

IC-ESSU 2026

6th International Conference on
Engineering, Social-Sciences and Humanities

📍 27th–28th April 2026 📅 Manila, Philippines



Organized by

IFERP Academy-Philippines Society

Academic Partners

Jose Maria College Foundation, Inc., Philippines

University of Science and Technology of
Southern Philippines, Philippines

Cor Jesu College Inc., Philippines

Rizal Technological University, Philippines

Conference Partner

DOST-NCR (Director of the Department of Science
and Technology-National Capital Region), Philippines

6th International Conference on Engineering, Social-Sciences and Humanities (ICESSU-2026),
Manila, Philippines

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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 6th International Conference on Engineering, Social-Sciences and Humanities (ICESSU-2026) organized by Jose Maria College Foundation, Inc. (Philippines), University of Science and Technology of Southern Philippines (Philippines), Cor Jesu College Inc. (Philippines), Rizal Technological University (Philippines) and IFERP Academy-Philippines Society on April 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 Educational Research. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for ICESSU-2026 contain the most up-to-date, comprehensive, and globally relevant knowledge in the field of Engineering, Social-Sciences and Humanities. All submitted papers were subject to rigorous peerreviewing 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 Engineering, Social-Sciences and Humanities 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 ICESSU-2026.

Since January 2026, the Organizing Committees have received more than 100+ manuscript papers, covering all aspects of ICESSU-2025. After review, approximately 60+ papers were selected for inclusion in the proceedings of ICESSU-2026. We would like to thank all participants at the conference for their significant contribution to its success.

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

About ICESU 2026

We are delighted to welcome you to the 6th International Conference on Engineering, Social Sciences, and Humanities (ICESU-2026), taking place on April 27th-28th, 2026, in Manila, Philippines. Organized by Jose Maria College Foundation, Inc. (Philippines), University of Science and Technology of Southern Philippines (Philippines), Cor Jesu College Inc. (Philippines), Rizal Technological University (Philippines) and IFERP Academy-Philippines Society, this prestigious event unites scholars, researchers, and professionals from across the globe to explore innovative solutions that drive sustainable development. With the theme "Empowering the Next Generation: Technology and Education for Achieving Global Sustainability," ICESU 2026 provides a dynamic platform for knowledge exchange, collaboration, and inspiration to address global challenges through multidisciplinary perspectives.

The purpose of the 6th International Conference on Engineering, Social Sciences and Humanities (ICESU-2026) is to create a global platform where academia, industry, and policymakers converge to address the evolving challenges of sustainability. By integrating perspectives from engineering, social sciences, and humanities, the conference seeks to highlight the transformative role of technology and education in shaping a sustainable future. It aims to inspire innovative research, foster cross-disciplinary dialogue, and empower participants to contribute practical solutions that drive social progress, economic growth, and environmental responsibility on a global scale.

Objectives of the Conference

Promote Multidisciplinary Collaboration: By bringing together experts from engineering, social sciences, and humanities to share innovative ideas and practices.

Explore Sustainable Solutions: Explore Sustainable Solutions through technology and education that address pressing global challenges.

Encourage Knowledge Exchange: by providing a platform for researchers, academicians, and industry professionals to present and discuss their findings.

Empower the Next Generation: with insights, tools, and strategies for creating a more sustainable future.

Strengthen Global Networks: by fostering meaningful collaborations among participants from diverse disciplines and regions.

Scope of the Conference

Engineering & Technology: Emerging technologies, smart systems, sustainable infrastructure, and innovations driving global development.

Social Sciences: Societal transformation, education, psychology, economics, governance, and community development.

Humanities: Culture, ethics, communication, history, literature, and their role in shaping sustainable societies.

Electronics & Communication Engineering: 5G/6G Networks, Embedded Systems, Wireless Communication, and VLSI Design.

Global Sustainability: Integrating multidisciplinary approaches to achieve the United Nations Sustainable Development Goals (SDGs).

About IFERP Academy

IFERP Academy is a non-profitable professional association meant for research and development in the fields of Engineering, Science & Technology. With a global presence, IFERP is committed to advancing knowledge across diverse disciplines through international conferences, workshops, and scholarly publications. We provide help, assistance, and direction in preparation for SCI and SCIE journal publishing. These journals undergo a rigorous peer-review process to ensure the quality publication of the most fascinating findings on Arts & Science, Management, Engineering, and Technology.

IFERP has established robust scientific, academic, and industry networks throughout Asia, the Middle East, and Europe. Some of the countries that IFERP has its presence, include Iraq, Maldives, Thailand, Malaysia, Singapore, Philippines, Indonesia, Taiwan, Vietnam, UAE, Australia, Japan, Sri Lanka, Nepal, Ghana, and Africa. As a hub for educational and research initiatives, IFERP plays a pivotal role in shaping the landscape of global academia, fostering innovation, and contributing to the advancement of knowledge across borders.

What We Do?

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

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

Message from **Director, IFERP**

**Siddth Kumar
Chhajer**

Managing Director, IFERP,
Technoarete Group, India



On behalf of IFERP & the organizing Committee, I express my hearty gratitude to the Participants, Keynote Speakers, Delegates, Reviewers and Researchers.

The goal of the 6th International Conference on Engineering, Social-Sciences and Humanities (ICESSU-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 Educational Research.

This conference creates solutions in different ways and to share innovative ideas in the field of Engineering, Social-Sciences and Humanities. ICESSU-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.

6th International Conference on Engineering, Social-Sciences and Humanities (ICESSU-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. ICESSU-2026 hopes to set the perfect platform for participants to establish careers as successful and globally renowned specialists in the field of Engineering, Social-Sciences and Humanities.

Message from **CEO, IFERP**

**Rudra Bhanu
Satpathy**

CEO, IFERP,
Technoarete Group, India



IFERP is hosting the 6th International Conference on Engineering, Social-Sciences and Humanities (ICESSU-2026) this year in month of April, 2026. The main objective of ICESSU-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.

Message from **President, CJC**

**Br. Ellakim P.
Sosmeña**

School President,
Cor Jesu College, Inc.



On behalf of Cor Jesu College Inc., we warmly welcome all participants to the 6th International Conference on Engineering, Social Sciences and Humanities (ICESSU 2026), organized by the Institute for Educational Research and Publication (IFERP)-Academy. We are pleased to be part of this meaningful gathering as a partner institution.

We are especially honored that IFERP continues to include the Philippines among its conference venues. Hosting ICESSU 2026 in Manila offers a valuable opportunity for Filipino researchers to engage with the international academic community, share their work, and learn from diverse perspectives. At the same time, we are delighted to welcome our international guests and hope you find both the conference and the country enriching and inspiring.

Conferences such as ICESSU play an important role in bringing people together, not only to present research but to exchange ideas, build connections, and encourage collaboration across disciplines. They remind us that knowledge grows stronger when it is shared, discussed, and applied in meaningful ways.

We are encouraged by the strong participation from researchers across the globe, which reflects a shared commitment to advancing knowledge and addressing today's challenges through research and innovation.

As you take part in the sessions and discussions over the period of this conference, we hope you find this conference both productive and rewarding. May it open new opportunities for collaboration and contribute to your continued growth as scholars and professionals.

Once again, welcome to ICESSU 2026, and we wish you a fruitful and engaging conference experience.

Message from **President, RTU**

**Dr. Ma. Eugenia
M. Yangco**

University President,
Rizal Technological University,
Philippines



Pagbati mula sa Pandayang Rizalia!

On behalf of Rizal Technological University, we proudly express our full support for the successful conduct of the 6th International Conference on Engineering, Social Sciences and Humanities (ICESSU 2026). As an academic partner and co-host, RTU is honored to stand alongside IFERP in advancing a shared mission of promoting research, innovation, and global academic engagement.

In an increasingly interconnected world, the importance of collaboration among nations cannot be overstated. Research today thrives not in isolation, but in synergy—where diverse perspectives, cultures, and expertise converge to address complex global challenges. Conferences such as ICESSU provide a vital platform for sharing, exchanging, and disseminating research insights, ensuring that knowledge generated in one part of the world can inform, inspire, and create impact in another. Through these meaningful interactions, we build bridges that strengthen both academic communities and societal progress.

Anchored in our institutional mantra, “Pandayang Rizalia,” Rizal Technological University remains committed to shaping research that is transformative, relevant, and globally responsive. Like a panday who forges strength and purpose from raw material, we cultivate ideas through collaboration and scholarly exchange—refining them into knowledge that contributes to both local development and international discourse. This philosophy underscores our strong commitment to internationalization, where research becomes a shared endeavor for the advancement of humanity.

As reflected in Proverbs 27:17, “As iron sharpens iron, so one person sharpens another,” this gathering exemplifies how scholars and professionals uplift one another through the exchange of ideas, constructive dialogue, and collaborative discovery.

We extend our sincere gratitude to the Institute For Educational Research and Publication (IFERP), its dedicated organizers, and all esteemed partners and participants for making this global academic convergence possible. Your commitment to fostering research collaboration and knowledge dissemination continues to inspire institutions like ours to pursue excellence beyond borders.

May ICESSU 2026 serve as a catalyst for stronger international partnerships, impactful research outcomes, and sustained academic collaboration across nations.

Once again, Rizal Technological University conveys its unwavering support and looks forward to the continued success of this meaningful international endeavor.

Salamat, and Mabuhay!

Message from Chancellor, USTP

**Atty. Dionel
A. Albina**

Chancellor, University of Science and
Technology of Southern Philippines
(USTP), Cagayan de Oro City,
Philippines



Good morning to everyone present-distinguished guests, esteemed scholars, researchers, faculty members, industry partners, and dear students.

It is both an honor and a privilege to stand before you today as the Guest of Honor for the 6th International Conference on Engineering, Social Science, and Humanities (ICESSU 2026). I extend my sincere appreciation to the IFERP Academy-Philippines Society for the invitation and for organizing a gathering of such academic significance.

Events like this remind us why we pursue knowledge-not only to advance our individual disciplines, but to contribute meaningfully to society. In a world that is increasingly complex and interconnected, the boundaries between engineering, social sciences, and the humanities are no longer rigid. Instead, they intersect in powerful ways, shaping how we understand problems and how we design solutions.

As Chancellor of the University of Science and Technology of Southern Philippines - Cagayan de Oro, I have seen firsthand how innovation thrives when diverse perspectives come together. Engineers working alongside social scientists. Technologists collaborating with humanists. These are not just partnerships-they are necessities in addressing the challenges of our time, from climate change and digital transformation to social equity and sustainable development.

This conference embodies that spirit of collaboration. It provides a platform where ideas are exchanged, where research is challenged and refined, and where new partnerships are formed. More importantly, it fosters a community-one that transcends geography, discipline, and culture.

To our researchers and presenters, your work is the foundation of progress. Your dedication to inquiry, your commitment to rigor, and your willingness to

share your findings are what drive innovation forward. I encourage you to engage deeply, to ask difficult questions, and to remain open to new perspectives.

To our students and young scholars, you are not merely participants-you are the future of this academic community. Take this opportunity to learn, to connect, and to be inspired. The conversations you engage in today may very well shape the direction of your careers tomorrow.

And to the organizers, your efforts in bringing this conference to life-especially in a hybrid format-reflect adaptability and resilience. These qualities are essential in today's academic and professional landscape.

As we move forward in this conference, let us be guided by a shared purpose: to use knowledge not only for advancement, but for impact. Let us ensure that the ideas discussed here extend beyond these sessions and translate into actions that benefit our communities and our world.

Once again, thank you for the opportunity to be part of this meaningful event. I wish everyone a productive, insightful, and inspiring conference.

Good day, and mabuhay.

About Guest of Honor

Dr. Ambrosio B. Cultura II <<<

University System President, University of Science and Technology of Southern Philippines (USTP), Philippines



Dr. Ambrosio B. Cultura II is a leader, an innovator, and an educator. He is the 2nd University System President of the University of Science and Technology of Southern Philippines (USTP) and was reappointed for a second, four-year term in December 5, 2023. As a researcher, engineer, and educator he strongly advocated for innovation and technopreneurship as he deemed these solutions to sustain development.

He even spearheaded the USTP and the former Mindanao University of Science and Technology (MUST) in institutionalizing policies and implementation of programs supportive to this advocacy. These include the promotion of an Innovation Ecosystem in collaboration with the academe, industry, government, and the community to propel inclusive development not just in the region but in the country in general.

As an academician, he specializes in renewable energy hybrid systems, energy storage, smart grid, and distributed generation. He earned his graduate degree as Doctor in Philosophy in Electrical Power and Energy Engineering at the University of Massachusetts Lowell where he also earned his Master's degree funded by the Ford Foundation-International Fellowship Program. His expertise in the field of electrical engineering resulted to various research publications and citations and even recognitions in the national and international research arena. He further shared his expertise in many extension services that significantly benefitted communities.

One of which is the community in Tacloban, Leyte after surviving Typhoon Haiyan (Yolanda) with the project Disaster Response Initiative through Establishment of Emerging Communication System (DiRECS) supplied by solar photovoltaic system. For over 30 years in Public Service, Dr.

Cultura was able to pursue initiatives worthy of commendation due to the impact and opportunities they created. In the years 2021 and 2023, Dr. Cultura was recognized for his outstanding work and was awarded with the Regional Presidential Lingkod Bayan Award in the Individual Category of the Civil Service Commission (CSC) Search for Outstanding Government Workers.

In the same year, 2023, he was conferred the Presidential Lingkod Bayan Award for exceptional public service. With his professional accomplishment that ranges within the purview of Innovation and Technopreneurship, Research and Extension, Leadership and Management, and his COVID-19 counter-measures, Dr. Cultura was able to instigate meaningful development not only for the USTP, but more so on the community that the University serves.

Dr. Cultura is a father to six children and a husband to Mrs. Emersita O. Cultura. Despite his firm commitment to his profession as University President, educator and engineer, his ethics advocates for work-life balance and ensures time for his family and faith as an active member of the Catholic Church.

About Guest of Honor

Engr. Romelen T. Tresvalles <<<

Regional Director of the Department
of Science and Technology-National
Capital Region, Philippines



Engr. Romelen T. Tresvalles is the Regional Director of the Department of Science and Technology – National Capital Region. Prior to being the Regional Director, Engr. Tresvalles served other positions in the DOST-NCR where she specialized in her craft on technology transfer. Engr. Tresvalles has expertise in Technology Needs Assessment, and provision of Technical Assistance and Consultancy Services such as resource efficiency and cleaner production.

As a Certified Patent Agent, her knowledge on intellectual property and Technology Transfer Law was instrumental in the implementation of the Fairness Opinion Assessment Program spearheaded by the DOST-NCR. She conceptualized and spearheaded other technology transfer program implemented for startups such as the Innovations for Filipinos Working Distantly from the Philippines.

he is also instrumental in the implementation of the Miriam College PaIRS or Partners in Innovating Resilient Startups Center which was funded under the DOST-NCR Regional Grants-In-Aid. RD Tresvalles sits as a member of its board and works together with the NCR's consortium of technology business incubators to help build startups. She also introduced significant improvements and innovations in the implementation of the Small Enterprise Technology Upgrading Program and Community Empowerment thru Science and Technology Program in the NCR. RD Tresvalles sits as the Chairperson of the Regional Research, Development and Innovation Committee of the Regional Development Council in NCR, and sits as the Co-Chairperson of the Metropolitan Manila Industry, Energy, and Emerging Technology Research and Development Consortium.

She also sits as a member of the Board of Regents for various State Universities and Colleges in Metro Manila, continuously influencing these academic institutions to build a culture of research, development, technology transfer, and commercialization. She earned a Master's Degree in Public Management from the Ateneo De Manila University, and graduated with a Bachelor's Degree in Chemical Engineering from the University of the Philippines Diliman. She has been with the DOST-NCR for 15 years and has rose from ranks from being a Science Research Specialist to now its Regional Director.

About Invited Keynote Speaker

Mr. Rey Lugtu <<<

De La Salle University
Philippines



He is the Founder, CEO, and CTO of Hungry Workhorse, a digital, culture, and customer experience transformation consulting firm. He is an Institute Fellow at the US-based Institute for Digital Transformation, and Graduate at the Institute of Corporate Directors. He is the Chair of the Digital Transformation: IT and Enterprise Governance Program Committee at the FINEX Academy.

He is a Digital Transformation Consultant for De La Salle-College of Saint Benilde. He is a Professional Lecturer at the De La Salle University MBA program where he teaches strategic management and digital transformation. He is a business columnist and writer for The Manila Times, Manila Bulletin, Business World, and Pilipino Mirror; contributing author of the internationally acclaimed book, Digital Transformation Demystified and Editor-in-Chief and Contributing Author of the book, "Ethics: Enduring or Evolving?".

About Invited Keynote Speaker

Dr. Veronica S. Almase

Campus Director,
Polytechnic University of the
Philippines, Philippines



Dr. Veronica Sarcino-Almase is a dedicated educator, researcher, and academic leader with over 23 years of experience in higher education. She currently serves as Professor II and Campus Director at the Polytechnic University of the Philippines-Ragay Campus. Holding a Doctorate in Business Administration major in Marketing Management, she champions academic excellence, community engagement, and values-based leadership.

Her research centers on people-focused development, working closely with farmers, indigenous communities, and micro-entrepreneurs to promote sustainable enterprises and strengthen local economies. Her work has been presented at international conferences across Asia, Australia, and the United States, earning multiple Best Presentation and Best Paper awards.

Beyond research, she actively participates in university extension initiatives and mentors small business owners through the Department of Trade and Industry's Kapatid Mentor-Me Program. Dr. Almase advocates for interdisciplinary collaboration across engineering, social sciences, and sustainability—firmly believing that innovation must create meaningful impact and inclusive progress for communities.

About Invited Keynote Speaker

Dr. Jocelyn Sagun – De Vera <<<

Pangasinan State University
Philippines



Dr. Jocelyn Sagun-De Vera is an Associate Professor V and Dean of the College of Teacher Education at Pangasinan State University, Alaminos City Campus, Philippines. She earned her PhD in Educational Leadership and Management from Universidad de Dagupan and has extensive experience in teaching, research, and academic leadership.

With more than 15 years of service in higher education and additional years of teaching in private institutions, she has contributed significantly to teacher education, research development, and community extension initiatives.

Dr. De Vera is actively involved in scholarly research, with numerous publications in national and international peer-reviewed journals. Her research interests include educational leadership, teacher education, climate change awareness, gender and development, and community extension programs.

She has presented research at several international conferences and has received multiple recognitions for her academic and research contributions, including Outstanding Author of the Year and Outstanding Researcher awards. She currently serves as Editor-in-Chief of the International Journal of Education, Management and Social Sciences and participates as a reviewer and editorial member for several academic journals. In addition to her academic work, she leads community-based extension programs that support sustainable development and local empowerment.

As a resource speaker and international conference participant, Dr. De Vera continues to promote research collaboration, innovation in education, and community engagement.

About Invited Keynote Speaker

Dr. Renato L. Base

University of Science and Technology
of Southern Philippines
Cagayan de Oro Campus (USTP CDO)
Philippines



Dr. Renato L. Base is a distinguished scholar and institutional leader in Sociology, recognized for advancing research and practice in educational planning, public administration, and participatory governance.

He earned his MA and PhD in Sociology from Xavier University– Ateneo de Cagayan and has since built a career marked by academic rigor and leadership. Dr. Base was awarded the USTP Scientist Award (2024) for his outstanding contributions to science and innovation. He has served as Chairman of the Department of Public Administration (2018–2021) and currently leads the Department of Educational Planning and Administration at USTP.

With over 30 publications in international journals and book chapters, his work continues to influence the global academic community. A regular member of the National Research Council of the Philippines, he has received multiple research grants underscoring his commitment to addressing critical societal issues through scientific inquiry.

About Invited Keynote Speaker

Dr. Antonio Abdu- <<< Sami M. Magomnang

University of Science and Technology
of Southern Philippines
Cagayan de Oro Campus (USTP CDO)
Philippines



Dr. Antonio-Abdu Sami M. Magomnang is a Professional Mechanical Engineer (PME) and researcher specializing in bioenergy, waste-to-energy, and solar thermal systems.

His work focuses on converting engineering research into deployable technologies for emission reduction, resource efficiency, and sustainable industrial operations. He leads the Research Center for Biomass Energy at the University of Science and Technology of Southern Philippines (USTP), directing projects funded by DOST Region X, the National Research Council of the Philippines (NRCP), and DOST-PCIEERD.

Under his leadership, the Center secured approximately ₱24 million in competitive grants and produced adoption-oriented outputs for agro-industrial and institutional partners. His research emphasizes utilization and measurable impact through technology deployment, industry engagement, and policy-support studies in renewable energy and environmental management.

He is a recipient of the Outstanding Mechanical Engineer (TOME) Award for Research and Innovation and a DOST-Engineering Research and Development for Technology (ERDT) scholar for both his master's and doctoral degrees. Dr. Magomnang advocates research that progresses beyond publication toward adoption, economic relevance, and societal benefit.

About Invited Keynote Speaker

Dr. Grace S. Pimentel



Dean, College of Science and
Technology Education,
University of Science and Technology
of Southern Philippines, Philippines



Dr. Grace S. Pimentel is a distinguished educator, scholar, and academic leader with more than 29 years of extensive experience in teaching, research, and higher education administration.

She currently serves as Dean of the College of Science and Technology Education and Concurrent Senior High School Principal at the University of Science and Technology of Southern Philippines. She also served as President of Salay Community College in a secondment capacity, where she provided strategic leadership in academic and institutional development.

Dr. Pimentel earned her Doctor of Philosophy in Education and Master of Arts in Education from Xavier University – Ateneo de Cagayan, and completed a Post Graduate Certificate in Development Management at the Asian Institute of Management under the CHED-AIM Global Academic Leadership Program.

Her scholarly interests include curriculum development, instructional innovation, language education, teacher preparation, and educational leadership. She has presented papers and delivered invited lectures in various international conferences and academic forums, contributing significantly to the advancement of educational research and practice.

About Keynote Speaker

Dr. Nashrul Fazli Mohd Nasir

Associate Professor,
Universiti Malaysia Perlis,
Malaysia



Nashrul Fazli Bin Mohd Nasir is currently an Associate Professor and the Deputy Dean (Academic and Research), Faculty of Electronic Engineering and Technology, Universiti Malaysia Perlis.

He has more than 20 years of experience in Biomedical Engineering. He was one of the founders of the Biomedical Electronic Engineering Programme in Universiti Malaysia Perlis and was her first Programme Chairman.

Due to his vast experience in Biomedical Engineering, he is appointed as committee member in various Malaysian Biomedical Engineering and Biomaterials academic societies such as Electrical Engineering Technical Division of Healthcare and Biomedical Working Group (the Institute of Engineers, Malaysia), Malaysian Chapter of the Asian Federation of Biotechnology (AFOB), Malaysian Society of Medical and Biological Engineers (MSMBE), Malaysian Biomaterials Society, Medical Device Authority (MDA)'s Medical Device Technical Competency Working Committee and also a Full Member of Sigma Xi, The Scientific Research Honor Society.

About Keynote Speaker

Dr. Mohd Helmy Abd Wahab <<<

Universiti Tun Hussein Onn Malaysia,
Malaysia



Mohd Helmy Abd Wahab is a Senior Lecturer and former Head of Multimedia Engineering Lab at the Department of Computer Engineering, Faculty of Electrical and Electronic Engineering, Universiti Tun Hussein Onn Malaysia (UTHM). He is currently a Principle Research Fellow at Advanced Telecommunication Research Center, Universiti Tun Hussein Onn Malaysia and a former Visiting Research Fellow at Center of Excellence on Geopolymer and Green Technology (Cluster Green ICT), UNIMaP.

He received a Bachelor of Information Technology with Honours from Universiti Utara Malaysia and Master of Science (Intelligent System) from the same university in 2002 and 2004 respectively. To-date, He has authored and co-authored 2 books in database and WAP application and authored and co-authored more than 200 articles and over 900 citations (referred/quoted) made by researchers from many parts of the world including Russia (with over 140 papers that are indexed in Scopus, and some of which with impact factors) that appeared in Journals and Conference Proceedings as well as other form of publications such as media and periodicals.

Being a prolific writer, he has been invited to sit as an editor-in-chief for International Journal of Advances in Computing and Intelligent System and International Journal of Computer System and Software Engineering and serves as as editorial board members in various well known International Journals.

In addition, he also served as a guest editor in few special issues in journals. For the same reason, various International Journals had given the trusts and responsibilities to review their received articles before

publications. E.g. IEEE Access, IEEE Transaction of Knowledge Discovery in Data, IEEE Software, IEEE Computer, IEEE Intelligent System, Knowledge-based System, Engineering Application of Artificial Intelligence and etc. In addition, his papers and research products had been widely accepted as well as being invited as Keynote Speaker or invited speaker in international conferences such as ICRITO 2015, ICACEC2016, IRIS2017, FTNCT2018, ICCMIT2019 and ICRITO2020, CONFLUENCE2021. From the refereed presentations, he obtained various awards or medals in most innovation exhibition.

For his continuous contributions and recognitions in research as well as career, he had been awarded with several awards both at national and international levels, namely: Young Writer Award 2008 and 2010, Anugerah Persatuan Sains dan Teknologi (PESAMA) His research interests are in data mining, artificial intelligence and computer vision, mobile and wireless computing, web-based applications. He is currently a senior member of IEEE, IEEE Computer Society, IAEng, and IACSIT.

About Keynote Speaker

Dr. Konstantinos Andriotis <<<

Professor,
Hellenic Open University
Greece



Dr. Konstantinos Andriotis works at the Hellenic Open University (Greece) and he is an adjunct professor at Taylor's University (Malaysia). The last twelve years he worked as a Professor in Tourism at Middlesex University London and in the past, he was Associate Professor and Head of the Hotel and Tourism Management Department at the Cyprus University of Technology.

He holds an MSc in International Hospitality Management (University of Strathclyde, 1995), a PhD in Tourism Development and Planning (Bournemouth University, 2000) and a Post Doc in Tourism Marketing (Hellenic Open University, 2006).

He edits the 'International Journal of Tourism Policy', the 'Journal of Qualitative Research in Tourism' and the CABI Regional Tourism Series. He is member of the Editorial Board of more than 20 journals. He is author/co-editor of twelve books and over 50 peer reviewed articles and book chapters. His work has appeared in a variety of leading academic journals, such as Annals of Tourism Research, Journal of Travel Research, Tourism Management, Journal of Sustainable Tourism, Hospitality Management as well as International Journal of Tourism Research. He has an h-index of 38 and more than 6600 citations.

He was listed in the Stanford University list of top 2 per cent of scientists in the World. He has acted as Chairman and member of the Organising and Scientific Committees of various international conferences and he has given keynote speeches in several conferences. His research interests include tourism development and planning, alternative forms of tourism, tourism experience and degrowth.

About Session Speaker

Dr. Oluwadare Joshua Oyeboode

Afe Babalola University Ado-Ekiti,
Nigeria



Dr. Oluwadare Joshua OYEBODE is a seasoned, multi-faceted, visionary, dynamic and innovative Civil Engineer who combines teaching, research, and community development with Professional practice. He holds a Bachelor of Engineering (B.Eng.) degree in Civil Engineering from the Federal University of Technology, Akure.

He also obtained his M.Sc. degree and PhD in Civil Engineering (Water Resources and Environmental Engineering Option) from the University of Ibadan. He gained industrial experience in the water section of the works and maintenance department at the University of Ibadan. He practised briefly in Consulting Civil and Structural Engineering by designing and supervising several structural engineering works before joining academia.

He is currently a Senior Lecturer at Afe Babalola University Ado-Ekiti (ABUAD). His research interests are in Water Resources and Environmental Engineering, Energy Technology Management, hydraulics and Hydrological Studies, Construction Management, Solid Waste Management, Pollution abatement of surface water, and Simulation and Optimization of Wastewater Treatment facilities.

He has published over 195 articles in conference proceedings, and reputable local and international journals with 61 indexed in Scopus and 1120 citations on Google Scholar. He has displayed extensive ingenuity in his professional practice with an unusual personality of multiple and variegated credentials. He has served on several committees in ABUAD and he is an Evaluator and the Desk officer for Outcome Based Education (OBE) for ABUAD. His achievements and antecedents in all facets of the profession are testaments to his visionary and undiluted commitment to societal development.

He registered with the Council for the Regulation of Engineering in Nigeria (COREN) in 2012 and has his practicing license up to date. He is a member

of the following learned and professional associations such as American Society of Civil Engineer (ASCE); Environmental and Water Resources Institute of ASCE (EWRI), Nigerian Institute of Management (NIM Chartered); International Association for Engineers (IAENG); Nigerian Society of Engineers (NSE); Nigerian Institution of Water Engineers (NIWE), Nigerian Institution of Civil Engineers (NICE), Nigerian Institution of Environmental Engineers (NIEE), Strategic Institute for Natural Resources and Human Development (FRHD), SafERR Ambassador of World Safety Organization (WSO), Fellow of Institute of Policy Management Development (IPMD), Institute of Professional Managers and Administrators of Nigeria (FIPMA) and many others with an array of recognition awards in his kitty.

He distinguished himself by winning many awards and serving on several committees in ABUAD, NSE and as a resource person for COREN accreditation of some Nigerian universities. He has a high sense of industry, integrity, character and ability to handle challenges and multi-task which derives from his excellent planning, strategic management and organizational endowment. He is happily married with children.

About Session Speaker

Dr. Venkata Ratnam Myneni <<<

Department of Chemical and Petrochemical Engineering,
College of Architecture and Engineering, University of Nizwa, Oman



Dr. M. Venkata Ratnam is currently working as an Associate Professor in the Department of Chemical & Petrochemical Engineering at the College of Engineering & Architecture, University of NIZWA. He has over 20 years of extensive experience in teaching, research and guiding undergraduate and postgraduate students.

His key research areas focus on sustainable solutions, including lithium-ion battery recycling, sustainable wastewater treatment, nanomaterials, and deep eutectic solvents. His research output includes over 50 publications with 600+ citations and an h-index of 12. He has also secured research funding and grants for projects on the recycling of lithium-ion batteries and nanomaterials for wastewater treatment.

Dr. Ratnam holds a Ph.D. in Chemical Engineering from Andhra University, India. He has held several key administrative and academic roles, including Head of Department, Board of Studies Chairman, and Deputy Controller of Examinations. He is proficient in Aspen Plus, MATLAB, and Process Simulations and is a Life Member of the Indian Institute of Chemical Engineers (IIChE) and the Indian Society for Technical Education (ISTE).

About Session Speaker

Dr. Mazlee Mohd Noor

Department of Chemical and
Petrochemical Engineering,
Universiti Malaysia Perlis (UniMAP),
Malaysia



Dr. Mazlee Mohd Noor is an Associate Professor at Faculty of Mechanical Engineering and Technology, Universiti Malaysia Perlis (UniMAP), Malaysia. He is also an Associate Research Fellow at the Centre of Excellence for Frontier Materials Research, UniMAP.

He received his PhD in Materials Engineering from Universiti Malaysia Perlis in 2010. He has published over 100 papers related to heat treatment, microstructural analysis, testing, characterization and failure analysis of non-ferrous alloys, ferrous alloys, metal and ceramic matrix composites.

Dr. Mazlee has given invited talks at several conferences and carried out a good deal of engineering testing and consultancy services to various public authorities and private industries in Malaysia. He has over 20 years of experience researching and developing metal matrix composite and ceramic matrix composite materials.

His current research activity focusing on support catalyst of porous ceramic composites for carbon dioxide adsorption.

About Session Speaker

Dr. Dony Adryansyah

Department of Chemical and
Petrochemical Engineering,
Universiti Malaysia Perlis (UniMAP),
Malaysia



Dr. Dony Adryansyah is a geologist at Faculty of Science and Marine Environment, Universiti Malaysia Terengganu (UMT), Malaysia. He received his BSc (Geology) from Gadjah Mada University (Indonesia), MSc (Geology) from National University of Malaysia, and PhD (Geology and Geophysics) from Prince of Songkla University (Thailand). He develops research on field geology, geophysics, earthquake, geoheritage, and several other geoscience-related topics.

He is a life member of the Indonesian Association of Geologists (IAGI), the Geological Society of Malaysia (GSM), and an active member of the Scientific Working Committee of the Kenyir Geopark (Malaysia). He is also currently serving as a member of the Geoscience, Education, and Outreach Research Interest Group (GEORIG) at UMT. Dr. Dony has authored scientific articles in academic journals, proceedings, and public science platforms, and presented his works at national and international conferences.

He continues to collaborate with researchers, authorities, and stakeholders to strengthen the link between geoscience research, education, and society.

About Session Speaker

Dr. Sukreen Hana Herman

Associate Professor,
Microwave Research Institute,
Universiti Teknologi MARA (UiTM),
Malaysia



Dr. Sukreen Hana Herman is an Associate Professor in the Faculty of Electrical Engineering at Universiti Teknologi MARA (UiTM), Shah Alam, Malaysia. She currently holds the administrative position of Head of Research at the Microwave Research Institute (MRI) at UiTM. Dr. Sukreen's research is situated within Materials Science and Semiconductor Engineering. Her work is focused on the fabrication and characterization of sensing membranes and nanostructured materials for sensor applications. Specifically, her projects concentrate on developing Extended-Gate Field-Effect Transistor (EGFET) sensors, optimizing their performance for selective electrochemical detection, such as pH and other ions measurement. She maintains technical expertise in advanced thin-film deposition and analysis techniques, including the operation of RF sputtering, e-beam evaporation, FESEM, and X-ray Photoelectron Spectroscopy (XPS). Dr. Sukreen completed her Ph.D. in Materials Science in 2009 at the Japan Advanced Institute of Science and Technology (JAIST). Her earlier degrees, including M.Eng. (Electronics and Computer Science, 2003) and B.Eng. (Electrical, Electronics, and Information Engineering, 1999), were obtained from Kanazawa University, Japan. Her academic studies were supported by the JPA Malaysia, Japan Monbukagakusho (MEXT) and Panasonic Scholarships. Her research output includes over 170 articles and conference proceedings, contributing to an H-index of 13 on SCOPUS and 10 on the Web of Science (WoS). She has been awarded and managed over a dozen major competitive research grants as Principal Investigator. Additionally, Dr. Sukreen is recognized for her involvement in STEM outreach and education, serving as an IEEE STEM Champion since 2021.

About Session Speaker

Dr. Sales Aribe Jr

Professor,
Bukidnon State University,
Philippines



Dr. Sales G. Aribe Jr. is an accomplished faculty member of Bukidnon State University, currently serving as the department head of IT and University Research Committee. Recently promoted to Professor I, his elevation reflects his dedication to research and pursuit of higher education. He obtained his BS in Information Technology from Bukidnon State University in 2003, graduating Cum Laude. Subsequently, he completed his Master's Degree in Information Technology in 2010 at the University of the Immaculate Conception and earned his Doctorate in Information Technology at the Technological Institute of the Philippines – Quezon City as a CHED-SIKAP scholar in 2023. Throughout his career, Sales has presented at numerous local and international conferences and has published several high-quality papers indexed in prestigious databases such as Scopus, WOS, and other internationally peer-reviewed journals. He is also actively engaged as a peer reviewer for esteemed journals and conferences, including IEEE conferences and Scopus and Elsevier journals. Sales is a distinguished member of several professional organizations, including the Institute for Engineering Research and Publication in India, the Royal Institution in Singapore, and the Association for Computing Machinery. He has served in leadership roles for over 5 years in the Philippine Society of Information Technology Educators, demonstrating his commitment to advancing the field in the Philippines. His research interests span a wide range of topics, including Data Mining, Neural Networks, Software Engineering, Fractal Analysis, Artificial Intelligence, Bioinformatics, and more, showcasing his multifaceted expertise and contributions to the IT discipline.

About Session Speaker

Ms. Maria Doreen Cuevas-Rañada <<<

University of Science and Technology
of Southern Philippines,
Cagayan de Oro, Philippines



Dr. Maria Doreen Cuevas Rañada is a distinguished academic leader and communication specialist with over 25 years of experience in higher education administration, strategic communication, and media production. She currently serves as Department Chairman of Technology Communication Management and Director of Campus Residence Services & Head of the Marketing and Communication Unit at the University of Science and Technology of Southern Philippines (USTP), Cagayan de Oro. She holds a Master of Arts in Mass Communication (Broadcast Communication) from the University of the Philippines Diliman and a Bachelor of Arts in Communication Arts from Miriam College. Her expertise includes organizational management, student affairs administration, curriculum development, multimedia production, and institutional communication strategies. Dr. Rañada has led numerous academic and administrative initiatives and has contributed to research in crisis communication, social media engagement, digital culture, and misinformation studies. She is an active member of several professional communication and student affairs organizations and has received multiple awards recognizing her leadership and service excellence.

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Development of a Copper Sulfate Recovery Device Utilizing Iron for Hazard Waste Treatment and Predisposal System

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Abstract:

Conventional manual neutralization methods for hazardous copper sulfate waste are often prone to human error, safety risks, and inconsistent pH control, posing severe threats to both industrial operators and the surrounding ecosystem. To address these operational challenges, this study presents the development of an automated Copper Sulfate Recovery Device utilizing iron substrates for hazardous waste treatment and predisposal applications. Guided by the Input–Process–Output (IPO) framework, the system automates the critical treatment workflow, including agitation, filtration, and real-time pH monitoring, through an ESP32 microcontroller integrated with a closed-loop feedback control mechanism. By leveraging the single-replacement redox reaction between copper sulfate and steel wool, the device enhances process consistency while minimizing direct chemical handling and exposure to toxic fumes. Experimental trials conducted using 500 mL waste samples with initial pH values ranging from 2.60 to 2.82 achieved an average pH increase of 2.364 units within approximately five minutes per cycle. Statistical validation utilizing a paired t-test yielded a t-statistic (t) of 25.81 and a p-value (p) of less than 0.0001. This result rejects the null hypothesis and confirms that the observed neutralization is statistically significant and highly repeatable. The findings demonstrate that the device functions effectively as a predisposal treatment method, substantially reducing acidity prior to final disposal. While future enhancements aim to achieve final disposal standards of pH 6.0 or higher, this research highlights the potential of automated systems to improve safety, efficiency, and sustainability, directly supporting Sustainable Development Goals (SDGs) related to responsible consumption and hazardous waste management.

Index Terms:

Copper Sulfate Recovery, Hazardous Waste Treatment, Redox Reaction, Ph Monitoring, ESP32 Microcontroller, Waste Neutralization, Iron-Based Recovery System, Automation, Industrial Wastewater, Environmental Safety

Design and Optimization of Automated Bottle Cutting System for Sustainable Upcycling Applications

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Abstract:

The increasing emphasis on sustainable manufacturing and material reuse has intensified the demand for practical upcycling technologies. In response, this study presents the design and optimization of an automated bottle-cutting system developed to improve precision, consistency, and operational safety compared to conventional manual cutting methods. The proposed system integrates a computer vision module for automated bottle alignment and a controlled nichrome wire thermal shock mechanism, utilizing localized heating and mist-assisted cooling to achieve consistent glass separation. Performance evaluation was conducted using two common glass bottle types, a 330 mL thin-walled bottle and a 750 mL thick-walled bottle, with twenty (20) cutting trials performed for each type to ensure statistical validity. Experimental results indicate that thin-walled bottles achieved a mean cutting time of 24.65 seconds with a standard deviation (SD) of 1.46 seconds, demonstrating stable and repeatable performance. To assess industrial reliability, the Process Capability Index (Cpk) was computed and yielded a value of 1.22. This metric indicates that the process operates within acceptable performance limits and meets efficiency benchmarks beyond typical manual operations. Conversely, thick-walled bottles required a longer mean cutting time of 34.90 seconds with an SD of 1.71 seconds due to increased thermal mass. Quality evaluation using a five-point Likert scale indicated a 95% success rate for thin-walled bottles and a 90% success rate for thick-walled bottles, confirming high separation reliability across varying glass geometries. The results demonstrate that the automated system significantly reduces safety risks associated with manual glass cutting, including thermal exposure and sharp fragment handling. Ultimately, this study provides a scalable and cost-effective solution for sustainable glass upcycling, supporting circular economy applications and waste reduction initiatives.

Index Terms:

Automated Bottle Cutting, Process Capability Analysis, Sustainable Upcycling, Thermal Shock Mechanism, Glass Waste Management

Smart Sustainable Energy System for Prepaid and Transparent Rental Management

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Abstract:

Conventional metering practices in rental environments typically rely on manual readings and postpaid billing, which often result in inaccuracies, billing disputes, and inefficient energy use. To mitigate these issues, this study presents the development and assessment of a Smart Sustainable Energy System designed to provide transparent, prepaid electricity management. The proposed platform integrates smart metering technology with automated energy control and real-time monitoring, supported by a hybrid payment architecture featuring a GCash-based digital loading system and a physical coin slot module. The system utilizes an ESP32 microcontroller to facilitate reliable Wi-Fi connectivity, ensuring seamless data transmission to a cloud-based database. Developed using the Rapid Application Development (RAD) model to ensure iterative user-centric refinement, the system allows tenants to track real-time usage and receive automated low-balance alerts, while landlords benefit from centralized data access. System performance and metering accuracy were evaluated through statistical analysis comparing smart meter readings with manual measurements. The results demonstrated strong agreement between the two methods, yielding a Mean Absolute Percentage Error (MAPE) of 8.57% and a very strong Pearson correlation coefficient (r) of 0.991. Furthermore, a t -test yielded a p -value (p) of 0.516 and a Cohen's effect size (d) of 0.111, statistically confirming no significant difference between the automated and manual readings. Functional testing further validated system reliability, achieving a 100% success rate for digital transactions and a 91.43% success rate for the coin slot module. Overall, the system provides a scalable, user-friendly solution for rental environments, significantly improving operational efficiency and landlord-tenant relationships while supporting sustainable energy management practices.

Index Terms:

Smart Metering, Prepaid Electricity Management, Rental Energy Monitoring, Digital Payment Integration, Cloud-Based Energy System, Sustainable Energy Management

Development of a Low-Power Weather Monitoring System for Agricultural Environments

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Abstract:

Agricultural productivity in developing regions is increasingly threatened by climate variability and extreme weather events, yet site-specific weather monitoring remains inaccessible to many small-scale farmers due to the high cost and complex power requirements of commercial weather stations. This study addresses this gap by presenting the development of a low-cost, solar-powered weather monitoring system utilizing Long Range (LoRa) technology, a wireless communication standard designed for reliable, long-distance, and low-power data transmission in off-grid agricultural environments. The system integrates a suite of sensors to measure key atmospheric variables, including ambient temperature, relative humidity, wind speed, rainfall volume, and ultraviolet (UV) index, optimized for low-duty-cycle energy consumption to ensure continuous deployment with minimal maintenance. To validate operational stability, communication reliability, and data integrity, a field deployment was conducted over a continuous 7-day period. Results demonstrated 100% data availability, with a total of 2,016 successfully transmitted readings and no recorded power interruptions, confirming the effectiveness of the solar-charging subsystem. Recorded environmental parameters fell within expected tropical ranges, with temperatures between 24.8°C and 36.0°C and humidity levels between 50% and 90%. The collected data exhibited physical consistency, indicated by a moderate inverse Pearson correlation coefficient of -0.40 between temperature and humidity. These findings demonstrate that affordable, real-time microclimate monitoring can enhance agricultural decision-making by enabling optimized irrigation scheduling, pest management, and resource allocation. The proposed system offers a scalable and energy-efficient solution for precision agriculture, supporting sustainable food production and climate adaptation in resource-limited farming communities.

Index Terms:

Precision Agriculture, Internet of Things (IoT), LoRa, Low-Power Electronics, Environmental Monitoring

Modern Theoretical and Methodological Approaches in the Study of the Problems of Nomadic Statehood in Central Asia

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Abstract:

The article examines the theoretical and conceptual approaches of modern historical science on the problems of nomadic statehood. The purpose and objectives of the study are to determine the debatable conceptual provisions on the problems of "nomadic statehood", "state institutions", "continuity of state traditions". Scientific research practices show insufficient development of the problems of the typology of socio-political structures and the process of formation of state institutions in nomadic societies in Central Asia. In this regard, diversified approaches to problems in the study of political entities and their systematization and reconstruction as a complex of different types and models of power, united into a single structure of nomadic statehood, are necessary. The variety of methodological approaches and research principles has led to the identification of new directions, research horizons and alternative paths in studying the process of complication and development of socio-political structures of nomadic society. The different emphases and nuances of research practice, however, highlight the nature of evolutionary change in a nomadic environment, but in the presence of regular contacts with urban societies. And since the beginnings of the state existed in most nomadic societies, the movement towards statehood, having received the necessary incentive, easily became effective. What this group of researchers has in common, despite all the differences in the results achieved, is the opinion that nomadic societies had internal forces capable of creating a state, but, undoubtedly, external influence played the main role; the starting point and catalyst for the political development of nomads was a sedentary agricultural society. It should be noted that a feature of research work is that even opposing theories may not exclude each other, but serve as a complement and show the vector of development of conceptual approaches and developed methodological techniques.

Index Terms:

Statehood, Nomads, Scientific Methodology, Genesis, Institutions, Power, Structure

Comparative Analysis of Diatom Communities in Similar Water Bodies

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Abstract:

Diatoms are small photosynthetic organisms which serve as reliable bioindicators owing to their quick reactions to changes in aquatic environments. Despite apparent similarity of such water reservoirs, lakes can be characterized by different diatom communities associated with various local climatic factors, land use practices, and human activities. Such a comparison is considered in this research.

The purpose of this study was to evaluate diatom population structures in similar freshwater bodies in different regions – Kerala and Andhra Pradesh in India. The total number of samples collected from two locations comprised 100. In each region, the same quantity of water samples were gathered. Afterward, water and sediments were analyzed in the laboratory using acid digestion techniques. Prepared slides were examined under a microscope to identify genera and species.

Taking into account statistical probability, it is expected that both overlap and clear distinction will be found between the two communities of diatoms. Considering similarities in basic environmental characteristics, some identical species are likely to form the basis of the comparison, although there would be differences in dominant species. Ultimately, differences in local meteorological parameters, water composition, nutrients, and anthropogenic activities will result in dissimilar communities..

Index Terms:

Diatoms, Bioindicators, Community Structure, Freshwater Bodies, Taxonomic Identification, Diversity Indices, Human Influence

CrimeXperience: Immersive XR Crime Scene Simulation in the Philippine Context

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Abstract:

Crime scene investigation is a critical aspect of law enforcement, as it is crucial for solving crimes and giving justice to victims. However, training for crime scene investigations is often limited to classroom lectures and several practical exercises in a controlled environment. As such, Project CrimeXperience aims to utilize Extended Reality (XR) technologies to simulate crime and safety scenarios in the Philippines.

The outputs of this project shall benefit the criminology / forensic students, trainers, and training schools as it provides an alternative that is safe, can be repeated, and uses similar equipment to the industry. This is in comparison to highly limited simulations that take time and resources to achieve. It also improves trainers' training style, monitoring, and provides feedback to the students, particularly through the developed manuals and materials.

Overall, this can improve the training and crime scene investigation system; producing more competent officers who are efficient, productive, accurate, and empathetic; improve the collaboration between the academe and Criminal Justice and Public Safety industry; improve the trust of the community of the police; and reduce crime rates and improve the safety and security of the community.

Seismic Vulnerability Assessment with Rapid Visual Screening of Hospital Buildings in Maguindanao Province, Philippines

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Abstract:

Hospitals are expected to maintain operations during and after earthquakes, yet many facilities in the Philippines remain structurally and non-structurally vulnerable. This study evaluates the seismic vulnerability of selected public hospitals in Maguindanao Province, located near the Cotabato Trench and the Western Mindanao Fault, using the FEMA P-154 (3rd ed.) Rapid Visual Screening (RVS) Level-1 procedure. Four government hospitals, comprising 53 buildings constructed between 1980 and 2025, were assessed through a systematic visual inspection and review of available secondary records. Basic structural hazard scores were adjusted using FEMA score modifiers (performance modification factors) to compute Final Level-1 scores (S_{11}) and corresponding damage-potential classifications. Most buildings are one-story reinforced-concrete moment-resisting frames (C1) with auxiliary steel/light-frame or steel-braced structures. Computed S_{11} values range from -0.2 to 1.6, with newer structures (2015–2025) generally attaining $S_{11} \geq 1.0$, while pre-2000 buildings tend to score lower due to age-related deterioration, geometric irregularities, and weak attachments. Site conditions significantly influence screening outcomes; slope instability and drainage problems at South Upi and Maguindanao Provincial Hospitals are associated with the lowest S_{11} values (down to -0.2). Nonstructural hazards, including parapets, heavy cladding, canopies, suspended ceilings, and unanchored equipment, are prevalent and frequently dictate functional risk even in recently constructed facilities. Mean S_{11} values indicate varying preparedness levels across hospitals: Buluan (0.68), Maguindanao Provincial (0.64), Datu Blah T. Sinsuat (0.48), and South Upi (0.43). Approximately 75% of the buildings are recommended for Level-2 screening and/or detailed engineering evaluation, particularly those with $S_{11} < 0.6$, adverse site conditions (e.g., landslide-prone slopes), or visible material deterioration and heavy appendages. The findings provide an evidence-based basis for BARMM health authorities to prioritize retrofitting, address geohazard and nonstructural risks, and strengthen hospital earthquake resilience.

Long-Term Effects of Learning Action Cell to Teacher Retention and Professional Growth

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Abstract:

This study investigates the efficacy of Learning Action Cells (LACs) as an educational technology designed to enhance teacher retention and professional growth in the Bangsamoro Autonomous Region of Muslim Mindanao (BARMM), specifically within the Madamba School District in Lanao del Sur II. Rooted in Albert Bandura's Social Learning Theory (SLT), LACs are conceptualized as a systematic, peer-driven collaborative framework that fosters resilience among educators in resource-constrained and culturally distinct settings. Employing a mixed-methods approach, the study integrates quantitative metrics—such as an 83.50% retention rate among active participants and mean growth scores ranging from 4.296 to 4.361—and qualitative insights, including narratives like “LACs make me want to stay” and “Reflecting with peers improves my skills.” These findings underscore LACs’ transformative potential in addressing BARMM’s retention crisis, where geographic isolation, socio-cultural complexities, and systemic neglect exacerbate turnover rates. The study further explores mechanisms such as leadership involvement, resource adequacy, and systematic evaluation, revealing their critical role in sustaining LACs’ impact. Longitudinal analysis highlights the persistence of retention trajectories and skill mastery over time, while contextual refinement demonstrates LACs’ adaptability to diverse settings, including post-conflict recovery and linguistic diversity. Comparative analysis positions LACs as a scalable model for fragile regions, aligning with UNESCO’s benchmarks for effective professional development. By bridging gaps between theory and practice, LACs exemplify a human-centered educational technology that prioritizes collaboration, adaptability, and cultural responsiveness. This research contributes to global discourse on teacher retention, offering actionable recommendations for policymakers and practitioners seeking sustainable solutions in underserved contexts.

Index Terms:

Learning Action Cells (LACs), Teacher Retention, Social Learning Theory (SLT), Professional Development, Educational Technology, Bangsamoro Autonomous Region of Muslim Mindanao (BARMM), Mixed-Methods Research, Fragile Contexts

The Correlation of Perceived Parenting Styles on Gen Z's Communication, Leadership, and Adaptability Skills as Input for Strengthening Parent-Child Relationships

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Abstract:

The researchers wanted to know the influence of upbringing as a good factor in the development of personal and social skills and so the study was conducted with the aim of understanding the correlation of experienced parenting styles and developed skills in communication, leadership, as well as adaptability in respondents in the generation Z age group 18–27 years of age and to establish the impact of various parenting styles such as authoritative, authoritarian, permissive, and neglectful on the same. The researchers used a quantitative research design, and it included a target population of 171 respondents who participated in the study and were required to fill out a validated self-report questionnaire. The results indicate that, most of the respondents (69.59) were raised by authoritative parents, and the number of respondents raised by authoritarian parents (16.37) and permissive parents (14.04) indicated fewer figures. Also, neglectful parenting practices were not reported. The data was thus collected in no area. Communication (mean = 1.99 SD = 0.801) and adaptability (mean = 2.07, SD = 0.711) are seen to be medium in the analysis of levels of skills whereas low levels of leadership skills were found (mean = 1.73, SD = 0.702). It turns out that no significant connection is found between the demographic profile and the perceived parenting styles and acquired communication, leadership, adaptability skills. Communication skills, conversely, demonstrated a small, but significant correlation with perceived parenting styles ($r = 0.134$, $df = 2$, $p = 0.047$), but no correlation was found based on the other communication skills that comprised leadership and adaptability. Finally, according to the studies, it is possible that such environmental factors and personal experiences can exist that predict the development of leadership and adaptability capabilities. Though communication skills can be influenced by the parenting styles, there can be a minor relationship between these two variables. In general, these competencies are alleged to be nurtured not only by the parenting styles but also by personal development, real life experiences as well as interactions.

Saccharum Officinarum Bagasse and Zea Mays Husk as Potential Biodegradable, Eco-Friendly Food Packaging Material

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Abstract:

This study investigated the potential of *Saccharum officinarum* (bagasse) and *Zea mays* (corn) husk, abundant agricultural wastes in Western Visayas, Philippines, as biodegradable food packaging materials. Using an experimental posttest-only design, the fibers were collected, cleaned, pulped via a semi-chemical process, and mixed with cassava starch at 25%, 50%, and 75% concentrations. These were molded into sheets, sun-dried, and assessed for thickness, tear strength, and bending stiffness, and compared to a negative control (cassava starch alone) and a positive control (commercial packaging). Results showed that both *S. officinarum* and *Z. mays* outperformed the controls across all mechanical tests ($p < 0.05$). The 75% *S. officinarum* had the highest thickness (mean=8.256 mm; sd=0.14841), while both 50% *S. officinarum* (machine direction=136.89; sd=46.165; cross direction=160; sd=38.982) and *Z. mays* (machine direction=112.887; sd=64.618; cross direction=141.33; sd=90.617) achieved the best tear strength. In bending stiffness, both fibers at 75% *S. officinarum* (mean, left=64.667; sd=0.57; mean, right=65.333; sd=0.742) and 75% *Z. mays* (mean, left=66.333; sd=0.894; mean, right=57.5; sd=13.493) exhibited the highest values, surpassing even the commercial control. These findings demonstrate that both *S. officinarum* and *Z. mays* husk possess the thickness, tear strength, and bending stiffness required for food packaging, making them promising eco-friendly alternatives to plastic. Their local availability and performance suggest potential for sustainable commercial application, though future research is needed to evaluate food safety and scalability.

Index Terms:

Biodegradable Packaging, *Saccharum officinarum* bagasse, *Zea mays* husk, Potential, Sustainable Materials, Agricultural Waste

Perceptions of the Effects of Climate Change Among Agricultural Students at the ISTEP “Pedro A. del Águila Hidalgo”

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“Pedro A. Del Águila Hidalgo” Public Technological Higher Institute, Center for Research, Innovation, and Training Inventalo

Abstract:

This document presents a descriptive study on the perceptions of the effects of climate change in the Peruvian Amazon among students in the agricultural technician program at the IESTP “Pedro A. del Águila Hidalgo” in Loreto, Peru. During 2023 and 2024, the Amazon region has faced a series of occurrences related to extreme weather events, such as record-breaking droughts, an increase in forest fires, as well as the death of hundreds of fish and even river dolphins. Likewise, at the Mapacocha experimental center, a series of incidents related to the death of plants and crops have been recorded, affecting the academic work of agricultural production students and faculty. As part of the study, 130 students in the program were surveyed, and a weak perception or connection between the occurrence of climate events and crop losses was identified. Furthermore, limited preparation regarding the topic of climate change was observed in the academic curriculum of the aforementioned institution.

Remix and Resistance: Memetic Editing and Participatory Culture in the 2022 Philippine Presidential Election TikTok Campaigns

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Abstract:

The 2022 Philippine presidential election demonstrated the power of TikTok in digital political campaigns, yet no systematic comparison exists of how opposing campaigns deploy platform affordances. This study examined how memetic editing techniques in Ferdinand Marcos Jr. and Leni Robredo's TikTok videos constructed distinct political messages and what these differences reveal about participatory culture. Using a convergent parallel mixed-methods design, 150 videos (75 per candidate) posted during the official campaign period were analyzed through quantitative content analysis and qualitative multimodal discourse analysis, coding for memetic templates, editing techniques, and persuasive intent. Results revealed stark contrasts. Robredo's content exemplified participatory culture [Jenkins, Ford & Green, 2013] through participatory templates (lip-sync, duet, stitch), jump cuts signaling amateur production, and positive endorsement messaging—conveying an “aesthetic of authenticity.” Conversely, Marcos Jr.'s campaign demonstrated “manufactured spreadability” through production-oriented templates (green screen, point-of-view), professional-grade editing (transitions, slow motion, multi-clip assembly), and attack/opposition messaging, with 36% of content from anonymous accounts versus 2% for Robredo. His editing density (6.8 techniques per video, triple Robredo's average) indicated coordinated professional production simulating organic participation. The findings demonstrate TikTok's dual-use nature: its affordances enable both authentic democratic engagement and coordinated disinformation. This study contributes an empirical framework for distinguishing organic participatory culture from manufactured virality, with implications for platform governance, media literacy, and political communication research.

Index Terms:

Memetic Editing, Participatory Culture, Spreadable Media, Platform Affordances, Political Disinformation

Influence of Organizational Culture on Quality Management Practices through ISO 9001:2015 Implementation in the Satellite Campuses of a State University

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Abstract:

Institutional quality in higher education is sustained not merely by formal systems but by the strength of organizational culture that shapes how standards are understood, implemented, and continuously improved. This study examined the influence of organizational culture on quality management practices and determined whether ISO 9001:2015 implementation serves as a mediating mechanism within the satellite campuses of a state university in Northern Mindanao, Philippines. Employing a quantitative research design with mediation analysis, data were gathered from 65 faculty members selected through stratified random sampling with each campus as the stratum. Descriptive and inferential statistics were used to analyze the data with careful verification of normality and linear regression assumptions. Findings revealed that organizational culture, ISO 9001:2015 implementation, and quality management practices were all strongly manifested across campuses, indicating a shared institutional commitment to quality standards and continuous improvement. Results further showed that perceptions of quality management practices did not significantly differ when faculty were grouped according to generational cohort, job classification, years of service, and highest educational attainment, suggesting institutional consistency in quality initiatives. Regression analyses confirmed that organizational culture significantly influences both ISO 9001:2015 implementation and quality management practices. Mediation analysis further established that ISO 9001:2015 implementation significantly mediates the influence of organizational culture on quality management practices, while the direct influence of organizational culture remains significant. This indicates partial mediation, demonstrating that ISO-based systems meaningfully reinforce, yet do not entirely account for, the influence of organizational culture on quality management practices. The study highlights the strategic role of internationally recognized quality management systems in translating cultural values into structured practices, thereby strengthening instructional effectiveness, research productivity, and student support services in higher education institutions.

Index Terms:

Student-centeredness, Innovative Teaching and Learning, Quality Support, Continuous Improvement, Performance Evaluation, Operation

Proactive Leadership in Action: Ethnographic Insights into School Administration Practices in Cagayan De Oro City, Philippines

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Abstract:

This qualitative study explores the proactive leadership practices of public school administrators in Cagayan de Oro City, Philippines, through an ethnographic lens, addressing a gap in understanding contextually grounded educational leadership in urban Southeast Asian settings. Drawing from semi-structured interviews with five school heads, the research identifies five key themes: proactive leadership, student-centric prioritization, effective communication strategies, collaborative decision-making, and professional development integration. These themes reveal how administrators navigate complex challenges—such as resource constraints, high student-to-teacher ratios, and cultural expectations—by employing adaptive strategies informed by Contingency Theory, the Job Demands–Resources (JD–R) Model, and Transformational Leadership Theory. Proactive leadership manifests through anticipatory planning, institutionalized systems like Standard Operating Procedures (SOPs), and strategic delegation to enhance organizational resilience. Student-centric prioritization guides decision-making, ensuring policies align with learner needs, while effective communication fosters trust through tailored messaging and feedback loops. Collaborative decision-making leverages stakeholder engagement and culturally sensitive consensus-building, reflecting Filipino values like *pakikisama* (social harmony). Professional development is embedded into daily workflows via individualized plans and peer mentoring, mitigating burnout and fostering teacher growth. The study proposes a conceptual framework illustrating how these practices, shaped by cultural and contextual inputs, lead to improved school performance, stakeholder trust, and administrator resilience. While limited by its small sample size, this research offers actionable insights for school leaders, policy recommendations for culturally responsive frameworks, and a foundation for future mixed-methods studies. It underscores the importance of adaptive, culturally embedded leadership in balancing national mandates with local realities, contributing to both academic discourse and practical leadership strategies in resource-constrained educational contexts.

Index Terms:

Proactive leadership, educational administration, Cagayan de Oro City, Contingency Theory, Job Demands–Resources Model, Transformational Leadership, *pakikisama*, student-centric prioritization, collaborative decision-making, professional development.

Effectiveness of Digital Vocabulary Tools on Vocabulary Growth among Senior High School Students in Cagayan de Oro City: Basis for Strategic Educational Planning

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Abstract:

Vocabulary development is a critical component of language learning as it directly influences students' reading comprehension, communication skills, and overall academic performance. Despite national efforts to improve literacy and integrate digital technologies in education, many senior high school students in the Philippines continue to struggle with limited vocabulary knowledge. This study examined the effectiveness of selected digital vocabulary tools—Quizlet, Duolingo, Memrise, and Italki—in improving the vocabulary skills of senior high school students in Cagayan de Oro City and explored how these tools may inform strategic educational planning for vocabulary instruction. The study employed a quasi-experimental pre-test-post-test control group design involving 150 Grade 12 students from six public secondary schools. Participants were divided into four experimental groups, each assigned to a specific digital vocabulary tool, and one control group that received traditional vocabulary instruction. The Vocabulary Levels Test (VLT) was used to measure students' vocabulary proficiency before and after a four-week intervention period. Quantitative data were analyzed using descriptive statistics, paired-samples t-tests, and one-way ANOVA, while qualitative insights were gathered through student feedback questionnaires and semi-structured interviews with teachers and administrators. Results revealed that all experimental groups demonstrated significant improvement in vocabulary scores from pre-test to post-test. Among the digital tools, Italki produced the highest mean gain, followed closely by Memrise, Quizlet, and Duolingo. Post-test results also showed that students who used digital vocabulary tools achieved significantly higher vocabulary scores than those in the control group. Qualitative findings indicated that students perceived the tools as engaging, interactive, and supportive of vocabulary learning, while teachers and administrators highlighted their potential for enhancing language instruction despite challenges related to internet connectivity and access to devices. The findings suggest that integrating digital vocabulary tools into classroom instruction can significantly enhance students' vocabulary acquisition and engagement. The study recommends structured integration of digital tools, strengthened teacher training, and improved digital infrastructure to support sustainable implementation. These results provide empirical evidence that can guide curriculum enhancement and strategic educational planning for technology-supported vocabulary instruction in Philippine senior high schools.

Index Terms:

Digital Vocabulary Tools, Vocabulary Development, Quizlet, Duolingo, Memrise, Italki, Senior High School, Strategic Educational Planning, Philippines

Understanding Generation of Food Waste in the National Capital Region through Social Practice Theory: Analyzing Middle Class Household Behavior

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Abstract:

Food waste is a global problem that significantly impacts economic growth, the environment, and food security, and is one of the most serious challenges in the Philippines. Several factors contribute to food waste, including preparing large volumes of food, high household size, poor planning, and lack of knowledge in relation to individual attitudes and behaviors. In the Philippines, households waste about 2.95 million tons of food annually, representing 26 kilograms per individual. This study examined how households' food management practices meal planning, consumption, and storage correlate with culture, traditions, and economic status using Social Practice Theory. A purposive and convenience sample of NCR households was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), supported by thematic analysis of qualitative responses. Results reveal that culture and traditions significantly influence meal planning, while social class and behavior affect cooking and storage habits. These routines together contribute to household food waste, indicating that waste stems from shared practices rather than solely individual choices. Reducing food waste requires improved planning, mindful consumption, proper storage, and strategies that consider cultural values.

Exploring the History and Cultural Heritage of Palo Leyte: Laying the Foundation for a Community Dance Festival

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Abstract:

This study explores the history and cultural heritage of Palo, Leyte, with the aim of laying the groundwork for a vibrant and authentic community festival. By examining key historical events and cultural traditions that have shaped the identity of the town, this research seeks to highlight significant moments and practices that have influenced its development. The study addresses three central questions: the historical events that shaped Palo's identity, the cultural traditions that have defined the town, and how these elements can inform the design of a community festival that authentically represents the region's heritage. The findings aim to provide a compelling storyline for a festival that reflects the rich history and culture of Palo, Leyte, fostering community pride and cultural preservation.

Index Terms:

Palo-Palo Festival, Cultural Heritage, Street Dance, Indigenous Traditions, Tourism, Historical Preservation, Cultural Identity

Assessing Competency Gaps and Training Needs of University Peer Facilitators in Academic Stress and Performance Anxiety Management

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Abstract:

Academic stress and performance anxiety are common challenges for university students, affecting mental health, academic outcomes, and overall wellbeing. Peer support programs can help address these challenges, but their effectiveness depends on the skills and preparedness of facilitators. This study examined the competencies of 109 peer facilitators at Mariano Marcos State University to inform the design of Project LIFT, a structured training module. Using a descriptive cross-sectional design, participants completed the Training Needs Assessment Survey (TNAS), which measured self-reported competence in three areas: knowledge of academic stress and performance anxiety, counseling and facilitation skills, and cultural responsiveness using Filipino psychological concepts (e.g., *hiya*, *utang na loob*, *bahala na*). Descriptive statistics, including mean scores and frequencies, were used to identify priority areas for training. Results showed moderate competence in knowledge ($M=2.46$) and counseling skills ($M=2.45$), but low competence in cultural responsiveness ($M=1.50$). Facilitators frequently encountered challenges managing emotional responses and session boundaries ($GWM=3.35$). Participants preferred interactive, role-playing workshops delivered in short, half-day sessions. These findings indicate that while peer facilitators have basic knowledge and skills, they require targeted training in culturally responsive strategies and structured interventions.

Index Terms:

Peer Facilitators, Training Needs, Academic Stress, Performance Anxiety, Cultural Responsiveness, Higher Education

Determining Factors Influencing the Satisfaction of Physically Challenged Students with Campus Accessibility in Higher Education Institutions in Metro Manila

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Abstract:

This study examined factors influencing the satisfaction of physically challenged students with campus accessibility in higher education institutions in Metro Manila. Despite ongoing efforts toward inclusivity, many students with physical disabilities continue to face barriers that limit academic participation. Guided by the Theory of Planned Behavior and the Social Model of Disability, the study applied Structural Equation Modeling to analyze how physical barriers, campus design, and policy and administrative factors shape attitudes, subjective norms, perceived behavioral control, and overall accessibility satisfaction. Data were gathered from 171 students with diverse physical disabilities using structured survey instruments. Findings showed that physical barriers significantly influenced subjective norms and perceived behavioral control but not attitudes. Campus design affected all TPB constructs, highlighting its central role in accessibility experiences, while policy and administrative barriers influenced only perceived behavioral control. Subjective norms and perceived behavioral control significantly predicted satisfaction, whereas attitudes did not, indicating that satisfaction is driven more by perceived support and autonomy than by personal evaluations of accessibility. Overall, the results emphasize the combined role of structural and psychosocial factors and highlight the need for inclusive infrastructure, stronger institutional practices, and supportive campus environments to improve participation and well-being among physically challenged students.

Index Terms:

Campus Accessibility, Inclusive Education, Social Model of Disability, Theory of Planned Behavior, Structural Equation Modeling

Law-Mate: AI Assistant for FIR And Legal Awareness

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Abstract:

The legal documentation process and FIR drafting will necessitate the accurate use of legal/statutory language which creates difficulty when attempting to map natural-language narratives to statutory/legal provisions. This study introduces a framework called Law-Mate, an artificial intelligence-based semantic retrieval and legal search and FIR analysis system that attempts to bridge this gap by using a sentence-transformer (all-MiniLM-L6-v2) model with cosine similarity to return semantically-related statutory sections in response to plain-language queries and an FIR recommendation module that combines embedding-based similarity and rule-based consistency checking to identify possible applicable legal standards. The Law-Mate was developed using MERN stack technology and precomputed embeddings, this allows to fetch the legal sections/statutory provisions faster.

Index Terms:

Legal NLP, Semantic Search, Sentence Transformers, FIR Analysis, Cosine Similarity, Legal Information Systems, AI in Law.

ENGINE.AI (NLT): A Meta LLaMA 3.1 Integrated Natural Language Terminal for Automated File and Code

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Abstract:

Engine.AI (NLT) is an intelligent, conversational assistant developed to bridge the gap between high-level human reasoning and low-level local file system operations. Modern computing environments require users to frequently switch between conceptual thinking and technical command execution, leading to increased cognitive load and reduced productivity. This project addresses that challenge by enabling users to interact with the file system through natural language instructions, which are automatically translated into executable code and system commands.

The system leverages the Meta LLaMA 3.1 large language model accessed via the Hugging Face Inference API to accurately interpret user intent, generate context-aware scripts, and perform complex automation tasks. A secure sandboxed execution environment ensures that all operations are isolated from critical system resources, preventing unintended modifications. To further enhance reliability, an automated undo mechanism is implemented using a dedicated trash directory, allowing users to safely revert file operations.

Additional features include AI-driven debugging, intelligent summarization of execution results, real-time syntax highlighting, and an interactive file-tree visualization within a web-based terminal interface. Empirical evaluations demonstrate that the platform effectively reduces context switching, minimizes manual scripting effort, and accelerates routine development workflows. Engine.AI represents a step toward more intuitive human-computer interaction by unifying natural language understanding with practical system-level automation.

Index Terms:

Meta LLaMA 3.1, Natural Language Processing, Intent Recognition, File System Automation, AI-Driven Debugging, Secure Sandbox, Developer Productivity

Moving Towards Circularity: A Baseline Study for the implementation of BIDA-CE: Batang Idol Para sa Disiplinadong Aksyon Project in Ormoc City, Leyte

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ECLIPSE Inc.

Abstract:

This study focuses on the Knowledge, Attitudes, and Perceptions of the community towards Circular Economy in Ormoc City. Particularly, it explores narratives and experiences of the children, youth, community leaders, and members of the vulnerable groups, along with school personnel, relating to the Circular Economy. This study aims to establish the realities of schools and communities before the implementation of the proposed Batang Idol para sa Disiplinadong Aksyon (BIDA-CE) project, a circular economy (CE) initiative designed for the Local Government Unit (LGU) of Ormoc City, Leyte, through ECLIPSE Inc. The project seeks to transition the city from a linear “take-make-dispose” economic model toward a circular economy that emphasizes reduction, reuse, and recycling. This shift is necessitated by Ormoc’s rapid urbanization and increasing waste volumes, which mirror a regional trajectory projected to reach millions of tons annually. A mixed-methods research design was used to establish baseline indicators. This involved a Knowledge, Attitudes, and Perceptions (KAP) survey of 1,000 stakeholders to yield quantitative data, complemented by qualitative insights from interviews and focus group discussions. The participant pool was strategically composed of the youth sector between the ages of 13 and 24 (60%), community leaders (15%), vulnerable groups (15%), and children between the ages of 6 and 12 (10%).

Key Findings: Awareness vs. Sustained Action. While 78% of the 1,000 profiled stakeholders fall into a “transitional” category (emerging or active engagement), only 1% have achieved “sustained CE practice”. Furthermore, 21% of respondents remain at a “Pre-Awareness Level.”

Policy Landscape. Ormoc’s current legal framework is “defensive and preventive. While the city has enacted strong ordinances to stop plastic leakage (Ordinance No. 36 and 51) and established an effective policy for business accountability (Tax Ordinances Nos. 8 and 10), it currently lacks policies that promote material recovery or industrial symbiosis. There was an evident absence of a policy solely for the promotion and full implementation of the circular economy.

The “Inside Out” Educational Model. Findings indicate that waste management practices among students are increasingly shaped within the household context before being reinforced in schools. Segregation, composting, and basic waste reduction behaviors are often first learned and normalized at home, positioning the family as the primary site of environmental socialization. Schools then function as reinforcing institutions, formalizing these practices through policies, routines, and structured activities. This “inside-out” model highlights the bidirectional relationship between household behavior and school-based circular economy initiatives, suggesting that effective interventions must address both domestic and institutional settings.

Educational Personnel is one of the key influencers. Teaching and non-teaching personnel emerge as critical behavioral influencers within the school system. By consistently modeling circular economy practices and enforcing accountability mechanisms such as waste audits and segregation protocols, school personnel serve as “behavioral anchors” that shape student discipline and compliance. Their role extends beyond instruction to institutional leadership, where daily reinforcement and visible adherence to circular practices contribute to the normalization of waste-conscious behavior among students.

Recommendations: The study identifies several strategic levers to accelerate circularity. With youth comprising approximately 60% of stakeholders, there is substantial potential to position them as active drivers of behavioral and cultural change rather than passive beneficiaries. Schools also represent institutional microcosms where circular practices—such as waste audits and material characterization—can be normalized through consistent policy and practice. At the community level, barangay-based integration offers an opportunity to co-develop

localized ordinances that institutionalize composting systems and community material recovery facilities (MRFs), strengthening grassroots ownership and implementation.

To address identified gaps and leverage existing opportunities, the study recommends a shift from a predominantly punitive business approach that simply taxes business establishments for waste to a regenerative policy framework that incentivizes businesses through tax benefits or fee reductions tied to material recovery and waste reduction. Capacity-building initiatives are also critical, with a clear need for advanced training for school personnel and community leaders to move beyond the traditional 3Rs toward more complex circular systems. Furthermore, sustained LGU investment in visible and accessible infrastructure, such as composting hubs and recycling facilities, should be complemented by social and material incentivization mechanisms, including skill-based recognition or awards, to sustain community engagement. Finally, standardizing waste audits in schools through technical waste characterization is essential to generate data-driven insights that can inform long-term resource recovery and circular economy planning.

Practice Teaching Experiences of Pre-Service Teachers: A Mixed Methods Examination of Instructional Support, School Environment and Practicum Challenges

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Abstract:

This study examined the practice teaching experiences of pre-service teachers using a convergent parallel mixed-methods design, focusing on instructional support, school environment, and practicum-related challenges. Quantitative data were collected through a validated survey instrument, while qualitative data were gathered from open-ended responses and analyzed using Braun and Clarke's (2006) thematic analysis. Descriptive findings revealed that all domains—instructional support and practicum activities ($M = 4.61$), rapport with the school community ($M = 4.51$), practicum site conditions ($M = 4.69$), and engagement in teaching-related activities ($M = 4.66$)—were rated as very highly evident, indicating generally positive practicum experiences.

However, qualitative results uncovered critical challenges, including inconsistent mentoring practices, communication and coordination gaps, limited school resources, classroom management difficulties, heavy workload, and emotional stress. Despite these issues, many pre-service teachers reported supportive environments, professional growth, and the development of resilience. The integration of findings highlights that while the practicum program is structurally strong, inconsistencies in implementation and contextual constraints affect the overall experience. The study concludes that enhancing mentoring systems, improving communication mechanisms, ensuring adequate resources, strengthening classroom management training, and providing psychosocial support are essential to achieving a more consistent and effective practicum program. These findings provide valuable insights for improving teacher education programs and developing responsive practicum frameworks.

Index Terms:

Experiential Learning, Mixed-Methods Research, Practicum Experiences, Pre-Service Teachers, Professional Development

Acceptability of Corchorus olitorius (Saluyot) Fiber as Raw Material in Fabric Making

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Abstract:

The suitability of *Corchorus olitorius* (saluyot) fiber as a raw material for fabric manufacture was investigated in this study, acknowledging its potential as a sustainable and locally sourced substitute for conventional textiles. Forty purposively selected respondents, including industry professionals, faculty from Higher Education Institutions (HEIs), and Technical-Vocational-Livelihood (TVL) teachers, evaluated samples of saluyot yarn and fabric produced at the Philippine Textile Research Institute (PTRI) using a descriptive-evaluative research design. Frequency counts, weighted averages, and the Kruskal-Wallis test for group differences were used to support a structured review that examined usefulness, durability, appearance, and texture. All parameters showed high approval, with utility ($M=4.65$), durability ($M=4.48$), and appearance ($M=4.80$) receiving especially high marks. Industry specialists were more confident in the material's performance, according to a significant difference in durability ratings, despite the fact that respondents' judgments were generally similar. The fiber's strength, cultural significance, and variety of product possibilities were emphasized in the qualitative feedback, which also pointed out the need for better texture and cutting-edge processing methods to increase comfort. Saluyot fiber is a feasible and promising material for clothing and industrial textile uses, according to the study's findings, which also help regional value chains and sustainability initiatives. To improve its commercial preparedness and encourage wider use, further advocacy, standardized testing, and ongoing development are advised.

Mediating Employee Engagement Practices and Process Excellence Philosophy in Performance Management for Organizational Effectiveness

Francis Banaag

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Abstract:

Background: Employee engagement practices and the company's philosophy in operational excellence tend to matter most for companies with service operations. These factors must help organizational leaders to understand dynamics of today's workforce as well as identify ways to motivate and empower employees to optimize processes that strategically addresses organizational effectiveness.

Methods: This study utilized partial least square structural equation modeling (PLS-SEM) to identify parallel mediation role of employee engagement practices, process excellence philosophy, affecting organizational effectiveness of businesses with service operations in Metro Manila. The study has also evaluated the challenges in the implementation of performance management system and the drivers of process excellence philosophy.

Results: Employee engagement practices suppresses negative direct effect of performance management system towards organizational effectiveness. Moreover, process excellence philosophy weakens the inverse relationship and flips significant effect of performance management to non-significance.

Conclusion: A final model has established where indicators of performance management system and process excellence must be redirected appropriately through employee engagement practices to add value between elements involved and achieve significant positive effects on the company's organizational effectiveness.

Index Terms:

Employee Engagement Practices, Process Excellence Philosophy, Organizational Effectiveness, Performance Management System, Parallel Mediation Analysis

Exploring Productivity Frontier and Strategic Positioning: The Moderating Role of Financial Control

Francis Banaag

Rizal Technological University, Philippines

Abstract:

Background: Strategic positioning reflects how the firm creates value for its customers, maintain competitive capabilities and practices that leverage available resources. Practices relevant to the productivity frontier reflect the pursuit of differentiation through all approaches or a low-cost way to compete with existing offerings of various competitors. The presence of financial discipline strengthens the impact of a firm's strategy on its overall performance.

Methods: The study uses the partial least squares structural equation modeling (PLS-SEM) to test the hypothesized model and simultaneously estimate multiple relationships within a unified framework

Results: The findings are both significant and counterintuitive, and they convincingly show that while both the productivity frontier and financial control independently have a significant positive relationship with strategic positioning, financial control does not act as a moderating variable.

Conclusion: Financial control is a crucial mechanism through which operational efficiencies can indirectly influence strategic outcomes. This insight moves beyond simplistic direct-effect models and provides a more realistic picture of how these key organizational elements interact.

Index Terms:

Productivity Frontier, Partial Mediation Model, Strategic Positioning, Financial Control

Mediating Employee Engagement Practices and Process Excellence Philosophy in Performance Management for Organizational Effectiveness

Francis Banaag

Rizal Technological University, Philippines

Abstract:

Background: Employee engagement practices tend to matter most at the company with service operations and helps organizational leaders to understand dynamics involving today's workforce as well as identify ways to strategically address organizational effectiveness.

Methods: The study uses the partial least squares structural equation modeling (PLS-SEM) to test the hypothesized model and simultaneously estimate multiple relationships within a unified framework. Purposive sampling and a 5-point Likert scaling technique were used for this study. One hundred thirty-seven (137) respondents were selected and asked to assess the twelve (12) item questionnaire to measure the structural relationships between performance management system, employee engagement, process excellence and organizational effectiveness.

Results: Employee engagement practices suppresses negative direct effect of performance management system towards organizational effectiveness. Moreover, process excellence philosophy weakens the inverse relationship and flips significant effect of performance management to non-significance.

Conclusion: The absence of employee engagement, performance management system might actually harm the organization, which is a highly persuasive and strong argument for the necessity of human-centric management.

Index Terms:

Employee Engagement Practices, Process Excellence Philosophy, Organizational Effectiveness, Performance Management System, Parallel Mediation Analysis

The Preservation of Tunnels in RTU towards Filipino Cultural Heritage

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Abstract:

This study investigated the historical background of the tunnels located at the RTU during the Japanese occupation of the Philippines (WWII) and propose to register to the National Historical Commission of the Philippines to be consider as one of the Cultural heritage sites in the Philippines. Employing a qualitative approach, the research involved interviews with five local residents of Mandaluyong City who lived there during the Japanese occupation period. Additionally, researchers consulted primary and secondary sources at the National Historical Commission of the Philippines library, National Library, and Rizal Library.

The findings indicate that the RTU tunnels were not built by the Japanese but they contributed to the expansion of these tunnels and assumed that they were likely part of the extensive tunnel network constructed by the U.S. Army Corps of Engineers between 1932 and 1946. These tunnels served multiple purposes, including bomb-proof storage, hospitals, and military headquarters. Interview data suggests the RTU tunnels were used for civilian and military passage, potentially including tankers. The discussion contextualizes the Tunnels in RTU that was within the broader defensive strategy of the Japanese army in Mandaluyong. Due to its proximity to strategic locations like Fort McKinley and Camp Murphy, Mandaluyong was heavily fortified by the Japanese. This included blocking road access points, constructing observation posts, and establishing checkpoints. The adobe and concrete fences of the San Carlos Seminary tunnels connected to specific barangays, and the area's elevated terrain likely influenced the decision to build tunnels in RTU.

Index Terms:

Student-centeredness, Innovative Teaching and Learning, Quality Support, Continuous Improvement, Performance Evaluation, Operation

Challenges and Management Practices of Mandaluyong Local Officials in Addressing the Pandemic

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Abstract:

This research paper aims to assess the challenges and management practices of Mandaluyong local officials in addressing the Pandemic in terms of economy, health care, and food safety. The researchers use mixed methods design-qualitative and quantitative. Respondents of the study is 380 coming from the different sectors of the society. The instrument used in this study was the researcher- made questionnaire. For quantitative data, the researchers used t test for independent sample means and ANOVA. Results of the study revealed: majority of them are female, age ranging 20–25 years old, non- professionals, and high school graduate; performance of the Local government of Mandaluyong City in health care was assessed very effective and effective in of food safety; Challenges faced by the Local officials on economy focus on the closure of businesses leading to unemployment; health care insufficient delivery of quality health services and implementing safety health protocols; in food safety, delivery of sufficient as well as clean and hygienic food practices. Management practices of the Local officials of Mandaluyong City centered on: Provision of emergency support thru “ayuda”, opening of “kadiwa” stores selling affordable goods; In health care, policies on prohibitions on illegal selling of vaccines are strengthened, observing the safety health protocols; In food safety, assurance of health and clean handling of foods. Test for the difference showed no difference between male and female on the assessment on level of effectiveness; In terms of age, respondents differ on their assessment; in terms of educational background and nature of work, assessments do not differ significantly.

Index Terms:

Ayuda, Food safety, Kadiwa, Local government, Mandaluyong City

The Strategies of the Unemployed Workforce in the Time of Pandemic

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Abstract:

The research paper explores the strategies of the unemployed workforces in Metro Manila in time of pandemic for the F.Y. 2022. It also includes the perception of the unemployed workforce in terms of self-esteem and self-efficacy. The researchers used the convergent parallel mixed method through quantitative and qualitative data analyzes, frequency, percentage and ANOVA. There are 417 respondents in this study and distributed the questionnaires through google forms. Majority of the respondents are female aged 20–25 years old and living with their relatives. Most of the respondents have a low self-esteem when it comes to self-respect, but the respondents agree that they can manage difficult problems, resourceful, goal-oriented and rational in solving their problems. Recommended strategies among unemployed workforce, the researchers will conduct seminars and workshop ties up with TESDA to support the needs the respondents and to become self-reliant in pandemic times.

Index Terms:

Metro Manila, Strategies, Pandemic, Unemployment, Workforce

The Service Delivery of the Registrar in Rizal Technological University: From the Lens of the Clients

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Abstract:

Efficient service delivery for the satisfaction, continuous patronage of clienteles, to ensure quality improvements, confidentiality, integrity and honesty at all times is always at the top priority of of the Registrar in Rizal Technological University. This study sought to assess the service delivery of the Registrar to offered efficient and satisfaction of their clients. The researchers used systematic random sampling technique for 536 respondents for the S.Y. 2023–2024. Majority of the respondents are female which constitute 58.6 percent and 183 were males which is equivalent to 34.1 percent. The respondents assessed as moderately efficient with a weighted mean of 3.45 the Delivery of Services of the RTU Registrar in terms of admission and registration while the overall mean rating of 3.97 indicates that the respondents assessed as satisfied the Delivery of Services of the RTU Registrar in terms of enrollment. There is lack of equipment such as cabinets, safes, and locks, lack of computers to assist properly the clients. Increase the number personnel in dealing with their clients. There is a need to provide training among personnel in the registrar, full implementation of computerization if possible to provide an efficient service among their clients. This is essential to understand customers' satisfaction to identify their strengths, weaknesses, opportunities and threats of the RTU Registrar.

Index Terms:

Efficient, satisfaction, Registrar Service Delivery

Assessing RTU Library Infrastructure for Service-Oriented Learning and User Engagement

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Ethelyn Verdadero

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Abstract:

This study assessed the reliability of the Rizal Technological University (RTU) Library infrastructure in promoting service-oriented learning and user engagement for Academic Year 2023–2024. Using a descriptive survey design, data were collected from 500 student-respondents through stratified random sampling, ensuring representation across various colleges and year levels. The study utilized a structured questionnaire via Google Forms to evaluate library accessibility, facilities, technological resources, staff support, and overall satisfaction. The findings offer valuable insights for improving library infrastructure and enhancing the delivery of academic services to better meet the needs of RTU students.

Index Terms:

Facilities, Reliability, RTU Library, Service – Oriented, User Engagement

Police Officers Responses in the Implementation of Peace and Order in Amidst of Pandemic

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Abstract:

During pandemics, like COVID-19, law enforcement agencies are responsible for working with government and public health officials to contain spread, serve the local community, and maintain public order. The study was to analyze and explore the challenges and responses among police officers in the implementation of peace and order in amidst of pandemic in Mandaluyong City for the F.Y. 2023–2024. The researchers used qualitative and quantitative method through online survey data. There were 536 total respondents. The study reveals, the assessment of the respondents in the implemented peace and order in Mandaluyong City as responsive and effective among local residents. Th challenges faced by police officers in amidst of pandemic are the following: lack of discipline among civilians/ violators of the health protocols, risk of virus exposure during deployment and interaction with the community, concern of exposing their family members to the virus and the rise in the number of infected or COVID-19–related fatalities in police officers. The results suggest, additional police officers, budget and equipment monitoring properly the local residents for health protocols and physical training at least twice a week for coping mechanism enhancement of physical and mental aspect.

Index Terms:

Covid – 19, Mandaluyong City, Police officers, Pandemic, Peace and Order

The Competencies of Women Police Officers in the Process of Community Policing

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Abstract:

The law enforcers make up the first pillar of the criminal justice system in the Philippines. They perform many functions vital promoting peace and order. Further, the Philippine National Police, female police officers are playing key roles in the traditionally male-heavy hierarchy. The study focuses on the competencies of women police officers in the process of community policy in Mandaluyong City for the years 2017– 2019. With this scenario, the women police officers experienced difficulties in their duties in the organization. It used descriptive method through survey questionnaire. There were only 24 respondents due to pandemic among police officers in Mandaluyong City. Based on the conclusion, communication is the best competencies among women police officers in the process of community policing. It is encouraged information dissemination to post in the social media to increase more women police officers and lucrative incentive to compensate with their functions and duties as police officers. This is also essential to remain them within the organization.

Index Terms:

Competencies, Philippine National Police, Police Officers, Community Policing

Effect of Retting Methods on the Tensile Strength of Saluyot (*Corchorus olitorius*) Fiber for Sustainable Textile Applications

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Abstract:

This study investigated the effect of two retting methods, sun-drying and freshwater retting, on the tensile strength of saluyot (*Corchorus olitorius*) fibers for potential sustainable textile applications. A comparative experimental design was employed, wherein fiber samples extracted from each method were subjected to tensile testing using a Constant Rate of Extension (CRE) machine in accordance with ASTM standards. Descriptive statistics, including mean, standard deviation, and coefficient of variation, were utilized to evaluate fiber performance and consistency. The results revealed that sun-dried fibers exhibited a higher mean tensile strength (4.6 N) compared to freshwater-retted fibers (2.4 N). Furthermore, sun-dried fibers showed lower variability (CV=40.34%), indicating more consistent fiber quality, whereas freshwater-retted fibers demonstrated significantly higher variability (CV=76.34%) and a wider range of tensile values. This suggests that freshwater retting may lead to inconsistent fiber properties due to uncontrolled environmental and microbial conditions. Overall, the findings indicate that sun-drying is a more effective and reliable method for producing stronger and more uniform saluyot fibers, supporting its potential as a sustainable alternative for textile and material applications

Index Terms:

Corchorus olitorius, Natural Fibers, Sustainable Textile

The Hostility Paradox: Cultural Mediation of Aggression Among Filipino Student-Athletes

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Abstract:

Background: Aggressive behavior in competitive sports is a multi-faceted construct that can compromise athlete well-being, increase injury susceptibility, and negatively impact systemic sportsmanship. While participation in sports is often associated with physical and psychological health, it also provides an environment where hostile aggression, driven by anger and the intent to harm, can manifest.

Problem and Aim: Most research on sport aggression originates from Western, individualistic cultures, leaving a socio-cultural blind spot regarding how unique values shape aggressive expression. This study aimed to investigate the prevalence and predictors of sport-specific aggression among Filipino student-athletes, specifically examining how cultural values like *pakikisama* (social harmony) mediate these behaviors.

Methods: Employing a mixed-methods concurrent triangulation design, the study surveyed 727 student-athletes (aged 18–29) from the National Capital Region. Data were collected using the Buss-Perry Aggression Questionnaire (BPAQ) and a validated 50-item situational survey. Hierarchical Multiple Regression was utilized to determine the unique predictive weight of contextual factors, dispositional traits, and environmental catalysts.

Results: The final hierarchical model explained 51% of the total variance in aggressive behavior. While overt aggression was relatively rare ($M=2.39$), male athletes and those in contact sports exhibited significantly higher aggressive tendencies. Environmental catalysts, such as performance frustration and perceived officiating unfairness, added significant unique variance (8%), often overriding general disposition. Notably, a “cultural paradox” was identified where internal hostility negatively predicted overt acts, suggesting that the value of *pakikisama* serves as a cognitive inhibitor.

Conclusions: The findings establish that aggression is an ecosystemic issue heavily influenced by the competitive environment rather than personality alone. Managing aggression in the Philippine sporting context requires a shift from punitive measures toward a framework targeting emotional regulation, autonomy-supportive coaching, and systemic officiating standardization to foster safer competitive ecosystems.

Index Terms:

Sport Aggression, Social Cognitive Theory, Hierarchical Regression, Filipino Student-Athletes, *pakikisama*, Emotional Regulation

Fostering Engagement: How Teacher Effectiveness and Classroom Dynamics Shape the Physical Education Learning Climate

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Abstract:

The quality of the learning climate in Physical Education (PE) is paramount for student engagement and the adoption of lifelong healthy habits. This study explored how teacher effectiveness and classroom dynamics shape the PE learning climate from the student's perspective. A convergent parallel mixed-methods design was employed, gathering quantitative and qualitative data simultaneously from 1955 university students through a comprehensive survey. Quantitative results indicated that students strongly agree that their PE teachers are effective across instructional practices ($M=4.46$), professional qualities ($M=4.40$), and interpersonal interactions ($M=4.47$). Teachers were highly rated for providing clear instructions and showing respect. However, qualitative analysis revealed critical nuances for fostering deeper engagement. While students value enthusiasm, clarity, and inclusivity, their motivation is significantly hindered by monotonous instruction, a lack of variety, and insufficient personalized feedback. The integrated findings conclude that while foundational teaching competencies are strong, advancing student engagement requires a deliberate pedagogical shift. To transform a compliant climate into a truly engaging one, educators must diversify activities, integrate student choice, provide specific, individualized feedback, and cultivate a more approachable, communicative rapport. This study underscores the need for professional development focused on these nuanced, student-centered strategies.

Index Terms:

Teacher Effectiveness, Physical Education, Student Engagement, Classroom Dynamics, Mixed-Methods Research

Environmental Stressors and Student Engagement in Physical Education: A Mixed-Methods Study

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Abstract:

The learning environment is a fundamental determinant of student development, yet participation in Physical Education (PE) is profoundly influenced by the physical surroundings. While students generally perceive their infrastructure as sufficient, with an overall mean of 4.07, specific environmental stressors act as powerful demotivators that can override positive social aspects. Thermal discomfort is a primary barrier, as heat is described by students as “super draining” and “exhausting,” matching the study’s lowest quantitative scores for ventilation and temperature at 3.81. Statistical analysis identifies Safety in the Learning Environment as the most robust predictor of student drive ($B = 0.27$, $\beta = 0.32$, $t = 20.68$, $p < .001$), confirming that environmental security is a primary requirement for engagement. Data collected from 1,955 students reveals a critical functional disruption: while students value open areas for movement, these spaces are frequently encroached upon by parked vehicles. This spatial encroachment signals a lack of institutional support, which thwarts students’ psychological needs for autonomy and competence. Although peer camaraderie serves as a vital psychological buffer that sustains excitement during activities, it is insufficient to fully counteract the energy-draining effects of thermal stress and spatial disruptions. Strategic investment in climate-appropriate, roofed facilities and strict protection of designated PE zones from external interference are crucial for fostering sustained engagement and promoting lifelong physical activity in urban educational settings.

Preliminary Carbon Storage Capacity Assessment of the Three Mangrove Species in Intertidal and Coastal Zones of Bacoor Cavite

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Abstract:

Mangrove ecosystems were appraised to be essential for coastal resilience and carbon sequestration are under threat due to habitat destruction and climate change. A mixed-method of field surveys, remote sensing, and laboratory analyses were employed to collect data on species composition, density, and biomass. The findings show that the study area is home to three mangrove species: *Rhizophora mucronata*, *Avicennia* sp., and *Sonneratia alba* with *Rhizophora mucronata* and *Avicennia* sp., being the most dominant species in the whole mangrove plantation. Aboveground biomass for potential carbon sequestration in landward is 60.36 Mg ha⁻¹, midward 3,288.68 Mg ha⁻¹ and seaward 6,589.84 Mg ha⁻¹. Belowground biomass in landward is 18.05 Mg ha⁻¹, midward 21.95 Mg ha⁻¹, and seaward 2,104.39 Mg ha⁻¹. The Average vegetative carbon in a plot was estimated to be 30,810.12 Mg C/ha, with estimate of vegetative carbon in a Intertidal stratum accounting for 46,831.39 Mg C and estimate of vegetative carbon in a coastal stratum contributing 306,560.74 Mg C. The total carbon storage capacity of the mangrove plantation in Bacoor, Cavite is 389,548 Tons C, thus indicating its importance for conservation and sustainable management efforts in order to protect these critical ecosystems.

Index Terms:

Mangroves, Zonations, Carbon Storage, Biomass, Remote Sensing

Cooperative Grit and Distributed Regulation: How Filipino Cultural Values Shape Athletic Persistence and Discipline

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Abstract:

While athletic self-regulation is traditionally framed through Western individualistic paradigms, this study explores how Filipino cultural values rooted in the indigenous concept of *Kapwa* (Shared Inner Self) redefine these strategies among student-athletes. Utilizing a Convergent Parallel Mixed-Methods design with a sample of 786 collegiate participants, the research proposes a "Sociocultural Model of Interdependent Regulation". Quantitative analysis reveals that Collective Spirit (*Bayanihan*) and Resilience (*Tiyaga/Diskarte*) serve as the primary behavioral drivers, statistically grounding the novel concept of "Cooperative Grit" through a strong correlation ($p = .858$). Furthermore, multiple regression analysis yields an exceptionally high coefficient of determination ($R^2 = 0.901$), indicating that 90.1% of the variance in self-regulation is explained by the cultural model. These statistical findings are contextualized by qualitative narratives revealing a "Relational Will," where discipline is transformed into a reciprocal moral duty (*Utang na Loob*) to support family and coaches. Ultimately, the study demonstrates that while indigenous values provide a "high ceiling" for collective motivation, they function as a "double-edged sword" by creating vulnerabilities such as the suppression of personal needs to maintain social harmony (*Pakikisama*). These findings suggest that to be effective, psychological interventions in Philippine sports must shift from individualistic skill-building to group-based and family-integrated strategies.

Index Terms:

Kapwa, Cooperative Grit, Relational Will, Self-Regulation, Filipino Athletes, Interdependent Regulation, Mixed Methods

Development of V-Trough Concentrating Photovoltaic with Azimuth-Altitude Dual-Axis Tracking and Front Surface Water Mist Cooling

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Abstract:

Solar energy, characterized by its global availability, ease of installation, low maintenance requirements, and scalability, presents numerous advantages. However, a significant challenge in the realm of photovoltaic cells is the delicate balance between the absorption of solar flux and the consequent temperature increase, both of which are pivotal for energy conversion efficiency. The research introduces a prototype of a photovoltaic module that is equipped with a dual-axis solar tracker, a V-trough concentrator, and a front surface water mist cooling system. The V-trough concentrator in the proposed photovoltaic system has geometric concentration ratio of 2.00 $\times$, a trough angle of 300, and made up of anodized aluminum as the reflective material. The dual-axis solar tracker and the water mist cooling system are controlled by an Arduino Mega 2560 microcontroller. The solar tracking function operates until the absolute value difference of the average of the left set LDR and the right set LDR falls below the threshold value of 10%, similar to the voltage of the top set and bottom set LDR. Moreover, the water mist cooling system activates when the temperature reaches 42°C and deactivates at 32°C. The heating rate of the proposed photovoltaic system is approximately 0.5°C per minute, while its cooling rate, when the front water mist cooling system is activated, can reach up to 1.70°C per minute. The proposed PV surpasses other photovoltaic setups in terms of current, power, and energy collection, with the test date for each photovoltaic setup not significantly affecting the results. The study concludes that the dual-axis photovoltaic system, fitted with a V-trough concentrator and a front surface water mist cooling system, represents a promising strategy for efficient energy harvesting and conversion.

Index Terms:

Solar Energy; Photovoltaic Module; Dual-Axis Solar Tracker; V-Trough Concentrator; Water Mist Cooling System

The Changing Survival Strategy Adapted by Mandaluyong City Residents in the Midst of Pandemic Surge

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Abstract:

The study examined how residents of Mandaluyong City adapted to the socioeconomic disruptions caused by the COVID-19 pandemic in the Philippines. The pandemic generated significant income shocks and affected several aspects of daily life, including health and food safety, economic stability, access to education, and the availability of social services. Using a mixed-methods research design, the study combined quantitative survey data and qualitative interview responses to analyze the experiences and coping mechanisms of local residents. Out of 374 respondents, a portion participated in interviews while the remaining participants completed structured surveys. Statistical analysis was conducted using independent sample t-tests and Analysis of Variance (ANOVA) to determine differences in responses according to demographic profiles.

The findings revealed that respondents demonstrated high awareness of health and food safety practices during the pandemic. Despite this awareness, many residents experienced fear of infection, which contributed to mental and physical health challenges. Educational difficulties were also reported, particularly due to limited access to electronic devices and unstable internet connectivity that hindered students' participation in remote learning. Economically, the closure of numerous businesses resulted in job losses and unemployment. Social interactions and mobility were restricted due to strict lockdown measures.

Residents prioritized health and food security as primary concerns. Suggested strategies included expanded vaccination programs, mental health support services, hazard pay for workers, and continued government food assistance to support vulnerable communities.

Index Terms:

COVID - 19, Food safety, Pandemic, Mandaluyong City, Survival Strategy

Factors Influencing Inclusive Practices in Teacher Education: A Systematic Literature Review for Multidimensional Measurement

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Abstract:

Inclusive practices in teacher education have gained international attention, yet the factors influencing them remain fragmented, limiting multidimensional measurement tools. This systematic review (PRISMA guidelines) analyzed research on factors influencing inclusive practices in teacher education published between 2020 and 2025. Seven databases were searched for peer-reviewed articles, systematic reviews, empirical studies, and policy documents. After screening, 24 key references were selected for in-depth analysis. Results indicate six major domains: (1) institutional policy and governance (25.0%), (2) awareness, beliefs and attitudes (20.8%), (3) pedagogical implementation including UDL and assessment (20.8%), (4) intentions and self-efficacy (12.5%), (5) Philippine legal/policy context (12.5%), and (6) measurement, instruments and methods (8.3%). No studies on technology or digital accessibility appeared. While several instruments measure individual factors, a validated multidimensional measure integrating all six domains remains absent. In the Philippine context, the legal framework (RA 11650 and its IRR) provides a strong policy foundation, but empirical research on implementation is limited, and no locally validated instrument was identified. This review highlights the need for further research on comprehensive, culturally appropriate measurement tools to guide evidence-based improvements in teacher education for inclusive practices, particularly in under-represented contexts such as the Philippines.

Index Terms:

Systematic Review, Inclusive Practices, Teacher Education, Pre-Service Teachers

Global Research Trends on Situational Leadership and Its Impact on Employee Performance Through Employee Engagement: A Systematic Literature Review and Bibliometric Analysis (2015–2025)

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Abstract:

Human resources play a vital role in the sustainability of global organizational strategies, but this sector is now facing increasingly intense dual pressures: the need to meet skyrocketing performance targets while maintaining employee mental well-being and psychological engagement. Amidst the tension between high productivity demands and talent retention, integrating leadership flexibility with organizational psychology has become an urgent research priority. This study applies a bibliometric-assisted systematic review approach to map the intellectual evolution and global research trends related to this topic. Through a structured search of the Scopus database with strict screening criteria, this study analyzes a dataset of high-quality articles published between 2015 and 2025. Using VOSviewer network visualization and content analysis, this study identifies three dominant thematic clusters: leadership style adaptability, employee engagement mechanisms, and organizational performance metrics. A crucial finding shows a significant upward trend in publications after the pandemic in response to changes in work patterns, with Structural Equation Modeling (SEM) becoming the most dominant tool for testing causality. However, this analysis reveals a gap where global literature is still dominated by Western perspectives and lacks local cultural context. Practically, especially for organizations in Indonesia operating in the Tapal Kuda region, this study concludes that it is necessary to combine three priority strategies in the future management agenda, namely the adaptation of paternalistic situational leadership (*nguwongke*), the application of hybrid communication (*egalitarian-subtle*) typical of Javanese-Madurese culture, and the strengthening of emotional bonds through communal solidarity values (*tan tretan dhibik*). The synergy of these three aspects based on Pandalungan culture is crucial to transforming the human resource management model in order to achieve robust performance efficiency without sacrificing employee engagement and loyalty.

Index Terms:

Situational Leadership; Employee Performance; Employee Engagement; Pandalungan Culture; Systematic Review

Deep Learning for Breast Cancer using Mammogram and Histopathology

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Abstract:

In every part of the world, breast cancer remains the leading cause of cancer mortality in women. An early and accurate diagnosis is critical to achieving good treatment outcomes. This paper presents a multi-modal deep learning framework that synthesizes mammogram and histopathology images into a more accurate and effective breast cancer detection system. The framework leverages YOLOv5 to improve lesion localization in mammograms, while the histopathology patches utilize Vision Transformers (ViT). Both cross-modal feature fusion and attention are employed to extract complementary information from the imaging modalities. The overall framework is assessed using a combined dataset which includes 15,000 images, as well as 650 human patient cases used in the validation specificity. The final overall metrics generated by the multi-modal model included an accuracy of 98.7%, sensitivity of 97.8%, and specificity of 99.1%. Grad-CAM integrated visualizations were provided to increase explainability and help support clinical decision making. In summary, the results show this model has great potential for real-time diagnostic support and the potential for use in clinical care.

Index Terms:

Breast Cancer Detection, Deep Learning, YOLOv5, Vision Transformer, Histopathology, Mammogram, Feature Fusion, Medical Imaging

Consumption Value on Purchasing Decision: As Input for Consumer Behavior Model

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Abstract:

Consumer behavior has changed gradually due to advancements in technology and evolving social standards. Their decision-making process is shaped by their access to a multitude of perspectives, options, and information. Scholars and industry experts are currently focusing on understanding what drives consumers' purchasing decisions and how businesses can cater to these needs effectively. Key topics include the importance of quality, price sensitivity, and overall satisfaction in consumer decision-making processes (Smith et al., 2021). As Holbrook (2019) mentioned in his study, consumption value refers to the level of fulfillment of consumer needs by assessing the net utility derived from a product or service after comparing the benefits and the costs involved. It can influence consumers' needs and wants and how companies prioritize them. Researchers utilize consumer behavior theories and empirical studies to uncover insights, with recent publications in journals like the Journal of Consumer Psychology, the Harvard Business Review, and others providing valuable sources. By staying updated on these trends, businesses can better understand customer wants and adjust their strategies to enhance the value proposition for their target audience. Consumption value is a key factor in understanding consumer purchasing decisions. It reflects the perceived benefits and satisfaction of a product or service relative to its cost. According to Anwar and Andrean (2020), one of the issues of purchasing decisions influence the customer's perceptions of prices. Price perception is the tendency of consumers to use prices in assessing product quality as evaluating the quality, durability, and functionality of a product is essential before making a purchase. In consumer behavior, price perceptions vary across individuals and products. Some consumers prioritize low prices, while others may associate higher prices with superior quality. Additionally, there are also misleading advertising tactics employed by companies. Clever marketing techniques can create an illusion of greater value or benefits than what the product actually offers (Anton, 2023). This can lead to consumers making purchases based on false claims or exaggerated benefits. Companies now confront a wide range of problems as consumer needs and purchasing behavior evolve. The quality of the product and its benefits to the buyer are critical factors in the purchasing decision. If the quality of what consumers value differs from what the company's product or service provides, adoption and satisfaction may suffer (Maia, et al. 2023). Poor quality of products and services can affect the consumption value of purchasing decisions. A problem related to not understanding consumption value and consumer behavior is ineffective targeting (Ong, et al. 2022). From the point of view of the company, without insight into what customers value and how they behave, marketers may struggle to tailor their marketing efforts to the right audience, leading to wasted resources and missed opportunities. Additionally, the ineffective product positioning (Ong, et al. 2022). Without a clear understanding of what aspects of a product or service are most valued by consumers, businesses may struggle to position their offerings effectively in the market. This can result in misalignment between the perceived value of the product and the target market's expectations, leading to difficulties in attracting and retaining customers. Moreover, a lack of insight into consumer behavior may lead to poor pricing decisions, such as setting prices too high or too low relative to the perceived value of the product, which can negatively impact sales and profitability. Overall, without a deep understanding of consumption value and consumer behavior, businesses may face challenges in effectively targeting, positioning, and pricing their products or services in the market. With

the issues and problems provided, the solution that the researchers want to achieve for this is to know the basis of the consumers when purchasing products. The researchers want this study to pave the way for companies to develop marketing plans and strategies for their business as it was gathered that understanding consumption value and consumer behavior is important for creating effective marketing strategies and plans. Consumption value reflects the perceived worth of a product or service to consumers, guiding marketers in adjusting offerings to meet customer needs effectively. By analyzing consumer behavior, marketers gain insights into purchasing patterns, preferences, and motivations, enabling them to anticipate market trends and create targeted campaigns that connect with the target audience. This understanding also informs product development, and distribution channels ensuring alignment with consumer expectations and increasing the chance of success in a competitive market environment. The marketing plan will be the driving factor for the success and growth of the company and to gain an advantage in the market. This will help companies to fix their customer service, have an ideal price for the product, help get feedback, and communicate to customers effectively, together with knowing the factors that can shape the ideas of the consumers. Therefore, understanding consumer behavior and consumption value serves as the cornerstone for building successful marketing strategies. Knowing what customers want and how they make purchasing decisions is key for businesses to succeed

Index Terms:

Purchase, Consumer Behavior, Fast Food Chain, Preferences, Consumption Value, Marketing Plan, Strategy

AI Literacy and Ethical Decision Making: The Mediating Role of Digital Confidence and the Moderating Effect of Responsible AI Use of College Students

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Abstract:

This study is aimed to investigate the relationship between AI Literacy and Ethical Decision-Making among college students in which Digital Confidence mediates the relationship and Responsible Use of AI moderates it, as it becomes more entrenched in education and buhay with the advent of artificial intelligence. This research shows how competence, confidence, and responsibility determine ethical behavior in the academic context. This study utilized quantitative-correlational design utilizing Structural Equation Modeling (SEM) through WarpPLS 8.0 for testing direct, mediating and moderating effects. The respondents were 483 out of the total population of a state university in the National Capital Region, who participated in taking the survey through Google Forms. Data were collected using a validated Likert-scale questionnaire, which were subsequently analyzed using confirmatory factor analysis, path modeling, and bootstrapping procedures. Findings reveal the influence of AI Literacy on both Digital Confidence and Ethical Decision-Making and that Digital Confidence mediates that relationship, while Responsible Use of AI moderates the direct relationship of AI Literacy with Digital Confidence. It becomes clear that ethical awareness strengthens competence-to-confidence pathways. This shows that AI Literacy, Digital Confidence, and Responsible AI Usage could be conceptualized as integrated drivers of Ethical Decision-Making under the 21st Century Skills framework, which has implications for curriculum design and policy-making for ethical AI education development.

Index Terms:

AI Literacy, Ethical Decision-Making, Digital Confidence, Responsible Use of AI, 21st Century Skills

Education Outcomes of Free Tuition Law (Universal access to Quality Education in the Philippines)

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Abstract:

This study aimed to examine the implemented RTU free tuition fee law implemented in Rizal Technological University students for the 2nd semester of AY 2021–2022. The study will employ the convergent parallel mixed method where the researchers will collect both quantitative and qualitative data, analyzes them separately and then compare the results to see if the findings confirm or disconfirm each other. There are 527 total number of participants were selected in the university. Student respondents will be determined using simple random sampling methods where every member of the population has an equal chance of being selected from the whole population of RTU students enrolled during the 2nd semester of AY 2021–2022. The purposive sampling is to be used to determine the implementer respondents, who are said to be the experts in the implementation of free-tuition law at RTU. The study reveals the implementation of free tuition fee law is appropriate, but the university faced challenges in the compliance of documents in applying free tuition fee among students in the Commission on Higher Education. It reveals the implementation is only for the regular students. It is encouraging the Commission on Higher Education should not limit in giving free tuition fee among the students since it is stated in the 1987 Constitution, Article XIV “that the state shall protect and promote the right of the citizen to quality education at all levels and the education should be accessible to all”.

Index Terms:

Commission in Higher Education, Education, Free Tuition Fee, SUCs

Moodle Learning Management System (LMS) in a Higher Education Institution E-Learning Environment

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Abstract:

Moodle has been gradually gaining worldwide popularity as a course management system for online learning. It has become an essential tool in the Higher Education Institutions (HEIs), playing a significant role in this shift of paradigm in the education sector. This study aimed to evaluate the usability of the Moodle system in terms of learnability, efficiency, effectiveness, memorability, error feature, satisfaction, and accessibility. With focus also on the challenges encountered in terms of connectivity, accessibility, and feedbacks from lecturers. Mixed method design was used to collect data. Quantitative descriptive survey was used to assess the usability of the Moodle and qualitative research method through guided interview to identify the limitations of the Moodle. The participants of the study, coming from five colleges-CAS, CED, CBEA, CEAT, and IPE. Modified survey instrument, based from the definition of usability by Nielsen (2014) and from IS) 9241, was used. The statistical tools include t-test for independent sample means and One-Way ANOVA for the significant difference by gender, age, and course respectively. Results of the study show the p-value of 0.227548 indicating no significant difference by age, the p-value of 0.09333 indicating that there is no significant difference by gender when compared to the tabular value p-value of 0.05; and there is a significant difference between the usability of Moodle in terms of course with the p-value of 5.03E-05 which is greater than p-value of 0.05. Majority of the respondents of the study agreed on the usability of the Moodle when measured in terms of the identified parameters. The results of the study would be useful to the institutions trying to integrate technology in their teaching and learning processes.

Index Terms:

e-Learning Environment, LMS, Moodle, Usability

Development of a Method for the Detection of Artificial Intelligence Use in Textual Works

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Abstract:

The rapid advancement of large language models (LLMs) such as GPT-4, Claude, and Gemini has created significant challenges for educators, researchers, and content creators. This comprehensive study presents a novel integrated methodology for detecting artificially generated text, combining linguistic feature analysis, statistical modeling, and machine learning approaches. Our research evaluates the effectiveness of 47 distinct features across 12 detection methods on a dataset of 8,500 samples comprising both human-written and AI-generated texts. We achieve a detection accuracy of 94.2% with minimal false positives (3.1%) and false negatives (5.8%), significantly outperforming existing commercial tools. This paper provides detailed performance metrics, comparative analysis with state-of-the-art methods, and practical recommendations for implementation in academic and professional settings.

Index Terms:

AI Detection, Natural Language Processing, Machine Learning, Text Classification, Linguistic Features, LLMs, Authenticity Verification

Proposed Filipino Tech-Based Language Competencies: Input to Realigning Filipino Subjects to the Laboratory Junior High School's Mandate as Technological Institution

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Abstract:

This study produced a set of tech-based Filipino language competencies specially designed for Junior High School students of the Laboratory School. It serves as an initial step toward aligning the Filipino subject with the school's mandate as a technological institution. The research focused on identifying target competencies for Grades 7 to 10, exploring challenges in implementing a technology-enhanced language curriculum and crafting competencies that address instructional gaps. The teachers from the Filipino Department, being the direct implementers of the curriculum, were selected as the primary respondents. Their insights were critical in contextualizing the realities of classroom instruction and the integration of technology language learning. To further strengthen the output, experts in instructional technology and Filipino language education were consulted. The development of the proposed competencies was also guided by the recalibrated K to 12 curriculum, particularly the MATATAG framework. Emphasis was placed on enhancing students' ability to develop, present, and engage with written, visual, and multimodal texts using available digital tools. These competencies are intended to be a relevant and practical contribution to curriculum revision efforts in the Filipino subject area, ensuring that it evolves in response to both technological advancements and the shifting needs of 21st-century learners.

Index Terms:

Tech-Based, Filipino, Competencies, Laboratory Junior High School

Risk Management in Archipelagic and Continental Nations: A Comparative Study of the South and Southeast Asia

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Abstract:

Flooding is one of the most destructive natural hazards affecting countries in South and Southeast Asia. Archipelagic and coastal nations are particularly vulnerable due to their exposure to typhoons, monsoon rainfall, riverine flooding, and rising sea levels. This study examines flood risk management (FRM) systems in selected countries in the region, specifically the Philippines, Pakistan, Indonesia, and India, during calendar years 2024–2025. The research aims to analyze similarities and differences in institutional capacities, governance mechanisms, community participation, and policy effectiveness in managing flood-related disasters.

The study employs a comparative analytical approach using secondary data from government reports, disaster management agencies, and international organizations. It assesses the effectiveness of existing flood risk management policies and strategies in reducing disaster impacts and examines how socio-economic, cultural, and geographical factors influence flood preparedness, mitigation, and recovery efforts in the four countries.

Findings indicate that while these countries have developed national disaster risk reduction frameworks, early warning systems, and community-based disaster preparedness programs, significant variations exist in institutional coordination, resource allocation, and community engagement. Countries with stronger governance structures and more active community participation demonstrate higher levels of resilience and disaster preparedness. However, challenges such as inadequate infrastructure, limited financial resources, rapid urbanization, and climate change continue to hinder the effectiveness of flood risk management systems.

The study identifies best practices including integrated disaster governance, climate-resilient infrastructure development, improved early warning systems, and community-based disaster risk reduction initiatives. Based on the comparative analysis, the research proposes policy recommendations aimed at strengthening institutional coordination, enhancing adaptive capacity, and promoting sustainable and integrated flood risk management frameworks suitable for vulnerable archipelagic nations.

Index Terms:

Effectiveness, India, Indonesia, Risk Management, Pakistan

Mapping the Research Trends of Artificial Intelligence Literacy in Education: A Bibliometrics Analysis

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Abstract:

The research study maps educational artificial intelligence literacy research trends from 2020 to 2025 through bibliometric analysis of 738 Scopus documents. The study uses Bibliometrix and VOSviewer to analyze publication growth patterns together with identifying key authors and publication sources and research output from different countries and academic fields. Research output has experienced rapid growth which started after 2023 because of increased usage of generative AI technologies. The main themes focus on literacy and education methods and psychological principles while newer fields include digital literacy and higher education implementation and responsible AI technology application. Research findings show that developed countries maintain research output and scientific production at moderate levels while developing countries start to make greater research contributions. The existing gaps in teacher education and extended empirical research studies demonstrate that progress has been made but important issues still need resolution. The study offers an all-encompassing analysis of the academic discipline while it identifies essential research paths needed to develop AI literacy education programs.

Index Terms:

Artificial Intelligence Literacy, AI Literacy, Artificial Intelligence in Education, Digital Literacy, Educational Technology

Proposed Learning and Development Plan for Pre-Service Teachers' Community Engagement

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Abstract:

This study explores the challenges faced by pre-service teachers in community engagement and develops a structured plan to enhance their readiness and effectiveness. The research identifies key barriers including travel delays, limited resources, and coordination difficulties, which impact instructional time and quality. By converting these challenges into design inputs, the study proposes a learning and development plan integrating boot camps, micro-teaching, partnership projects, and learner-centered routines. The inclusion of Universal Design for Learning (UDL) and high-dosage tutoring frameworks supports inclusive pedagogy and equitable education. Recommendations emphasized targeted training, competency-based modules, supervision cycles, and institutional support to sustain community programs and improve pre-service teacher preparedness. The proposed learning and development plan help pre-service teachers build key skill in planning, teaching, and coordination. Clear routines, shared calendars, and travel limits reduced delays and protected learning. Portable kits and learner-centered approaches kept instruction uninterrupted. Quick probes, coaching notes, and one-page handovers improved feedback and continuity across teams. Overall, communication with partners became smoother and sessions were safer and more reliable across sites. This approach fosters stronger school-community partnerships and enhances adaptability in diverse educational settings. For policy recommendations, the Institution's Student Sector Groups (Student Council, College of Education Council, Pre-service Teachers' Association) may adopt an integrated system for implementing students' community engagement activities, in coordination with the Extension and Community Services Office. Such an approach will foster more meaningful student participation and ensure sustainable, student-led community programs.

Index Terms:

Pre-Service Teachers, Community Engagement, Teacher Preparation, Learning and Development

Tacit Knowledge as the Missing Link in Digital Knowledge Management Adoption: A Conceptual Analysis of UAE Construction

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Abstract:

The construction industry is adopting digital technologies to enhance its productivity and knowledge exchange capabilities. Yet, organizations struggle to implement knowledge management (KM) systems despite their technological advancements. The study investigates the reasons behind the ongoing problem by examining construction knowledge. The study shows that most construction knowledge exists as experiential knowledge which requires specific contexts for understanding yet cannot be fully documented, while digital systems function to handle only structured explicit data. The two elements create a basic obstacle which prevents organizations from successfully implementing knowledge management practices. The paper uses established knowledge management theory to show how digital tools provide support for specific knowledge processes but fail to accommodate knowledge sharing that happens through social interaction and experiential learning. The study discovered that practitioners prefer to use direct communication methods instead of official systems because they consider knowledge management technologies to be less helpful. The study presents a conceptual solution to the problem by defining it as an epistemological misalignment between knowledge and technology. The study demonstrates the necessity to change from technology-based methods towards development strategies which accurately depict the actual process of knowledge creation and sharing. The study results offer valuable guidance for enhancing construction knowledge management systems design and implementation processes used in knowledge-intensive industries.

Index Terms:

Construction Industry, Knowledge Management, Tacit Knowledge, Digital Transformation, Technology Adoption, Epistemological Mismatch.

Hemolens – Explainable AI for Donor Eligibility in Blood Bank Systems

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Abstract:

The Blood Bank Management System is a website that helps take care of blood donations and makes sure hospitals get the blood they need. It uses technology to make everything work better and safer. Old blood bank systems often do things that can cause problems, like running out of blood when it is needed, taking a long time to respond in emergencies, and not being transparent about what is going on. The Blood Bank Management System uses a set of tools called MERN to bring people who donate blood, hospitals, labs, and administrators all in one place. One of the things about this system is that it has a way to verify donors through labs before they can give blood. This is called Lab-Based Donor Verification. It makes sure that donors are checked by registered labs. The system also has a part that uses artificial intelligence to predict when there might not be enough blood. It looks at how much blood's being asked for and how much is available to figure out if there will be a shortage. The Blood Bank Management System also protects medical information by using special codes like JSON Web Tokens and passwords that are hidden and only letting certain people access certain things. The Blood Bank Management System has a page that shows what is happening right now and sends alerts. This helps the people in charge make decisions. The system uses automation, verification, and predictive analytics to make the blood donation process. The Blood Bank Management System is trying to solve the problems that blood bank systems have. It creates a community for everyone involved in the blood donation process.

The Blood Bank Management System is designed to make it easier to manage blood donations, keep track of inventory, and get hospitals the blood they need.

Index Terms:

Blood Bank Management System, Donor Eligibility Verification, Healthcare Informatics, Inventory Management, Role-Based Access Control, Web-Based Application, Secure Authentication, MongoDB, MERN Stack, Digital Healthcare Systems

From The Narrative of Risk Toward A Guide Plan for the Implementation of Filipino Research during the Pandemic

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Abstract:

In establishing any program or project during a pandemic, it is critical to consider the risks that may affect organizational systems and processes. This study seeks to: assess the risk encountered in Filipino research conducted by Teacher Education Program students in the Filipino Department at Rizal Technological University, with emphasis on processes before, during and after the study; and develop a proposed guide plan for implementing Filipino research. Narratives from student-researchers about their work during the first two years of the pandemic yielded pertinent information about these risks. Findings indicate that many risks are embedded in systems and procedure, including the infodemic and its associated difficulties; protocols for in-person consultations and research dissemination; and requirements related to presentation, publication, and copyright registration. Accordingly, risk must be explicitly acknowledged and managed through approaches anchored in academic integrity, ethical research practices, and responsible dissemination and use of research outputs. It is essential to integrate the administration and monitoring of risk-related activities across the entire research lifecycle, from the start of student's research courses through completion and dissemination.

Index Terms:

Risk, Filipino Research, Guide Plan, Academic Integrity, Infodemic, Ethical Research

Developing a Responsible Artificial Intelligence Policy Framework for Higher Education: Evidence from Student Perceptions and Experiences

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Abstract:

Artificial intelligence (AI) is rapidly transforming higher education by introducing technologies that support teaching, learning, and institutional decision-making. AI-powered tools can enhance instructional efficiency, personalize learning experiences, and expand access to educational resources. However, the growing integration of AI in academic environments also raises concerns related to ethical governance, academic integrity, data privacy, and algorithmic transparency. Despite increasing institutional interest in regulating AI use, limited empirical research has examined how students' perceptions and experiences with AI influence their attitudes toward institutional AI policy development. This study investigates the relationships between students' perceptions of artificial intelligence, adoption-related factors, and experiences with AI technologies, and how these variables influence support for responsible AI governance in higher education. Using a quantitative descriptive-correlational research design, survey data were collected from 359 university students. The findings indicate that students demonstrate generally positive awareness of AI and recognize its potential to improve learning efficiency, educational accessibility, and personalized instruction. Nevertheless, respondents also expressed concerns regarding privacy risks, algorithmic bias, data security, and the potential reduction of human interaction in learning environments. Further analysis shows that students' perceptions of AI, adoption-related factors, and experiences with AI tools significantly predict attitudes toward institutional AI policy. Based on these findings, the study proposes the SAFER-AI Framework (Student-Aligned Framework for Ethical and Responsible Artificial Intelligence Governance). The framework provides an evidence-based policy model to guide higher education institutions in implementing responsible and transparent AI governance.

Index Terms:

Artificial Intelligence in Higher Education, AI Governance, Student Perceptions, Responsible AI Policy, Educational Technology, SAFER-AI Framework

Courtyard Sal3: Bridging the Gap to the Marginalized Community

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Abstract:

This descriptive study was conducted to evaluate the effectiveness of Courtyard Sal3 on bridging the gap to the marginalized community for the school year 2024–2025 in the aspects of evaluation of the activity, which became the basis for a proposed framework of the mathematics program.

This study covered the population of 72 parents, 10 school employees, and 97 students who were able to participate in the activity. Mean was used as a statistical tool to quantify the data. It utilized survey questionnaires that were validated by the IPA office. GRACE PASS Pre-test and Post-test results were presented to observe progression on the achieved competencies of the students. Themes were identified from the qualitative responses.

The findings of the study revealed that the parents, students, and school employees found the activity excellent, and the activity reached the goals much more than expected. The pre- test result is 59 %, the students are approaching proficiency, and the post-test result is 72%, the students reach the proficient level. This means that the courtyard sale is an effective avenue to enhance students' learning. The themes are divided into three key phases; Preparation, Execution, and Post-Sale. Through these phases, learners engage in authentic tasks such as planning, pricing, selling, and financial recording. The project fosters entrepreneurial thinking, financial literacy, and personal growth through hands-on, collaborative learning and care for the community.

This study, thereby, recommends including more immersive community engagement. Students will not only refine their entrepreneurial skills but also develop a deeper sense of empathy and social awareness, helping them grow into responsible, compassionate individuals who understand the importance of giving back to their communities.

Index Terms:

Courtyard Sale, Community Immersion, Entrepreneurship, Marginalized Community

Assessing RTU Library Infrastructure for Service-Oriented Learning and User Engagement

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Abstract:

This study assessed the reliability of the Rizal Technological University (RTU) Library infrastructure in promoting service-oriented learning and user engagement for Academic Year 2023–2024. Using a descriptive survey design, data were collected from 500 student-respondents through stratified random sampling, ensuring representation across various colleges and year levels. The study utilized a structured questionnaire via Google Forms to evaluate library accessibility, facilities, technological resources, staff support, and overall satisfaction. The findings offer valuable insights for improving library infrastructure and enhancing the delivery of academic services to better meet the needs of RTU students.

Index Terms:

Facilities, Reliability, RTU Library, Service – Oriented, User Engagement

Optimization and Performance Assessment of the Semi-Automated Tile-Making Machine: A Sustainable and Green Economy Approach Towards Recycling Of PCB Wastes

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Abstract:

This study examines the optimization and performance evaluation of a semi-automated tile-making machine designed to recycle printed circuit board (PCB) e-waste. Addressing the e-waste issue in Batangas City, Philippines, this study explored a sustainable method of converting PCB waste into unglazed decorative wall tiles of varying sizes. The tile composition includes pulverized PCB waste, Portland cement, colored cement, an anti-toxic solution, and water. Using Atomic Absorption Spectrophotometry, the research evaluates the crushing efficiency (69%) and pulverization rate (71%), along with material toxicity, water absorption, compressive strength, flexural strength, and heavy metal leaching. The study also presents a 3D model and animation of the machine, which integrates an Arduino and a PID controller. The optimization process involves crushing, pulverizing, mixing, molding, and dry heating. Lastly, an economic feasibility analysis based on a return-on-investment scheme highlights the viability of this eco-friendly recycling approach, expecting a yearly average output of 69,120 pieces of unglazed tile and a return on investment in 1.449 years.

Index Terms:

Unglazed Tiles, e-Waste, PCB-infused Tile Maker, Semi-Automated Tile Maker Machine, Green Economy

A RAG-Based Hybrid Intelligent Framework for Automated Job Recommendation Systems

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Abstract:

The traditional job portals rely on the use of keyword-based search engines, which often provide job suggestions that are inadequate and unnecessary. To overcome this limitation, this paper proposes the use of an Intelligent Job Recommendation System with Retrieval-Augmented Generation (RAG) that relies on generative AI and the retrieval of job data to provide contextually relevant and personalized job suggestions. Based on the skills of the users, the system retrieves relevant job postings, supplements the information it has retrieved, and uses generation logic to obtain eligibility insights and explanations for matches. The system also has permanent application tracking, HR evaluation, direct linking to career portals, and a domain-specific exception rule for medical jobs. The proposed RAG framework enhances the accuracy, explainability, and recruiter engagement of job recommendations compared to traditional job filtering systems.

Index Terms:

AI Recruitment, Skill Matching, HR Evaluation, Job Recommendation System, Retrieval-Augmented Generation, RAG

Predictive Analysis of Seasonal Crop Patterns Using Machine Learning and Climatic Data for Sustainable Agricultural Planning

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Abstract:

Climate unpredictability and changing seasonal patterns pose problems for traditional farming, making crop selection and planting schedules difficult. This research looks at using machine learning to support sustainable agriculture. The study identifies crop patterns by looking at historical agricultural data and meteorological factors like temperature, precipitation, humidity, and solar radiation. In the face of erratic weather, the goal is to transform yield and climate data into predictive insights for crop selection and resource efficiency. The broad pipeline of the research technique began with data collected from several sources, such as NASA POWER databases and current agriculture statistics. Important preparation steps to address any inconsistent or missing data came next. Subsequently, feature engineering was performed to effectively capture both seasonal variations and evolving temporal crop trends. A range of machine learning models, specifically Decision Tree, Random Forest, XGBoost, and CatBoost, underwent training and evaluation using established performance metrics. Tools such as Scikit-learn and Google Colab aided in driving the implementations. The analyses showed that the impact of some important climatic factors, mainly precipitation and temperature, on crop productivity is common across seasons [14], [18]. This exposes the critical requirement to operationalize climate-based information in next generation decision support systems for modern-day agriculture.

Identification of Active Fires Hotspots in Haryana Using Remote Sensing

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Abstract:

Paddy crop residue burning is a major environmental concern in rice belts of Northern India, particularly in Haryana and Punjab. The stubble burning result in soil health deterioration due to simultaneous burning of favorable soil microorganisms and it severe the air pollution, particularly during winter months. In this study, a geospatial investigation was conducted to find the agriculture related active fire hotspots in Haryana from the year 2021 to 2024. For this, daily mean active fire data from thermal infra-red bands of Visible Infrared Imaging Radiometer Suite (VIIRS) 375m available from NOAA-20 satellite was used to detect fire hotspots appearing due to high temperature released from paddy straw stubble burning. The near real-time active fire hotspots data from NOAA-20 satellite was obtained from NASA's FIRMS (Fire Information for Resource Management System) country data from the year 2021 to year 2024. These data were filtered in QGIS environment for the month from September to December of each year and using Haryana State boundary map available from Survey of India, and thereby providing distribution of post-harvest paddy straw stubble burning hotspots in Haryana. The geospatial analysis showed that the number of fire hotspots appeared in the month of September when stubble burning begin, gradually rising, highest in month of November and contained in the month of December when the paddy harvesting season ends. The analysis also indicate that there is a yearly decline in the number of fire spots which could be a combined impact of improved residue management procedure, stricter enforcement of anti-burning legislation, etc.

Index Terms:

Crop Residue Burning, NASA FIRMS, NOAA-20, Survey of India, QGIS

The Danger and Necessity of Technology in the Contemporary Times: Reflection on Stiegler's Pharmakon as a Form of Limited Distanciation

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Abstract:

Technology is considered a new way of life. In the present time, humanity focuses on transformation and innovation to enhance the human way of living. The further humans engage themselves with artifacts, machinery, and tools, the more they build a sort of relationship. This relationship, Bernard Stiegler calls "Pharmakon," the technology itself — a relationship that Stiegler considers both curative and dangerous at the same time. The transformation in the way of life of humanity has rapidly changed not only society but also individuals. As life becomes increasingly technological and innovative, it is also crucial to examine the phenomenological transformation of humanity that accompanies technology. The importance of examining how far technology can transcend and its relationship to human existence.

Technology has already aided many human needs. However, at the same time, it has also reconstructed things and created more problems in contemporary times. Stiegler believes that every individual should develop a good relationship with the things they deal with and be responsible for the creations. As stewards of the earth, humans are accountable and need to take action for the world they make. Reflecting on Bernard Stiegler's concept of Pharmakon, humans must draw the line and make a meaningful relationship between humans and technology. Distanciation is not a restriction, but the notion of how humans should put things in place.

SuperLife 360: A Unified, Intelligent Super App Framework for an Inclusive Digital Ecosystem

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Abstract:

The increasing popularity of certain mobile applications has resulted in disjointed digital experiences that are sluggish with excessive data input, lack of coherent interfaces, and additional cognitive work. Our suggestion is the SuperLife 360, a single application, which integrates different financial services, including healthcare, management, e-commerce, transportation, and social communication, by means of microservices architecture. The main principle of our accessibility-first design is the principle of accessibility that places emphasis on digital inclusion of a wide range of demographics. The result of performance appraisal of 1,247 employees showed a decrease of 43 percent in the storage capability of the device and provided a 37 percent improvement in task completion time, and 89 percent expressed contentedness in the device. This framework receives 99.7 percent uptime and less than 200 milliseconds response time maintaining Web Content Accessibility Guidelines 2.1 Level AA conformity. The disabled users achieved 91 percent of task success rates as opposed to 62 percent which was by standalone applications. This study offers architectural trends to the creation of inclusive digital ecosystems that do not just eliminate but also equalize the integration effectiveness and privacy protection, and ubiquitous availability..

Index Terms:

Super App Architecture, Digital Inclusion, Microservices, Accessibility, Mobile Computing, Unified Platform, Machine Learning.

Assessing the Impact of Smoking and Awareness Factors on Youth Tobacco Use in India: A State-wise Analysis Using GYTS Data

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Abstract:

This paper thoroughly examines the trends of youth tobacco usage in India through state, level data from the Global Youth Tobacco Survey (GYTS) and focusing especially on the behavioural, environmental, and educational factors. The main finding of the research is that youth tobacco use in India varies greatly from state to state. Recent data indicate substantial disparities in youth tobacco use across Indian states, with some ranking among the highest in prevalence and others among the lowest. It is Northeastern states where the youth consistently score high on the usage level, while several Southern and Western states find the minimum youth prevalence. These differences signal that youth tobacco consumption in India is mostly a matter of social and environmental conditions specific to the region rather than a reflection of common nationwide factors.

Additional analyses indicate that awareness programs conducted in classrooms are only weakly correlated with the decrease in tobacco use, thus awareness campaigns when used alone do not make a good preventive measure. Cluster analysis classifies states into three groups, namely high, moderate and low risk, which shows that states with a high level of exposure to smoking environments generally have high tobacco use despite awareness being relatively high. Therefore, this result confirms that exposure to the environment outweighs education in determining adolescent tobacco behaviour.

The paper finds that there is a notably strong positive correlation between the first, time use of tobacco and the current tobacco consumption which corroborates that early start of tobacco consumption being a very high risk for later addiction. The study further reveals that youths who are exposed to people smoking around school premises have a greater chance of becoming smokers themselves, thus it is highly correlated with increased prevalence of youth tobacco use. particularly, smoking around children has been seen as one of the main causes that have led to the smoking behaviours being normalized and adopted by teenagers. In addition to this, smoking at home is still generally higher compared to exposure in schools which highlights the fact that family environments play a major role in continuing youth tobacco use.

Generally, youth tobacco use in India is mainly caused by environmental exposure and early initiation, whereas awareness, based interventions are found to have little impact when done alone. The findings here go to show that in addition to educational efforts, there is a need for region, specific, exposure, focused prevention strategies aimed at effectively reducing tobacco use among adolescents.

Radiology Report Analysis Using Deep Learning and NLP

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Abstract:

Radiology report analysis plays a vital role in modern healthcare by supporting accurate diagnosis and clinical decision-making. However, the increasing volume of radiological data and the variability in reporting styles make manual interpretation time-consuming and prone to inconsistencies. To address these challenges, this paper presents a comprehensive system for radiology report analysis using deep learning and natural language processing (NLP).

The proposed approach integrates image-based analysis with text-based understanding to extract meaningful clinical insights. A pre-trained deep learning model is employed to analyze chest X-ray images and detect potential abnormalities, while an NLP pipeline is used to process radiology reports by identifying key entities, normalizing medical terminology, and generating concise summaries. To enhance transparency, Grad-CAM is utilized to highlight regions in medical images that contribute to the model's predictions, enabling better interpretability.

In addition, a multimodal fusion mechanism is introduced to correlate findings from both image and textual data, improving the reliability of the analysis. The system further generates structured radiology-style outputs, including findings, impressions, and recommendations, thereby reflecting real-world clinical reporting practices. An interactive interface is also developed to facilitate user interaction, visualization, and report exploration.

The results demonstrate that combining deep learning with NLP provides a more comprehensive understanding of radiological data. The proposed system not only improves efficiency but also supports clinicians by offering interpretable and structured insights, making it a promising step toward intelligent radiology assistance systems.

Index Terms:

Radiology Report Analysis, Deep Learning, Natural Language Processing, Medical Image Analysis, Chest X-ray, Multimodal Learning, Explainable Artificial Intelligence, Grad-CAM, Clinical Decision Support, Automated Report Generation

CNN-Powered Model for Real-Time Baybayin Script Transliteration

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Abstract:

Baybayin is a precolonial Filipino writing system. Due to the lack of modern technological solutions to ensure its preservation and use, previous research has concentrated on developing automatic translation systems (e.g., character-level, word-level) for converting Baybayin into their corresponding phonetic equivalents in the Latin-based Filipino characters. As a result, compared to prior research, this study focuses on and achieves a real-time transliteration, word-by-word level detection web application using a camera yielding high reliability. The methodology employs a You Only Look Once version 8 (YOLOv8) model to detect handwritten Baybayin word regions and a customized Residual Network (ResNet)-based Convolutional Neural Network (CNN) to classify and transliterate Baybayin representations into their corresponding Tagalog words. The base dataset from James Arnold Nogra's handwritten Baybayin characters was split into 80% training and 20% validation sets. After that, these characters were used to produce synthetic word images to represent 652 common Tagalog words. The fine-tuned YOLOv8 model attained a precision of 0.99709, a recall of 0.99718, and mean Average Precision values of 0.99500 (mAP50) and 0.99434 (mAP50-95); meanwhile, the CNN model has obtained 99.80% validation accuracy after the 19th training epoch. Using an automatic real-time Baybayin transliterator can significantly bridge the ancient writing system into the Philippine National Language "Filipino," preserving its cultural heritage. Future work includes dataset expansion, performance optimization, and mobile deployment.

Index Terms:

Baybayin, Handwritten Transliteration, Convolutional Neural Network, Real Time Detection, Cultural Preservation

Energy Consumption Estimation and Comparison Across Cloud, Fog, and Edge Computing Infrastructures

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Abstract:

The research study analyzes power usage patterns which cloud computing systems and fog computing systems and edge computing systems generate when they process various types of workloads. The main goal of this research involves studying power consumption patterns which these models generate when they process applications which need fast response times and heavy computational workload. The research team applied simulation techniques to analyze power consumption between system components which include processing units and transmission lines and storage systems. The research team developed separate models for each architecture which they validated through testing using identical task specifications for fair evaluation. The research team analyzed simulation-based energy assessment data to study performance versus power consumption trade offs. The estimation model development process included three main parameters which combined computational needs with communication timings and network arrangements to create an authentic operating environment. The research shows that cloud computing achieves its best performance through centralized resource management but fog and edge computing systems process data near devices to reduce transmission power needs and decrease network delays. The power consumption of local nodes increases when distributed processing systems operate. The research shows that hybrid deployment methods offer an optimized method for attaining energy efficiency through their deployment procedures. The research shows how essential it is to select proper architectural systems which will support sustainable and energy-efficient distributed computing environments.

Index Terms:

Cloud Computing, Fog Computing, Edge Comput- Ing, Energy Consumption Modeling, Distributed Systems, Internet of Things (IoT), Simulation Frameworks, Cloudsim, Ifogsim, Edgecloudsim, Workload Management, Green Computing, Latency Optimization

Vision Guided Warehouse Management

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Abstract:

The Vision Guided Warehouse Management System is an Internet of Things robotic system designed to automate material handling and product verification in a warehouse setting. The system includes an ESP32-controlled mobile robot, Firebase cloud storage for real-time inventory updates, an outdoor facility camera for external vision guidance, and QR code scanning for product recognition. The robot is controlled and navigated by a mobile app, and computer vision techniques using Python and OpenCV help with product QR code scanning, recognition, and verification. The system is completely automated. To move, sort, and place objects, the mobile robot uses DC motors and a 180° servo system. By reducing human labor and increasing pick accuracy, the suggested system offers a financially viable substitute for pricey industrial automation systems. The viability of integrating robotics, vision technology, and cloud-based inventory management in small to medium-sized warehouse settings is illustrated in this paper.

Index Terms:

Facility Camera Guidance, Inventory Management, Mobile App Control, OpenCV, Computer Vision, QR Code Detection, Firebase, IoT Robotics, and ESP32

Real-Time Anomaly Detection in Surveillance Video Using Convolutional Autoencoders

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Abstract:

Automated surveillance has, over time, become almost inseparable from how we think about security systems today. Still, if you actually picture a person sitting in front of multiple screens for hours, watching for something unusual, it starts to feel... unrealistic. Fatigue sets in, attention drifts, and small but important details slip through. So while human monitoring sounds reliable in theory, in practice it is often inconsistent.

What this paper tries to do is move away from that dependence on constant human attention. Instead of explicitly telling a system what counts as "normal" or "abnormal," it leans on an unsupervised deep learning approach. More specifically, a Convolutional Autoencoder is used to learn patterns from video data without labels. The idea is fairly intuitive once you sit with it for a moment. The model gets really good at reconstructing everyday, expected scenes, like pedestrians walking in a typical flow. But when something unusual appears, say a vehicle entering a pedestrian-only zone or someone moving unpredictably, the system struggles to recreate that frame accurately.

That gap between the original input and the reconstructed output, referred to as reconstruction error, becomes the signal. Higher error suggests the model is, in a sense, confused. And that confusion is treated as a marker of anomaly. It's not perfect, of course. Some edge cases might still blur the line between normal and abnormal behavior, especially in crowded or highly dynamic environments. Even so, the approach has a certain elegance because it avoids the need for exhaustive labeled datasets, which are often difficult to obtain.

When tested on the UCSD Pedestrian Dataset, the model performs reasonably well. It manages to catch irregular activities like unauthorized vehicle movement and erratic pedestrian behavior, and it does so in real time, which matters a lot in practical settings. There is still room for refinement, particularly in reducing false positives, but the results suggest that this direction is worth exploring further.

Index Terms:

Anomaly Detection, Computer Vision, Convolutional Autoencoder (CAE), Deep Learning, Real-time Analysis, Reconstruction Error, Unsupervised Learning, Video Surveillance

Developing Critical Thinking through Reflective Learning: A Basis for Designing a Reflective Learning Toolkit for Araling Panlipunan 7

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Abstract:

ESTOQUE, DANIEL SEAN R. Developing Critical Thinking through Reflective Learning: A Basis for Designing a Reflective Learning Toolkit for Araling Panlipunan 7. Master of Arts in Education, Major in Social Sciences Education. The National Teachers College, December 2025. Adviser: BADILLES, DIONICO D.

This study investigated the relationship between the level of academic achievement and the integration of critical thinking in Araling Panlipunan 7 (Asian History) among selected Grade 7 students of Ignacio Villamor High School for School Year 2024–2025. Anchored on David A. Kolb's Experiential Learning Theory and guided by the principles of constructivism, the study aimed to (1) determine the test scores of the respondents based on the Revised Bloom's Taxonomy of Objectives in the cognitive domains of Analyzing, Evaluating, and Creating; (2) assess the respondents' level of awareness and participation in the integration of critical thinking in terms of implementation of subject matter, student engagement and development, and assessment and evaluation tools; (3) determine the significant relationship between test scores and the rate of awareness and participation in critical thinking integration; and (4) design a Reflective Learning Toolkit as a basis for enhancing critical thinking in Araling Panlipunan 7.

The study employed a descriptive–correlational research design using a quantitative approach. Purposive sampling was used to select 350 respondents, comprising 100 for pilot testing and 250 for actual data gathering. Data were collected through a validated researcher-made questionnaire and a Fourth Periodic Examination aligned with the Revised Bloom's Taxonomy. Cronbach's Alpha was used to establish instrument reliability, while the Spearman Rank-Order Correlation was utilized to determine the relationship between variables, given that the data violated the assumption of normality under the Shapiro-Wilk test.

Findings revealed that respondents performed best in the Analyzing cognitive domain (mean score = 5.76), with a noticeable decline in the Evaluating (mean score = 2.15) and Creating (mean score = 0.98) domains, indicating a consistent decrease in higher-order thinking skill acquisition as cognitive complexity increased. In terms of critical thinking integration, respondents rated the Socratic Method and Focus Group Discussions as those most frequently employed by teachers, while the use of innovative and diversified teaching methodologies remained limited. Analytical reasoning tools such as Multiple-Choice and Modified True-or-False tests were the most commonly used assessment strategies. The Spearman Rank-Order Correlation yielded an r value of -0.14 , indicating a weak negative correlation between overall test scores and the rate of awareness and participation in critical thinking integration. The p -value of 0.03 , which is less than the 0.05 alpha level, confirmed no significant relationship between the two variables, leading to the failure to reject the null hypothesis.

The study concluded that while students demonstrated measurable competencies in the lower levels of the revised taxonomy, their exposure to varied and innovative critical thinking activities in the classroom remained limited. The inverse relationship between test performance and critical thinking integration suggests that teachers' instructional practices have yet to fully align with the higher-order thinking demands of the curriculum. Based on these findings, the researcher proposed a Reflective Learning Toolkit grounded in Kolb's Experiential Learning Cycle, designed to bridge this gap by providing structured, reflective learning activities that support the development of critical thinking skills in Araling Panlipunan 7.

Index Terms:

Critical Thinking, Reflective Learning, Araling Panlipunan, Revised Bloom's Taxonomy, Experiential Learning, Reflective Learning Toolkit, Descriptive–Correlational Research, Grade 7

Optimization and Performance Assessment of the Semi-Automated Tile-Making Machine: A Sustainable and Green Economy Approach towards Recycling of PCB Wastes

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Abstract:

This study examines the optimization and performance evaluation of a semi-automated tile-making machine designed to recycle printed circuit board (PCB) e-waste. Addressing the e-waste issue in Batangas City, Philippines, this study explored a sustainable method of converting PCB waste into unglazed decorative wall tiles of varying sizes. The tile composition includes pulverized PCB waste, Portland cement, colored cement, an anti-toxic solution, and water. Using Atomic Absorption Spectrophotometry, the research evaluates the crushing efficiency (69%) and pulverization rate (71%), along with material toxicity, water absorption, compressive strength, flexural strength, and heavy metal leaching. The study also presents a 3D model and animation of the machine, which integrates an Arduino and a PID controller. The optimization process involves crushing, pulverizing, mixing, molding, and dry heating. Lastly, an economic feasibility analysis based on a return-on-investment scheme highlights the viability of this eco-friendly recycling approach, expecting a yearly average output of 69,120 pieces of unglazed tile and a return on investment in 1.449 years.

Index Terms:

Unglazed Tiles, e-Waste, PCB-infused Tile Maker, Semi-Automated Tile Maker Machine, Green Economy

Data Driven Agronomy Leveraging Machine Learning for Optimal Crop Yield Prediction

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Abstract:

The present crop recommendation systems that are employed in agriculture are generally based on a small number of modalities and datasets that cannot dynamically adapt to changes in actuality in terms of disease control and sustainability. We propose a smart crop recommendation framework, combining IoT, real-time monitoring, and disease indicators in an MCDM model for precision agriculture, with crop rotations. The proposed framework utilizes a combination of advanced machine learning models including improved deep belief network, convolutional neural network, and long short-term memory for identifying spatiotemporal patterns in multiple multi-modal datasets. The proposal involves a big data infrastructure for handling agricultural datasets and information. The framework considers the issue of explaining features of crops for making appropriate decisions. It was found out that the proposed framework provided improvements over existing crop recommendation frameworks with regard to adaptability, prediction, and sustainability.

Index Terms:

Crop Recommendation, Deep Belief Networks, CNN, LSTM, IoT, Precision Agriculture, Big Data, Hybrid Deep Learning, Disease Prediction, Crop Rotation

Data-Driven Smart Energy Optimization for Sustainable Industrial Infrastructure: An AI-IoT Framework Supporting SDGs 7 and 9

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Abstract:

Industrial manufacturing consumes vast amounts of energy, and rising tariffs combined with sustainability mandates create urgent need for smarter management practices. This paper proposes a five layer AI and IoT based energy management framework for smart factories, integrating sensing, communication, data management, analytics, and decision support to deliver actionable insights for energy optimization.

Through a realistic hypothetical case study of a medium sized manufacturing plant, the framework demonstrates 15% annual energy reduction (300,000 kWh), ₹2.4 million cost savings, and 240 tonnes CO₂ reduction with a 2.8 year payback, addressing key issues such as idle machine running, peak demand violations, and inefficient HVAC operation. The methodology specifies system architecture, AI models (forecasting, anomaly detection), KPIs, and assumptions for reproducibility and adaptation.

The results align with sustainable development principles, supporting UN SDGs 7, 9, 12, and 13 through the triple bottom line: economic viability, environmental stewardship, and operational excellence. Challenges including legacy integration, cybersecurity, and change management are addressed through practical mitigation strategies. This work provides manufacturing managers and engineers with a scalable blueprint for leveraging Industry 4.0 technologies to achieve sustainability and competitiveness.

Index Terms:

Smart factory, IoT, AI, Energy Management, Sustainable Manufacturing, Industry 4.0, Triple Bottom Line

Next Generation Embedded Platform for Low Carbon Future Towards Climate Action

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Abstract:

Vehicle emissions are a significant source of air pollution and the accumulation of greenhouse gases, which contribute substantially to climate change, especially when vehicle engines run inefficiently. Thus, a smart real-time vehicle emission and condition monitoring system is necessary for sustainable vehicle management. In this paper, an IoT-based embedded system architecture for overall vehicle condition and emission monitoring is introduced using an ESP32 microcontroller with carbon monoxide (CO), carbon dioxide (CO₂), temperature, humidity, vibration, and sound sensors. An RFID module provides a unique identification number to each vehicle, making it traceable and facilitating vehicle-specific data acquisition. A normalized emission assessment approach with a weighted multi-parameter Emission Index is developed for accurate vehicle operation status determination and emission severity level identification. Sensor data is communicated to a cloud platform for real-time data visualization, automated data logging at scheduled times, and automatic emission level threshold notification. The system has been found to have stable parameter tracking, reliable alert notification, and high synchronization between the vehicle display and cloud dashboard data. The proposed system design facilitates cost-effective fleet-level monitoring and data-driven maintenance planning for environmentally sustainable transportation systems globally.

Index Terms:

Vehicular Emission Monitoring, IoT, ESP32, Cloud Analytics, Embedded Systems, Low-Carbon Transportation

Arduino-Based Welding Simulator for Improving Arc Length Control in Shielded Metal Arc Welding Training

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Abstract:

Shielded Metal Arc Welding (SMAW) training in technical-vocational institutions is resource-intensive, particularly during early skill acquisition when trainees struggle to maintain proper arc length between the electrode tip and the workpiece. This challenge often leads to excessive electrode consumption and increased electrical energy use, raising training costs. This study developed and evaluated an Arduino-based welding simulator designed to improve arc length control in SMAW training and to offer a low-cost alternative to high-cost simulation systems. Using a developmental-descriptive research design, the study covered the design, validation, and assessment of the device. The simulator integrated infrared and photodiode sensors, real-time LCD monitoring, and differentiated audio feedback to support skills development. Validation trials confirmed its ability to detect arc length deviations and electrode contact with the workpiece and to provide immediate feedback during operation. Acceptability was assessed by 15 SMAW trainers, 10 welding practitioners, and 5 trainees using a validated researcher-developed Likert-scale instrument. The simulator obtained a grand mean of 4.86 across functionality, effectiveness, design, economic feasibility, and safety, indicating a high level of acceptability. Its use also reduced electrode consumption by 15.22% and electrical energy use by 15.21%. In addition, all 25 trainees passed the national competency assessment. These findings suggest that the Arduino-based welding simulator is an effective, accessible, and sustainable training tool for strengthening foundational SMAW skills in resource-constrained technical-vocational institutions.

Index Terms:

Shielded Metal Arc Welding; Arduino-Based Simulator; Arc Length Control; Technical-Vocational Education; Welding Training; Sustainable Skills Development

Design and Implementation of a Machine Learning-Based Real Estate Price Prediction and Investment Analysis System

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Abstract:

The real estate sector involves complex decision-making processes influenced by multiple factors such as location, property type, and market trends. This paper presents the design and implementation of a web-based decision support system that integrates machine learning techniques for property price prediction and investment analysis.

The system employs a Gradient Boosting regression model trained on structured datasets containing different property types, including houses, apartments, and plots. The architecture follows a full-stack approach, combining a React-based frontend, a Node.js backend, and a Flask-based machine learning service.

The application provides functionalities such as price prediction, return on investment (ROI) calculation, and future price estimation. The system was evaluated using sample property data and produced reasonably consistent predictions. Although the model is not highly optimized, it performs adequately for basic real-world applications such as price estimation and investment planning.

The primary focus of this work is on system integration and usability rather than achieving maximum predictive accuracy.

Index Terms:

Machine Learning, Real Estate, Price Prediction, Gradient Boosting, ROI Analysis, Decision Support System

Centralized Student Project Repository and Management System

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Abstract:

Every year, engineering colleges produce hundreds of student projects that get submitted, graded, and then never looked at again. There is no proper place where this work lives, and that is a real waste. We built a web-based system called Project Showcase to change that. The idea is simple: students upload their projects, teachers review and approve them, and everyone can search and browse through the work. We also added features like likes, comments, and department-wise filtering so the platform feels like something people actually want to use, not just a digital filing cabinet. We tested it with 400 projects from our own college and found that the search worked correctly 87% of the time, pages loaded in about 1.4 seconds, and 82 out of 100 users said they were happy with the experience. This paper explains how we built it, what decisions we made along the way, and what we would do differently or add next.

Index Terms:

Student Project Repository, Web Platform, Role-Based Access, React.js, Node.js, MongoDB, Project Management

MindMate: A Digital Therapist Chatbot

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Abstract:

Mental health challenges, including stress, anxiety, depression, and emotional burnout, have escalated in modern society due to rapid digitalization, academic and occupational pressures, and lifestyle changes. Despite the increasing need, access to professional mental health services remains limited because of social stigma, high costs, and insufficient availability of trained therapists.

This research proposes MindMate, a digital therapist chatbot designed using data science and artificial intelligence (AI) technologies to provide preliminary mental health support. MindMate serves as a conversational agent offering emotional support, mood tracking, mental health screening, and personalized coping strategies in a confidential and scalable manner.

The system employs Natural Language Processing (NLP), machine learning models, and sentiment analysis to understand user emotions and generate empathetic responses. Ethical data handling, privacy protection, and bias mitigation are central to the design. This paper elaborates on MindMate's architecture, data science methodology, implementation workflow, applications, and future prospects. The study demonstrates how AI-driven chatbots can complement traditional mental healthcare and improve accessibility for individuals seeking support.

Index Terms:

Digital Therapist, Mental Health Chatbot, Artificial Intelligence, Data Science, NLP, Sentiment Analysis, Healthcare Analytics

Universal Modular NLP Chatbot for Multi-Domain Query Handling

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Abstract:

As healthcare continues to evolve, hospitals are being expected to adopt processes that are faster, more accurate, and more holistic and centered around the needs of the patients. Traditional hospital reception desks and call centers are unable to handle the volume and scale of large patient calls, which results in unresponsive queues, overwhelmed employees, and delayed diagnoses. One way to solve this issue are chatbots that use a Generative AI framework built on Large Language Models (LLMs) and Natural Language Processing (NLP). Through the use of sophisticated data science, such chatbots can navigate large amounts of data pertinent to the healthcare field and provide precise and accurate answers regarding appointment scheduling, physician availability and specialties, billing questions, healthcare services, and even primary diagnosis for symptoms. This not only relieves hospital staff of routine administrative tasks, but provides faster responses to patients, which in turn improves the overall patient experience. This research project presents a novel intelligent conversational chatbot system designed to assist and optimize hospital administrative and clinical operational processes. Unlike traditional chatbots designed to respond to frequently asked questions and schedule appointments, this system has a number of advanced capabilities, such as:

- Recommending relevant specialists and appropriate OTC medication.
- Reserved appointment slots for medical consultation.
- Assisting patients with inter-departmental or inter-service movement in the hospital.

Using NLP the chatbot mimics the dialog of a doctor-patient consultation, focusing on extracting intents, symptom analysis, and applying ML for disease prediction. The GPT-4, BERT Medical LLMs, and other structured medical knowledge bases supported empathy and accuracy in the responses. This paper focuses on the chatbot's lifecycle development from data gathering and model training to integration in hospitals.

It analyzes the benefits of reducing patient triage and reception process time, improving hospital resource utilization, and extending care delivery beyond the hospital. Moreover, chatbots are available at any time to guide patients through the hospital's processes, maintain EHRs, and provide customized recommendations.

They can also assist with hospital administration by analyzing data patterns, forecasting patient traffic, and streamlining the allocation of hospital resources. Overall, a data science-enhanced NLP based chatbot streamlines operations, improves the communication, and is economically friendly for the modern management of hospitals while providing a better experience for patients. In developing countries like India, where hospitals are often over-booked and under staffed, these types of smart systems can help in improving operational productivity and proactive engagement with patients. This proposed chatbot takes a step towards smart hospital ecosystems by transforming a traditional service model in healthcare into a digitized, proactive, and patient-centered model.

Smart College Event and Notice Management System: A Framework for Intelligent Campus Information Dissemination

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Abstract:

The digital transformation of academic infrastructure requires a fundamental pivot from traditional, manual administrative protocols to intelligent, data-driven management systems. Historically, campus communication has relied on physical notice boards, leading to chronic information lag, location dependency, and significant resource waste—with some institutions printing over 2.6 million pages annually. This research presents a comprehensive framework for a Smart College Event and Notice Management System (SCENMS), designed to integrate predictive AI analytics, real-time Internet of Things (IoT) dissemination, and a scalable event-driven microservices architecture. The framework leverages diverse datasets, including student behavioral logs, organizational involvement profiles, and event metadata, to identify latent engagement patterns and facilitate personalized interventions. By applying machine learning techniques such as Bidirectional Encoder Representations from Transformers (BERT) for text classification (achieving 95.2% accuracy) and hybrid collaborative filtering for event recommendations, the system ensures high-relevance dissemination without contributing to digital fatigue. Furthermore, the adoption of a cloud-native architecture ensures fault tolerance and independent service scaling. The findings indicate that AI-driven frameworks can enhance event participation rates by up to 45% and reduce administrative labor by an average of 13 hours per week.¹ This research highlights how the integration of AI and IoT can bridge the gap between physical campus presence and digital information accessibility while addressing critical concerns regarding data privacy under FERPA/GDPR and information overload.

Building a Conversational AI Chatbot from Scratch: A Practical Guide for Final-Year Engineering Projects

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Abstract:

The rise of conversational agents, popularly known as chatbots, has become an essential element in modern-day digital systems since they improve customer interaction and engagement. While their acceptance is rising briskly across industries, there exists a marked contrast between the expected advantages and actual success rates. This contrast indicates the inherent challenges implicated in the design and deployment of effective conversational systems.

The paper was aimed at proposing a detailed framework for building an ML-based chatbot from scratch. Positioning this as a suitable and impactful capstone project for the final year of engineering students, the study initiated with an investigation into different approaches toward conversational AI. It outlined the evolution from rigid, rule-based mechanisms toward adaptive, intelligent machine learning-driven solutions.

A comparison is drawn with the purpose of showing the limitations of typical recurrent neural network architectures, such as those that implement LSTM models, versus the capabilities of Transformer-based architectures. These state-of-the-art models form the basis for the proposed chatbot system. The paper then discusses in detail the complete end-to-end development process, including the modular architecture of an advanced NLU module, coupled with a data-driven approach for dialogue management.

To assess performance effectively, a combined evaluation strategy is introduced that incorporates both quantitative metrics, including Accuracy and F1-Score, and qualitative, user-focused indicators such as Task Completion Rate and User Satisfaction.

Index Terms:

Chatbot, Conversational AI, Machine Learning, Natural Language Processing (NLP), Transformer-Based Models.

Real Time Collaborative Study Planner

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Abstract:

Collaborative learning environments demand efficient communication, structured temporal coordination, and clearly defined accountability among participants. However, in real-world academic settings, student groups typically depend on fragmented software ecosystems—such as messaging platforms, calendar applications, and standalone task management tools—which operate in isolation. This fragmentation leads to frequent context switching, duplication of effort, inconsistencies in planning, and increased likelihood of missed deadlines. Such inefficiencies negatively impact both individual productivity and overall group performance.

To address these challenges, this paper presents StudyWith, a full-stack collaborative study planner that unifies communication, scheduling, and task management within a single, secure, and real-time web platform. The system is designed to reduce coordination overhead by co-locating essential collaborative functionalities while maintaining a structured and role-aware workflow. StudyWith incorporates an AI-assisted scheduling module that leverages structured user inputs to generate context-aware study plans, thereby augmenting human decision-making rather than replacing it.

The platform is implemented using modern web technologies, including Next.js (App Router) and TypeScript for the frontend and server integration, MongoDB with Mongoose for data persistence, NextAuth for secure authentication, Socket.IO for real-time bidirectional communication, and Genkit-based orchestration for large language model (LLM) integration. The architecture follows a modular and layered design, enabling scalability, maintainability, and extensibility.

This paper formalizes the system architecture, defines comprehensive data models and a two-tier role-based access control mechanism, and details security measures such as session validation, server-side authorization enforcement, and controlled file handling. Additionally, it introduces a reproducible evaluation framework that assesses the system across multiple dimensions, including functional correctness, usability, system reliability, and real-time consistency.

An implementation-grounded analysis demonstrates that StudyWith effectively supports collaborative workflows with reduced coordination friction, improved task visibility, and consistent real-time synchronization across users. The system also provides a strong foundation for future empirical studies, advanced analytics integration, and longitudinal research on educational outcomes in technology-mediated collaborative learning environments.

Design and Development of a Hardware-Agnostic Multi-User ERP System for Smart Campus Management

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Abstract:

This paper presents a technology agnostic ERP solution to revitalize the process of managing educational institutions under challenging conditions. Existing management solutions utilize costly hardware components like biometric readers and GPS systems, leading to excessive overheads and limiting their scalability. This study aims to implement a software-based architecture running on affordable consumer mobile phones. The software is equipped with six different types of users to support a decentralized administrative infrastructure.

The novel contribution of this work lies in integrating mobile sensor networks with algorithmic optimization methods. Biometric authentication is replaced with QR codes and geofencing to streamline attendance collection, and vehicle-based telematic systems are replaced with mobile phone sensors using Haversine distance computation. Also, an evolutionary optimization approach called Genetic Algorithm (GA) optimizes NP-hard scheduling problems by generating feasible timetables, whereas an efficient CSV data importer manages the first-time database loading operation.

Experimental comparison with existing baseline systems shows that our proposed framework cuts down the initial cost of implementation by 90%, reduces attendance logging time by 93%, and produces optimal timetables free of hard constraints. Thus, using smartphones to perform intensive computational operations provides an effective strategy for developing future-generation educational management systems.

Index Terms:

Educational Erp, Genetic Algorithm (GA), Mobile Sensor Networks, Automated Attendance, QR Codes, Geofencing, Timetable Optimization, Decentralized Administration, Cost-Effective Management, Haversine Distance.

Real-Time Prediction of EV Charging Slot Availability

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Abstract:

The widespread acceptance of electric vehicles (EVs) has led to an increased demand for efficient charging points. As governments and corporations focus on sustainable transportation to combat carbon emissions and fossil fuel consumption, electric vehicles have become an integral part of future transportation infrastructure. However, one of the biggest drawbacks of adopting electric vehicles is the availability of charging points. Unlike fuel stations, where customers take a few minutes to refuel their vehicles, electric vehicles require a longer period to be charged, which may lead to congestion and waiting times at charging points. With the increasing number of electric vehicle users, customers are often left uncertain about the availability of a charging point when they arrive at the charging station. This uncertainty may deter potential customers from using electric vehicles and also lead to inefficient use of charging points. Hence, intelligent systems capable of predicting the availability of charging points in real-time are becoming increasingly essential. Real-time prediction systems will enable customers to locate available charging points and also optimize charging schedules to reduce waiting times. By integrating real-time sensor data, charging point history, and sophisticated machine learning algorithms, predictive systems can accurately forecast the likelihood of charging point availability. These systems not only make customers' lives easier but also improve the overall efficiency of electric vehicle charging infrastructure and help build smart and sustainable transportation systems.

Index Terms:

Electric Vehicle Charging Prediction, EV Charging Slot Availability, Smart Charging Infrastructure, Machine Learning for EV Charging, Intelligent Transportation Systems, Real-Time Charging Station Monitoring, Smart Grid Integration, Predictive Energy Management

Green Urban Maps Based on Citizen Science through the Implementation of An Information System

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Abstract:

This document describes the analysis, development, implementation, and use of an information system for generating urban green maps based on the city of Iquitos's tree registry. Iquitos is a city located in the Peruvian Amazon with at least half a million inhabitants. In recent years, it has experienced an increase in the heat index caused by rising temperatures related to the El Niño phenomenon, as well as the use of heat-retaining materials (corrugated metal sheets, concrete), and even housing design. Efforts have been made to increase green spaces; however, the expected results have not been achieved. An information system has been designed and developed that consists of a mobile app allowing for the individual, georeferenced registration of trees and a web-based system enabling the storage, processing, and visualization of the data. Furthermore, with the participation of more than 100 schoolchildren in the context of a citizen science contest, over 5,000 trees have been recorded, and maps have been generated showing areas with high tree density and those in need of afforestation, providing an interesting decision-making tool for the city.

Index Terms:

Citizen Science, Urban Green Maps, Geographic Information System (GIS), Urban Tree Cover, Environmental Monitoring

AI-Based Portfolio Website Generator Using NLP and Automated Cloud Deployment

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Abstract:

In the contemporary digital employment landscape, having a professional online portfolio has become a critical requirement for students, job seekers, freelancers, and working professionals. Unlike traditional resumes, digital portfolios provide a dynamic, interactive, and visually compelling representation of an individual's skills, experiences, and achievements. However, designing, developing, and deploying a portfolio website typically requires expertise in web development, design principles, content structuring, and cloud hosting—skills that most non-technical users do not possess.

Existing portfolio-building platforms such as Wix, WordPress, GitHub Pages, and Canva simplify template selection but still require significant manual effort in content entry, formatting, and deployment. Moreover, these platforms lack intelligent automation for extracting structured information from resumes and enhancing content using artificial intelligence.

This paper proposes an AI-Based Portfolio Website Generator that integrates Natural Language Processing (NLP), Generative AI, and automated cloud deployment to transform a user's resume into a fully functional, professional portfolio website with minimal human intervention. The system automatically extracts structured data from uploaded resumes using advanced NLP techniques such as Named Entity Recognition (NER), semantic parsing, and contextual embedding models. A Generative AI module further refines and enhances the extracted content to ensure professional tone, clarity, and impact.

Users can select from multiple responsive portfolio templates, after which the system dynamically populates the selected template with AI-enhanced data. A fully automated deployment pipeline then pushes the generated website to GitHub and deploys it on Vercel, instantly providing users with a live, shareable website link.

Extensive experimental evaluation demonstrates that the proposed system significantly reduces portfolio creation time, improves content quality, and increases user satisfaction while eliminating the need for technical expertise. The system is scalable, secure, and cloud-ready, making it a practical solution for digital identity creation in the modern job market.

Index Terms:

AI Portfolio, NLP, Resume Parsing, Generative AI, MERN Stack, Automated Deployment, Cloud Hosting, Web Application

Web-Based Task Management System with Role Based Access and Activity Tracking

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Abstract:

The proposed research study deals with the design and development of Web-Based Task Management System with Role-Based Access and Activity Tracking to provide improved task coordination, security, and accountability support within a collaborative environment. The proposed system with a structured workflow offers a common platform to handle task creation, allocation, updating, and deletion operations. The Role-Based Access Control system increases system security and secured access to the system to perform their respective tasks with privilege levels assigned to them only. The proposed system encompasses an activity tracking system to offer a report on activities performed by the user and task updating performed, and also real-time task tracking facilitates the continuous observation of task execution, performance, and deadline-related monitoring. In addition, the proposed system facilitates automatic email notification to the user by task owners related to task allocation and deadlines. The proposed system is helpful in enhancing productivity, minimizing operation-related deficiencies, and also fostering teamwork among employees to eliminate unstructured task handling practices more efficiently and effectually. The proposed system can also expand to embrace techniques involving sophisticated analytics or task performance charts and also mobile application support.

Index Terms:

Web-Based Task Management, Role-Based Access Control, Activity Tracking, Task Monitoring, Workflow Management, Secure Authentication, Collaboration Systems, Productivity Enhancement, Audit Logs, Centralized Task Management, Notification Systems.

Prep-Wise: Smarter Prep with Every Paper

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Abstract:

This research work is relevant to the current scenario in the education sector, focusing on the challenges of organizing and searching academic resources and assisting in efficient exam preparation. The current university management framework provides only limited functionality in terms of administrative assistance, attendance tracking, and viewing grades. However, they do not provide sophisticated support in the form of intelligent document organization, semantic searching, and AI- assisted exam preparation tools. To overcome these limitations, this research work aims to develop a holistic framework that combines the capabilities of Retrieval-Augmented Generation (RAG), Optical Character Recognition (OCR), vector semantic search, and generative models. The Smart Academic Assistant Portal provides a two-fold Previous Year Question (PYQ) Manager and an AI-assisted Sample Paper Generator, using a modified Tesseract-NER pipeline for metadata extraction from PDF files, PostgreSQL for storing relational data, and Qdrant vector embeddings for context-dependent searching. The system uses few-shot prompting with local large language model inference (llama3.2:3b via Ollama) to generate difficulty-level normalized mock question papers based on Bloom's Taxonomy. The system comes with a Next.js frontend for responsive user interaction and a FastAPI backend for scalability using asynchronous request processing. The performance analysis shows that the semantic search functionality decreases false positives by as much as 45% compared to keyword-based filtering alone, and the fewshot prompted question generation functionality provides 71% immediate usability with logically consistent and pattern-following questions.

Index Terms:

Retrieval-Augmented Generation, Semantic Search, Optical Character Recognition, Question Generation, Academic Repositories, Vector Embeddings, Large Language Models

CrimeXperience: Immersive XR Crime Scene Simulation in the Philippine Context

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Abstract:

Crime scene investigation is a critical aspect of law enforcement, as it is crucial for solving crimes and giving justice to victims. However, training for crime scene investigations is often limited to classroom lectures and several practical exercises in a controlled environment. As such, Project CrimeXperience aims to utilize Extended Reality (XR) technologies to simulate crime and safety scenarios in the Philippines.

The outputs of this project shall benefit the criminology / forensic students, trainers, and training schools as it provides an alternative that is safe, can be repeated, and uses similar equipment to the industry. This is in comparison to highly limited simulations that take time and resources to achieve. It also improves trainers' training style, monitoring, and provides feedback to the students, particularly through the developed manuals and materials.

Overall, this can improve the training and crime scene investigation system; producing more competent officers who are efficient, productive, accurate, and empathetic; improve the collaboration between the academe and Criminal Justice and Public Safety industry; improve the trust of the community of the police; and reduce crime rates and improve the safety and security of the community.

Index Terms:

Augmented Reality Application, Virtual Reality Application, Learning Management System, Crime Scene Investigation, Forensic Science

VertoPay: A Secure Closed-Loop QR-Based Payment System With Admin-Mediated Settlement for Campuses

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Abstract:

Campus financial ecosystems in Indian universities remain heavily cash-dependent, creating operational inefficiencies and exposing stakeholders to security risks including fraud and the absence of institutional oversight. Generic digital payment platforms, while convenient, remove administrative control and depend on external banking infrastructure that may be unavailable in adverse network conditions. VertoPay addresses these challenges by proposing a secure, closed-loop academic coin payment system designed for campuses, where one academic coin maintains strict 1:1 parity with the Indian Rupee. The system is implemented using React Native (Expo SDK 50) for the mobile client and Node.js 18 with MongoDB 6.0 for the backend. Security is enforced through bcrypt-protected QR payloads, nonce-based replay prevention, and MongoDB multi-document ACID transactions. Performance evaluation demonstrates an end-to-end payment latency of approximately 320ms under singlenode conditions, with a 95th-percentile latency of 420ms. The system eliminates dependency on external banking infrastructure while providing full administrative mediation of fund flows, making it a viable, hardware-free solution for institutional digital payments.

Index Terms:

Academic Coin, Admin-Mediated Settlement, Bcrypt, Campus Payments, Closed-Loop System, Digital Wallet, MongoDB, Node.js, QR Code, React Native, Smart Campus, Replay Prevention, RBAC

Investigating Flow Channel Design: Straight Parallel Configuration in PEM Fuel Cells

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Abstract:

In the world where the nature is now at a critical point, in which concerns about the environment are becoming of crucial importance, the search of clean and efficient energy sources has become the top priority. Proton exchange membrane fuel cells (PEMFCs) do hold some ray of hope, as they have the capability to directly convert the chemical energy of fuels to useful work, and thus the environmental impact is minimal. Nevertheless, to get the maximum performance of PEMFCs, novel design strategies, especially the flow field Designs (FFDs) of the bipolar plates (BPs) are needed.

The aim of the project is to simulate the design of flow channels in PEMFCs on suitable simulation softwares. The aim is to model channel geometries and the operating conditions under various design conditions.

The article presents a complex analysis of the performance of Proton Exchange Membrane Fuel Cell and the research on the local species transport in the given conditions, with a hint at the influence of geometric designs and parallel channels are investigated. Simulations of the influence of parameters like channel width, depth and spacing are examined. Various FFD were tested to improve diffusion of the reactants, to decrease pressure drop as well as electrical efficiency. DoE is used to implement an effective search of the design space and find the best channel configurations. FFDs can be improved in a variety of ways: adding baffles, devising new design, or using bio-inspired designs. Nevertheless, comprehensive evaluation of performance, cost, manufacturing issues is crucial.

An Improved CNN Method for Malware Detection

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Abstract:

This article an improved CNN model for malware detection is developed. In developing the model, the CNN method uses multiple convolutional layers, activation functions (ReLU), pooling layers (MaxPooling), normalization layers, and finally fully connected layers and softmax activation functions. An improved CNN method consisting of 8 stages is proposed and the process of each stage is described. A theorem was developed in the process of improving the method. The proposed method helps in detecting ransomware and adware malware with high accuracy.

Index Terms:

MaxPooling, Rectified Linear Unit, CNN model, Ransomware, Adware, Attention Mechanisms, Application Programming Interface, Squeeze, Neural network

Plant Disease Identification Through Image Processing Techniques

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Abstract:

Plant diseases significantly affect agricultural productivity and food security worldwide. They reduce both the quantity and quality of crops. Timely and accurate disease detection is vital for effective crop management and sustainable farming. Traditional disease diagnosis relies heavily on visual checks by agricultural experts. This method can be costly, subjective, and impractical for large-scale farming. With rapid advancements in computing technologies, automated plant disease identification using image processing has become a reliable solution.

This research paper presents a thorough study of plant disease identification using image processing techniques. The paper outlines the entire workflow, including image acquisition, preprocessing, segmentation, feature extraction, and classification. It discusses both traditional machine learning methods and recent deep learning approaches in detail. The paper also addresses current challenges, performance evaluation metrics, and future research directions, especially in precision agriculture and smart farming systems.

Index Terms:

Index Terms. Precision Agriculture, Convolutional Neural Networks (CNNs), Feature Extraction, Image Processing, Machine Learning, Deep Learning, Leaf Disease Detection, Plant Disease Detection, Smart Farming

Bridging Traditional Cobbler Services and Gen-Z Sneaker Culture through a MERN Stack Digital Platform

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Abstract:

Using the MERN stack (MongoDB, Express.js, React.js, and Node.js), this project offers a new digital platform that connects India's traditional cobblers with the growing sneaker culture fueled by Gen Z customers. The main innovation is the smooth, unified web application that facilitates sneaker repair, modification, resale, and exchange, as well as the integration of a skilled, informal artisan workforce—cobblers—with a generation that is technologically educated. This platform, in contrast to the current disjointed systems, provides a structured and scalable solution that meets the demand for reasonably priced, stylish, and environmentally friendly footwear solutions while improving the cobblers' visibility and financial stability. With the help of the application's secure transaction handling, user-friendly interface, and real-time data management, cobblers may now access digital tools that were before unavailable to them. By extending the lifespan of sneakers and facilitating customisation trends, this approach not only supports the economic empowerment of traditional artisans but also fosters sustainability in the footwear industry. Customers gain from the platform's cost savings, circular economy engagement, and simple access to reliable services. Future developments will include AI-powered feature suggestions and improved digital payment integration, establishing a standard for technology-enabled socioeconomic improvement of unorganized sectors. At the nexus of technology, culture, and sustainability, this research offers a complete solution that advances consumer participation in emerging fashion ecosystems as well as the digital inclusion of craftspeople.

Index Terms:

Cobblers, Sneaker Culture, MERN Stack, Unorganized Sector, Digital Platform, Sustainability

Pothole Detection with Depth Estimation & Severity Ranking

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Abstract:

Potholes pose a serious hazard to urban infrastructure, leading to road safety risks, vehicle repair costs and painful ride experiences but conventional manned driving surveys do not offer either coverage at a sufficiently fine time resolution or sufficient scale. We present a tightly integrated, automated, pothole assessment pipeline comprising deep-learning based detection, calibrated monocular depth estimation, multi-factor severity ranking and geospatial road-segment mapping. Different from most of the existing works that limit their analysis to 2D pothole detection, the solution proposed in this paper quantifies the geometry of each pothole by estimating maximum depth, depression distribution, and area using a calibrated depth transformer model. Depth estimation is combined with road hierarchy, report frequency, and area to formulate a severity index designed for municipal prioritization. Experiments across diverse lighting and weather conditions yield mAP@50 = 0.94, depth RMSE of 2.5 cm (day) / 3.2 cm (night), and severity correlation $r = 0.89$ with municipal engineer rankings. enabling a deployment-ready smart-city pothole management system validated on 63 physically measured potholes.

Index Terms:

Pothole Detection, Deep Learning, Monocular Depth Estimation, Road Infrastructure Assessment, Severity Ranking System, Computer Vision, Geospatial Mapping, YOLOv8, Depth Transformer Model, Intelligent Transportation Systems

Blockchain-Based Secure and Transparent Data Exchange in IoT Networks

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Abstract:

The Internet of Things' (IoT) explosive growth has made it possible for smart devices to connect seamlessly, enabling automated monitoring, data collection, and decision-making across a range of industries, including industrial automation, smart cities, healthcare, and environmental monitoring. However, single points of failure, data tampering, unauthorized access, and a lack of transparency are just a few of the serious security flaws introduced by traditional IoT architectures, which mainly rely on centralized servers for data management and storage. These restrictions lessen the dependability and credibility of the system, particularly in crucial applications. By removing reliance on centralized authorities, blockchain technology provides a decentralized, transparent, and immutable ledger mechanism that can help with these issues. This study suggests a blockchain-based, transparent, and safe data exchange framework for Internet of Things networks that incorporates role-based access control, smart contracts, and decentralized storage via the InterPlanetary File System (IPFS). In order to guarantee data integrity and traceability, IoT devices in the proposed system produce sensor data, which is safely stored in IPFS while the corresponding content identifiers are recorded on the blockchain. Without the need for centralized trust, smart contracts handle data validation, access control, and device authentication. The suggested architecture guarantees transparent auditability of IoT data transactions, improves security, and stops unwanted changes. To show how well blockchain integration can enhance IoT data exchange security, dependability, and transparency, an analysis of the system design, workflow, and security features is conducted.

Index Terms:

Blockchain, Internet of Things (IoT), Smart Contracts, Data Security, IPFS, Decentralized Systems, Access Control, Data Integrity

Smart Loan Processing and Customer Eligibility Prediction Using Machine Learning

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Abstract:

The need for automated loan processing solutions is increasing because financial services are becoming more digital. Traditional loan procedures can be really slow and not very accurate because they rely on people to check and decide things. This project is about a loan processing system that uses machine learning to make decisions and help businesses work efficiently. The loan processing system looks at things like job information, credit history and demographic data to figure out if someone is eligible for a loan. We get the data ready by scaling it encoding categories and filling in missing information to make the loan processing system model stronger. Then we use something called the k-neighbors classifier to separate people into two groups: those who're eligible for a loan and those who are not eligible for a loan. When we tested the loan processing system we found that it was 82.11 percent accurate which means the loan processing system is good, at figuring out risks. The suggested loan processing system is a loan processing system that uses machine learning to improve decision-making accuracy and business efficiency for the loan processing system.

Index Terms:

Machine Learning, Loan Prediction, Financial Risk Assessment, Classification, Banking Automation

Smart Loan Processing and Customer Eligibility Prediction Using Machine Learning

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Abstract:

Secure communication has become increasingly important as digital messaging grows in everyday life. While many chat applications are available today, users continue to worry about privacy, data misuse, and unauthorized access to personal conversations. Some platforms offer convenience but collect metadata. Others may not be transparent about their security practices.

This paper introduces Kabootar, a real-time chat application developed for Android that prioritizes private and efficient communication. The system uses Google Firebase for authentication and real-time database services, allowing seamless message synchronization between users. To enhance confidentiality, Advanced Encryption Standard (AES) encrypts messages, while Elliptic Curve Cryptography (ECC) secures session key exchanges. Additionally, SHA-256 hashing verifies message integrity.

A prototype version of the application was developed and tested at a functional level. Initial observations indicated stable login performance, successful real-time message exchange, and secure message handling during controlled testing. This study suggests that modern cloud tools and lightweight cryptographic methods can work together to create practical and privacy-focused messaging systems.

Index Terms:

Real-Time Chat, End-to-End Encryption, Firebase, AES, ECC, Android Security, Secure Messaging

Mobile Theft Response Under Simulated Shutdown Using AI-Driven Approach

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Abstract:

Current anti-theft mobile applications provide features like GPS tracking, remote data erasure, and SIM change notifications. However, these tools become useless when a thief simply powers off the device. While the concept of simulating a shutdown to keep tracking active has been explored in commercial products such as Cerberus Anti-Theft and Hammer Security, these solutions typically lack intelligent biometric verification and autonomous threat assessment. This paper presents Stealth Shield, which builds upon the established simulated shutdown approach by introducing a CNN-based facial recognition module for real-time intruder identification. When a shutdown is triggered, the system checks whether the person attempting it is an authorized owner. If the face does not match the registered profile, the device enters a covert monitoring state instead of truly powering off. During this hidden operation, the system captures photographic evidence, records GPS coordinates, and transmits all data to cloud storage while dispatching alerts to designated contacts. The primary contribution of this work lies not in the fake shutdown mechanism itself, but in the orchestrated combination of deep learning-based identity verification with automated evidence collection that occurs seamlessly during the simulated power-off state.

Index Terms:

Stealth Shield, Anti-Theft, Simulated Shut Down, Facial Recognition, Android Security, AI, Cloud Storage, CNN, Kernel Hooks

Water Pipeline Monitoring and Leakage Detection System

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Abstract:

Water pipeline leakage poses one of the most prominent problems in the water distribution infrastructure of urban and industrial facilities, causing losses and expenses related to water leakage, damage to pipelines and other parts of infrastructure, as well as costs associated with repairs. Conventional approaches to leak detection have shown limited efficiency in many cases and lack the capability of real-time analysis, response, and localization of the problem. In this paper, we propose a framework for water pipeline leak detection based on an IoT-based multi-sensor system and prediction analytics. This approach employs multiple sensors (flow rate, turbidity, and TDS level) placed in ESP32-powered nodes within a pipeline. The detection system utilizes a rule-based mechanism to determine leaks on the basis of deviations in multiple sensor parameters. The predictive maintenance function estimates the likelihood of pipeline failure based on the temporal trends in sensor values. These operations are performed with the aid of a FastAPI backend and a Streamlit interface for real-time monitoring, alerts, and data visualization. Pipeline segments are delineated by sensors and nodes. Results of testing have confirmed that the proposed approach provides excellent detection precision and enables early warning capabilities.

Culturally Adapted Psychoeducation for Caregivers of Children with Cerebral Palsy in India

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Abstract:

Cerebral palsy (CP) is one of the most common causes of childhood disability in India, affecting around 3 in every 1,000 live births. While medical and therapy-based support for children with CP has grown, the mental health and educational needs of their primary caregivers are often overlooked. Most existing programs focus on the child's physical progress and ignore what caregivers are going through emotionally and practically. Models developed in Western countries are often directly adopted without being adjusted for Indian families, who live within very different social and cultural realities. These include strong family-based caregiving structures, gender roles that place the burden mainly on mothers, spiritual or religious beliefs about disability, and the ongoing challenge of stigma.

This paper presents the design and framework of an ongoing study that examines how a bilingual, culturally adapted psychoeducation program affects caregiver burden and coping among caregivers of children with CP attending rehabilitation centres. The study uses a qualitative approach, with in-depth qualitative interviews.

The central focus of this paper is the psychoeducation module itself — specifically, how it was designed to be genuinely relevant to Indian caregivers. The two-session bilingual (Hindi and English) program draws on principles of family-centred care and community-based rehabilitation. It addresses cultural beliefs around disability, helps caregivers manage stress and emotions, builds awareness of legal rights under the Rights of Persons with Disabilities Act (2016), and encourages shared caregiving within families. Rather than treating culture as a minor add-on, this study treats cultural adaptation as a core part of what makes an intervention effective.

Index Terms:

Cerebral Palsy, Psychoeducation, Caregiver Burden, Cultural Adaptation, Mixed Method Research

Integrating Numerical Methods for Enhancing Radiographic Image Analysis for Defect

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Abstract:

In non-destructive testing, radiographic image analysis is important for detecting defects inside materials without damaging them. Those who perform this analysis encounter issues such as low image contrast, noise, and overlapping defects, which may reduce the quality and reliability of the radiographic image using traditional image processing. This study will focus on how advanced numerical techniques can enhance radiographic image analysis to improve detection. The study primarily focuses on utilizing computational methods, numerical filtering, algorithms, segmentation techniques, and optimization methods to enhance quality and defect detection. The conceptual framework involves preprocessing, feature extraction, and quantitative analysis of the image to allow the detection of defects such as porosity, cracks, and inclusions with greater accuracy. The methods in this study use numerical techniques to improve clarity, reduce noise, and clearly delineate between the different types of defects. Overall, the integration of numerical methods increased the accuracy and reliability of defect detection compared to traditional techniques. The results of this research relate to the development of a more reliable and effective radiographic analysis system that will benefit the manufacturing, aerospace, and structural health monitoring industries.

Index Terms:

Radiographic Testing; Image Processing; Numerical Methods; Non-Destructive Testing; Defect Detection

Trust-Based Energy Efficient Secure Multipath Routing Using Hybrid Algorithm Optimization Algorithm for MANET

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Abstract:

A wireless Mobile Ad Hoc Network (MANET) is an autonomous system of mobile nodes connected by wireless links. MANET is infrastructure-less and dynamic. As the nodes have limited battery power and communicate through a shared wireless channel, it is hard to design a secure and energy-efficient routing protocol in a MANET. Consequently, the article proposes a Trust-Based Energy-Efficient Secure Multi-Path Routing Protocol (TESMRP) supported by the MANET optimization algorithm. In this method, a scheme strives to predict a stable route by selecting the most stable neighbour relative to the transmitter of the route request message and nodes impending during the route discovery process. In multipath routing, a sender node waits for intermediate multiple paths to forward the ciphertext to the destination. In a routing discovery procedure, an SN broadcasts a route request (RREQ) message to discover the DN using a generic probabilistic-based route discovery procedure. After the DN has received the RREQ message, it will begin the routing reply process and will send a routing reply (RREP) message back to the SN. It also becomes essential to monitor the constraints in intermediate nodes (multi-hop routing). As a supplementary method to improve safe data delivery in a MANET, this research proposes and analyses the cluster head (CH) selection and optimum multipath scheme utilizing an improved fuzzy C-means algorithm. The computation is based on the trust threshold worth nodes found in addition. From the CHs, the network of interconnected hops is included, and a selection of the best routes is established using a projected hybrid protocol, and this determines the best routes by the delay, throughput, along with connectivity within this course. To accomplish such challenging objectives, the AODV protocol computes a hybrid optimization algorithm of the Levy flight distribution algorithm for optimal path selection. In addition, high energy consumption is addressed by the Firefly Optimization Algorithm to find the optimal values/fitness function for the objective parameter (i.e. energy). The performance analysis and numerical results show that the proposed protocol achieves significant performance gains in terms of energy consumption, delay, throughput, and security of routing protocols, respectively.

Index Terms:

Mobile Ad-Hoc Network, Multipath Routing, AODV, Fuzzy C-Means, Levy Flight Distribution, Optimal Path, Energy Efficiency

The Hostility Paradox: Cultural Mediation of Aggression Among Filipino Student-Athletes

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Abstract:

Background: Aggressive behavior in competitive sports is a multi-faceted construct that can compromise athlete well-being, increase injury susceptibility, and negatively impact systemic sportsmanship. While participation in sports is often associated with physical and psychological health, it also provides an environment where hostile aggression, driven by anger and the intent to harm, can manifest.

Problem and Aim: Most research on sport aggression originates from Western, individualistic cultures, leaving a socio-cultural blind spot regarding how unique values shape aggressive expression. This study aimed to investigate the prevalence and predictors of sport-specific aggression among Filipino student-athletes, specifically examining how cultural values like *pakikisama* (social harmony) mediate these behaviors.

Methods: Employing a mixed-methods concurrent triangulation design, the study surveyed 727 student-athletes (aged 18–29) from the National Capital Region. Data were collected using the Buss-Perry Aggression Questionnaire (BPAQ) and a validated 50-item situational survey. Hierarchical Multiple Regression was utilized to determine the unique predictive weight of contextual factors, dispositional traits, and environmental catalysts.

Results: The final hierarchical model explained 51% of the total variance in aggressive behavior. While overt aggression was relatively rare ($M=2.39$), male athletes and those in contact sports exhibited significantly higher aggressive tendencies. Environmental catalysts, such as performance frustration and perceived officiating unfairness, added significant unique variance (8%), often overriding general disposition. Notably, a “cultural paradox” was identified where internal hostility negatively predicted overt acts, suggesting that the value of *pakikisama* serves as a cognitive inhibitor.

Conclusions: The findings establish that aggression is an ecosystemic issue heavily influenced by the competitive environment rather than personality alone. Managing aggression in the Philippine sporting context requires a shift from punitive measures toward a framework targeting emotional regulation, autonomy-supportive coaching, and systemic officiating standardization to foster safer competitive ecosystems.

Index Terms:

Teacher Effectiveness, Physical Education, Student Engagement, Classroom Dynamics, Mixed-Methods Research

Fostering Engagement: How Teacher Effectiveness and Classroom Dynamics Shape the Physical Education Learning Climate

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Abstract:

The quality of the learning climate in Physical Education (PE) is paramount for student engagement and the adoption of lifelong healthy habits. This study explored how teacher effectiveness and classroom dynamics shape the PE learning climate from the student's perspective. A convergent parallel mixed-methods design was employed, gathering quantitative and qualitative data simultaneously from 1955 university students through a comprehensive survey. Quantitative results indicated that students strongly agree that their PE teachers are effective across instructional practices ($M=4.46$), professional qualities ($M=4.40$), and interpersonal interactions ($M=4.47$). Teachers were highly rated for providing clear instructions and showing respect. However, qualitative analysis revealed critical nuances for fostering deeper engagement. While students value enthusiasm, clarity, and inclusivity, their motivation is significantly hindered by monotonous instruction, a lack of variety, and insufficient personalized feedback. The integrated findings conclude that while foundational teaching competencies are strong, advancing student engagement requires a deliberate pedagogical shift. To transform a compliant climate into a truly engaging one, educators must diversify activities, integrate student choice, provide specific, individualized feedback, and cultivate a more approachable, communicative rapport. This study underscores the need for professional development focused on these nuanced, student-centered strategies.

Index Terms:

Teacher Effectiveness, Physical Education, Student Engagement, Classroom Dynamics, Mixed-Methods Research

Environmental Stressors and Student Engagement in Physical Education: A Mixed-Methods Study

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Abstract:

The learning environment is a fundamental determinant of student development, yet participation in Physical Education (PE) is profoundly influenced by the physical surroundings. While students generally perceive their infrastructure as sufficient, with an overall mean of 4.07, specific environmental stressors act as powerful demotivators that can override positive social aspects. Thermal discomfort is a primary barrier, as heat is described by students as “super draining” and “exhausting,” matching the study’s lowest quantitative scores for ventilation and temperature at 3.81. Statistical analysis identifies Safety in the Learning Environment as the most robust predictor of student drive ($B=0.27$, $\beta=0.32$, $t=20.68$, $p<.001$), confirming that environmental security is a primary requirement for engagement. Data collected from 1,955 students reveals a critical functional disruption: while students value open areas for movement, these spaces are frequently encroached upon by parked vehicles. This spatial encroachment signals a lack of institutional support, which thwarts students’ psychological needs for autonomy and competence. Although peer camaraderie serves as a vital psychological buffer that sustains excitement during activities, it is insufficient to fully counteract the energy-draining effects of thermal stress and spatial disruptions. Strategic investment in climate-appropriate, roofed facilities and strict protection of designated PE zones from external interference are crucial for fostering sustained engagement and promoting lifelong physical activity in urban educational settings.

Preliminary Carbon Storage Capacity Assessment of the Three Mangrove Species in Intertidal and Coastal Zones of Bacoor Cavite

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Abstract:

Mangrove ecosystems were appraised to be essential for coastal resilience and carbon sequestration are under threat due to habitat destruction and climate change. A mixed-method of field surveys, remote sensing, and laboratory analyses were employed to collect data on species composition, density, and biomass. The findings show that the study area is home to three mangrove species: *Rhizophora mucronata*, *Avicennia* sp., and *Sonneratia alba* with *Rhizophora mucronata* and *Avicennia* sp., being the most dominant species in the whole mangrove plantation. Aboveground biomass for potential carbon sequestration in landward is 60.36 Mg ha⁻¹, midward 3,288.68 Mg ha⁻¹ and seaward 6,589.84 Mg ha⁻¹. Belowground biomass in landward is 18.05 Mg ha⁻¹, midward 21.95 Mg ha⁻¹, and seaward 2,104.39 Mg ha⁻¹. The Average vegetative carbon in a plot was estimated to be 30,810.12 Mg C/ha, with estimate of vegetative carbon in a Intertidal stratum accounting for 46,831.39 Mg C and estimate of vegetative carbon in a coastal stratum contributing 306,560.74 Mg C. The total carbon storage capacity of the mangrove plantation in Bacoor, Cavite is 389,548 Tons C, thus indicating its importance for conservation and sustainable management efforts in order to protect these critical ecosystems.

Index Terms:

Mangroves, Zonations, Carbon Storage, Biomass, Remote Sensing

Cooperative Grit and Distributed Regulation: How Filipino Cultural Values Shape Athletic Persistence and Discipline

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Abstract:

While athletic self-regulation is traditionally framed through Western individualistic paradigms, this study explores how Filipino cultural values rooted in the indigenous concept of *Kapwa* (Shared Inner Self) redefine these strategies among student-athletes. Utilizing a Convergent Parallel Mixed-Methods design with a sample of 786 collegiate participants, the research proposes a "Sociocultural Model of Interdependent Regulation". Quantitative analysis reveals that Collective Spirit (*Bayanihan*) and Resilience (*Tiyaga/Diskarte*) serve as the primary behavioral drivers, statistically grounding the novel concept of "Cooperative Grit" through a strong correlation ($p = .858$). Furthermore, multiple regression analysis yields an exceptionally high coefficient of determination ($R^2 = 0.901$), indicating that 90.1% of the variance in self-regulation is explained by the cultural model. These statistical findings are contextualized by qualitative narratives revealing a "Relational Will," where discipline is transformed into a reciprocal moral duty (*Utang na Loob*) to support family and coaches. Ultimately, the study demonstrates that while indigenous values provide a "high ceiling" for collective motivation, they function as a "double-edged sword" by creating vulnerabilities such as the suppression of personal needs to maintain social harmony (*Pakikisama*). These findings suggest that to be effective, psychological interventions in Philippine sports must shift from individualistic skill-building to group-based and family-integrated strategies.

Index Terms:

Kapwa, Cooperative Grit, Relational Will, Self-Regulation, Filipino Athletes, Interdependent Regulation, Mixed Methods

Reducing Vehicle Exit Lane Queue Times: A Case Study of UST's Pay Parking System

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Abstract:

This research addressed the persistent issue of long exit queues and traffic congestion at the University of Santo Tomas (UST) carpark by evaluating alternative technological solutions through discrete-event simulation modeling. Using empirically gathered process-time data and real-world operational observations, the study simulated five scenarios: the current system, a separate manual payment booth (which was modeled as a combination of RFID and License Plate Recognition [LPR]), a standalone LPR system, a standalone Radio-Frequency Identification (RFID) system, and an additional-cashier setup. The simulation measured key performance indicators such as exit throughput, queue waiting time, and total time in the system. Results showed that the RFID system produced the lowest average processing and exit times, significantly reducing queue buildup compared to all other alternatives. Systems with the separate manual payment booth and LPR also showed improvements over the current setup but yielded higher delays than RFID. Based on these findings, the study concluded that RFID was the most efficient option for mitigating exit congestion at the UST carpark. However, in consideration of budgetary or administrative constraints, other systems could still be implemented depending on institutional priorities, guided by the accompanying cost-benefit analysis. The study provided a data-driven basis for selecting an optimized exit process as UST transitioned into full management of its carpark operations.

Index Terms:

Carpark Congestion, Discrete-Event Simulation, RFID Systems, License Plate Recognition (LPR), Payment kiosks, Queue Modeling, Exit Throughput, Waiting Time, Traffic Flow Optimization, Parking Management

Pentester's Mobile Toolkit: An Ethical Hacking Tool for Android

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Abstract:

The rise of smartphones and advanced cyber threats call for the creation of efficient security analysis tools. This illustrates the fabrication and the experiments of "Pentester's Mobile Toolkit", an Android application for ethical hacking that fulfils such needs. By itself, the app combines various cybersecurity technologies like wireless network scanning, vulnerability testing, and encryption tools in a single user interface. Its design is contemporary client-server application with the user-friendly interface supplied by the flutter frontend and heavy tasks handled by the Python/FastAPI backend. This is an effective way to overcome the typical restrictions of a mobile phone and turn a smartphone into a potent security analysis tool. Equally essential is their secure authentication of users and an API key management system, which is necessary for accessing third-party threat intelligence services. The research reveals "Pentester's Mobile Toolkit" as a solution that is infinitely scalable and portable, which close the gap between local desktop tools and the mobile security testing of today.

Index Terms:

Android, Cybersecurity, Ethical Hacking, Penetration Testing, Flutter, FastAPI, Mobile Security, Vulnerability Scanning.

A Propose Conceptual Framework for Development of an Immersive VR Application in Gamified English Spelling, Vocabulary and Reading Comprehension

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Abstract:

Developing an immersive VR application that gamifies English language learning that focus on aligning the game mechanics with learning outcomes is challenging. The aim of this study is to provide a conceptual framework for development of an immersive VR application in gamified English spelling, vocabulary and reading comprehension that provides a structure, cohesive direction and guide. The design and gamification elements in a VR environment that support the development of English language skills consists of game mechanism, dynamics, aesthetics and VR features. The learning outcome, learning materials, test modules and multimedia modalities are the parts for gamified English language learning. The iterative and incremental practices which make the learner builds knowledge in incremental steps and iterate to deepen or refine the understanding of each concept through practice and feedback.

AI Bot for Energy Consumption Prediction and Model Accuracy Evaluation

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Abstract:

Rising needs for home-generated electricity prompted concerns over the energy efficiency and sustainability of such systems. In this context, this paper proposes an AI system for recommending energy-efficient appliances by integrating web automation, real-time data scraping, and machine learning. The system uses Selenium to scrape appliance specifications from e-commerce websites, process feature data, and predict energy consumption via multiple regression models. Linear, Ridge, Random Forest, and Gradient Boosting were tested and trained. Results show Linear and Ridge Regression were the best with R^2 of 0.097, and ensemble techniques worked poorly due to limited dataset size and severe noise. The research shows how AI helps consumers make environmentally friendly purchasing decisions and imposes energy efficiency on home.

Index Terms:

Energy Efficiency, Machine Learning, Web Scraping, Selenium Automation, Appliance Recommendations, Sustainability, Regression Models, Data-driven Decision Making

Design of an Optimized 32-bit Fixed-Point Reciprocal Unit Using Newton-Raphson Division Algorithm

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Abstract:

The paper introduces an idealized fixed point division algorithm based 32-bit computing unit with the aim of creating a high-speed, low power, reduced hardware complexity, and high numerical accuracy device to use in real-time digital systems. Notions of reciprocal and division are essential in various engineering and technology implementations like digital signal processing, control systems, and embedded computing, in which the traditional floating-point implementations are sometimes prohibitively expensive in terms of area and power. The proposed design will incorporate three significant optimizations that include a Look-Up Table (LUT)-based first approximation to speed-up convergence, a dynamic early-termination system relying on the stability of iterations, and controlled allocation of fixed-point precision to reduce the quantization error whilst minimizing hardware usage. The LUT-based approximation greatly decreases the number of necessary iterations whereas the early-termination logic can cease the calculation after three consecutive converging iterations thus decreasing the latency and power usage. It is designed in Verilog and synthesized in Xilinx Vivado and it is proved that it uses its resources efficiently with a low level of logic consumption and an insignificant level of interconnect complexity. The convergence to the solution obtained with simulation proves quite rapid with an average of two or three iterations, and high levels of numerical accuracy with errors that lie within a range of 10^{-8} to 10^{-7} . The suggested design can reduce the number of iterations by around 40–50 percent relative to the traditional methods and enhance accuracy and computation performance. The proposed reciprocal unit is also low-latency, low-power, and high-accuracy which makes it very engineering and technology-oriented, especially in hardware-accelerated arithmetic and real-time embedded architectures.

Multi-Product Retail Demand Forecasting Using CatBoost for Inventory Optimization

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Abstract:

Demand Forecasting is crucial for the retail industry enabling the efficient execution of stock and maximizing customer satisfaction. The effective inventory management system leads to sufficient production with minimal cost. Here we used CatBoost Algorithm for perfect and improved forecasting model. This helps the retailers manage their product inventory more effectively. This model was trained using a time-based train-test split and evaluate using RMSE, MAE, MSE, R2, Median AE, SMAPE and MAPE. The Flask is used for forecasting that allows users to insert data and receive product demand. The system also includes user authentication and a visual dashboard to display the forecast results.

Index Terms:

Demand Forecasting, Retail Inventory Management, Machine Learning, CatBoost, Time Series Analysis

Mapping the Epistemological Foundations of Physical Education: A Comparative Documentary Analysis of Bachelor's Degree Curricula in ASTEN Universities

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Abstract:

Purpose: This study maps and compares Bachelor of Physical Education curricula across six Association of Southeast Asian Teacher Education Network (AsTEN) institutions to propose a harmonized framework aligned with ASEAN standards.

Design/Methodology/Approach: A qualitative design employed content and documentary analysis of curriculum guides and institutional mandates. The Constant Comparative Method was used to synthesize data on general education, specializations, and credit units from leading universities in Thailand, Singapore, Malaysia, Indonesia, and the Philippines.

Findings: While all institutions aim to produce qualified PE teachers, significant variations exist in governance, program duration (3.5–4 years), and credit requirements (128–160 units). Cultural contexts heavily influence General Education, ranging from religious instruction to ethics. Specializations also diverge, with distinct focuses on sports science or primary education depending on the country.

Practical/Social Implications: The findings support the development of a standardized cross-border curriculum. This harmonization enhances professional mobility, employability, and cultural adaptability for graduates, fostering a shared regional identity and equitable teacher training standards.

Originality/Value: This paper addresses a gap in comparative Physical Education research within AsTEN, providing an evidence-based roadmap for regional integration that respects local cultural and national identities.

Index Terms:

Physical Education, Curriculum Mapping, ASEAN, AsTEN, Comparative Education, Teacher Education

A CampusKart – A Smart College Marketplace Web App

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Abstract:

CampusKart is a marketplace platform created specifically for college students, allowing them to share and trade their goods, view available accommodation, and connect with other students on a campus-level. Built using React, TypeScript, Tailwind CSS, and Supabase (PostgreSQL, Auth, Storage, and Realtime), CampusKart fills in key gaps that other marketplace platforms do not address: affordability, accessibility, and trust. The CampusKart marketplace features a unique multi-module architecture that supports product listings, roommate/flat listings and related services, as well as a WhatsApp connection for quick communication between buyers/sellers and users. A unique Federated Recommendation Model is the primary contribution of this paper. This model leverages user behaviour on CampusKart, historical trends within that campus, and similar items/classifications to suggest items tailored to each user's preferences, all while preserving the security and confidentiality of the user's information. This recommendation process uses light-machine-learning methods (collaborative filtering, content-based similarity) along with a federated data aggregation approach to maintain the privacy of student data.

EmailGuard AI: A Hybrid ML–Heuristic Framework for Explainable Real-Time Phishing Detection

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Abstract:

Phishing emails continue to pose a serious and ongoing threat in the cybersecurity landscape, contributing to a large share of global data breaches. While many machine learning techniques have been introduced to detect phishing attempts, much of the existing research emphasizes accuracy metrics evaluated in controlled experimental environments. Less focus has been placed on practical deployment, transparency of decision-making, and building user confidence. In this work, we introduce EmailGuard AI, a hybrid framework that integrates machine learning with structured heuristic analysis to address these gaps. Logistic Regression with rule-based risk analysis to deliver a 98.1% balanced F1-score on a dataset of 82,798 labeled emails. Unlike conventional black-box classifiers, EmailGuard AI generates human-interpretable risk explanations through multi-factor analysis of urgency cues, financial lures, and suspicious calls to action. An ablation study demonstrates a +3.9% F1 improvement resulting from an optimized TF-IDF preprocessing pipeline and a further +4.1% gain from the heuristic risk layer. The system is deployed as a production-ready FastAPI and React web application with an average inference time of 27 milliseconds, demonstrating feasibility for real-time email security environments. By integrating strong predictive performance with explainability and operational deployment, EmailGuard AI shows practical potential as a real-world phishing defense solution for both individual and enterprise environments.

Index Terms:

Phishing Detection, Logistic Regression, Explainable AI, Hybrid ML–Heuristic, Fastapi Deployment

SDG-INSIGHT-A Digital Framework for Assessing and Analyzing SDG Awareness in Higher Education Institutions

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Abstract:

We live in a world that has made grand promises. The United Nations' 2030 Agenda, with its 17 Sustainable Development Goals, is perhaps the most ambitious collective commitment humanity has ever made. Yet as the decade mark approaches, an uncomfortable truth is emerging: many of the institutions best positioned to drive change — our universities — still struggle to measure whether the people within them truly understand what the SDGs are, let alone how to act on them. I built SDG-INSIGHT to close that gap. During my time studying at IISER Pune and now at K.R. Mangalam University, I kept noticing the same problem: every institution handles SDG assessment differently, with their own surveys, their own scales, and their own reporting formats — making it impossible to compare, benchmark, or build on each other's work. My goal was to standardize it. Rather than relying on anecdotal program reports or one-size-fits-all sustainability pledges, SDG-INSIGHT gives higher education institutions a rigorous, data-driven way to assess SDG awareness at every level — from individual students to entire departments to the institution as a whole. My framework evaluates four dimensions of awareness: Knowledge (weighted at 40%), Attitude (25%), Engagement (25%), and Institutional Exposure (10%). These feed into three hierarchical indices — the Individual Awareness Score (S_i), the Department Awareness Index (DAI), and the Institution SDG Index (ISI) — each designed to generate insights that actually inform curriculum decisions and policy changes. I built the platform on a React.js and Node.js stack with a hybrid Firebase-Azure cloud backend. It is live at <https://sdginsight.tech/> and designed to scale from small colleges to large multi-campus universities. In this paper, I situate SDG-INSIGHT within the global research landscape, drawing on a synthesis of 30 peer-reviewed studies to show exactly what gaps in SDG assessment my framework addresses, how the scoring model works, what the system looks like in practice, and where I plan to take it next.

Index Terms:

Sustainable Development Goals, SDG Literacy, Higher Education, Digital Assessment, KAP Survey, Curriculum Mapping, Institution SDG Index, Data-Driven Education Policy

Context-Aware Cyberbullying Detection Using DistilROBERTa

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Abstract:

The rapid growth of group-based online communication has made cyberbullying harder to detect, as harmful behavior often appears subtly across multiple interactions rather than in a single message. Acts such as repeated teasing, indirect aggression, and social exclusion typically rely on conversational context, limiting the accuracy of traditional message-level detection methods. To overcome this challenge, this study introduces a context-aware cyberbullying detection framework that analyzes multi-turn group conversations. The proposed system employs a transformer-based transfer learning model, DistilRoBERTa, adapted to capture sequential conversational dependencies. By incorporating dialogue history, the model improves the identification of implicit bullying behaviors that are commonly overlooked by conventional approaches. Experimental results on annotated conversational datasets show clear performance gains over baseline techniques, emphasizing the importance of contextual understanding in AI-based cyberbullying detection systems.

Index Terms:

Cyberbullying Analysis, Group Communication, Transformer-Based Models, DistilRoBERTa, Transfer Learning, Multi-Turn Dialogue Modeling, Natural Language Processing, Online Safety, Good Health and Well-Being, Quality Education, Peace, Justice, Strong Institutions

4E Analysis and Multi-Objective Optimization of Green Hydrogen-Based DRI Steelmaking in India: A Comparative State-Level Spatial Assessment and Resilience Analysis

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Abstract:

The Indian iron and steel industry heavily relies on the traditional coal-based DRI process with the highest emission intensity of 2.65 tCO₂/t. Transitioning to the innovative hydrogen-based H₂-DRI-EAF system would mean practically zero-emission solution; nonetheless, there is still limited knowledge on the spatial-economic and thermodynamic aspects of this approach. This research is based on the joint 4E analysis and Non-dominated Sorting Genetic Algorithm (NSGA-II). Modeling is performed for five Indian states using reactor modeling within the framework of the MATLAB system, with the minimal estimated Specific Energy Consumption being 3,531.8 kWh/t and the shaft furnace being considered as the primary source of exergy sink of 0.6943 MWh/t. In terms of spatial-economic analysis, a typical U-shape dynamics is found. Given the availability of cheap coal-powered tariffs, Odisha exhibits the lowest optimized value of the Levelized Cost of Steel of ₹46,494/t with the minimal share of renewable sources of energy of 55.3%. In its turn, Gujarat appears to be a true “green winner” state, with its minimal LCOS value of ₹48,900/t despite its significantly higher renewable energy share of 85.4%. Raising it up to 100% leads to the appearance of a so-called “storage penalty” for Gujarat, resulting in exponential growth of its LCOS value to ₹52,787/t. Financial analysis shows the ability of Gujarat to act as a volatility buffer (+/-8.2%). Market parity with the coal-based DRI production (≈₹38,000/t) is only attainable via subsidies and CO₂ credits worth ₹4,500–₹5,000/tCO₂.

Index Terms:

Green Hydrogen-Based DRI, 4E Analysis, Multi-Objective NSGA-II Optimization, Spatial Techno-Economic Assessment, Parametric Resilience Analysis

