPS, and TGA-DSC.

Among the examined approaches, the mechanochemical route offers significant environmental and practical benefits: it proceeds under solvent-free conditions, requires only ambient temperature and pressure, and yields nanostructured Bi₂S₃ within minutes. This method produced nanosized particles with uniform morphology, moderate crystallinity, and enhanced thermal stability. In contrast, solvothermal synthesis yielded highly crystalline nanorods but with residual organics, while the thermal route gave intermediate structural features. Optical analysis confirmed that synthesis-dependent microstructure directly affects band gap and related optoelectronic behavior.

The results highlight mechanochemical synthesis as a sustainable and scalable pathway for Bi₂S₃ preparation. By eliminating toxic solvents and reducing energy input, this approach aligns with green chemistry principles and offers a promising route to functional nanomaterials for future energy and environmental technologies (Table 1).

Table 1. Summary of physicochemical and thermoelectric properties of Bi₂S₃ samples synthesized by different methods

Property	Bi ₂ S ₃ -M	Bi ₂ S ₃ -T	Bi ₂ S ₃ -S
Crystallinity (XRD)	Low	High	Moderate
Primary particle size (TEM), nm	50–150	100–400	150–500
Band gap (UV-Vis Tauc), eV	1.38	1.30	1.22
Surface carbon (XPS C 1s)	Trace	None	Present
Thermal stability (TGA, mass loss %)	~25	~60	~35
Carrier concentration (Hall), cm ⁻³	~5×10 ¹⁶	~1×10 ¹⁷	~2×10 ¹⁶
Mobility (cm ² /V·s)	7	4	16
Resistivity (Ω·cm)	0.2	0.1	0.5



Few-Shot Object Detection and 6D Pose Estimation for Oil Palm Fresh Fruit Bunches

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Accurate estimation of oil palm's six-degree-of-freedom (6D) pose is one of the main challenges in computer vision for precision agriculture, which is the detection of Fresh Fruit Bunches (FFBs). Deep learning-based frameworks usually need big datasets with labels, which are difficult to get in plantation environments because of high variability within classes, occlusion, and changes in lighting. This paper proposes a data-efficient framework for 6D pose estimation and few-shot object detection that maintains high accuracy while reducing the reliance on extensive manual labeling. A lightweight YOLOv8 detector is trained in a low-shot regime using only 1,050 annotated images, while generalization is further improved through semi-supervised pseudo-labeling and synthetic data augmentation. The detected FFB instances are transformed into partial point clouds using RGB-D sensing and camera intrinsics, which are then processed by a hybrid RGB-D pose network inspired by DenseFusion for initial pose regression. To improve robustness under partial visibility and noisy depth measurements, a Coherent Point Drift (CPD)-based registration refinement is employed, providing more accurate alignment compared to Iterative Closest Point (ICP). Experimental results on publicly available FFB datasets demonstrate that the proposed method achieves competitive mean Average Precision (mAP) in detection and lower Average Distance of Model Points (ADD) in pose estimation despite limited training data. Future work will focus on integrating this data-efficient pipeline into autonomous harvesting systems to enable scalable and reliable deployment in real-world plantation environments.

Relationships between Yield Stress and Slump Test Spreading for High Yield Stress Materials

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The cone or mini-cone slump test is the most common method to evaluate the flow properties of liquid materials. Although slump provides a qualitative measure of workability, the relationship between slump and more quantitative rheological parameters is not fully understood.

In this study, we propose a new dimensionless method and model relating slump to yield stress, for not only fluid materials, but for materials with a high yield stress. This method consists of forcing the material to flow in a cylinder using weights fig. 1., this method developed and generalized according to the dimensions and geometry used. The chosen material is cement paste. To increase or decrease the workability of the latter, we varied the W/C ratio. The yield stress measurements of the cement paste used are carried out using rheometer with stress controlled, equipped with a bladed mobile, subsequently these measurements are compared to the slump measurements in a cylindrical geometry. The cylindrical slump model is in excellent agreement with the experimental data of the yield stress obtained using the rheometer. Most of the other slump models available in the literature, concern only fluid materials, Several researchers have proposed an empirical equation to relate the yield point to the volume of the mold (mini-cone) and to the final diameter at the stop of the flow of the slumped paste called final spreading. The model created is based on the postulate that the phenomena are controlled only by the self-weight of the material. According to our knowledge, a large divergence has been recorded between the empirical equations and the rheometric measurements in the case of materials with high yield point. The cylindrical slump model is in excellent agreement with the experimental data of the yield stress obtained using the rheometer.

Most of the other slump models available in the literature, concern only fluid materials. According to our knowledge, a large divergence has been recorded between the empirical equations and the rheometric measurements in the case of materials with high yield stress.

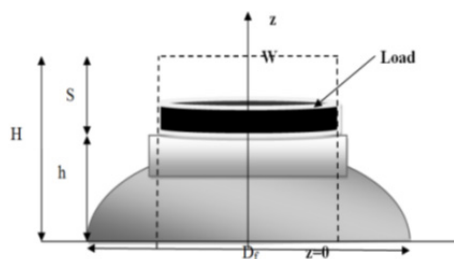


Fig. 1: Cylindrical slump



Fig2: Spreading (a) Without Load and (b) Under Load



Performance Evaluation of LoRa-Based Data Transmission for UAV Environmental Monitoring Systems

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This paper presents the design and evaluation of a low-cost LoRa-based communication system for environmental data transmission using an unmanned aerial vehicle (UAV). The proposed system enables direct, long-range communication between a drone-mounted sensor unit and a ground receiver without depending on internet or cellular networks. Both nodes are built using ESP32 microcontrollers and SX1278 LoRa transceivers, while onboard sensors measure CO, NO₂, VOC concentration, temperature, and humidity. Real-time data are displayed through a lightweight HTML dashboard accessible within the same Wi-Fi network. Field experiments were performed under three weather conditions sunny, rainy, and windy at multiple UAV altitudes to analyze link stability, signal quality, and packet delivery. Results showed that LoRa maintained over 94% packet delivery success up to 2 km range, with the best performance observed in sunny conditions. The findings confirm that LoRa technology provides a reliable, energy-efficient, and scalable solution for UAV-based environmental monitoring in remote areas. Future improvements will include GPS integration, adaptive transmission control, and multi-drone coordination for larger network coverage.

Keywords— LoRa communication, UAV monitoring, Wireless data transmission, Environmental sensing, Weather impact, ESP32, Long-range IoT

Multi-Modal Frequency-Selective Channel Modeling for UAV-to-Ground Communication in Future Wireless Networks

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Unmanned Aerial Vehicles (UAVs) are increasingly used in wireless networks because of their ability to provide mobility and wide range coverage. However, the reliable UAV-to-Ground (U2G) communication in Future Wireless Networks (FWNs), remains challenging. The main difficulties arise from UAV posture changes during flight, the presence of static and dynamic scatterers in dense environments, and the frequency-selective nature of fading across different bands. The existing models focus on simplifying these factors, which limit their accuracy. This paper proposes a posture-aware, multi-modal, and frequency-selective channel modeling framework for U2G communication. The framework includes UAV yaw, pitch, and roll to capture posture effects on multipath behavior and Doppler spread. It also combines LiDAR sensing with Radiofrequency (RF) data to distinguish between static and dynamic scatterers. In addition, Graph Neural Network (GNN) and Grasshopper Optimization Algorithm (GOA) are used to learn spatial-temporal channel features and optimize delay spread, coherence bandwidth, and angular dispersion across sub-6 GHz and mm Wave bands. The simulation results indicate reduced Path Loss Root Mean Square Error (PL-RMSE) and more accurate predictions of delay spread and coherence bandwidth across sub-6 GHz and mm Wave bands.

Keywords— Channel Modeling, Frequency-Selective Fading, FWNs, GNN, GOA, LiDAR Integration, Multi-Modal Sensing



Integrating New Technologies like Blockchain, Artificial Intelligence, and Data Analytics to Enhance Efficiency and Transparency in Humanitarian Operations

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The integration of block chain, artificial intelligence (AI), and data analytics in humanitarian operations heralds a transformative era, promising heightened efficiency, transparency, and impact. Block chain's decentralized ledger ensures secure and transparent records, fostering trust and integrity. AI, with predictive analytics, revolutionizes resource allocation, enhancing decision-making in crisis scenarios. Data analytics facilitates informed interventions by systematically analysing diverse datasets, optimizing resource allocation with precision. However, ethical considerations surrounding privacy, data security, and inclusivity necessitate on-going scrutiny. Striking a balance between technological innovation and ethical conduct is crucial. Transparent dialogues with diverse stakeholders, especially the communities served, are vital for establishing ethical frameworks. In conclusion, this technological synergy holds immense potential to reshape humanitarian landscapes, meeting challenges with agility while upholding core values of trust, accountability, and respect for the rights of those in need.

Keywords— Block Chain in Humanitarian Operations, Artificial Intelligence for Efficiency, Data Analytics for Transparency, Integrating New Technologies in Humanitarian Aid, Enhanced Efficiency in Disaster Response, Transparency in Humanitarian Operations, Block Chain for Supply Chain Management

Development of Six Core Areas in Quality-of-Life Technology (QoLT) for Malaysia's Elderly Population

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As societies age rapidly, ensuring the quality-of-life for elderly individuals has become a critical challenge. This study explores key domains of Quality-of-Life Technology (QoLT) tailored to support the elderly, focusing on smart living, healthcare, mobility, communication, leisure, education, and employment. In smart living, safety concerns such as fall risks, fire hazards, and emergency responsiveness are highlighted, alongside the need for secure daily life and home environments. In healthcare, emphasis is placed on personalized care, medication management, disease prediction, and telemedicine. Smart mobility addresses transportation access, walking aids, and pedestrian safety, while smart communication tackles digital literacy and social isolation. Leisure components focus on enabling cultural participation and physical activity, and the education and employment domain calls for re-employment opportunities and elderly-friendly learning environments. This holistic approach identifies critical areas for technological and service intervention to empower older adults, promote independence, and enhance well-being. The findings serve as a foundation for developing integrated smart systems that address the unique needs of aging populations.



Food Quality Evaluation of *Manihot esculenta* Crantz Gluten-Free Noodles

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Gluten-free noodles often have less acceptable cooking behavior and appearance compared to gluten-containing counterparts. In this study, the cooking and color characteristics of *Manihot esculenta* Crantz flour-based GF noodles fortified with xanthan gum, guar gum, whey protein, and egg were investigated. The effects and interactions among the ingredients were estimated using a fractional factorial design. The optimized formulation demonstrated good cooking characteristics, with rapid optimum cooking time (3.33 min), minimum cooking loss (1.53%), a high yield (103.05%), and acceptable swelling index (2.47). Yellowness ($b^*10.13$) was an acceptable value in color measurements. Egg was the main contributor to the yellow colour. Validation of the model confirmed good predictability performance and is comparable to commercial noodles, which contributes to sustainable food production and diversity in diet.

STEAM +H as a Strategy for Comprehensive Education

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The diverse ways in which Science, Engineering, and Technology are learned are expanding beyond the classroom. This research explores the potential of Makerspaces as transformative learning environments within the framework of upper secondary education, integrating the STEAM+H (Science, Technology, Engineering, Arts, Mathematics, and Humanities) approach. It analyzes how Makerspaces facilitate knowledge acquisition and promote the development of 21st-century skills—such as critical thinking, creativity, collaboration, and digital literacy—through active, student-centered methodologies. Based on a theoretical review and practical experiences, it is argued that Makerspaces not only foster interdisciplinarity but also strengthen the connection between technical knowledge and humanistic thinking, enabling students to address real-world problems from an ethical, creative, and collaborative perspective. Finally, guidelines are proposed for the implementation of these environments in public educational contexts, highlighting their value as catalysts for pedagogical innovation and educational equity, as well as the generation of sustainable solutions for the Sustainable Development Goals (SDGs).

Keywords— STEAM+H, Makerspaces, Comprehensive Education, 21st-Century Skills, Sustainable Solutions



The Impact of Digital Transformation Disclosure Features in Annual Reports on the Cost of Debt Capital of A-Share Listed Companies in China

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With the rapid development of digital technologies, corporate digital transformation has become a key strategy for enhancing competitiveness and optimizing the financing environment. This paper explores the impact of digital transformation disclosure characteristics in annual reports on the debt capital costs of Chinese A-share listed companies. The aim is to quantify the disclosure of digital transformation information in annual reports in terms of quantity, quality, tone, and extent, and to reveal how these disclosure characteristics, under the moderating effects of the degree of digitalization in analyst reports, media reports, and digital strategy consistency, influence the company's debt capital cost. This study employs text analysis techniques combined with deep learning and natural language processing (NLP) methods. It extracts data from the annual reports of Chinese listed companies from 2013 to 2024 using Python, and utilizes Stata software for data processing, quantifying digital transformation disclosure information in the annual reports and conducting regression analysis. The empirical results show that the quality, tone, and extent of digital transformation disclosure in annual reports have a significant impact on the company's debt capital costs, with the degree of digitalization in analyst reports, media reports, and digital strategy consistency playing a moderating role. Robustness tests further validate the effectiveness of these results. The study finds that improvements in the quality and extent of digital transformation disclosures significantly reduce the company's debt capital costs, especially when digital strategy consistency within the company moderates this effect. This suggests that when a company's digital strategy is highly consistent across goal setting, resource allocation, and execution, the credibility and transparency of its disclosed information are enhanced, thereby further reducing investors' risk expectations and optimizing debt financing conditions. Furthermore, external information sources such as media reports and the degree of digitalization in analyst reports also play a key moderating role in this process. Specifically, the level of attention and depth of interpretation given to digital transformation by these external sources can influence market perceptions of the company's digital transformation and further amplify or strengthen the impact of digital transformation disclosure on debt capital costs. In summary, the empirical results of this paper reveal how internal and external factors interact to affect the company's debt financing environment and capital costs through the quality and transparency of digital transformation information disclosures. This paper not only provides empirical evidence for the relationship between digital transformation and debt financing costs, but also offers theoretical support and practical guidance for policymakers and business managers in optimizing information disclosure and reducing cost of debt capital.

Keywords— Digital Transformation, Disclosure Characteristics, Debt Capital Cost, Text Analysis, Natural Language Processing (NLP)

NEURAID (Neuro-Evidence and Unseen Response AI Diagnostic System): An AI-Driven Behavioral Diagnosis Framework

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NEURAID (Neuro-Evidence and Unseen Response AI Diagnostic System) is a highly advanced, AI-driven behavioral diagnosis framework to allow the quick identification and everlasting observation of neurological disorders such as Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS), Parkinson's disease in the earliest stages, and Alzheimer's-related cognitive decline. The whole system can only be based on digital behavioral biomarkers, which are mainly composed of keystroke dynamics and screen-interaction rhythms that unobtrusively capture the changes in fine motor control, reaction timing, and cognitive consistency throughout the natural computer usage. To realize this goal the entire process is made skilfully with the help of a multi-layer Long Short-Term Memory (LSTM) architecture that not only recognizes short-term motor irregularities but also picks up long-term cognitive drifts which are indicators of neurological decline. Besides the above actions, the system also ensures to attract the clinical crowd by treating them with transparency and trust with the application of Explainable AI (xAI) methods making the whole process smoother with the use of SHAP-based interpretability where the specific behavioral features (like the inter-key latency variance or typing rhythm irregularity) that bear the strongest influence on the prediction of the system are identified. Furthermore, the framework is designed to work with edge computing and federated learning so that the secure and privacy-preserving model updates are possible through the non-transmission of the raw user data. Shifting its reliance from episodic and self-reported assessments to continuous and context-aware digital behavior analysis, NEURAID brings forth a prime and approachable route for early neurological screening. The system is designed to furnish the medical professionals with objective, interpretable metrics and at the same time prop up the notion of equitable, AI-assisted healthcare, thus, taken the dream of Good Health and WellBeing (UN SDG 3) through preventive digital diagnostics even further.

Keywords— NEURAID, Neurological Disorders, Explainable AI (xAI), LSTM, Digital Biomarkers, Keystroke Dynamics, Federated Learning



Applying Generative Adversarial Networks for Automatic Detection of Differentiation of Tuberculosis and COVID-19 Using Chest X-ray Images: A Computer Vision Approach

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In this study, a deep learning model is developed to detect pneumonia, COVID-19, and tuberculosis, from chest X-ray images, and the goal is to differentiate the TB and COVID-19 from healthy lungs. In this paper, ResNet50 and VGG16 models are used because of their good performance in image classification tasks, and therefore, Generative adversarial networks (GANs) and other data augmentation techniques are used to improve the quality of data. These methods are used in this study to detect lung diseases, thus, they are utilized to achieve a more accurate diagnosis. The state of the art pre-trained GAN was utilized in image resizing and normalization, as well as in generating synthetic images. Other forms of data augmentation ensured the model encountered the set thresholds. Model evaluation was based on measurement of the model accuracy, precision, F1 score, and ROC AUC for the training, validating, and testing datasets. The results of the experiments showed that the ResNet50 architecture outperformed VGG16 in terms of accuracy and stability during the tests when the precision and recall were evaluated, with both reaching 0.99 for all the classes. However, VGG16 achieved high precision of 0.99 and recall of 0.93 in the diagnosis of tuberculosis, which was surprising. Clinically significant areas were shown by Grad-CAM visualizations, and McNemar's test with p value of less than 0.001 proved that ResNet50 was significantly better. This highlights the value of GANs, data augmentation, and model improvement in the deep learning sphere for clinical diagnosis aiding the control of diseases affecting the respiratory organ.

Keywords— ResNet50; VGG16; GANs; Grad-CAM; Chest X-ray; Deep Learning; COVID-19; Tuberculosis; Statistical Validation

DeepStroke Classification Using Machine Learning Models for Accurate Brain Stroke Detection

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Eccentric blood flow to the brain leads to brain stroke, a dangerous medical condition that can induce severe outcomes and permanent disabilities. Ischemic (obstruction) and hemorrhagic (rupture of an artery) are the two predominant types of strokes. Prompt and accurate classification is the reason for reducing brain damage, preventing complications, and improved patient outcomes. In hopes of improving the performance of stroke prediction, in this work, Deep Stroke Classification is introduced as a highly robust machine learning model. To ensure maximum model performance, the system implements a structured pipeline that encompasses data preparation, feature engineering, missing value handling, and data cleansing. For the purpose of informing better medical decisions, sophisticated methods of data visualization are employed to unearth valid strokes-associated information patterns. Various deep learning models and machine learning models, including K-Nearest Neighbors (KNN), were explored. Random Forest was selected after extensive research because of its high accuracy rate in classification and robustness. The system is implemented in an online platform created using Django, enabling clinicians to access an intuitive-to-use, AI-powered tool for real-time stroke prediction.

Keywords— Deep Learning, Data Preprocessing, Feature Engineering, Data Visualization, K-Nearest Neighbors (KNN).



AI-Driven Visual Storytelling Through Images using Text and NLP

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Artificial intelligence is reshaping the story telling offering innovative ways to create engaging visual narratives. While existing AI models like Google assistant, Alexa uses NLP based system in order to process the text and speech, they don't provide the image generation facility. Also current generative AI models like ChatGPT can create single image but doesn't support multi image sequencing.

Our project addresses this gap by focusing on developing a cost-effective AI-powered visual storytelling system using Stable Diffusion and Natural Language Processing (NLP). The process begins with NLP, which processes text through tokenization and topic extraction, allowing the system to human language effectively. Stable Diffusion models, enhanced with Stability Ai api, then generate images that align with the processed text. These visuals are organized into logical sequences, transforming written content into compelling visual stories.

We have designed a user-friendly interface for interaction and a clear storytelling experience. User feedback is integral to improving the system, helping us refine its accuracy and efficiency. With an accuracy rate of 90% at present, our system closes the gap between visual and written narrative, presenting difficult information in a readable and entertaining manner, especially in education, and encouraging innovation in the digital world.

Keywords— Deep Learning, Data Preprocessing, Feature Engineering, Data Visualization, K-Nearest Neighbors (KNN).

Vision Mate – Smart Glass for Visually Impaired People in Home Environment

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This paper introduces VisionMate, a wearable smart-glass assistive system developed to support visually impaired individuals in indoor home environments. The setup integrates a Raspberry Pi single-board computer, a USB camera, a rechargeable battery, and an optimized YOLOv5s object detection model trained on a custom dataset captured from household scenes. VisionMate identifies daily objects and potential obstacles in real time and communicates them to the user through audio and vibration-based feedback. Experimental evaluation using real-world home trials demonstrates that the optimized YOLOv5s model achieves a mAP@0.5 of 78.6%, operates at 8–12 FPS on a Raspberry Pi 4 (8 GB), and consumes an average of 6.5 W power. The results confirm that VisionMate provides a low-cost, real-time assistive solution suitable for safe indoor navigation and object recognition, with potential for future improvements in adaptability and user personalization.



An AIoT Smart Energy Management System

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Energy management systems have been revamped by the convergence of AI and IoT under the term AIoT, and further, to allow intelligent, adaptive, and efficient energy use. This literature review articulates the work done in AIoT-based energy management systems, with special emphasis on methodologies such as IoT framework for real-time energy monitoring, deep learning models for demand forecasting, and other data science techniques for analyzing energy patterns. Particular emphasis is given to sustainability, scalability, and allowing renewable energy sources to curb environmental degradation. However, considerable challenges remain in the form of threats to data security, interoperability issues, and cost-effectiveness concerns. This paper seeks to examine the various strategies proposed in the literature for overcoming these challenges and increasing the efficiency of smart energy systems, in the context of optimizing energy consumption, cutting down the costs involved, and promoting environmental sustainability. In addition, the review paints an insightful picture on current trends, research gaps, and future directions for the development of safer, scalable, and more secured AIoT-based energy management solutions.

Keywords— AIoT, Energy Management Systems, Smart Grids, Renewable Energy, Deep Learning, IoT Security, Demand Forecasting, Data Analytics

Law Smart: An AI-Powered Legal Assistant

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The “AI Powered Legal Assistant” aims to simplify and enhance the legal research process using advanced technologies like Large Language Model (LLM) and Machine Learning (ML). Traditional legal research methods are often time-consuming and prone to missing crucial information due to the vast amount of data involved. This project addresses these challenges by developing a tool that can quickly analyze legal texts, find relevant information, and provide useful insights. The assistant is designed for both legal professionals and common users, making legal information more accessible and understandable. By automating the search and analysis process, it significantly reduces the time needed for providing a solution and improves the accuracy of results. Ultimately, the AI Powered Legal Assistant aims to transform the legal research landscape, making it faster, more accurate, and accessible to a broader audience. In addition to saving time and enhancing productivity, this tool promotes better decision-making by providing precise legal insights. Future iterations may include advanced features like predictive analytics and personalized recommendations, further empowering users to navigate complex legal frameworks with ease. Specific use cases include assisting legal professionals in finding precedents and helping non-experts understand complex legal documents through simplified summaries.

Keywords— Legal AI, Retrieval-Augmented Generation (RAG), Llama 3.2, Multi-Language NLP, Data Encryption.



Evaluating Engagement and Decision-Making in a Gamified VR Simulator

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We evaluate Fisherman Manager VR, a Virtual Reality Serious Game game designed to train strategic-decision making and resource management in a coastal operations context. The system is presented only as an educational game but as a case study in simulation-based system engineering. We detail in its real-time architecture (Unreal Engine, HMD Integration), stochastic resource models and logging pipeline for decision analytics. A formative evaluation analyzes engagement (playtime), user satisfaction, decision-making latency, and action success rate under a gamified design aligned with Flow Theory and Self-Determination Theory. Results indicate high engagement (3.4h cumulative per participant), high satisfaction (4.6/5 Likert), fast average decision speed (0.7s) and a high successful-action rate (91%). We highlight implications for engineering education, simulation design, and also Virtual Reality-based decision support environments.

Keywords— Virtual Reality, Serious Games, Gamification, Engagement, Decision-Making, Education, Resource Management, Systems Engineering

A Hybrid Artificial Bee Colony–Firefly Algorithm for Optimized Cluster Head Selection to Enhance Network Lifetime in WSNs

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Wireless Sensor Networks (WSNs) play a vital role in modern applications such as environmental monitoring, healthcare, and surveillance, where energy efficiency and network longevity are key performance parameters. This paper presents a hybrid optimization approach combining the Modified Artificial Bee Colony (ABC) algorithm and the Modified Firefly Optimization Algorithm (FOA) to enhance cluster head (CH) selection for prolonged network lifetime and stability. The proposed Hybrid ABC–FOA (HMABCFA) model is mathematically formulated to minimize total energy consumption, inter-node distance, and latency while maximizing residual energy and network stability. In the hybrid method, the Modified ABC algorithm performs local search and candidate exploration, while the Modified FOA, enhanced with a tidal force mechanism, refines global search by avoiding premature convergence. The firefly-based refinement phase replaces the scout bee mechanism to enhance exploration, enabling more robust CH selection. Simulation results demonstrate significant performance improvements—23.21% in network lifetime, 19.84% in energy stability, and 22.88% reduction in latency—compared to conventional methods. Additionally, topology analysis comparing Gaussian and Torus network models reveals that the Torus topology achieves superior load balancing, energy uniformity, and communication efficiency. These findings confirm that the proposed HMABCFA approach effectively enhances energy efficiency, stability, and scalability in WSN environments.



Polycyclic Aromatic Hydrocarbons (PAHs) Persistence, Transformation, Bioaccumulation, and Fate in Different Waste-Impacted Environmental Matrices: A Mini Review

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This paper provides an in-depth analysis of polycyclic aromatic hydrocarbons (PAHs), focusing on their chemistry, sources, distribution, biotransformation, magnitude, and environmental fate, as well as their bioaccumulation and bioconcentration in humans, animals, and plants. PAHs are a group of hazardous organic compounds consisting of multiple fused aromatic rings that have significant negative impacts on human health and ecosystems. The paper highlights the various sources of PAHs, including waste combustion processes, industrial activities, and natural occurrences, and discusses their distribution in different environmental compartments such as air, water, and soil. The complexity of PAH degradation processes, which can lead to the formation of potentially toxic transformation products, is also examined. The bioaccumulation and bioconcentration of PAHs in living organisms are explored, along with the mechanisms involved in their secretion and removal. Given the close association of PAHs with solid waste, sludge, and wastewater effluents, this review also emphasizes their significance within waste management contexts and the need for improved control and treatment strategies. Additionally, the exposure limits of these persistent organic pollutants were presented in accordance with the regulatory standards and permissible limits established by various global environmental and chemical regulatory agencies.

Keywords— Polycyclic Aromatic Hydrocarbons (PAHs), Waste-Impacted Matrices, Environmental Fate, Bioaccumulation, Waste Management

Mathematical Modeling of Direct Current Electric Motors in the Adaptation of Vehicles in the Automotive Fleet using Retrofit Technology

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In the field of electrical engineering, the study and mathematical modeling of direct current (DC) electric motors is fundamental to understanding their behavior and optimizing their operation in various industrial and domestic applications. DC motors are characterized by their ease of control and dynamic response, making them key components in automation and control systems. This research aims to develop a precise mathematical model that allows for the simulation and analysis of the performance of a DC electric motor, considering both its electrical and mechanical aspects, and thus facilitating its integration into advanced design, simulation, and control projects. The proposed model also includes the variation of electrical parameters in both the stator and rotor due to a temperature gradient, addressing a key limitation in traditional approaches that assume constant thermal conditions. The developed mathematical model successfully represented the dynamic behavior of a DC electric motor, accurately integrating the electrical, mechanical, and thermal effects that influence its performance. Incorporating the temperature gradient in the stator and rotor parameters significantly improved the model's fidelity under real operating conditions. This contribution enhances the precision of control and simulation systems, providing a more realistic foundation for industrial applications that require high-performance motor analysis under variable thermal environments.



Detecting Cyber Attacks Using BiLSTM, Transformer and Uncertainty Checking

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Industrial Control Systems (ICS) are critical to vital industries like manufacturing, transportation, and power generation. As cloud-based systems and the Internet of Things (IoT) become more integrated, the cyber threat landscape surrounding ICS has expanded, exposing them to ransomware, denial of-service, and data manipulation attacks. Identifying such threats is challenging due to evolving attack behaviors and imbalanced datasets often used in training detection systems. This research introduces a hybrid intrusion detection Bidirectional Long Short-Term Memory (BiLSTM) integration framework and Transformer architectures with uncertainty estimation to enhance the classification of cyberattacks within Modbus-based ICS networks. The CIC Modbus 2023 dataset is used for training and testing, and to rectify data imbalance, the Synthetic Minority Oversampling Technique (SMOTE) is utilized. The proposed model demonstrates excellent performance, achieving 99.87% accuracy for binary classification and 86.12% for multiclass classification. Visual analyses using confusion matrices and classification reports confirm its ability to distinguish various attack categories. The findings indicate that combining deep learning with uncertainty estimation significantly improves detection precision and the resilience of ICS cybersecurity frameworks.

Keywords— Industrial Control Systems, Cyberattack Detection, BiLSTM, Transformer, Uncertainty Estimation, Modbus Protocol, SMOTE, Deep Learning

A Hybrid NLP–Ensemble Model for Fake News Detection

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The explosive growth of online content has intensified the circulation of misinformation and intentionally deceptive narratives (“fake news”), posing substantive risks to stakeholders across society, media ecosystems, and governance. This work introduces a machine-learning framework for automated fake-news classification that integrates ensemble learning with natural language processing (NLP). Textual inputs undergo a standardized preprocessing pipeline—removal of noise (special characters, URLs, punctuation), tokenization, and TF-IDF vectorization—prior to supervised modeling. Three base classifiers—Logistic Regression, Decision Tree, and Random Forest—are trained on a labeled corpus comprising authentic and fabricated news instances. Their outputs are fused via ensemble averaging to enhance predictive stability and overall discriminative power. Empirical evaluation demonstrates superior accuracy, precision, and recall relative to individual models, yielding reliable detection performance. For practical deployment, the system is exposed through a Flask-based REST API, enabling seamless front-end integration for real-time verification. The results underscore the value of rigorous NLP preprocessing and model ensembling for misinformation mitigation, and motivate future extensions using deep architectures and contextual embeddings to capture richer semantic cues.

Keywords— Fake News Detection; Machine Learning; Natural Language Processing; Ensemble Classification; Text Preprocessing; Logistic Regression; Decision Tree; Random Forest; TF-IDF; Real-Time News Verification



An Integrated BERT–LDA–SHAP Approach for Sentiment and Topic Analysis of Public Opinion on Indonesia’s 2024 Presidential Candidates

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The presidential election is a crucial event in shaping Indonesia’s democratic process. Understanding public perception of presidential candidates can provide valuable insights for political communication and strategy. This study conducts sentiment analysis on public opinions toward three candidates Anies Baswedan, Prabowo Subianto, and Ganjar Pranowo using the IndoBERT model on social media data related to the 2024 presidential election. The sentiment classification results show that the IndoBERT model achieves strong performance, with accuracy scores of 0.86 for Anies, 0.80 for Prabowo, and 0.87 for Ganjar. The models demonstrate high precision and F1-scores across positive, neutral, and negative classes, indicating their effectiveness in distinguishing sentiment categories. To further interpret the findings, Latent Dirichlet Allocation (LDA) was applied to identify dominant topics in each sentiment class. The results reveal that positive sentiments center on themes of leadership, intelligence, and integrity, while negative sentiments emphasize criticism of corruption and communication style. Finally, SHapley Additive exPlanations (SHAP) were used to interpret the IndoBERT model’s predictions, showing that words such as ideal, cerdas, jujur, and anti korupsi strongly influence positive sentiment classifications. Overall, this integrated approach combining BERT, LDA, and SHAP provides a transparent and comprehensive understanding of public sentiment and discourse surrounding presidential candidates in Indonesia’s 2024 election.

Keywords— Election, IndoBERT, LDA, Presidential, Sentiment Analysis, SHAP, Social Media

PolluSense : A Gamified Computer Science Approach for Air Pollution Reduction and Real – Time AQI Awareness

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Air pollution is one of the most dangerous and emergent problems in the modern world. Around 98% of the world's population breathes air that exceeds WHO safety limits. In India northern states like Punjab, Haryana, Uttar Pradesh experiences surge in pollution levels due to factors like stubble burning, vehicular emissions, industrial activities and unfavourable winter metrology. The contaminants like (P.M)2.5, (P.M)10, has worst effects on health, environment and economy. Though Bengaluru and Delhi are similar to each other in terms of Industrialization and Urbanisation but still Bengaluru has better AQI than Delhi due to governance and environmental policy. Cities like Bengaluru and Zurich on contrast with Delhi and Kuala Lumpur maintain better air quality through technological innovation and long-term planning. Beijing's story from world's most polluted city to modal of air quality index recovery demonstrates impact of sustained policy and citizen participation. To address the problem of air pollution, this paper developed the solution "Pollusense" a mobile based application that integrates with real time AQI that rewards user for activities like carpooling, planting, walking, cycling etc. The app has automated gamification features (streaks, leaderboard, badges) and a reward – voucher system to encourage behavioural change. The app has activity verification system which initially verify activities like, cycling and walking with GPS location, photos and distance measure. And rewards voucher after approval. Pollusense aims to reduce pollution, increase community engagement and health fitness by integrating daily personal activities with positive environmental results. The proposed solution proves how computer science, AI, IOT sensors and cloud technologies can overall contribute to improving air quality index.

Keywords— Pollution, AQI, stubble burning, vehicle emission, Delhi, Punjab, Kuala Lumpur, Zurich, Beijing, India, Air Quality Index, Bengaluru, Sahaya, FixMyStreet, Urbanisation, "Cycle Routes Act", "Spatial planning Act", API keys, Cycling, Walking, Rewards, Voucher, Photo, Geolocation, Authentication, Voucher, Streak, Leaderboard, Badges, Rewards, Community Participation, DHT11, Python, MATLAB, MQ135

