ICCCE
by IFERP
27 & 28 Feb 2026 | Bali, Indonesia

4th International Conference on Computer, Cybernetics and Education

27th & 28th February, 2026

Bali, Indonesia

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ICCCE
by IFERP
27 & 28 Feb 2026 | Bali, Indonesia

4th International Conference on Computer, Cybernetics and Education (ICCCE-2026),
Bali, Indonesia

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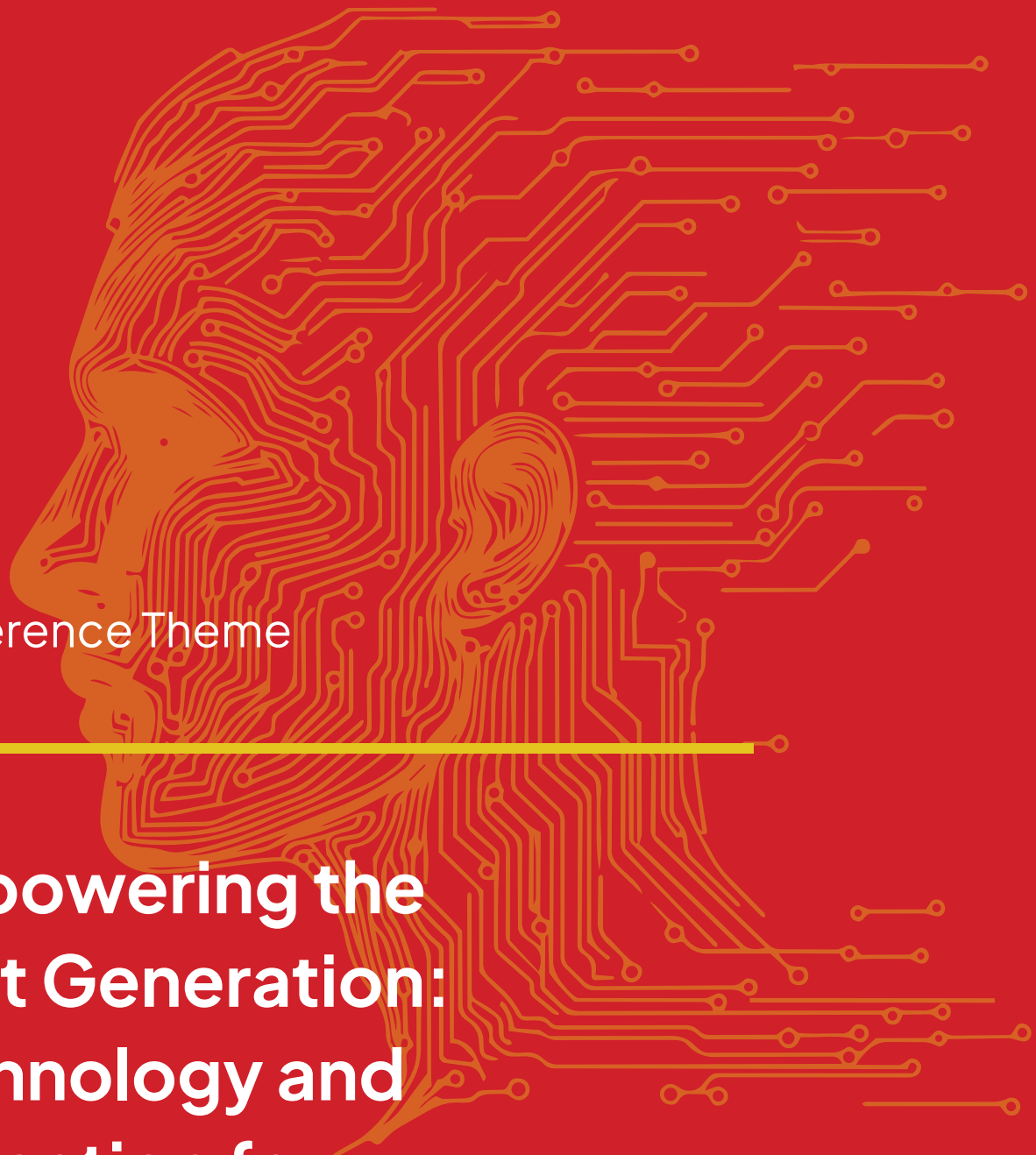

Conference Theme

Empowering the Next Generation: Technology and Education for Achieving Global Sustainability

Preface

We are delighted to extend a warm welcome to all participants attending 4th International Conference on Computer, Cybernetics and Education (ICCCE-2026) organized by Karakalpak State University, Uzbekistan; Tulsiramji Gaikwad-Patil College of Engineering and Technology, India; Sebha University-Libya and IFERP Academy-Indonesia Society taking place in Bali, Indonesia on January 27th-28th, 2026. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in the field of 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 ICCCE-2026 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Computer, Cybernetics & Education. 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 Computer, Cybernetics & Education, but also serve as a valuable summary and reference for further research in this field.

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

Since December 2025, the Organizing Committees have received more than 125+ manuscript papers, covering all aspects of ICCCE-2026. After review, approximately 60+ papers were selected for inclusion in the proceedings of ICCCE-2026. We would like to thank all participants at the conference for their significant contribution to its success.

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

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About **ICCCE 2026**

ICCCE 2026 is a global interdisciplinary conference organized by IFERP, uniting experts from computer science, cybernetics, and education to explore forward-thinking, research-based solutions for building a sustainable future. The conference focuses on the intersection of technology and education, emphasizing collaborative innovation, digital transformation, and knowledge-sharing that empowers the next generation. Through integrated discussions and global partnerships, ICCCE 2026 aims to address real-world challenges by aligning academic excellence with practical, scalable solutions for achieving global sustainability.

"Empowering the Next Generation: Technology and Education for Achieving Global Sustainability" highlights the vital intersection of innovation and learning in addressing today's most pressing global challenges. By fostering inclusive education and harnessing the power of technology, this conference aims to equip future leaders with the skills, knowledge, and mindset needed to create sustainable solutions. It emphasizes the importance of interdisciplinary collaboration, ethical innovation, and youth empowerment to drive progress aligned with the United Nations Sustainable Development Goals (UN SDGs), ensuring a more resilient and equitable world for generations to come.

Purpose of the Conference

International Conference on Computer, Cybernetics and Education (ICCCE 2026) aims to advance innovation and collaboration at the intersection of technology and education to build a more sustainable global future. With a focus on empowering the next generation, the conference brings together thought leaders in computer science, cybernetics, and education to share research, explore digital solutions, and foster impactful knowledge exchange.

Objectives of the Conference

Foster Interdisciplinary Collaboration: Unite professionals from computer science, cybernetics, and education to encourage integrated research and innovation.
Advance Technology-Driven Education: Explore how emerging technologies can enhance teaching methods, accessibility, and learning outcomes globally.
Translate Research into Practice: Bridge the gap between academic research and real-world applications for societal and educational impact.
Promote Sustainable Development Goals (SDGs): Align conference initiatives with the UN SDGs, focusing on inclusive, equitable, and quality education.
Empower Emerging Scholars and Professionals: Provide a global platform for students, researchers, and educators to present their work, network, and grow professionally.

Scope of the Conference

- Artificial intelligence, machine learning, and cybernetics in education
- Digital learning platforms and educational technology tools
- Human-computer interaction and intelligent systems for learning
- Ethical use of technology and digital inclusion in education

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About **IFERP Academy**

The IFERP Academy is a committed professional organization that advances engineering, science, and technology. IFERP anticipates a global scientific community brought together by digital innovation. This organization puts a great emphasis on promoting research activities, communicating the newest insights, and driving industrial trends.

IFERP has built strong networks throughout Asia, the Middle East, Europe, and countries such as Iraq, Malaysia, Australia, and more. They have incorporated networking, research support, publications, and worked in other scientific areas.

IFERP excels in organizing International Conferences that connect researchers worldwide. It holds important international webinars, publishes journals and publications that are indexed by Web of Science and SCOPUS, and provides thorough research assistance and guidance. Engaging in Youth Empowerment projects and encouraging Industry-Institute Interaction are key components of IFERP's goal. The organization is committed to enabling professionals through faculty advancement, skill development, and persistent research and publication initiatives.

What IFERP Do?

IFERP is committed to improving the professional experience by providing a world-class platform to professionals. Their dedication extends to the following activities:

Academic Resource Accessibility: They make academic resources and support available to aspiring scholars in both rural and urban locations.
Diverse Educational Program: They organize a wide range of educational events such as workshops, conferences, webinars, seminars, guest lectures, short-term training programs, and faculty development programs.
Drive Innovation: They work hard to foster curiosity and creativity, and stay up to date on the newest trends and advancements in the dynamic field of Engineering, Science, and Technology.
Knowledge Sharing and Collaboration: They believe in the strength of the exchange of knowledge and actively collaborate with institutions, organizations, and associations to contribute to our shared objective of a better future.
Publication & Recognition: They also provide opportunities for research articles to be published in reputable journals and actively promote and encourage transdisciplinary research activities.

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.

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Message from **Director, IFERP**

Mr. A. Siddth Kumar Chhajer

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

On behalf of Institute For Educational Research and Publications (IFERP) & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 4th International Conference on Computer, Cybernetics, and Education (ICCCE-2026) 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 Computer, Cybernetics, and Education.

This conference creates solutions in different ways and to share innovative ideas in the field of Computer, Cybernetics, and Education. ICCCE-2026 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.

4th International Conference on Computer, Cybernetics, and Education (ICCCE-2026) 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. ICCCE-2026 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in the field of Computer, Cybernetics, and Education.

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Message from **CEO, IFERP**

Mr. Rudra Bhanu Satpathy

CEO & Founder,
IFERP Academy, Technoarete Group,
India

IFERP is hosting the 4th International Conference on Computer, Cybernetics, and Education (ICCCE-2026) this year in month of February, 2026. The main objective of ICCCE-2026 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.

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Welcome **Address**

Dr. Berdiyar Bakhtiyarovich Jollybekov

Rector,
Karakalpak State University,
Uzbekistan

It is my great honor and pleasure to extend a warm welcome to all distinguished delegates, researchers, academicians, industry professionals, and students participating in the 4th International Conference on Computer, Cybernetics and Education, held on 27th–28th February 2026 in Bali, Indonesia.

In an era marked by rapid technological advancement and global interconnectedness, the integration of technology and education has become a decisive factor in shaping a sustainable and inclusive future. The theme of this conference, "Empowering the Next Generation: Technology and Education for Achieving Global Sustainability," is both timely and highly relevant, addressing the critical role of innovation, digital transformation, and interdisciplinary research in solving global challenges.

International conferences such as this provide a valuable platform for the exchange of knowledge, the sharing of innovative ideas, and the strengthening of global academic and professional networks. They encourage meaningful dialogue across disciplines and cultures, fostering collaboration that transcends geographical boundaries and contributes to sustainable development worldwide.

At Karakalpak State University, we place strong emphasis on research excellence, academic innovation, and international cooperation. We are committed to nurturing future generations who are not only technologically skilled and intellectually capable, but also socially responsible and environmentally conscious. We firmly believe that education and research are powerful tools for driving positive change in society.

I would like to commend the organizers for their dedication and efforts in bringing together this important international forum. I wish all participants productive discussions, inspiring exchanges, and a rewarding academic experience. May this conference serve as a catalyst for new ideas, lasting collaborations, and impactful contributions toward a more sustainable global future.

Thank you, and I wish the conference every success.

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Welcome **Address**

Mr. Mohammed H.M. Alowa

Assistant Professor, Petroleum & Gas Engineering Department,
Director of International Cooperation Office Sebha University, Libya

Mohammed E. Mehrez Alowa is a Senior Petroleum and Gas Engineer and Director of the International Cooperation Office at Sebha University, Libya, with over two decades of academic, industrial, and strategic leadership experience. He holds an MSc in Petroleum and Gas Engineering and has played pivotal roles in advancing university governance, international partnerships, and capacity-building initiatives.

Mr. Alowa has served in senior academic and administrative roles including Head of Petroleum and Gas Engineering, Head of Chemical Engineering, and General Manager of Health, Safety & Environment at Sebha University. He is recognized for leading and managing major European Union-funded higher-education projects that strengthen institutional frameworks and international cooperation.

He currently coordinates the ARMONIA project, an Erasmus+ initiative aimed at harmonizing and modernizing the Libyan higher education system through the adoption of Bologna Process principles, quality assurance mechanisms, and international academic standards across Libyan universities.

ARMONIA

He also leads Sebha University's engagement in the HGRA project, an EU-backed capacity-building effort to enhance academic and institutional capabilities in the study and management of migration challenges affecting Libya and the broader Mediterranean region. HGRA project Mr. Alowa's research interests span drilling and completion engineering, renewable energy systems, sustainable development, and internationalization of higher education. He is committed to fostering strategic global partnerships and empowering institutions in challenging environments to achieve sustainable impact.

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Welcome **Address**

Dr. Mohan Gaikwad Patil

Chairman,
Gaikwad-Patil Group,
India

It gives me immense pleasure to extend my warm greetings to all delegates, researchers, academicians, industry experts, and students participating in this International Conference. In today's rapidly transforming global landscape, higher education and research play a pivotal role in addressing complex societal, technological, and environmental challenges. International conferences such as this serve as powerful platforms for knowledge exchange, interdisciplinary dialogue, and global collaboration, enabling researchers to transcend boundaries and collectively shape innovative solutions for the future.

I strongly believe that the convergence of academia, industry, and research is the cornerstone of sustainable development. This conference not only encourages the dissemination of cutting-edge research but also inspires young minds to think critically, innovate responsibly, and contribute meaningfully to society.

At the Gaikwad-Patil Group of Institutions, we are deeply committed to fostering a culture of research excellence, innovation, and global engagement. We strive to prepare students and scholars who are not only professionally competent but also socially conscious and ethically grounded.

I congratulate the organizers for their dedicated efforts in conceptualizing and conducting this conference and wish all participants fruitful deliberations, insightful discussions, and a memorable academic experience.

Let us work together to transform knowledge into impact and ideas into action.

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Guest of **Honor**

Dr. Berdiyar Bakhtiyarovich Jollybekov

Rector,
Karakalpak State University,
Uzbekistan

Berdiyar Jollibekov is the rector of KSU. Berdiyar Bakhtiyarovich Jollybekov (born February 11, 1977, Nukus, Republic of Karakalpakstan) is a Doctor of Agricultural Sciences and Professor. Since September 28, 2023, he has been serving as the Rector of the Karakalpakstan Institute of Agriculture and Agrotechnologies. He earned his Master's degree from Tokyo University of Agriculture and Technology in 2008, specializing in soil science, biotechnology, and pharmacognosy. He is fluent in Russian, English, and Japanese. His academic and administrative career includes extensive experience in research, international cooperation, and innovation management in higher education and agricultural sciences.

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Guest of **Honor**

Mr. Timur Nurimbetov

Vice Rector for International Affairs, Karakalpak State University, Uzbekistan.

Mr. Timur Nurimbetov is the Vice Rector for International Affairs at Karakalpak State University, Uzbekistan. He holds a PhD in Economic Sciences and has extensive experience in higher education administration, teaching, and international academic cooperation. His research interests include agricultural economics, diversification of agricultural production, and sustainable development. He is the author and co-author of more than 50 scientific publications and has been actively involved in national and international projects, including Erasmus+ programs.

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Guest of **Honor**

Mr. Shakhimardan Shaniyazov

Head of the International Relations Department,
Karakalpak State University,
Uzbekistan

Mr. Shakhimardan Shaniyazov (PhD) is the Head of the International Relations Department at Karakalpak State University, Uzbekistan. He has extensive experience in managing international cooperation, working with foreign partner institutions, and supporting academic mobility programs for students and faculty. He holds a PhD in Biology and has an academic background in forestry management and environmental sciences. His professional interests include international education, environmental studies, and sustainable development. He has participated in and coordinated several national and international projects, including Erasmus+ programs, and has contributed to scientific publications and international conferences.

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Guest of **Honor**

Dr. P. L. Naktode

Principal,
Tulsiramji Gaikwad-Patil College
of Engineering and Technology
(TGPCET), India

It is my privilege to warmly welcome you to our college—an autonomous institution committed to quality education. We work on the principle of "Learn to Grow." With this inspiring thought, Vidarbha Bahu Uddeshiya Shikshan Sanstha, Nagpur laid the foundation to provide education in the field of engineering, enabling students to become skilled engineers, capable managers, and above all, responsible human beings dedicated to building a stronger, vibrant, and skilled India. We envision TGPCET playing a significant role in shaping the careers of tomorrow's leaders and developing individuals who will make a meaningful impact on global development. Looking at our track record, TGPCET has achieved many milestones in terms of consistently excellent academic results, successful placements, and vibrant extracurricular activities. We are continuously striving to impart quality education to our budding engineers, and this journey is becoming more glorious year after year—empowering our graduates to make their mark across the globe. Success depends on opportunity—make the most of the resources available to you.

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About **Plenary Keynote Speaker**

Mr. Vamshidhar Reddy Vemula

Lead Software Engineer Wellsfargo, USA

Vamshidhar Reddy Vemula is a Lead Software Engineer specializing in cloud security architecture for enterprise-scale financial systems.

He designs and secures cloud-native microservices and API platforms operating within highly regulated banking environments, supporting mission-critical digital services.

His work focuses on Zero Trust architecture, secure authentication frameworks, and DevSecOps automation to strengthen resilience, compliance, and high availability across large-scale transaction workloads.

He has led initiatives in API gateway security and secure service-to-service communication across distributed cloud systems.

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About **Keynote Speaker**

Dr. S. B. Goyal

Professor & Dean, Department of Computer Science & Engineering, Chitkara Institute of Engineering & Technology, Chitkara University, India.

Prof. Dr. Shyam Bihari Goyal, widely recognized as Prof. Dr. S. B. Goyal, is a distinguished academician and researcher in the field of Computer Science and Engineering, with over two decades of experience spanning teaching, research, and academic leadership. He earned his Ph.D. from Banasthali University, Rajasthan, India, in 2012. Dr. Goyal has made significant contributions to the integration of Industry Revolution (IR) 4.0 technologies into higher education curricula, including Quantum Computing, Big Data, Data Science, Artificial Intelligence, Blockchain, and Cloud Computing, particularly across Malaysian universities.

A seasoned speaker and thought leader, he has been invited to deliver keynote talks and serve as a panelist at several prestigious forums, including Bloconomic 2019 and the World AI Show 2021, as well as various academic and industry platforms focused on IR 4.0 advancements. Dr. Goyal is an IEEE Senior Member (since 2013) and a certified IBM Master Mind Faculty (since 2013). His research interests lie at the forefront of technological innovation, encompassing Cyber Security, Internet of Things (IoT), Data Mining, Artificial Intelligence, Machine Learning, Blockchain, Metaverse, and Quantum Computing. He has authored an impressive body of work, including: 80+ SCIE/Scopus/WOS-indexed journal papers, 45+ Scopus-indexed book chapters, 10+ Scopus-indexed edited/authored books, 320+ total publications, 12 international patents and copyrights granted in Australia, Japan, Germany, Canada, and India.

Dr. Goyal is also a respected editorial contributor, serving as a reviewer, guest editor, and editor for numerous international journals and Scopus-indexed books with publishers such as IEEE, Springer, IGI Global, and Inderscience. Currently, Dr. Goyal holds the position of Professor and Dean, Department of Computer Science & Engineering at Chitkara Institute of Engineering & Technology, Chitkara University, Rajpura, Punjab, India, since June 2025. Prior to this, he served as Dean and Director of the Faculty of Information Technology at City University, Malaysia, where he led the faculty to achieve notable recognition and academic excellence at national and international levels. He has also played a pivotal role in

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embedding emerging technologies and skills into university curricula, introducing modules on Big Data, Cloud Computing, Blockchain, DevOps, Google Flutter, Cyber Security, and Data Science, thereby aligning academic programs with industry demands.

Dr. Goyal is committed to building a future-ready, globally benchmarked academic ecosystem, equipping students with advanced technological competencies and preparing them for leadership in a rapidly evolving digital world. His career objective is to leverage his deep expertise to drive academic innovation, research excellence, and international accreditation in premier institutions.

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About **Keynote Speaker**

Mr. Juan Intan Kanggrawan

Chief of Digital & Business Operations, Gihon Technology & Telecommunication Group, Indonesia.

Mr. Juan Intan Kanggrawan is a digital, policy, and business strategy executive with over 15 years of experience at the intersection of business, government, and technology. He currently serves as Chief of Digital & Business Operations at Gihon Technology & Telecommunication Group, where he leads digital transformation, builds new business units, and delivers innovative solutions for Fortune 500 companies and G20 countries. Juan has successfully led and mentored more than 150 professionals across strategy, product, data, engineering, policy, research, and operations, generating measurable impact across Southeast Asia. His career includes senior leadership roles at GovTech Edu (Ministry of Education & Culture, Indonesia), Jakarta Smart City, Traveloka, and GovTech Singapore. He has overseen multi-million-dollar budgets, scaled digital ecosystems for tens of millions of users, and advised on national digital initiatives in areas such as education, transportation, and healthcare. Internationally, Juan has been a trusted advisor to the UN, World Economic Forum, UK- PACT, ASEAN, and other organizations on AI, data governance, and digital innovation. He is also an active volunteer, academic researcher, and speaker at leading global forums. With a passion for talent development, teaching, and knowledge sharing, Juan continues to drive digital impact at the city, national, and regional level.

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About **Keynote Speaker**

Dr. Sayan Kumar Ray

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

Dr Sayan Kumar Ray is the Head of School of Computer Science and full Professor at Taylor's University, Malaysia. He completed a Ph.D degree in Computer Science from the University of Canterbury in New Zealand with full scholarship. While in New Zealand, Sayan worked in the School of Digital Technologies at Manukau Institute of Technology (MIT) in Auckland where he held positions like Associate Dean, Head of School, Academic Leader of Research and Curriculum Development, and Network Leader. He also won multiple awards, including, Research Excellence Award, Overall Outstanding Performance Award, and Teaching Excellence Award. Prior to MIT, Auckland, Sayan used to work as Design Engineer at Tait Communications, New Zealand, where he researched on Evolved Packet Core backbone network of LTE-Advanced technologies. Sayan's research is on topics related to Cybersecurity, IoT Applications, Autonomous Transportation System, 5G/6G networks, and Applications of AI and Machine Learning. His work regularly features in top-tier journals and conferences and till date has more than hundred publications, including in top journals like IEEE Communications Surveys and Tutorials, IEEE JSAC, IEEE Access, Elsevier JNCA, Computer Networks, Sensors and in premier conferences like IEEE LCN, IEEE WCNC, IEEE APCC, ACIS, PACIS, etc. Sayan's coauthored papers have won 5 Best Paper Awards and 1 best commendation award in international conferences of repute. He has given several keynotes and invited talks at conferences and other events. Sayan has supervised multiple Ph.D and Masters research work to successful completion and has been a regular examiner for Ph.D and Research Masters thesis. He also has 4 granted UK and Australian patents. Sayan has been an active consultant for corporate projects related to AI-enabled cyber defense, vehicle-to-infrastructure road safety systems, multicriteria-based mobility and handover system for high-speed vehicles in 5G networks, designing and setting up hybrid cloud system for educational institutions, etc.

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About **Keynote Speaker**

Dr. Syed Zulkarnain Syed Idrus

Department of Computer Science, Universiti Malaysia Perlis (UniMAP), Malaysia

Dr. Syed Zulkarnain Syed Idrus is an Associate Professor at Universiti Malaysia Perlis (UniMAP), Malaysia. He began his higher education in 1995 at North Trafford College (NTC), Manchester, United Kingdom, and obtained a Business & Technology Education Council (BTEC) National Diploma (ND) in Information Technology Applications in 1997. He then pursued a Bachelor's Degree at the University of Manchester Institute of Science and Technology (UMIST), Manchester, in Information Systems Engineering, graduating in 2001. After gaining experience in the private education sector, he continued his studies and earned a Master's Degree in Computer Engineering from Universiti Malaysia Perlis (UniMAP) in 2008. He later completed his Ph.D. in Computer Science and Applications at the Université de Caen Basse-Normandie (UniCAEN), Caen, France, in 2015, specializing in computer security. To date, he has authored over 260 publications, including journal articles and conference papers, with an h-index of 23. He has also published ten (10) books and holds two (2) patents. His expertise in computer security is well recognized; he has been invited to serve on the editorial boards of several international journals. In 2017, he was invited for a special one-hour interview on Bernama News Channel (BNC) – Astro Channel 502, Kuala Lumpur, where he shared professional insights, knowledge, and experience regarding cybersecurity challenges. In recognition of his continued contributions to research and his professional career, he has received numerous prestigious national and international awards.

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About **Keynote Speaker**

Dr. I Nengah Subadra

Associate Professor,
University of Triatma Mulya,
Indonesia

Dr. I Nengah Subadra, S.S., M.Par., Ph.D. is an Associate Professor and Principal Lecturer at Universitas Triatma Mulya, Bali – Indonesia, where he currently serves as Head of the Research, Publication, and Community Service Agency. He previously held the position of Dean of the Faculty of Business and Tourism (2020–2024) and was formerly the Head of the Applied Bachelor Degree in Tourism Programme at Sekolah Tinggi Pariwisata Triatma Jaya (STIPAR Triatma Jaya), a well-known institute for tourism, hospitality, and restaurant management in Bali. Dr. Subadra completed his Ph.D. in Tourism Studies at the University of Lincoln, United Kingdom, specializing in qualitative research methods. His academic expertise covers a wide range of subjects including Sustainable Tourism Development, Environmental Studies, Tourism Regulation, Destination Management, Research Methodology, and Tourism Marketing. He also teaches at the Graduate School of Udayana University, Denpasar, where he lectures on Cultural Tourism alongside senior professors, and has taught Cultural Heritage Tourism for international classes. Additionally, he contributes to the Graduate School of Economics at Universitas Triatma Mulya, focusing on research methods and destination marketing. With extensive academic and leadership experience, Dr. Subadra is dedicated to advancing research, education, and community service in tourism studies.

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About **Keynote Speaker**

Dr. Selvakumar Manickam

Professor,
Universiti Sains Malaysia,
Malaysia

Dr. Selvakumar Manickam is a leading authority in cybersecurity and AI. As a professor and the director of the Cybersecurity Research Center, he has been instrumental in advancing security and privacy research. His contributions have significantly shaped algorithms and models that address complex challenges in cybersecurity. Dr. Manickam's passion lies in forging connections between theory and practice, often by integrating cybersecurity and AI technologies. Equipped with decades of software development expertise, he also spearheads cutting-edge projects in AI-driven automation, optimizing efficiency and safety across diverse sectors, including manufacturing and agriculture. His work has catalyzed significant improvements in productivity and security, showcasing the transformative potential of AI in real-world applications. A prolific researcher and author, Dr. Manickam consistently publishes in top-tier journals and presents at prestigious conferences. He has cultivated a new generation of experts in the hybrid field of AI and cybersecurity. His insights are highly valued by journalists and industry leaders, solidifying his reputation as a thought leader in cybersecurity and AI. Dr. Manickam's dedication to pushing the boundaries of knowledge makes him an influential figure in shaping the future of these critical fields.

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About **Keynote Speaker**

Dr. Akbar Ahmad

Professor,
Tulsiramji Gaikwad Patil College of Engineering and Technology,
India

Dr. Akbar Ahmad is a distinguished academic leader, researcher, and Senior Member of IEEE with over 17 years of experience in strategic planning, institutional effectiveness, and power electronics. Currently serving as the Director of Research and Innovation at TGPCET Nagpur and Director HR at GPGI, he has held prominent international leadership roles, including Director at Sustainzy (UAE) and Director at Symbiosis Skills and Professional University. Dr. Ahmad holds a Ph.D. from MNNIT Allahabad, specializing in solar PV converter topologies, and has published over 65 research works, with his collaborative studies ranked among the top 10 most cited in Wiley (IET Power Electronics) for 2023–2024. A recipient of prestigious honors from the Union Ministry of Energy and a patent holder for IoT-based agricultural drones, he is a recognized expert in Hardware-in-Loop (HIL) design and renewable energy integration. Beyond his administrative and research achievements, he has mentored dozens of international students and remains a key consultant and visiting professor for institutions across Germany, the Maldives, and the Indian Railways.

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About **Keynote Speaker**

Ms. Indira Ermekbaeva

Specialist, International Relations Department, Karakalpak State University, Uzbekistan

Indira Ermekbaeva- PhD student at Tashkent State University of Economics with professional experience in international relations, education, and research. Working as a Specialist at the International Relations Department of Karakalpak State University, with additional experience as an English teacher and tutor. Holds a Master's degree in Tourism Management and Hospitality from Dong- A University (South Korea) and a Bachelor's degree in English Language and Literature. Fluent in Karakalpak and Uzbek, with advanced English and upper-intermediate Russian, and strong communication, organizational, and digital skills relevant to international projects.

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About **Keynote Speaker**

Dr. Swapnili Karmore

Professor and Head of the Department, Computer Science and Engineering (CSE), Tulsiramji Gaikwad Patil College of Engineering and Technology, India

Dr. Swapnili Karmore is a Professor and Head of the Department of Computer Science and Engineering (CSE) at Tulsiramji Gayakwad-Patil College of Engineering and Technology (TGPCET), Nagpur, India. She also serves as the Branch Counsellor of IEEE and Advisor for the IEEE Student Chapter of the Computational Intelligence Society (CIS). Previously, she served as the Dean of Research and Development and as an Associate Professor and Head of the Department of Data Science at G.H. Raisoni Institute of Engineering and Technology (GHRIET), Nagpur. Dr. Karmore is a recognised PhD guide and is currently supervising eight research scholars, out of which four have successfully been awarded their PhD degrees. She earned her PhD in Computer Science and Technology from Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur. With an impressive academic and research record, Dr. Karmore has published four SCI-indexed papers, thirty-two Scopus-indexed research publications, eighteen patents, one book, eight book chapters, and more than ninety-nine research articles in reputed international and national journals and conferences. She has also organised several national and international conferences, workshops, faculty development programs, and guest lectures for students and faculty members. Her research interests include the Internet of Things (IoT), Artificial Intelligence, and Embedded Software Testing. Dr. Karmore has received several prestigious awards, including the Utkrushta Shikshak Award from I2oR, Research Excellence Award, Best Paper Award, and the Sanman – Stri Shakticha Nari Shakti Award in recognition of her excellence in technical education and contributions toward women empowerment. She has also been honoured with the Outstanding Contribution in Reviewing Award from Elsevier ISTA, Shiksha Ratan Puraskar, and a Certificate of Excellence for Meritorious Service. Dr. Karmore has guided numerous undergraduate and postgraduate projects, including interdisciplinary projects, and is widely recognised for her outstanding contributions to research, academics, and institutional development.

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About **Session Speaker**

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About **Session Speaker**

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Prof. Kumud Saxena is a distinguished academic leader with over 19 years of teaching, research, and administrative experience in Computer Science and Information Technology. She is currently the Dean of the School of CSE & IT at NIET, managing more than 3,500 students and 80+ faculty members. She holds a Post Doctorate in Artificial Intelligence, Machine Learning & 5G from Aarhus University, Denmark, and a Ph.D. in Computer Science from Dr. B.R. Ambedkar University, Agra. Over her career, she has published 50+ research papers in SCI, Scopus, and peer- reviewed journals, authored 4 book chapters, and filed 18 patents (with one granted). She has also led government-sponsored research projects, including collaborations with IIT Roorkee. Prof. Saxena has been instrumental in establishing new departments such as AI, IoT, and Cloud Computing, along with Centers of Excellence in Blockchain and Metaverse at NIET. She has played a pivotal role in NBA and NAAC accreditations, curriculum design as BoS Convener internal as well as for other Universities, and international collaborations through AICTE- approved twinning programs and MoUs with global universities. Her expertise spans AI & ML, AR/VR, IoT, HPC, wireless communications, and emerging technologies, and she is a recognized HPC Master Trainer by AICTE. She has delivered numerous guest lectures, FDPs, and workshops and served as session chair, reviewer, and technical committee member in reputed national and international conferences. For her outstanding contributions, she has received multiple accolades including Star Performer Awards (2020, 2023), Special Recognition for Industry–Academia Collaboration (2022), and Best Research Paper Award at ICCIN 2020. She is also an active member of professional bodies such as IEEE, CSI, and S4DS. With a strong focus on industry–academia integration, she has led collaborations with AWS, Capgemini, Google Cloud Program, NTT Data, Wipro, LTiMindtree, and DLT Labs, ensuring students receive cutting-edge training aligned with global industry standards. Prof. Kumud Saxena continues to inspire as a researcher, mentor, and academic leader, dedicated to advancing education, fostering innovation, and shaping the next generation of technology professionals.

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About **Session Speaker**

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Sameem Abdul Kareem is an Honorary Professor at the University of Malaya, a position conferred upon her mandatory retirement in June 2022. She is also a Fellow of the Academy of Sciences Malaysia and a Part-Time Lecturer in the Department of Artificial Intelligence, Faculty of Computer Science, at the same university. Prior to this, she served as Director of the Institute of Computer Science C Digital Innovation at UCSI University from November 2022 to March 2023. Her career at the University of Malaya spanned nearly three decades (1993–2022) as an academic in the Department of Artificial Intelligence. She held several leadership roles, including Dean of the Faculty of Computer Science (2019–2022), Deputy Dean for Undergraduate Studies (2001–2008), and Deputy Dean for Postgraduate Studies (2014–2016 C 2018–2019). Professor Sameem began her academic career in 1986 as a Lecturer at the Institute of Preparatory Studies, ITM (now UiTM). She holds a B.Sc. (Hons.) in Mathematics from the University of Malaya (1986), an M.Sc. in Computing from the University of Wales, Cardiff (now Cardiff University, 1992), and a PhD (2002). Her research interests include Artificial Intelligence in Medicine, Machine Learning, Data Analytics and Mining, Image Processing, and Biomedical Informatics. She has published extensively in international journals and has been a presenter and invited speaker at numerous national and international conferences. Professor Sameem has successfully supervised many Master's and PhD candidates to completion and has served as an internal and external examiner for universities within Malaysia and abroad.

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About **Session Speaker**

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Budi Nurani Ruchjana is a full professor in the Department of Mathematics at Universitas Padjadjaran, Indonesia. She received her B.Sc. in Mathematics from Universitas Padjadjaran in 1987, a Master's degree in Applied Statistics from Institut Pertanian Bogor in 1992, and a Doctorate in Mathematics and Natural Sciences from Institut Teknologi Bandung in 2002. Her research focuses on spatiotemporal modelling, stochastic processes, time series analysis, spatial analysis, geostatistics, and ethnomathematics. She was a Dean of Faculty of Mathematics and Natural Sciences Universitas Padjadjaran and a President of the Indonesian Mathematical Society (IndoMS) at 2012–2016. She was a member of the Commission of Developing Countries International Mathematical Union (CDC IMU) period 2015–2018. She was a coordinator from Universitas Padjadjaran in the International Consortium of Research Innovation and Staff Exchange Social media Analytics (RISE_SMA) year 2019–2024, on H2020 Schema funded by the European Union, with Coordinator Prof. Stefan Stieglitz from Potsdam University. Until now, she was a member of IAENG, European Women in Mathematics (EWM), Association Women in Mathematics (AWM), CWM IMU Ambassador for Indonesia, and EC member of Asian Oceanian Women in Mathematics (AOWM).

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Review on Design and Impact Analysis on a Frameless Chassis Construction of Bus for Different Speeds

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Abstract:

The chassis forms the structural backbone of any vehicle, directly influencing its safety, strength, and stability. Conventional bus chassis rely on pressed-steel ladder frames, which provide durability but contribute significantly to overall vehicle weight, fuel consumption, and manufacturing cost. This study focuses on the design and impact analysis of a frameless chassis construction for Volvo buses using both conventional and composite materials. A three-dimensional chassis model is created in Creo based on workshop specifications and analyzed in COSMOS simulation software under varying impact speeds. The materials studied include steel, carbon-epoxy, and E-glass epoxy composites, which are evaluated for stress distribution, deformation, and energy absorption. Simulation results demonstrate that composite materials can significantly reduce weight while maintaining or enhancing crash performance. The proposed frameless composite chassis exhibits improved crashworthiness, lower maintenance needs, and enhanced fuel efficiency. This research supports the development of lightweight and safe bus structures, promoting sustainability and cost-effectiveness in modern transportation.

Index Terms:

Frameless Chassis, Composite Materials, Impact Analysis, Crashworthiness, Weight Reduction

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Design and Development of Sustainable Seaweed Drying: Temperature uniformity (36–40°C) Validation for *Kappaphycus alvarezii*

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Leah A. Alindayo
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Abstract:

Seaweed farming is a primary livelihood in coastal regions of the Philippines, particularly in Tawi-Tawi, where *Kappaphycus alvarezii* is cultivated for carrageenan production. However, traditional sun drying remains inefficient, requiring 5–7 days and exposing seaweed to contamination, uneven drying, and quality degradation, which negatively affects farmers' income. This study presents the design and development of an IoT-based hybrid seaweed dryer powered by renewable solar energy to address these limitations and support sustainable post-harvest processing. An experimental research approach was employed to evaluate system performance, focusing on temperature stability, drying efficiency, and operational reliability. A hysteresis-based control algorithm was implemented to maintain the drying temperature within the optimal range of 36–40°C, while data were logged at 15–minute intervals for analysis. Results demonstrated stable temperature control with thermal uniformity maintained within ±2°C across multiple trials, validated through simulation and real-time testing. The system achieved effective humidity reduction, consistent drying performance, and reliable operation under varying environmental conditions. The findings confirm that the proposed hybrid dryer improves drying efficiency, preserves product quality, and reduces dependence on conventional sun drying. By integrating intelligent control and clean energy, the system offers a scalable and sustainable solution that empowers coastal farming communities and aligns with global sustainability goals in technology and education.

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Evaluation of Taxpayer Acceptance Toward Coretax as A Digital Tax Administration System Using the UTAUT Model and Usability Testing

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Abstract:

Indonesia's Directorate General of Taxes has introduced the Core Tax Administration System (Coretax) to unify registration, filing, payment, invoicing, and compliance monitoring on a single digital platform. Early implementation, however, revealed usability frictions and gaps between intended service efficiency and users' lived experience, underscoring the need for a systematic acceptance and usability evaluation. This study examines taxpayers' acceptance of Coretax through the Unified Theory of Acceptance and Use of Technology (UTAUT) capturing Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions as antecedents of Behavioral Intention and subsequent Use Behavior and complements it with the System Usability Scale (SUS) to assess perceived ease, efficiency, and comfort during task execution. A quantitative survey targets individual and corporate taxpayers who have used Coretax for reporting and invoice generation; responses are analyzed descriptively and with variancebased structural modeling to estimate construct reliability, path effects, and the mediating role of intention. By integrating technology-acceptance drivers with standardized usability evidence, the study provides a consolidated view of what enables or inhibits sustained use of a nationwide digital taxation platform. The findings are expected to inform design, onboarding, and support interventions such as clearer process guidance, strengthened help channels, and interface refinements that can improve user experience while advancing the effectiveness and inclusivity of Indonesia's digital tax administration.

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Comparative Analysis of ARIMA and Anomaly Detection of Timeseries Rainfall using AI Approaches

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Abstract:

Finding anomalous patterns or behavior in big datasets that could point to security risks or system malfunctions is a crucial task in the world of cloud computing. Recent developments in machine learning combined with the Internet of Things' (IoT) and cloud computing's explosive growth have made a number of cloud-based data-driven methods for autonomous anomaly detection possible. Conventional anomaly detection methods can be resource and time intensive, particularly when handling massive amounts of data. The suggested method in this study seeks to overcome these difficulties by offering a scalable and effective way to identify irregularities instantly. We can spot any dangers and take the necessary precautions to lessen them by regularly examining data streams and spotting irregularities. Furthermore, our method can assist in promptly detecting and resolving system malfunctions or performance problems, guaranteeing the continued availability and effectiveness of cloud-based systems. In order to accomplish this, the geographic area employed in the inquiry is derived from a 50 GB NCEP timeseries dataset. The geographic resolution is 77° longitude by 12° latitude, and the period span is from 2010 to 2024 with a daily (24–hour) resolution. Since Z-score is a crucial statistic for anomaly identification, it is computed. From 2010 to 2024, monthly anomaly detection for the Bangalore region was conducted to identify variations in precipitation values. The recorded Z-score values show if the chosen region has enough or insufficient rainfall. All things considered, the suggested cloud computing anomaly detection technique is a noteworthy development in the industry, and we think it could have a big influence on the dependability and security of cloud-based systems. Furthermore, an analysis has been done to compare the ARIMA timeseries model, SARIMA, and existing machine learning methods.

Index Terms:

Anomaly Detection, Z-score, ARIMA, SARIMA, NCEP

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Acaricidal Activity of Star Apple (Chrysophyllum caimito) Leaf Extract as Dog Shampoo

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Abstract:

Parasitic diseases are a worldwide problem in the wellbeing of animals. Amongst numerous parasites infesting livestock; ticks are blood-feeding ectoparasites (Rao et al., 2018). The tick infestation in dog emphasizes the importance of tick control measures (Beck et al., 2013). Recently, C. caimito leaves has been found to have pediculicidal impact on grown-up head lice (Sevilles, Jamora et al. 2016). This study was conducted to determine the acaricidal activities of Chrysophyllum caimito leaf extract in different concentrations (10%, 20%, and 30%) into a dog shampoo formulation. Caimito leaf extract was studied on Rhipicephalus sanguineus Latreille ticks. 12 ticks were used per each concentration of the study. Collected ticks were placed for one minute into various shampoo concentrations and then on a dry filter paper in a Petri dish. The results of three repeated experiments were analyzed in 24–48–72 hours. Ticks submerged for 48 hours which had an LC50 of 0.59 already had almost complete mortalities for all solutions. All concentrations achieved one hundred percent mortalities for 72 hours of submersion. 10% shampoo formulation is already a lethal dose for ticks given 48 hours submersion. Caimito extract is a potent acaricide that could help cure dogs from ticks. It is an economical alternative to the pricey Permethrin Shampoo that is available in the market today.

Index Terms:

Chrysophyllum caimito, Permethrin, *Rhipicephalus sanguineus Latreille*, Shampoo Base, Shampoo

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Valuing Mangroves: Writing a Storybook for the Promotion of Katunggan it Ibajay

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Abstract:

Valuing Mangroves and writing a storybook for the promotion of Katunggan it Ibajay is a creation under the Agri-Ecotourism Circuit Enhancement and Promotion Program, which focuses on enhancement, engagement, development, production, and conservation of the mangrove ecosystem or known as the Katunggan of Ibajay, located in Ibajay, Aklan, Philippines. This study is rooted in the need to bridge the gap between this overlooked ecosystem and the community, the study aimed to transfer knowledge and foster environmental stewardship among 30 pupils of Bugtong Bato Elementary School, Bugtong Bato, Ibajay, Aklan, Philippines through engaging Information, Education, and Communication (IEC) materials. These materials, the hardbound storybook with adventures and songs are viewed as an effective tool by inserting educational content about the Katunggan's ecological value, local folktales, and cultural heritage within fascinating stories. Here, we draw on literature that supports the effectiveness of storybooks and graphic animations in enhancing children's vocabulary and comprehension, the project leverages these artistic and interactive elements to inspire curiosity, encourage critical thinking, and facilitate the retention of information. We discussed, (1) a version of the storybook that presented to local schools to promote awareness, (2) encourage educational engagement through interactive learning about local ecosystems and traditions. (3) preserve culture by introducing local folktales to reinforce a sense of identity and belonging. (4) Strengthen the connection to nature by encouraging children to develop a personal link with the environment, leading to conservation efforts. (5) Foster creativity and communication skills through artistic expression. (6) Stimulate sustainability by incorporating eco-friendly habits into the content. The gaps in protecting and promoting the Katunggan it Ibajay were closed as knowledge and tools were offered to them.

Index Terms:

Mangroves, Storybook, Tourism, Education

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Portable Braille Reader: User-Adaptive Interface for Inclusive Education

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Abstract:

This article presents a conceptual design for a portable Braille reader, aiming to improve accessibility and inclusion for visually impaired students in courses at various levels, primarily in engineering and technology. The device features an updatable tactile surface with a standard 2×3 Braille cell, dual ergonomic controls for speed, forward, stop, and reverse (adaptable for right- and left-handed users), a display for sighted collaborators, and wireless connectivity (Bluetooth, Wi-Fi), as well as USB-C for real-time text input and battery charging. Inspired by flight boards (aviation), it includes an elastic strap for thigh attachment, allowing for greater mobility and enabling students to access digital content during theoretical and practical classes, fieldwork, or extracurricular activities. This interdisciplinary proposal integrates mechanical, electronic/mechatronics, and computer engineering, assistive technology, and inclusive pedagogy, positioning tactile feedback as an essential component for equitable STEM education.

Index Terms:

Braille , Portability, Accessibility, Inclusion, Visually Impaired.

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Enhancing Operational Availability through Reliability Centered Spare Parts Management: A Case Study from the Geothermal Power Plant

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Abstract:

In the renewable energy sector, geothermal power plants face long lead times and volatile failure modes that undermine spare parts availability and operational reliability. We implemented a Reliability Centered Spare Parts Management (RC SPM) framework at the 230.5 MW Wayang Windu Geothermal Power Plant (Indonesia) using ERP/CMMS data from 2020–2025. The approach integrates Failure Mode and Effects Analysis (FMEA), criticality ranking, and a three-row ABC classification (criticality–lead time–usage value) across 258 asset–spare mappings. Service-level decisions (z-values) and inventory parameters, Safety Stock (SS), Reorder Point (ROP), and Economic Order Quantity (EOQ) were configured in the ERP system to automate replenishment and align stock policies with reliability priorities. Post implementation, operational availability increased from 98.2% to 99.3%, inventory turnover rose from 10.28 to 16.30, stockout frequency decreased by 30%, and holding cost (inventory value proxy) fell by 6.7%. We provide auditable SS/ROP/EOQ calculations and justify service levels by ABC class to balance risk and cost in high volatility environments. The findings demonstrate that RC SPM can systematically improve reliability while optimizing inventory in renewable energy contexts, supporting SDG 7 (Affordable and Clean Energy) and SDG 9 (Industry, Innovation, and Infrastructure). Limitations include a single-site scope and reliance on historical demand profiles. Future work will integrate predictive analytics, machine-learning-based demand forecasting, and multi-site validation to assess generalizability and long-term return on investment.

Index Terms:

Reliability Centered Maintenance, Spare Part Management, Safety Stock, Inventory Turnover, Part Availability, Geothermal Operations, Operational Reliability

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Empowering Future-Ready School Leaders: A Technology Acceptance-Based Digital Management Model for Sustainable Education

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Abstract:

This study aims to develop and validate a digital management measurement model for school leaders in Malaysia. Grounded in the Technology Acceptance Model (TAM) and tested using Confirmatory Factor Analysis (CFA), the study conceptualises school leaders' digital management across four main domains: administrative management, data and information management, digital civilisation management, and teaching and learning management. Data were collected from 420 school leaders, and the findings resulted in a validated model comprising 14 constructs which are Organizational Management, Digital Portfolio, Digital Leadership Development, Digital Classroom Management, Financial and Asset Management, Student Data Management, Information Delivery and Sharing, Monitoring, Recording and Reporting, Teaching and Learning Management, Digital E-learning Archive, Digital Security, Digital Social Responsibility, Digital Literacy, and Digital Ethics. The findings contribute a validated measurement model adapted to the Malaysian school context, offering both theoretical and practical insights to strengthen future-ready school leadership. Future research is encouraged to incorporate perspectives from subject-matter experts, Ministry of Education officials, and other key stakeholders to enhance the model's robustness, policy relevance, and applicability across diverse educational settings.

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IoT based Smart Mirror using Raspberry Pi

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Abstract:

Smart home technologies have developed rapidly with the integration of the Internet of Things (IoT) [3],[4], providing the potential to automate, individualize, and effortlessly interact both between humans and their environment. This paper introduces the design and implementation of an IoT-based smart mirror based on Raspberry Pi platform [1]. The prototype serves as an interactive information system giving real-time updates such as weather forecasts, calendar events, news feed, and health-related insights [5]. The system takes advantage of a two-way mirror, LCD screen, and robust IoT services that are lean and give a non-intrusive user experience. Experimental evaluation shows that the smart mirror has low latency content rendering, stable network connectivity and high usability in everyday home application scenarios. This work brings out the feasibility, affordability and practical relevance of smart mirrors as an element of intelligent living spaces.

Index Terms:

Smart Mirror, Internet of Things (IoT), Raspberry Pi, Home Automation, Human-Computer Interaction, Real-Time Systems

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A Computational Approach to Plagiarism Detection in Kannada Texts Using Sentence, Bigram, and Trigram Similarity Models

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Abstract:

Plagiarism detection in morphologically rich and low-resource languages such as Kannada poses significant computational challenges due to free word order, inflectional variations, and limited availability of standardized corpora or language tools. This study presents a multi-level similarity analysis framework for detecting plagiarism in Kannada texts, particularly when the plagiarized content involves sentence reordering and paraphrasing.

An original article and its derived version were evaluated using three distinct techniques: (1) sentence-level similarity, (2) bigram modeling, and (3) trigram modeling. Sentence-level comparison employed cosine similarity over TF–IDF-weighted vector representations, yielding 40.18% similarity despite deliberate sentence shuffling. Subsequently, bigram and trigram models were implemented to capture local lexical and contextual overlap, resulting in 40.23% similarity, confirming the partial recovery of semantic correspondence despite syntactic disruptions.

The results indicate that n-gram-based similarity models can partially overcome surface-level obfuscation and reveal structural resemblance between paraphrased texts. However, the study also reveals the limitations of purely lexical approaches and suggests integrating semantic embeddings (such as Word2Vec or BERT-based Kannada models) and synonym-aware matching for more robust detection.

This research contributes to the ongoing efforts to build computational plagiarism detection frameworks for Indian languages, bridging natural language processing, linguistic analysis, and educational technology. The proposed methodology demonstrates how combining sentence-level and n-gram similarity measures can enhance the accuracy and resilience of automated plagiarism detection systems in resource-constrained linguistic settings.

Index Terms:

Kannada NLP, Plagiarism Detection, N-gram Modeling, Sentence Similarity, TF–IDF, Cosine Similarity, Low-Resource Languages, Computational Linguistics

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Banana Bunchy Top Virus Detection from UAV Imagery Using DeepLabv3+ with MobileNetV2: A Semantic Segmentation Approach

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Abstract:

Banana Bunchy Top Virus (BBTV) poses a major threat to banana cultivation, frequently causing substantial yield reductions since infected plants rarely bear fruit. Traditional BBTV monitoring relies heavily on manual visual inspections, which are labor-intensive and prone to subjectivity and affected by observer variability and disease stage. In addition, given the limited adoption of semantic segmentation frameworks in banana disease detection, particularly for BBTV. This study explores an automated BBTV detection framework using a semantic segmentation approach based on DeepLabv3+ with a MobileNetV2 backbone, which was implemented to balance accuracy and computational efficiency. UAV-acquired banana plant images were preprocessed, annotated, augmented, and partitioned into training, validation, and testing subsets using Roboflow. Model training was conducted in MATLAB over 30 epochs using a learning rate of 0.0001 and a mini-batch size of 8. Model behavior was analyzed using training and validation accuracy and loss trends, while segmentation performance was quantified using standard computer vision segmentation metrics. Training and validation losses achieved 0.208 and 0.229. The model exhibited stable learning, attaining final training and validation accuracies of 91.90% and 91.13%. Class-wise evaluation yielded detection accuracies of 94.58% for BBTV-infected and 96.50% for non-infected plants, 80.83% precision, 75.75% recall, 64.22% IoU, and 52.04% Dice Score. The results indicate that lightweight semantic segmentation models are well-suited for scalable BBTV detection and spatial localization in precise agriculture applications.

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Design and Development of a Landslide Monitoring Using IoT-Based Wireless Sensor Network with Early Warning System

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Abstract:

Landslides are among the most destructive natural hazards in the Philippines, particularly in mountainous and upland regions that are highly exposed to intense rainfall, soil saturation, and geological instability. Traditional landslide monitoring approaches rely largely on manual observation and periodic surveys, which are limited by delayed data acquisition, high operational costs, and the absence of real-time early warning capabilities, especially in remote areas. This study presents the design and development of a Landslide Monitoring IoT- Based Wireless Sensor Network with Early Warning System to address these limitations and enhance disaster preparedness. An experimental and system development research approach was employed to evaluate system performance, focusing on sensor data reliability, wireless communication stability, and alert responsiveness. Distributed sensor nodes equipped with soil moisture, vibration, rainfall, temperature–humidity (DHT22), and GPS sensors were deployed and interconnected using LoRa-based communication, with data transmitted to a centralized monitoring platform. A threshold-based control algorithm was implemented to detect abnormal environmental and geotechnical conditions indicative of potential landslide occurrence, triggering automated SMS and alarm notifications. Results demonstrated reliable real-time data acquisition, stable long-range wireless transmission with minimal data loss, and timely generation of early warning alerts under simulated risk conditions. The findings confirm that the proposed system effectively enhances real-time landslide monitoring, improves early detection capabilities, and reduces reliance on conventional monitoring methods. By integrating intelligent sensing, wireless communication, and renewable energy, the system offers a cost-effective, scalable, and sustainable solution that supports disaster risk reduction and strengthens community resilience in landslide-prone areas.

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Evaluation of Bekasi Urban Forest Facilities in Indonesia

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Abstract:

This research is motivated by the increasing needs of the community in the use of land through of construction of various facilities that have an impact on the reduction in the area of green land that has changed function and it is used for various facilities that are expected to be able to increase the quality of comfort, health, and environmental security to provide easy access to the implementation and monitoring of various activities.

The aim of this researce is to identify and evaluate availability and function of facilities. Data collection was carried out through field observation techniques, interviews, documentation, and literature studies carried out since 2023 to 2026. Data explanation using qualitative descriptive methods includes determining factors of the quality of green open space that influence suistainable environmental development.

The results of this study show that this city forest has become a green open space, so there are many components due to lack of maintenance, supervision and management and repairs carried out inappropriately so that is reduces the functional value of the facilities and infrastructure and cannot be used as it should, resulting in a decrease in the quality of this city forest. Therefore, various development improvements were made to increase the quality level.

Index Terms:

Urban Forest, Facilities, Suistainable Development, Green Open Space

ISBN: 978-81-981425-0-4

Leading with Evidence: A Reflexive Thematic Analysis (RTA) of Data-Driven Decision-Making (DDDM) Practices of Exemplary School Leaders

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Abstract:

Purpose: This study explores the data-driven decision-making (DDDM) practices of exemplary school leaders in Brunei. Drawing from the works of Hallinger, Leithwood and Spillane on leadership theories and Fauske and Raybould on organizational learning theory, the research seeks to understand how its integration with DDDM practices can provide practical insights for school leaders to lead with evidence and build the capacity of teachers in data literacy.

Design/Methodology/Approach: A qualitative research approach was used, with semi-structured interviews serving as the primary data collection method. The sample consisted of seven exemplary school leaders from primary and secondary schools. Reflexive thematic analysis was conducted in several phases, beginning with the qualitative review of participants' experiences, followed by more theory-driven analysis.

Findings – The findings revealed the exemplary school leaders' DDDM best practices highlighting the unified data use vision for the school, anchored in instructional and transformational leadership. The significance of distributed leadership as the strongest foundation for collaborative cultures of inquiry, leadership modelling, relational trust and personalized support with strong commitment to ethical and respectful use of data is also emphasized. Finally, the systemic and organizational barriers to data use is uncovered specifically time constraints and limited access to advanced data technologies such as AI driven dashboards or automated analysis.

Practical Implications: The study emphasizes the need for integrated strategies drawn from leadership theories and principles that build teacher capacity, support collaborative culture of inquiry learning and addressing system level enablers and constraints.

Originality/Value: The research contributes uniquely to the field by focusing on perspectives of exemplary school leaders' DDDM practices, while also exploring building the capacity of teachers' data literacy in Brunei that has been largely underexplored.

Index Terms:

Data-Driven Decision-Making, Data Literacy, School Leadership, Leadership Theories

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A Hybrid Artificial Bee Colony and Particle Swarm Optimization Algorithm for Optimal Virtual Machine Selection in Cloud Data Centres

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Abstract:

Efficient virtual machine (VM) selection is a critical challenge in cloud data centers, directly affecting energy consumption, load balancing, and Service Level Agreement (SLA) compliance. Due to the NP-hard nature of VM selection under dynamic workloads, traditional heuristic approaches often fail to deliver optimal performance. This paper proposes a novel hybrid optimization approach that integrates Artificial Bee Colony (ABC) and Particle Swarm Optimization (PSO) to improve VM selection for migration. The proposed ABC–PSO algorithm combines ABC's strong exploration capability with PSO's fast exploitation mechanism to achieve a balanced and effective search strategy. A multi-objective fitness function is formulated to consider VM resource utilization, migration overhead, and resource contention. The algorithm is evaluated using the CloudSim Plus simulator under realistic workload conditions and compared with standard ABC, PSO, and other baseline techniques. Experimental results demonstrate that the proposed hybrid approach achieves reduced energy consumption, fewer SLA violations, improved load balancing, and stable convergence behavior. The findings confirm the effectiveness of metaheuristic hybridization for intelligent and energy-efficient cloud resource management.

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Advancing SDG 12 Through Product Development and Market Survey for Sago (Metroxylon sagu Rottb) Cookies

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Abstract:

The main objective of this study is to develop and determine the marketability of sago (Metroxylon sagu Rottb) cookies, to generate inputs for sustainable local livelihood activity in support to SDG 12–Responsible Consumption and Production. This investigation employed quasi-experimental research. The sago cookies developed by the researcher were subjected for nutritional facts approximate analysis and customer testing. The study involved 220 respondents. The validated questionnaire was used to gather data. The survey was done at the Iloilo Convention Center, Iloilo City, Philippines, during the National Science and Technology Week 2023. The findings reveal that most of the respondents were female, between 18–36 years old, and engaged in semi-skilled work. In terms of the sensory quality, most of the respondents claimed that they liked very much the appearance, flavor, texture, aroma, and overall acceptability of the cookies. They perceive a very positive first reaction to the quality of the cookies, it is of high quality, and very innovative, and they likely recommend it to others. Likewise, respondents revealed that the sago cookies attribute that they like most is for being a local product. The findings support the stimulus-response theory (SRT), if consumers have a positive reaction to the product, they tend to patronize it. Hence, sago cookies have potential in the market. Consequently, using local, sustainably grown flour reduces environmental impact and support the efficient use of natural resources as targeted in SDG 12.

Index Terms:

MetroxylonSagu Rottb Cookies, Local Resources, Product Development, SDG 12

ISBN: 978-81-981425-0-4

Smarter, Faster, Proactive: A Systematic Literature Review on the Future of AI Implementation in ERP Systems

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Abstract:

This research analyzes how Artificial Intelligence is transforming Enterprise Resource Planning (ERP) systems from reactive recording tools into proactive strategic platforms. Through a Systematic Literature Review of 50 high-quality articles published between 2020 and 2025 from Scopus and Google Scholar databases, this study dissects key technologies, architectural models, and the socio-technical impacts of AI integration. Using the PRISMA methodology and bibliometric analysis, it was found that Machine Learning and Natural Language Processing are the primary drivers of efficiency, with the potential to increase productivity by over 25%. The findings indicate that the success of this digital transformation depends not only on technical architectures like microservices and federated learning but is fundamentally determined by human factors, including change management and workforce upskilling.

Index Terms:

Artificial Intelligence, Enterprise Resource Planning, Systematic Literature Review, Machine Learning, Digital Transformation

ISBN: 978-81-981425-0-4

Threat Intelligence at PT Pos Indonesia (Persero) to Fulfill Cyber SecurityMaturity Controls of ISO/IEC 27001: Enhancing Detection Capability and Strengthening Incident Response and Recovery

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Abstract:

This study designs and implements Pos Cyber Threat Intelligence (PosCTI), a cyber threat intelligence platform aimed at enhancing the cybersecurity posture of PT Pos Indonesia (Persero). The main novelty of this research lies in the development of a compliance-driven Cyber Threat Intelligence (CTI) framework, specifically designed to address identified gaps in the "Incident Response and Recovery" domain (Level 3) based on the Cyber Security Maturity assessment issued by the Indonesian National Cyber and Crypto Agency (BSSN). Built on OpenCTI and integrated with external intelligence sources such as AlienVault and VirusTotal, the platform serves as a pioneering case study and blueprint for Indonesian state-owned enterprises to align cybersecurity operations with BSSN requirements and ISO/IEC 27001:2022 standards. Through a locally relevant phishing campaign case study, this research validates that PosCTI successfully centralizes intelligence management, enhances team collaboration, and facilitates effective threat investigation. The results indicate that a targeted CTI approach is not only operationally effective but also strategically valuable in supporting compliance with national cybersecurity regulations. Nevertheless, limited direct integration with BSSN systems remains a key limitation. Future work is recommended to focus on scalability, automation features, and strengthened coordination with BSSN to support continuous cybersecurity improvement.

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Effectiveness of Puzzle Video Games for Implementation of Learning Basic Physics Knowledge in Real World Application

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Abstract:

Knowledge and importance of the application of basic physics is rarely known in daily activities and is often overlooked. This research aims to enhances the understanding of basic physics application in a grounded real-world application "Watch It!", using puzzle game directed for student and young adults. Using method like Game Development Life Cycle and Experiential Tetrad, this paper manages to reach N-Gains score of 63.534% from 23 respondent with various backgrounds, proving the potential of puzzle video game in the application of grounded real-world cases.

Index Terms:

Learning, Serious Game, Puzzles, Video Game, Basic Physic, Grounded

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Zero-Shot Large Language Models For Pseudo-Labeling in Indonesia Hate Speech Detection Models

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Abstract:

The development of language and technology, such as social media, has given rise to new concerns, such as hate speech. Many researchers are encouraged to research specific domains such as hate speech to help improve detection capabilities, for which the availability of reliable datasets is crucial. However, the process of labeling datasets, especially those done manually, can be quite resource intensive and time consuming. Through this study, we explore whether labeling datasets with a low-resource language using a zero-shot approach in the latest LLM model can be a sufficient alternative in annotation tasks. A zero-shot pipeline was designed to compare the results of the annotation task on pseudo-labeling LLM with the ground truth dataset, which was then used to compare the resulting model with both annotation results. We found that LLM can be a more practical and economical alternative choice, in handling annotation tasks, although choosing the right LLM to handle specific domains is very important.

Index Terms:

Hate Speech, LLM (Large Language Models), Zero-Shot, Transformer Model, Machine Learning

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On Usage of LLM to Retrieve Metadata of Non-English Academic Literature

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Abstract:

Over the decades of improvements in computer technology, libraries have been adopting those that improve their functions in meaningful ways. In particular, Artificial Intelligence (AI) technologies have been used in libraries for years in various ways, with one of the latest innovations, those being Large Language Models (LLMs), promising to supplement or automate the time-consuming, but necessary work of creating metadata for library items, as well as assist with students' research and assignment work. The focus of this particular study is on ChatGPT's effectiveness in creating said metadata, judging how accurate its records are, how complete are the descriptions it gives, and whether or not it can provide hyperlinks of outside bibliographic records from which cover images can be referenced and retried. Across progressively large subsets of International Standard Book Numbers (ISBNs) of 1, 2, 3, 4, and 5 that were taken from an assembled dataset of 100 pieces of Russian-language academic literature, the model was judged on its performance by comparing its responses with existing records, which revealed that small batch sizes of 1 to 2 achieve reasonable accuracy by every metric, with increasingly bigger sizes sacrificing quality for quantity with smaller descriptions and faultier hyperlinks, missing records, and overall unreliability, especially with size 5 missing an overwhelming majority of the records. The results of this paper offer practical and scientific knowledge of using LLMs in more and less useful ways of managing data.

Index Terms:

Academic Libraries, Artificial Intelligence, Libraries, Library Technology, Natural Language Processing, Large Language Model

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Review on Design and Impact Analysis on a Frameless Chassis Construction of Bus for Different Speeds

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Abstract:

The chassis forms the structural backbone of any vehicle, directly influencing its safety, strength, and stability. Conventional bus chassis rely on pressed-steel ladder frames, which provide durability but contribute significantly to overall vehicle weight, fuel consumption, and manufacturing cost. This study focuses on the design and impact analysis of a frameless chassis construction for Volvo buses using both conventional and composite materials. A three-dimensional chassis model is created in Creo based on workshop specifications and analyzed in COSMOS simulation software under varying impact speeds. The materials studied include steel, carbon-epoxy, and E-glass epoxy composites, which are evaluated for stress distribution, deformation, and energy absorption. Simulation results demonstrate that composite materials can significantly reduce weight while maintaining or enhancing crash performance. The proposed frameless composite chassis exhibits improved crashworthiness, lower maintenance needs, and enhanced fuel efficiency. This research supports the development of lightweight and safe bus structures, promoting sustainability and cost-effectiveness in modern transportation.

Index Terms:

Frameless Chassis, Composite Materials, Impact Analysis, Crashworthiness, Weight Reduction

ISBN: 978-81-981425-0-4

Advancing SDG 12 Through Product Development and Market Survey for Sago (*Metroxylon sagu Rottb*) Cookies

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Abstract:

The main objective of this study is to develop and determine the marketability of sago (Metroxylon sagu Rottb) cookies, to generate inputs for sustainable local livelihood activity in support to SDG 12–Responsible Consumption and Production. This investigation employed quasi-experimental research. The sago cookies developed by the researcher were subjected for nutritional facts approximate analysis and customer testing. The study involved 220 respondents. The validated questionnaire was used to gather data. The survey was done at the Iloilo Convention Center, Iloilo City, Philippines, during the National Science and Technology Week 2023. The findings reveal that most of the respondents were female, between 18–36 years old, and engaged in semi-skilled work. In terms of the sensory quality, most of the respondents claimed that they liked very much the appearance, flavor, texture, aroma, and overall acceptability of the cookies. They perceive a very positive first reaction to the quality of the cookies, it is of high quality, and very innovative, and they likely recommend it to others. Likewise, respondents revealed that the sago cookies attribute that they like most is for being a local product. The findings support the stimulus-response theory (SRT), if consumers have a positive reaction to the product, they tend to patronize it. Hence, sago cookies have potential in the market. Consequently, using local, sustainably grown flour reduces environmental impact and support the efficient use of natural resources as targeted in SDG 12.

Index Terms:

MetroxylonSagu Rottb Cookies, Local Resources, Product Development, SDG 12

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Smarter, Faster, Proactive: A Systematic Literature Review on the Future of AI Implementation in ERP Systems

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Abstract:

This research analyzes how Artificial Intelligence is transforming Enterprise Resource Planning (ERP) systems from reactive recording tools into proactive strategic platforms. Through a Systematic Literature Review of 50 high-quality articles published between 2020 and 2025 from Scopus and Google Scholar databases, this study dissects key technologies, architectural models, and the socio-technical impacts of AI integration. Using the PRISMA methodology and bibliometric analysis, it was found that Machine Learning and Natural Language Processing are the primary drivers of efficiency, with the potential to increase productivity by over 25%. The findings indicate that the success of this digital transformation depends not only on technical architectures like microservices and federated learning but is fundamentally determined by human factors, including change management and workforce upskilling.

Index Terms:

Artificial Intelligence, Enterprise Resource Planning, Systematic Literature Review, Machine Learning, Digital Transformation

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Enhancing Sustainable Learning Experiences Through Augmented and Virtual Reality in Higher Education

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Abstract:

Sustainable learning in higher education requires modern technologies such as augmented reality (AR) and virtual reality (VR) for a better understanding of difficult subjects and practical visualization-based learning. AR and VR are the approaches that can provide active engagement and better utilization of resources. Augmented reality and virtual reality offer students and researchers the opportunity to learn in an environment that has no limitations, which enables interactive simulation in real-time visualization for academic content.

This research paper presents a framework that integrates AR and VR into the higher education learning approach to enhance the sustainable learning experience. This approach will focus on improving learning practices, conceptual understanding, and it will provide abilities for students to learn independently without being dependent on physical infrastructure. Additionally, this paper will explore the use of AR and VR in different fields, such as science, engineering, and medicine. AR and VR are significant technologies for the sustainability of higher education.

Index Terms:

Higher Education, Augmented Reality, Virtual Reality, Educational Technologies, Learning Outcome, Interactive Learning

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Empirical Comparison of Bloom Filter Variants: Practical Performance and Design Guidance

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Abstract:

Bloom filters are probabilistic data structures that have been developed for space-efficient membership testing with-out the need to maintain the entire dataset in memory. While many variants of Bloom filters have been proposed in theoretical settings, the question of which ones can be shown to perform well in practical settings remains. This paper presents an empirical evaluation of four popular variants of Bloom filters, using more than 152,000 test queries on a wide range of dataset sizes, distributions, and false positive rates. The results show that there are several surprising observations: a theoretically better variant can be worse in practice for certain hash function designs, cross-checking architectures are very close to the theoretical bounds, and adaptive Bloom filters provide a sound trade-off between accuracy and efficiency for dynamic workloads. Based on these results, the paper offers evidence-based recommendations for practitioners on how to choose Bloom filter variants based on their application constraints.

Index Terms:

Bloom Filters, Probabilistic Data Structures, Em-Pirical Evaluation, Performance Benchmarking, Adaptive Filters, Cross-Checking Filters, Hash Functions, Algorithmic Implementa-Tion, Real-World Workloads, System Design

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Traffic Flow and Congestion Prediction using Randomized Short Memory Neural Networks with Density-Based Spatial Clustering

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Abstract:

Traffic congestion is a significant problem in several nations worldwide. The majority of current traffic flow models do not effectively use the temporal and geographical characteristics of traffic data. This work introduces a novel method for predicting traffic flow and detecting congestion by using sophisticated deep-learning algorithms on data from traffic cameras or sensors. The approach consists of many phases. Firstly, the data may be normalised using the Error Max Normal Scaler algorithm. Then, the feature extraction can be performed using the Covariant Eigen Vector Component Analysis. Subsequently, the traffic flow may be forecasted via the Randomised Short Memory Neural Networks (RSMNN). The identification and analysis of congestion patterns is accomplished via the use of Density-Based Spatial Clustering of Applications with Noise (DBSCAN). The proposed framework seeks to optimise the precision of traffic flow estimates and better the identification of congestion, eventually leading to more effective traffic management and urban planning. The investigation was conducted using the Python programming language inside the Kaggle dataset environment. The effectiveness of the offered approaches is assessed using established criteria, showcasing the efficiency of the approach in practical situations.

Index Terms:

Traffic Flow, Congestion, Deep Learning, Randomized Short Memory Neural Networks,
Density-Based Spatial Clustering

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Decentralized Blockchain-Based Intrusion Detection System for Zero-Day Threats in IoT Environments

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Abstract:

The rapid Development of Internet of Things devices enabling connectivity and automation like never before but significant security issues that current systems are now facing especially against zero-day attacks that use unknown vulnerabilities to their advantage. Conventional centralized and signature-based intrusion detection systems are becoming more and more ineffective with the problem of scalability, single-point failure and failure to identify emerging threats. In this paper, it is suggested to use a Decentralized Blockchain-Based Intrusion Detection System to large-scale IoT settings. The system combines federated learning with anomaly-based detection, where each node of the IoT can locally train intrusion detection models on the data that it has observed on the network without compromising data privacy. A permissioned blockchain offers a decentralized coordination layer, that is guaranteed by integrity, authenticity, and trust on model updates by smart contract verification. Federated learning combined with blockchain increases the performance of detection. The decentralized architecture is fault-tolerant and can always be operational even whenever the nodes are compromised, thus it can be used in the most critical IoT applications like smart grids, healthcare-monitoring, and industrial systems. The experimental validation shows that the given DB-IDS is applicable in detecting zero-day attacks with a high level of privacy, scalability, and robustness, that is a powerful step to the next stage of IoT security architectures.

Index Terms:

Blockchain, IoT Security, Zero-Day Attack Detection, Intrusion Detection System, Federated Learning, Anomaly Detection, Smart Contracts, Machine Learning

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Radar-Driven Flood Nowcasting for Resilient Infrastructure Decision Support at District Scale in Kelantan

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Abstract:

Reliable flood nowcasting has the potential to reduce disruption to critical infrastructure. This paper presents a radar-driven district scale flood nowcasting approach designed with the intention to assist decision support for resilient infrastructure operations in Kelantan, Malaysia. Radar observations are transformed into district rainfall features through a reproducible processing pipeline, and probabilistic flood state nowcasts are produced at a 60–minute lead time. The study compares tree-based ensemble baselines against a sequence model that leverages temporal structure in recent rainfall evolution. Performance is assessed using leave-one-year-out (LOYO) evaluation to test temporal generalization under year-to-year variability, reporting both threshold-free discrimination and threshold-dependent decision metrics, including PR-AUC, recall, F1, and false alarm rate (FAR). At 60 minutes lead time, under pooled leave-one-year-out testing, XGBoost and LightGBM reach a mean F1 of approximately 0.983 and 0.981, FAR of 0.001 to 0.002 and near-perfect PR-AUC and recall, respectively. Whereas the LSTM configuration yields F1 around 0.193, with FAR around 0.259, recall around 0.4 and significantly low PR-AUC. These results support SDG 11.5: "Reduce the Adverse Effects of Natural Disasters" and SDG 13.1: "Strengthen Resilience and Adaptive Capacity to Climate Related Disasters" by quantifying year-robust 60–minute district flood nowcasting performance under LOYO and by making explicit the operational tradeoff between missed events and false alarms for resilient infrastructure operations.

Index Terms:

Flood Nowcasting, Weather Radar, District-Scale Early Warning, Temporal Generalization, Operational Decision Support

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Developing AI-Powered Solutions development for Traffic Analysis using YOLOv8 for Textual Descriptions Generation

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Abstract:

Due to the increasing number of traffic jams and accidents, there is a growing need for innovative traffic monitoring solutions. Traditional methods often fall short as they rely on human involvement and lack the speed and accuracy required for real-time analysis. This study utilizes YOLOv8, the latest and most advanced version of the "You Only Look Once" object detection model, to develop a machine-learning system capable of identifying and analyzing traffic patterns. By leveraging traffic images, the model can detect and classify various traffic elements, generate descriptive text, and offer real-time insights to enhance traffic management.

A custom traffic dataset containing 17 distinct object categories—including vehicles, buses, and pedestrians—was used to train the model. Data augmentation techniques such as blurring and grayscale transformations were applied to improve the model's adaptability across different conditions. YOLOv8 was fine-tuned over 30 training epochs, achieving strong performance metrics with an mAP50 of 0.385 and an mAP50–95 of 0.236.

Operating at a real-time speed of 30 to 50 milliseconds per image, the system demonstrated exceptional accuracy in identifying key traffic components. The model successfully detects objects such as cars, buses, and trucks with processing times ranging from 59.8 ms to 103.3 ms per image, making it well-suited for real-time applications. Additionally, it generates textual descriptions based on the detected objects, enabling automated traffic analysis. This capability enhances traffic monitoring, urban planning, and safety management by providing valuable insights. The proposed approach highlights the potential of deep learning and computer vision in developing scalable and automated traffic monitoring systems to tackle modern urban challenges.

Index Terms:

YOLOv8, Artificial Intelligence (AI), Traffic Detection, Textual Description, Object Detection

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RideGuard: An Integrated IoT-Based Anti-Theft and Accident Alert System for Bikes

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Abstract:

Motorcycle and scooter riders are at great risk, however, in terms of accidents and theft and often the reason for their poor safety is the lack of accessible and real-time safety mechanisms. Traditional solutions tend to be very costly, inefficient, or only handle a single aspect of the problem. This paper presents Ride Guard, an integrated system that is designed to improve the safety of riders and vehicles by combining accident detection and theft prevention using IoT technologies. The system utilizes several sensors such as MPU6050 accelerometer and gyroscope to track movement, SW-420 vibration sensor to detect collisions, and a GPS module to track the system's location in real- time. Additionally, the system incorporates the use of an RFID- based authentication mechanism for preventing theft, along with a magnetic reed switch to track unauthorised access. In this case, data gathered by these sensors is carved to a NodeMCU microcontroller and then this data will be possessed to cloud platforms such as ThingSpeak for later remote reaction. The system offers users instant alerts through mobile applications, SMS and email. This low-cost, scalable solution is meant to be easily added to the already existing transportation infrastructure and shows the potential that IoT and embedded systems can be used to enhance vehicular safety, medium control of stealing, as well as efficient case response.

Index Terms:

RideGuard, IoT, Accidents, Theft, GPS Tracking, RFID Authentication, Cloud-based Monitoring, NodeMCU, IOT Sensors, Real-Time Alerts, Vehicle Security, Embedded System, Smart Transportation, MPU6050, SW-420, ThingSpeak

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A Framework for Linking Data Quality Metrics to Business Value Through Predictive Analytics

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Abstract:

Dependable predictive analytics has turned into an essential skill for organizations aiming to improve decision-making and attain quantifiable business benefits. Nonetheless, the performance of predictive systems relies heavily on the quality of the foundational data. This research explores the systematic connection between data quality metrics and the reliability of predictive analytics, which ultimately relates to measurable business value results. Employing a cross-industry sample along with a quantitative research approach, the research defined essential dimensions of data quality, namely accuracy, completeness, consistency, timeliness, and validity and assessed their influence on predictive model performance metrics including accuracy, precision, recall, AUC, and RMSE. Structural equation modeling was utilized to examine the direct and mediating relationships between data quality, predictive reliability, and business performance indicators including revenue increase, cost savings, customer retention, and operational efficiency. The results indicate that increased data quality greatly enhances the reliability of predictive models, acting as a key factor that converts technical advancements into financial and operational benefits. The research adds value by delivering an empirically supported framework that links technical data governance strategies with strategic business results, furnishing actionable insights for companies aiming to enhance the returns on their analytics investments.

Index Terms:

Data Quality Metrics; Predictive Analytics; Business Value; Data Governance; Model Reliability

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Analysis of Piston used in a Bike Engine using Different Materials under Thermal Load

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Abstract:

The performance, reliability, and durability of internal combustion engines are heavily influenced by piston behavior, which operates under complex thermal load. This project focuses on the analysis of a bike piston made from different materials, such as aluminum-silicon alloys AISI5 (5% Si), AISI12 (12% Si), A390 (17% Si), and AISI20 (20% Si), AISI25 (25% Si). Each of these materials have some properties such as AISI5 has Excellent machinability and ductility but lower wear resistance and thermal stability, AISI12 has Good machinability and toughness, A390 has Balanced strength and wear resistance, AISI20 has High thermal stability but lower machinability, AISI25 has Superior thermal stability and wear resistance; however, its machinability and ductility are significantly reduced. The main objective is to analyses the Thermal stress, heat flux, total deformation and temperature distribution of these materials to identify the most suitable for high-performance piston under thermal load. In this project CAD, SOLIDWORKS and ANSYS software's are used to carry out the results for suitable materials used in piston for 150cc bike. Out of these material based on the performance under the thermal load, 1 material will be recommended for the bike piston design for better life.

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Emotion Recognition Using EEG Signals

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Abstract:

Human emotions play a crucial role in shaping how people think, behave, and make decisions. Although emotions are often expressed through facial expressions and vocal tone, these cues can be ambiguous and unreliable. As a result, physiological signals are commonly used to study emotional states, as they offer a more direct and consistent representation of how a person feels. Among these signals, electroencephalogram (EEG) data has proven particularly effective and is widely used in affective computing, mental health assessment, and brain-computer interface research. In this study, emotion recognition is performed using the Brainwave Feeling Emotions dataset, which is chosen for its rich temporal and contextual characteristics that enhance classification performance. A hybrid deep learning framework is proposed, combining gated recurrent units (GRUs) with a Feature Tokenizer (FT) Transformer incorporating an attention mechanism. To optimize model performance and automatically determine suitable training parameters, a hybrid Harris Hawks Optimization (HHO) and Whale Optimization Algorithm (WOA) is employed. The dataset consists of Positive, Negative, and Neutral emotional classes. Experimental results demonstrate that the proposed model achieves a test accuracy of 96.72%, indicating its effectiveness and practical applicability for real-world affective computing tasks.

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Intelligent Automation and Software Quality Assurance of Fixed Deposit Lifecycle Using Salesforce and Artificial Intelligence

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Abstract:

The Banking, Financial Services, and Insurance (BFSI) sector increasingly relies on cloud-based platforms to deliver scalable, compliant, and customer-centric financial products. Fixed Deposits (FDs) are among the most compliance-intensive instruments, involving stringent regulatory validation, accurate interest computation, customer verification, and operational reliability. Traditional Customer Relationship Management (CRM) automation depends largely on static rule-based workflows and extensive manual testing, resulting in defect leakage, delayed processing, and increased operational risk. This paper proposes a comprehensive intelligent automation and software quality assurance framework for Fixed Deposit lifecycle management by integrating Salesforce CRM with Artificial Intelligence (AI). The framework embeds machine learning models for customer risk classification, anomaly detection, and renewal prediction directly into CRM workflows, while incorporating automated testing and validation mechanisms across the lifecycle. A detailed experimental evaluation using a BFSI case study demonstrates substantial improvements in processing time, validation accuracy, defect reduction, and compliance reliability. The proposed approach illustrates how AI-driven quality-centric automation can significantly enhance the robustness, scalability, and trustworthiness of financial software systems.

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Review On Design of a Light-Weight Chassis for a Two-Wheeler Electric Vehicles

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Abstract:

The rapid transition toward electric mobility has intensified the demand for lightweight and structurally efficient vehicle components that enhance driving range and overall energy efficiency. Among these components, the chassis plays a critical role in determining the safety, stability, and performance of two-wheeler electric vehicles (EVs). Conventional steel chassis structures, though strong and durable, add significant weight that negatively impacts battery efficiency, acceleration, and handling. This research focuses on the design, modeling, and optimization of a lightweight chassis for an electric two-wheeler using advanced materials such as aluminum and fiber-reinforced composites. The chassis model is developed in SolidWorks and analyzed through Finite Element Analysis (FEA) in ANSYS to evaluate stress, deformation, and modal characteristics under various loading conditions. The study aims to achieve optimal weight reduction while maintaining structural integrity, stiffness, and vibration resistance. The results contribute to improving vehicle performance, energy efficiency, and rider safety, promoting the broader adoption of sustainable mobility solutions.

Index Terms:

Electric Vehicle (EV), Lightweight Chassis, Finite Element Analysis (FEA), Composite Materials, Structural Optimization

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Review On Design and Analysis of Light Weight Battery Tray for Four Wheel Car

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Abstract:

In the first place, the strict emission regulations, along with the increase in the number of customers for fuel-efficient vehicles, have made the automotive industry to come up with new and lighter structural parts very fast. One of the most important among these is the battery tray, which not only helps in securing the battery but also carries the loads imposed by the static, dynamic, and vibrational forces during the vehicle's operation. The main goal of this review paper is to give an extensive overview of the development of nonmetal battery trays for four-wheel passenger cars in recent times, considering both the material and the technical aspects. One of the most important points in this review is the selection of materials, structural optimization, and the finite element analysis techniques employed to accomplish the strength, stiffness, and durability trinity. The different lightweight materials and their different characteristics, like Aluminum Alloys, Advanced High-Strength Steels, Polymer Composites, and Engineering Plastics, are also compared with traditionally used Steel Trays. In addition, the paper highlights the use of CAD for modeling, Static and Modal Analysis, Vibration Response Evaluation, and the Multi-objective Optimization approaches that researchers adopted to improve the structural efficiency and vibration resistance. The key findings from the recent studies show that the optimized geometries paired with the right material substitution can cut down the mass substantially while still conforming to the requirements of automotive safety and NVH. The current trends, challenges, and future research directions in the non-metal battery tray development are pointed out in this review, which in turn aids sustainable and efficient automotive design.

Index Terms:

Lightweight Design, Battery Tray, Finite Element Analysis, Material Optimization, Vibration Analysis

ISBN: 978-81-981425-0-4

Design & Analysis of Magnetic Suspension System for Two-Wheeler

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Abstract:

The performance of a two-wheeler suspension system is a key factor in enhancing rider comfort, stability, and safety by isolating the rider from road irregularities. Conventional suspension systems spring, hydraulic, or pneumatic have limitations such as oil leakage, wear, and reduced long term efficiency. In order to mitigate the identified shortcomings, this work focuses on the design and analytical evaluation of a magnetic suspension system as an alternative approach. Permanent magnets coupled with springs are employed in the proposed system to form a passive damping arrangement that mitigates vibration, displacement, and acceleration of the spring mass. A prototype model is developed where magnets are positioned within a cylindrical arrangement to generate repulsive forces, providing effective shock absorption. Structural and finite element analysis (FEA) is conducted on suspension springs made of different materials including Carbon Steel, Chrome Silicon, Aluminium, Magnesium, and NiCr. Comparative analysis of stresses and deflections indicates that Carbon Steel exhibits the least deflection and best performance, while Aluminium shows maximum stress under similar loading. The results highlight the potential of magnetic suspension systems to enhance ride comfort, reduce maintenance, and improve stability for two-wheeled vehicles.

Index Terms:

Magnetic Suspension, Two-Wheeler, Ride Comfort, FEA Analysis, Spring Material

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Design of Tool for Friction Flange Manufacturing with all Materials and Testing

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Abstract:

Friction flange manufacturing, widely implemented through friction drilling or thermal drilling techniques, represents an advanced chipless metal forming process for creating strengthened flanged holes in thin-walled metallic sheets and plates. Unlike conventional drilling, this process utilizes frictional heat and plastic deformation to displace material, thereby forming an integral bushing or collar that enhances load-bearing capacity and joint strength without material loss.

This review paper provides an in-depth and systematic analysis of tool design strategies for friction flange manufacturing, with particular focus on Aluminium Alloy 6082 (AA6082) due to its widespread use in lightweight structural and automotive applications. Critical aspects such as tool material selection, tool geometry optimization, process parameters (including rotational speed, feed rate, and axial force), and their influence on material flow and heat generation are comprehensively discussed.

Special attention is given to tungsten carbide–based tools, which are extensively reported in literature for their exceptional hardness, superior thermal resistance, and enhanced wear durability under severe frictional and thermo-mechanical conditions. Existing experimental and numerical studies addressing thermal–mechanical coupling, plastic flow behavior, and tool–workpiece interactions are critically reviewed to evaluate their impact on flange formation quality.

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Heat Load Analysis and Optimization of HVAC System for a Hospital Operating Theaters

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Abstract:

Hospital Operating Theaters (OTs) demand stringent control of indoor environmental conditions to ensure patient safety, surgical accuracy, and infection control. Heating, Ventilation, and Air Conditioning (HVAC) systems play a critical role in maintaining temperature, humidity, air cleanliness, and positive pressurization in these spaces. This paper presents a detailed heat load analysis of a hospital operating theater and proposes optimization strategies for improving HVAC energy efficiency while maintaining compliance with healthcare standards such as ASHRAE 170. Sensible and latent heat loads from occupants, medical equipment, lighting, building envelope, and fresh air ventilation are evaluated. Optimization techniques, including variable air volume control, high-efficiency equipment, and intelligent HVAC control strategies, are discussed. The results demonstrate that optimized HVAC operation can reduce energy consumption by up to 25–30% without compromising indoor air quality or infection control requirements.

Index Terms:

Operating Theatres, Heat Load Analysis, HVAC Optimization, Hospital Buildings, Energy Efficiency, Infection Control, Laminar Airflow, HEPA Filtration

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Crochet Hook Innovation Mockup Making Using CNC Machine

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Abstract:

Crocheting is a widely practised craft that requires precision, comfort, and repetitive hand movements, which can often lead to fatigue and reduced efficiency. This project presents the design and development of an innovative crochet hook modelled using advanced computer-aided design (CAD) tools and intended for fabrication through computer numerical control (CNC) machining. The proposed design incorporates a multi-component internal mechanism housed within an ergonomic outer casing, aiming to enhance user comfort, control, and durability compared to conventional crochet hooks.

The CAD assembly allows detailed visualisation and analysis of internal components, ensuring proper alignment, dimensional accuracy, and manufacturability. CNC machining is selected as the manufacturing method due to its high precision, repeatability, and suitability for producing complex geometries with fine surface finishes. Materials such as aluminium or stainless steel are considered for strength and longevity, while lightweight materials may be used for ergonomic handling.

This innovative crochet hook design demonstrates the integration of product design and modern manufacturing techniques, providing a feasible solution for ergonomic improvement and efficient production. The project highlights the potential of CNC-based fabrication for developing advanced hand tools and serves as a foundation for future enhancements and commercialisation.

Index Terms:

Crochet Hook Design, Ergonomic Hand Tool, SolidWorks, CATIA, Stress Analysis, Finite Element Method, Virtual Simulation, Product Redesign, Design Case Study

ISBN: 978-81-981425-0-4

Composite Material Optimization with Tool on CNC Lathe - with Testing and Material: A Comprehensive Systematic Review

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Abstract:

Metal matrix composites (MMCs) aient surtout les composites à base d'aluminium renforcés au carbure de silicium (SiC), qui sont incontournably excellent strength-to-weight ratio, wear resistance and thermal stability. However, one of the biggest challenges that come with these hard ceramic reinforcements during machining are the excessive tool wear, poor surface finish, and unstable cutting conditions. In order to solve these problems, the optimization of machining parameters has become an important area of research. The current state of the art in the milling of Al-SiC composites is characterized by the formation of serrated chips and the occurrence of micro-cracking on the surface of the workpiece. The microscopic mechanisms of deformation were investigated and the long-term fluctuations in the cutting force component were monitored and analysed on the basis of changes in the chip thickness and cutting speed. A review of the literature reveals a number of major experimental and statistical approaches such as Design of Experiments (DOE), Taguchi methods, Response Surface Methodology (RSM), etc. The experiment criteria like cutting speed, feed rate, depth of cut greatly influenced the machining process and thus were discussed in detail. Moreover, the timely developments in hybrid machining, assisted machining, and predictive modeling techniques are pointed out. This review indicates where research is lacking and also suggests the directions to be taken in the future to obtain the benefits of high productivity, better surface quality, and longer tool life in composite machining.

Index Terms:

Metal Matrix Composite; CNC Machining; Surface Roughness; Material Removal Rate; Response Surface Methodology

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A Review of Automated IoC Extraction using Machine Learning

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Abstract:

Indicators of Compromise (IoC) are foundational details found within usually unstructured forms of data spread across threat reports, security blogs, and various other Open-Source Intelligence (OSINT) platforms on threat and vulnerability exploit details that are essential for identifying the exact location and method used by threat vectors in an attack. However manual extraction of such vast data can be inefficient when an organization's sensitive data is at stake, which are more often than not is the actual intent of threat actors. And thus, automating the process of IoC extraction has become key necessity in improving Cyber Threat Intelligence (CTI). This paper aims to provide a comprehensive review of existing Machine Learning (ML) techniques used for automated IoC extraction from unstructured textual data. Authors will be analyzing existing approaches across Rule Based, Named Entity Relationship (NER), (BERT), BiGRU, amongst others. And also dive into the challenges and research gaps that arise in the possibility of generalization, explainability and ML based IoC extraction systems.

Index Terms:

Indicators of Compromise (IoC), automation, Machine Learning (ML), Cyber Threat Intelligence (CTI), Open-Source Intelligence (OSINT)

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Review on Optimized Design and Computational Analysis of CPU Cooling Fan Blades

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Abstract:

The rapid evolution of high-performance computing systems has led to a substantial increase in heat generation within modern CPUs, making efficient thermal management a critical design challenge. Conventional air-cooling solutions predominantly rely on plastic fan blades, which are lightweight and economical but suffer from low thermal conductivity and limited durability. Recent research has increasingly focused on improving cooling performance through advanced material selection, optimized blade geometry, and computational analysis techniques. This review paper systematically examines recent advancements in CPU cooling fan blade design, with particular emphasis on aluminum blades, blade angle optimization, and Computational Fluid Dynamics (CFD)-based analysis. The reviewed studies highlight how material replacement and aerodynamic optimization significantly enhance airflow, heat dissipation, and overall cooling efficiency. Additionally, emerging trends such as machine-learning-assisted optimization, hybrid cooling technologies, and integrated system-level design are discussed. Key challenges, including increased blade weight, noise generation, and rotational balance, are also analyzed. The review identifies existing research gaps and provides valuable insights for developing efficient, durable, and high-performance CPU cooling solutions suitable for next-generation computing applications.

Index Terms:

CPU Cooling Fans, Aluminum Fan Blades, Thermal Management, Computational Fluid Dynamics (CFD), Airflow Optimization

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Review on Modeling and Analysis of an Ev-Specific Differential Gear-Box and Its Casing

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Abstract:

The rapid growth of electric vehicles (EVs) has intensified research on lightweight, efficient, and durable drivetrain components, particularly differential gearbox housings. This literature review examines recent advancements in the design, material selection, and analysis of EV-specific gearbox casings. Studies highlight that traditional cast iron and steel housings, although strong, significantly increase vehicle weight and reduce energy efficiency. To overcome this limitation, researchers have explored lightweight materials such as aluminum alloys, magnesium alloys, and hybrid composites, which offer improved strength-to-weight ratios and enhanced thermal performance. Finite Element Analysis (FEA) and modal analysis are widely employed to evaluate stress distribution, deformation, and vibration characteristics under operational loads. Several studies demonstrate that topology optimization and additive manufacturing techniques enable substantial mass reduction while maintaining structural integrity and NVH performance. Additionally, integrated modeling approaches that consider gears, shafts, bearings, and casing interactions have improved vibration prediction accuracy. However, the review reveals gaps in experimental validation, thermal–structural coupling, and EV-specific design standardization. Overall, the reviewed literature emphasizes the necessity of holistic design methodologies combining lightweight materials, advanced simulation tools, and manufacturability considerations to enhance the performance, reliability, and efficiency of electric vehicle gearbox systems.

Index Terms:

Electric Vehicles (EVs), Differential Gearbox, Lightweight Materials, Finite Element Analysis (FEA), Modal and NVH Analysis

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Fostering Achievement: The Pivotal Function of Emotional Intelligence in the Food Sector

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Abstract:

Proficient emotional awareness capable of gauging and guiding personal feelings alongside interpreting and affecting those of others is crucial for successful individuals navigating the demanding environment of contemporary gastronomy. In this field, there's an intense atmosphere characterized by intricate teamwork dynamics and rapid alterations; these factors necessitate both proficient technical knowledge as well as robust communication abilities. The study explores the pivotal function of emotional intelligence by concentrating on four fundamental aspects: understanding oneself deeply, managing emotions effectively, empathizing with others, maintaining high levels of intrinsic drive, and developing strong interpersonal abilities. These components greatly improve an individual's ability to handle pressure, interact well in conversations, address disagreements constructively, and foster a pleasant work environment. Practical outcomes related to Emotional Intelligence's role within the culinary sector are examined as well; these include how it affects customer satisfaction levels, managerial efficiency, group dynamics among employees, and employee loyalty. The study emphasizes this link by illustrating its significance for achieving superior performance within the industry through enhanced emotional awareness.

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Review of Adaptive Multi-Model Cybercrime Identification using Machine Learning and Explainable AI

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Abstract:

This paper presents an adaptive multi-model framework for cybercrime identification and prediction by integrating machine learning with explainable artificial intelligence (XAI). A multi-stage pipeline is developed that preprocesses cybercrime-related text, applies advanced ML models for classification, and incorporates XAI techniques such as LIME and SHAP to enhance interpretability. The framework not only achieves high accuracy in detecting malicious communication but also provides human-understandable justifications for each prediction, thereby improving trust and accountability. With real-time monitoring and continuous learning capabilities, the system is designed to evolve with emerging cybercrime patterns, ensuring robustness and applicability in diverse domains such as social media moderation, enterprise communication security, and law enforcement support.

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Thermal Analysis of Various Duct Cross Sections

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Abstract:

Heating, Ventilation, and Air Conditioning (HVAC) duct systems play a vital role in maintaining indoor thermal comfort and energy efficiency. The cross-sectional geometry of ducts significantly influences airflow characteristics, heat transfer performance, and pressure losses. This project presents a detailed thermal and flow analysis of HVAC ducts with different cross sections, including circular, rectangular, and modified geometries, to evaluate the impact of design changes on system performance. Computational Fluid Dynamics (CFD) simulations and analytical methods are employed to study temperature distribution, velocity profiles, heat transfer coefficients, and pressure drop under identical operating conditions. The results indicate that circular ducts offer lower pressure losses and more uniform airflow, while rectangular and altered cross sections show higher heat transfer rates due to increased surface area, accompanied by higher frictional losses. Design modifications demonstrate measurable improvements in thermal efficiency and airflow distribution when optimized geometries are adopted. The study provides practical guidelines for selecting and modifying HVAC duct cross sections to enhance thermal performance, reduce energy consumption, and improve overall system efficiency.

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Detecting Online Recruitment Fraud Using Deep Learning Approaches

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Abstract:

Online recruitment platforms have revolutionized the hiring process, but they have also given rise to fraudulent job postings, causing financial losses for job seekers. To address this issue, a deep learning-based methodology is proposed for detecting online recruitment fraud (ORF) using a novel dataset sourced from Fake Job Posting, Pakistan Job Posting, and US Job Posting datasets. The approach leverages Bidirectional Encoder Representations from Transformers (BERT) and Robustly Optimized BERT Pre-training Approach (RoBERTa) to transform job details into numerical vectors. To tackle the high-class imbalance in the dataset, the SMOTE variant, SMOBD, is applied for effective class balancing. The experimental framework integrates these enhanced features with a two-dimensional Convolutional Neural Network (CNN2D) for job classification. Results demonstrate that the combination of BERT features and SMOBD with CNN2D achieves the highest classification accuracy of 98.68%. This methodology addresses the limitations of outdated datasets, providing a robust solution for detecting fraudulent job postings and significantly contributing to the prevention of online recruitment scams.

Index Terms:

Online Recruitment Fraud/ Job Scams, Transformer Based Models, Class Imbalance, Real Time Fraud Detection

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A Lightweight Image Encryption Algorithm Based on Secure Key Generation

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Abstract:

With the rapid growth of digital image transmission and cloud-based storage, ensuring confidentiality and integrity of visual data has become a critical security requirement. Image encryption plays a vital role in protecting sensitive information from unauthorized access and cyber threats. This work presents a complete image encryption and decryption framework based on the Advanced Encryption Standard (AES), implemented entirely from first principles without reliance on external cryptographic libraries. The system accepts arbitrary digital images as input and transforms pixel-level data into secure binary cipher text using AES symmetric key cryptography. The encryption process converts image information into non-interpretable binary data, preventing visual or statistical inference attacks. The encrypted output is stored in a dedicated repository and cannot be viewed or reconstructed without the correct decryption process. During decryption, the encrypted binary data is reprocessed using the same AES key and algorithmic structure to accurately recover the original image without loss of quality. The framework supports flexible image formats and demonstrates reliable reversibility, confidentiality, and robustness against unauthorized access. By integrating encryption and decryption within a single application workflow, the system ensures secure image handling while maintaining computational efficiency. The approach highlights the effectiveness of AES for multimedia security applications, particularly in scenarios involving secure image storage, transmission, and access control.

Index Terms:

Image Encryption, Advanced Encryption Standard, Symmetric Cryptography, Binary Cipher Data, Secure Image Transmission, Data Confidentiality, Cryptographic Security, Image Decryption

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Physiological Signal-Based Pain Detection With Hierarchical Context Information

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Abstract:

The project aims to develop an automatic pain recognition system in healthcare, removing the dependence on medical expertise for manual feature extraction from physiological signals. This shift addresses the limitations of conventional methods, making pain recognition more accessible and widely applicable. The proposed solution introduces a deep learning model that uniquely combines the roles of feature extraction and classification. By leveraging the strengths of deep neural networks, this approach streamlines the process, eliminating the need for separate feature engineering and classification steps commonly found in traditional methods. The project introduces a novel aspect by incorporating multi-level context information for each physiological signal. Unlike uni-level context information used in prior approaches, this multi-level understanding aims to provide a more nuanced perspective on pain and painlessness. It enhances the discriminative power of the model by considering various levels of context within the physiological signals. The deep learning approach demonstrated in the project showcases its superiority in handling physiological signals for pain recognition. By eliminating the need for explicit feature engineering by medical experts, the model can autonomously learn and extract relevant features directly from the data. This not only marks a significant advancement over conventional methods but also enhances the efficiency and accuracy of pain recognition based on physiological signals.

Index Terms:

Pain Recognition, Physiological Signals, Context Vector, Attention Module, Deep Learning

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Cybernetic Approaches in Computer-Aided Education: Trends and Challenges

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Abstract:

The rapid spread of digital technologies has gradually reshaped how education is organized, delivered and evaluated. Within the changing landscape and interaction between computer science and cybernetics has become increasingly relevant particularly as educators seek more responsive and flexible learning system. The paper explore how computer supported learning environment influenced by cybernetic thinking are being incorporated into modern teaching practices to better address the diverse need of learners. Rather than treating technology as a passive instructional tool the study considers how cybernetic principles introduce feedback, adaptability and self-regulation into educational system. By examining practical examples from real learning context the paper illustrates how these approaches have supported innovation and contributed to improved academic outcome. It will also reflect on the historical development of cybernetics in education tracing how early theoretical concepts evolved into practical applications within classrooms and digital platform. Focus is given to current developments such as adaptive instructional design and the use of learning data to refine educational experiences over time. At the same time the paper acknowledge the challenges involved in applying cybernetic models including infrastructure limitations, changes in teaching roles and concerns related to ethics and data responsibility. Evidence from selected cases when these issues are carefully addressed, cybernetic approaches can increase student engagement and enhance learning effectiveness. Overall the paper argues that computer-based cybernetics has the potential to play a significant role in the ongoing transformation of education. It concludes by emphasizing the importance of continued experimentation critical evaluation and research as educational systems continue to adapt to an increasingly technology-driven world.

Index Terms:

Computer-Based Education, Cybernetic Principles, Personalized Learning, Educational Technology, Pedagogical Innovation

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Decentralized Blockchain-Based Intrusion Detection System for Zero-Day Threats in IoT Environments

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Abstract:

The rapid Development of Internet of Things devices enabling connectivity and automation like never before but significant security issues that current systems are now facing especially against zero-day attacks that use unknown vulnerabilities to their advantage. Conventional centralized and signature-based intrusion detection systems are becoming more and more ineffective with the problem of scalability, single-point failure and failure to identify emerging threats. In this paper, it is suggested to use a Decentralized Blockchain-Based Intrusion Detection System to large-scale IoT settings. The system combines federated learning with anomaly-based detection, where each node of the IoT can locally train intrusion detection models on the data that it has observed on the network without compromising data privacy. A permissioned blockchain offers a decentralized coordination layer, that is guaranteed by integrity, authenticity, and trust on model updates by smart contract verification. Federated learning combined with blockchain increases the performance of detection. The decentralized architecture is fault-tolerant and can always be operational even whenever the nodes are compromised, thus it can be used in the most critical IoT applications like smart grids, healthcare-monitoring, and industrial systems. The experimental validation shows that the given DB-IDS is applicable in detecting zero-day attacks with a high level of privacy, scalability, and robustness, that is a powerful step to the next stage of IoT security architectures.

Index Terms:

Blockchain, IoT Security, Zero-Day Attack Detection, Intrusion Detection System, Federated Learning, Anomaly Detection, Smart Contracts, Machine Learning

ISBN: 978-81-981425-0-4

Deterministic Distributed Lock Management for Multi Node Environments

Vijaya Krishna Namala

Abstract:

Distributed lock management is a fundamental component of multi node transactional systems, enabling concurrent access to shared resources while preserving correctness and consistency. In modern distributed environments, transactions frequently span multiple nodes and compete for shared data objects, making lock coordination both complex and performance critical. Existing distributed lock management mechanisms predominantly rely on nondeterministic lock acquisition, where lock requests are granted based on arrival order, timing, and runtime conditions. While such approaches are flexible, they introduce unpredictability in lock ordering, leading to circular wait conditions, deadlocks, repeated retries, and increased coordination overhead as system scale and concurrency levels grow. Lock conflicts propagate across nodes, amplifying delays during transaction execution and commit coordination. Deadlock detection and resolution mechanisms further add reactive overhead, often requiring transaction aborts or rollbacks that negatively impact throughput stability and system predictability. These challenges highlight a fundamental limitation in existing approaches, where correctness is preserved but performance degradation becomes unavoidable under high contention and large scale deployments. This research addresses these limitations by investigating deterministic distributed lock management for multi node environments. The proposed approach focuses on enforcing predefined lock ordering and structured lock acquisition rules across nodes, reducing ambiguity in lock interactions. By introducing determinism into lock coordination, the study aims to eliminate circular wait conditions at the design level rather than resolving them reactively at runtime. The work examines how deterministic lock management can provide predictable execution behavior, bounded lock wait times, and improved coordination efficiency while preserving transactional correctness. The objective of this research is to analyze the applicability, design considerations, and scalability implications of deterministic lock management in distributed systems, and to establish a structured framework for reducing contention induced inefficiencies in multi node transactional environments.

Index Terms:

Deterministic, Nondeterministic, Locking, Concurrency, Transactions, Deadlocks, Scalability, Coordination, Consistency, Synchronization, Contention, Scheduling, Throughput, Distributed

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The Learning Impact of 3D Visualization in Computer Science

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Abstract:

The main focus of this research is on finding out the role of 3D visualization in learning processes and cognitive load in computer science education among bachelor students in Kazakhstan. The sample included 84 participants, half of them were in the control group (2D), and the other half in the experimental group (3D). Both groups underwent a cognitive load survey, based on NASA-TLX dimensions, and a preliminary and post-test on how well they understood sorting algorithms. The experimental group scored much higher on the post-test ($M = 89.43$, $SD = 6.35$) than the control group ($M = 73.23$, $SD = 7.67$), $t(82) = -10.55$, $p < .001$, which shows a large effect size (Cohen's $d = 2.30$). When comparing results, it was important to note that both groups significantly increased their performance; however, the 3D group improved much more (+28.21 vs. +13.65). Students who used 3D visualization had less cognitive demand ($p < .001$) and less frustration ($p < .001$), but there were no significant differences in other areas. The correlation between learning performance and cognitive load was weak and non-significant ($r = -0.12$, $p = .278$). These findings show that usage of 3D visualization not only improves conceptual understanding but also does not increase cognitive load; that's why it is an effective tool for computer science education.

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A Scalable Architecture for Efficient and Resilient Microservices Deployment Using GitOps, Service Mesh, and Queueing-based Autoscaling

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Abstract:

The microservices architecture has transformed enterprise application development by promoting modularity, scalability, and rapid delivery. Yet, deploying and operating hundreds of independently scaled services introduces persistent challenges, particularly in maintaining observability, deployment consistency, and resource efficiency. This paper introduces a comprehensive deployment architecture that integrates declarative GitOps workflows, a service mesh for uniform observability and communication, and a queueing-theory-driven autoscaler that adapts to real-time workload dynamics. Our implementation leverages Argo CD, Istio, and Kubernetes on Amazon Elastic Kubernetes Service (EKS), supporting over 150 microservices. Experimental validation under a production-scale retail workload achieved a 37% reduction in p95 latency and 28% cost savings compared to the standard Kubernetes Horizontal Pod Autoscaler (HPA). Key contributions include: (i) a modular reference architecture for capstone and enterprise use, (ii) a replica estimation algorithm based on M/M/m queuing models, and (iii) open-sourced manifests and pipeline templates to promote reproducibility.

Index Terms:

Scalable Deployment; Kubernetes; CI/CD; Autoscaling; Cloud Native

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PATHFINDER: An AI - Driven Personalized Learning Platform

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Abstract:

As we navigate into a digital transformation, learners and workers will continue to encounter increased challenges delineated in an unveiled desire to identify skills, match the pace of the market, and ascend career radars. Pathfinder.ai is designed to meet this desire with an adaptive learning platform that has embedded career intelligence and AI supported professional tools. The adaptive learning platform uses Gemini AI engine/s for dynamic learning content and customized implement options, Next.js and Shadcn UI for responsive design and frame, Prisma ORM for data modeling purposes, and Clerk utilizes their [user authentication security] for security purposes under a modular architecture approach. Users will have access to AI (and mediated) learning journeys and industry insight dashboards, AI resume enhancements and cover letter writing, along with intelligent interview simulations. Pathfinder.ai has developed a creative and deliberate value when considering use for planning to work up the labor market due to the integration of AI personalization, [utilizing labor market information for analysis], including the labor market in real time, and pathfinders' premise of long-run professional adaptability and/or employability.

Index Terms:

Artificial Intelligence, Personalized Learning, Adaptive Systems, Career Insights, Resume Optimization, Gemini AI, Next.js, Shadcn UI, Prisma ORM, Clerk Authentication

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Enhancing Toward a Sustainable Architectural Education Model Using Blockchain-Based Metaverse Platforms: An Extended Study of Decentraland for Future Digital Learning and Industry Readiness

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Abstract:

The rapid advancement of Web 3.0 and blockchain-based metaverse platforms has transformed digital architecture from symbolic representation into a potential educational infrastructure. Previous research by Setiadi et al. (2025) positioned Decentraland as a socio-symbolic and technological spatial construct; however, its structured integration into architectural education and sustainability discourse remains underexplored. Despite increasing interest in metaverse environments, limited studies examine their pedagogical structure, sustainability implications, and alignment with industry-ready competencies. This gap creates an urgent need to conceptualize metaverse platforms as sustainable learning ecosystems rather than experimental digital spaces, but as sustainable and structured learning environments capable of responding to contemporary digital transformation challenges in higher education. This study aims to develop a conceptual framework for integrating blockchain-based metaverse platforms into sustainable architectural education. It investigates how Decentraland can function as a virtual design studio that supports environmentally efficient learning practices, enhances digital literacy, and strengthens competencies aligned with industry-ready ecosystems. A qualitative conceptual-analytical approach was employed, combining virtual spatial observation, analysis of decentralized governance mechanisms (DAO), and curriculum mapping against digital industry competency standards. The analysis focuses on sustainability integration, digital skill formation, and ecosystem alignment. The expected outputs of this research include the formulation of a metaverse-integrated pedagogical framework for architectural education, the development of a sustainability-oriented virtual studio model that reduces dependency on physical resources, and a structured competency mapping scheme aligned with Web3 professional practices. These outputs are intended to support curriculum transformation toward digitally mediated, environmentally conscious, and industry-ready architectural education for future professionals.

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The Implementation and Effectiveness of Social Customer Relationship Management (Social CRM) in Improving Sales Performance and Customer Loyalty at PT XYZ Car Dealer

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Abstract:

The rapid growth of digital transformation and social media penetration in Indonesia has significantly reshaped customer behavior in the automotive industry. PT XYZ, a medium-to-large scale car dealer operating in South Tangerang, serves approximately 3,500 active customers annually with 300–500 new vehicle transactions per year. Despite adopting Social Customer Relationship Management (Social CRM), challenges remain in system integration, digital competency of human resources, and measurement of business impact. This study aims to analyze the implementation and effectiveness of Social CRM from technological, organizational, and customer perspectives during the 2024 operational period. The research examines system quality, information quality, digital service quality, managerial support, and their impact on customer satisfaction, loyalty, and sales performance. The findings indicate that integrated digital interaction and responsive multichannel communication significantly improve customer engagement and repeat purchase intention. However, limited integration between social media platforms and internal systems remains a key constraint. The study concludes that Social CRM serves as a strategic instrument to strengthen competitive advantage and support sustainable sales growth in Indonesia's highly competitive automotive market.

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FragranceGuard: Your Scent Shield – A Smart Odor Detection Solution for Fresh and Clean Bathrooms

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Abstract:

Inadequate bathroom cleaning practices can result in significant odor accumulation, particularly if urine and feces residues are not thoroughly removed from toilet bowls. The FragranceGuard study aimed to develop a smart odor-detection solution for bathrooms by integrating gas sensors and air quality monitoring technologies to enhance data accuracy related to odors, occupancy, and environmental conditions. The study utilized a handheld portable air quality detector, incorporating gas sensors for precise odor data collection, a motion sensor for occupancy detection, and DHT11, PMS 7003, and VOC sensors for monitoring environmental conditions. Principal Component Analysis (PCA) of the MQ gas sensors revealed that MQ4, MQ6, MQ8, and MQ9 are positively correlated and effectively respond to environmental changes, with MQ9 showing an inverse relationship. Sensors MQ4, MQ6, MQ9, and MQ135 demonstrated heightened sensitivity to bad odors, confirming their reliability in detecting unpleasant smells. MQ8 consistently detected hydrogen, and MQ7 stabilized after an initial rise. The study validated the effectiveness of MQ gas sensors in detecting unpleasant odors during bad odor testing. This validation supports the use of these sensors for effective air quality monitoring and odor detection. The study successfully developed FragranceGuard to provide a smart odor- detection solution for maintaining fresh and clean bathrooms using gas sensors and other air quality monitoring technologies.

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Relationship between Meta Cognitive Skills and Perceived Employability: A Comparative Study of Male and Female Students

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Abstract:

Facing the issue of a lack of talents with innovative competitiveness and metacognition, creative, innovative, and Perceived Employability has been regarded as a crucial factor in enhancing national competitiveness and employability status. The trend of Meta Cognitive Skills and Perceived Employability implemented in higher education. However, limited research is available to understand the role Meta Cognitive Skills and perceived employability, especially in postgraduation students. The purpose of the present research was to study the relationship between Meta Cognitive Skills and on Perceived Employability in students. The study was conducted on 50 postgraduate students. The study focused on studying a group of young population who are going to shift from students to employees therefore the age range was kept from 21 years to 25 years. Participants included 50% female and 50% male undergraduate students. The collection of primary data is facilitated through a survey method which includes close-ended questionnaires and self-administered standardized tests. The research found a positive moderate correlation between Meta Cognitive Skills and Perceived Employability. A significant difference was not found in male and female participants on both variables. The research findings are important for strengthening and encouraging students to develop Meta Cognitive Skills and positively perceived employability while pursuing their studies at universities.

Index Terms:

Meta Cognitive Skills, Perceived Employability, Postgraduate Students

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Enhancing Cluster Performance by Reducing Response Time Variance Issues

Naveen Kumar Bandaru

Abstract:

Distributed transactional systems are widely deployed to achieve scalability and parallel execution by distributing workloads across multiple nodes. While increasing cluster size typically improves throughput, existing architectures often suffer from significant fluctuations in response times. This variance, or jitter, arises from synchronization delays, cross node communication overhead, and uneven workload distribution. Conventional sharding and static placement strategies exacerbate the problem by scattering related data across multiple shards, forcing transactions to span nodes and incur additional coordination. As concurrency grows, these cross shard interactions amplify waiting times, leading to unpredictable response behavior. Even when average latency remains acceptable, the inconsistency in response times undermines system reliability, degrades user experience, and restricts the ability to meet service level objectives. Current monitoring and scheduling mechanisms primarily optimize for mean latency or throughput, neglecting the critical dimension of variance. This oversight results in systems that appear efficient under average conditions but fail to deliver stable performance under realistic workloads. This paper addresses the challenge of response time variance by proposing a process oriented improvement framework that integrates adaptive shard management, locality aware scheduling, and variance focused telemetry analysis. The approach emphasizes minimizing inter shard communication and balancing workloads dynamically to reduce jitter across clusters of varying sizes. Experimental evaluation across 3, 5, 7, 9, and 11 node clusters demonstrates that the proposed framework not only sustains throughput but also significantly stabilizes response times. By quantifying variance alongside traditional metrics, the study highlights the importance of predictability as a core performance objective in distributed environments. The findings establish that reducing response time variance is essential for enhancing cluster performance, ensuring consistent transaction execution, and enabling scalable, dependable distributed systems suitable for modern cloud infrastructures.

Index Terms:

Clusters, Scalability, Variance, Latency, Throughput, Synchronization, Sharding, Overhead, Locality, Scheduling, Efficiency, Performance

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