# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES 2025

BOOK OF ABSTRACTS

# International Conference on Sustainable Environmental Technologies (ICSET 2025)

Maynila Ballroom, Manila Hotel, Manila City, Philippines

January 21-23, 2025

Organized by:

Mapúa University, Philippines

National Ching Hsing University, Taiwan

With

College of Engineering, University of the Philippines Diliman

Mapúa Malayan Colleges Laguna

Mapúa Malayan Colleges Mindanao

*"Environmental Technologies and their Sustainability in Industry 4.0 and Beyond"*

Lead Organizer:

Office of International Linkages, Relations, and Development Cooperation

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International Conference on Sustainable Environmental Technologies (ICSET) 2025

*"Environmental Technologies and their Sustainability in Industry 4.0 and Beyond"*

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# INTRODUCTION

*In 2013 and 2018, Mapúa University organized and hosted the ICSET 2013, 2018. Now Mapúa University (Philippines) in partnership with National Chung Hsing University (Taiwan), and in cooperation with the College of Engineering of the University of Philippines Diliman, Mapúa Malayan Colleges Laguna, and Mapúa Malayan Colleges Mindanao organize the ICSET 2025. This is an important event as Mapúa University is celebrating its 100 years founding anniversary on January 25, 2025.*

*This conference originated from the Asian Pacific Regional Conference (APRC) organized and held first in 2003 at Chia Nan University of Pharmacy and Science, Taiwan. Delegates from Thailand, Philippines, Japan and Korea participated in this international conference.*

*Following this kick-off conference, the APRC was continually organized at different locations of different countries. The organizing and hosting of APRC was passed to the University of the Philippines, Diliman, in 2006.*

*In 2007, the APRC was rotated to Khon Kaen University, Thailand. Because the University of the Philippines celebrated its 100 - year foundation in 2008, the 6th APRC became a centennial conference held at the main campus in Diliman, Quezon City, Metro Manila, Philippines. Afterwards, the APRC was hosted by Hanoi University of Science and Technology, Hanoi, Vietnam in 2009, and by Ubon Ratchathani University, Ubon Ratchathani, Thailand in 2010. In 2011, APRC became the International Conference on Sustainable Environmental Technologies (ICSET). Seoul National University, Korea hosted the ICSET 2011, and King Mongkut's University of Technology Thonburi, Thailand hosted the ICSET 2012.*

*Due to the COVID-19 pandemic, the conduct of ICSET was temporarily suspended until 2022. Now, the ICSET 2025 will provide you (again) of valuable information and experiences that would boost the competency of the international scientific community in terms of evolving environmental technologies developments for sustainability, green living helpful in socio-economic development, and how the landscape of environmental related researches evolve.*

*ICSET 2025 Secretariat*
*EQC3 International Core*
*January 2025*
*Manila, Philippines*

International Conference on Sustainable Environmental Technologies (ICSET 2025)
January 21-23, 2025

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# MESSAGE

*January 21, 2025*
Manila City

## DODJIE S. MAESTRECAMPO, PH. D.
*President and Chief Executive Officer*
*Mapúa University*
*Mapúa Malayan Colleges Laguna*
*Mapúa Malayan Colleges Mindanao*
*Chairman, ICSET 2025*

Greetings to all participants, speakers, and organizers of the International Conference on Sustainable Environmental Technologies (ICSET) 2025.

With immense pride and enthusiasm, we at Mapúa University welcome you to this momentous occasion, held as part of the university's centennial celebration under the theme, *"Always Building the Future."* This conference not only commemorates a century of Mapúa's unwavering commitment to academic and research excellence but also underscores our new vision of fostering sustainable socio-economic growth through digital transformation, innovation, and lifelong education.

ICSET has always stood as a beacon of knowledge sharing and progress in environmental technologies, addressing critical challenges in sustainability and green development. This year's conference aligns seamlessly with Mapúa's advocacy for integrating sustainability into every aspect of education, research, and community engagement. By combining our institutional focus on innovation and digital transformation with the themes of ICSET, we aim to empower society to achieve resilient and inclusive growth.

Our partnership with National Chung Hsing University for this event reflects the essence of international cooperation, which is pivotal in crafting solutions for a more sustainable future. As we convene experts and thought leaders from around the globe, I encourage each of you to seize the opportunities to share insights, exchange ideas, and inspire one another. Together, we can drive advancements in environmental technologies that are not only transformative but also essential to achieving socio-economic progress.

On behalf of Mapúa University, I extend my gratitude to all who have made this conference possible. May ICSET 2025 spark meaningful conversations, foster lasting collaborations, and pave the way for a brighter, greener future.

Thank you, and I wish everyone a productive and enriching conference experience.

Warm regards,

Dodjie S. Maestrecampo, PhD

# MESSAGE

*January 21, 2025*

**FUH-JYH JAN, PH.D.**
*Co-Chair, ICSET 2025*
*President*
*National Chung Hsing University*
*Taiwan*

Dear distinguished participants of ICSET 2025,

Warm greetings from National Chung Hsing University (NCHU).

It is a distinct honor for NCHU to join Mapua University in co-hosting this year's ICSET conference, held during a milestone year marking Mapua University's centennial anniversary. On behalf of NCHU, I extend our heartfelt congratulations to Mapua University on its 100th anniversary. This celebration is a testament to the university's remarkable legacy in education, innovation, and research, and we are delighted to share in the spirit of this memorable occasion.

The ICSET conference provides a unique opportunity for scholars, researchers, and industry professionals to come together, exchange ideas, and address some of the most pressing global challenges of our time. At NCHU, we believe that academic partnerships are essential for building a future enriched by sustainable solutions and pioneering advancements. I am confident that the collaborations and discussions arising from this event will inspire impactful research and foster new partnerships that will shape our fields for years to come.

I extend my best wishes to all participants for a productive and inspiring conference. May your time together be filled with meaningful insights, discoveries, and friendships that further our mission of enhancing knowledge and innovation. Congratulations again to Mapua University on its centennial milestone. We look forward to the remarkable achievements that will emerge from ICSET 2025.

# MESSAGE
*January 21, 2025*

MING-CHUN LU, PH.D.
*Founder*
*ICSET & EQC3*
*National Chung Hsing University*
*Taiwan*

 The rapid progress in industries and agriculture has led to significant environmental challenges, including resource depletion and pollution. While environmental protection is a priority for many nations, efforts to address hazardous substances and waste management remain insufficient.

To tackle these issues, the Asian Pacific Regional Conference (APRC) was established in 2003, evolving into the International Conference on Sustainable Environmental Technologies (ICSET) in 2011. ICSET has since served as a vital platform for knowledge exchange and collaboration on sustainable solutions to environmental problems.

With the theme "Environmental Technologies: Sustainability in Industry 4.0 and Beyond," ICSET 2025 underscores the transformative role of innovation, research, and collaboration in addressing the environmental challenges of the modern era. As we move further into Industry 4.0, where advanced technologies such as artificial intelligence, automation, and big data shape industries worldwide, the need to integrate sustainability into these advancements becomes increasingly critical. This conference provides a platform for exploring cutting-edge environmental technologies, promoting sustainable practices, and fostering partnerships that align with the goals of a greener and more resilient future.

This year's event is particularly significant as it marks Mapúa University's 100th anniversary, celebrating a century of academic excellence and its enduring commitment to sustainability and technological advancement. The conference also highlights the essential role of academia, industry, and policymakers in working together to address pressing global issues, ensuring that innovations not only enhance industrial progress but also protect and preserve the environment for future generations.

I sincerely hope ICSET 2025 inspires participants to pursue impactful solutions and collaborations for a sustainable future. My deepest gratitude goes to Dr. Dodjie S. Maestrecampo, President of Mapúa University, and Dr. Fuh-Jyh Jan, President of National Chung Hsing University, for their support. Special thanks go to Dr. Delia Senoro and her organizing committee for their dedication to making ICSET 2025 a success. Finally, I offer my heartfelt appreciation to all participants, authors, and presenters for their invaluable contributions to this event.

# THE PLENARY SPEAKERS

# Carbon Capture Technology

Gary Dirks, PhD
*Senior Director of Global Futures Laboratory*
*Director of Lightworks*
*Director of Julie Ann Wrigley Chair*
*Distinguished Global Futures Scientist*
*Arizona State University*
*United States of America*

## Abstract

*Capture and storage or reuse of carbon dioxide is becoming more prominent in policy solutions to the relentless rise in the concentration of the gas in the atmosphere.  Consequently, interest and investment in all aspects of capture technology has grown dramatically.  This presentation covers the entire technology chain from capture to storage.   The two main types of capture technologies, point source and direct air capture are covered with an emphasis on direct air capture. I will conclude with a brief overview of recent developments in the United States and the "Hub" program.*

# Linking Water Quality Monitoring and Water Treatment for Shallow Eutrophic Reservoirs in Taiwan

Professor Tsair-Fuh Lin
*Department of Environmental Engineering*
*National Cheng Kung University*
*Taiwan*

## Abstract

*Reservoirs are essential water sources for many countries, and their water quality significantly impacts water treatment processes and public water safety. Effective water quality monitoring provides critical insights for water resource management and improvements in treatment methods. This report addresses common water quality issues in eutrophic reservoirs that affect drinking water quality, including nutrient control, cyanobacterial growth, taste and odor issues, toxins, ammonia nitrogen, and sediment. Using real monitoring data from reservoirs in Taiwan, the presentation will explain the causes of these issues and discuss corresponding mitigation and improvement strategies for reservoirs and water treatment plants. It will also highlight the connection between water quality monitoring and advancements in water treatment technologies.*

# Renewable Energy and Sustainability: Environmental, Investment, and Regulatory Issues in the Philippines

Francisco G. Delfin, Jr., Ph.D.
*President and CEO*
*PetroGreen Energy Corporation (PGEC)*
*Philippines*

## Abstract

*Accelerated deployment of renewable energy (RE) in the Philippines, supportive of the Paris Agreement but driven more by the country's lack of significant fossil energy endowments, seeks to increase RE's share in the power mix from the current -23% to 35% by 2030 and to 50% by 2040. This ambitious goal has generated environmental, investment, and regulatory concerns of varying seriousness among different stakeholders.*

*A few critics claim that RE development will compete for lands for agricultural, recreational, and environmental use. Empirical evidence for the supposed displacement by RE of lands for conservation and recreation is rather weak. Land-based RE service contracts (geothermal, ground-mounted solar, on-shore wind but except hydro) as of mid-2024 encompass 2.16 Million hectares while 7.80 Million hectares of land are dedicated as protected areas. There is also little overlap, at the aggregate national scale, between protected areas and RE service contract blocks. And many RE firms promote sustainability by undertaking impactful environmental programs where the private sector's funding sources, access to technical expertise, the implementation flexibility overcome weaknesses in traditional state-led command-and-control environmental protection efforts.*

*Investments into residential and commercial and industrial (C&I) rooftop solar can help minimize land use conflicts in energy production. Total installed rooftop solar capacity in early 2024 was a measly 272 MWp compared to the 4,600 MWp rooftop solar potential of the Philippines estimated by IFC. Using bodies of water-lakes, dams, and fishponds - for solar installations help avoid competition for scarce lands and spaces. Aquavoltaics facilities where PV solar generation is integrated with aquaculture in fishponds can even boost fish production as shown in Taiwan. Scaling up rooftop solar and aquavoltaics installation will require government promotion through public policies. Even so, the intermittent nature of solar generation will have to be complemented by developing other RE resources and technologies that can provide more stability, scalability, and sustainability to the country's power supply and use. Three technologies need particular shoring up through supportive regulations – energy storage, offshore wind, and geothermal energy.*

# Structural Engineering of Built Environment in Harmony with the Environmental Technologies

ENGR. ADAM C. ABINALES, M.Eng., F.PICE, F.ASEP, iStructS-011
*President, National Association of Mapúa Alumni, Inc. (NAMA), Philippines*

## Abstract

*The Philippines is considered as one of the most disaster-prone countries in the world which can be attributed to its location within the Pacific Ring of Fire, at the center of a tropical cyclone basin, and along the boundary of major tectonic plates. With more than 120 million population occupying 30 million hectares land area, the biggest challenge is to make the built environment be sustainable to mitigate and reduce the disaster risk.*

*Most common construction materials used in the built environment and infrastructure in the Philippine setting are concrete and steel. These structures, when damaged by any extreme disaster event such as earthquake, severe tropical cyclone, induced landslides, flooding, etc. are either abandoned / condemned or demolished due to its inoperability. Similarly, old / historical built structures which were designed and constructed based on the past editions of the structural code / standard may pose potential danger to inhabitants and must be subjected to further evaluation. The challenge to structural engineering is the application of the right process and tool of evaluating and retrofitting of existing structures in harmony with the environmental technologies. Innovative strategies adopting technological advances in structural engineering are alternatives to the traditional methodologies in structural retrofitting of built environments for sustainable development.*

# Autonomous Small Robot with Robust Speech Recognition and Its Consumer Product

Dr. Yoshikazu Miyanaga
President, Chitose Institute of Science and Technology, Japan
Professor Emeritus, Hokkaido University, Japan
Adjunct Professor, University of Technology Sydney, Australia
Past-Chair, IEEE Japan Council
Chitose Institute of Science and Technology
Chitose, Hokkaido, 066-8665
Japan

## Abstract

*This topic introduces the design of a noise robust automatic speech recognition (ASR) system. It is suitable for speech communication robots, and in particular for ASR robots isolated from internet. For almost all of speech communication robots, a strong noisy robust speech recognition has been demanded. For both of a continuous speech dialog-based and a command-based ASR, we have designed strong robust ASR systems against various noise circumstances.*

*In this presentation, noise robust speech analysis techniques have been introduced. In order to develop the robustness under low SNR, Modulation Spectrum Control (MSC) have been explained for the robust speech features and they focus on the speech feature adjustment with important speech components. The MSC eliminates the noise corruption of speech feature parameters. In addition to MSC, the psychoacoustic masking effects for speech feature extraction in ASR is also introduced. It is based on the human auditory system. Generally, the mel-frequency cepstral coefficients (MFCC) are widely used speech features in ASR systems, and however one of their main drawbacks is the lack of psychoacoustic processing, which can affect and hamper the results. This presentation introduces noise robust speech features which improve upon MFCC and its modified features. A psychoacoustic model-based feature extraction which simulates the perception of sound in the human auditory system has been investigated and integrated into the front-end technique of the proposed ASR system. This new approach is useful for noise robust speech recognition embedded into AI-Robots.*

*Finally, some of real consumer products with these techniques are introduced. Among them, a small robot has been announced over the world as a practical product.*

# Environmentally Sustainable Reclamation And Coastal Protection

Atty. JOSEPH JOHN M. LITERAL
*Assistant General Manager for Reclamation and Regulation*
*Philippine Reclamation Authority (PRA)*
*Republic of the Philippines*

## Abstract

*According to the United Nations Office for the Coordination of Humanitarian Affairs, the Philippines is one of the most disaster-prone countries in the world. The Philippine archipelago is situated along the Pacific Ocean's typhoon belt, leaving the country vulnerable to around 20 typhoons each year, a quarter of which are destructive. In addition to the Philippine's close proximity to the typhoon belt, the Philippines is also located within the Pacific Ring of Fire which makes the country prone to recurrent earthquakes and volcanic eruptions. Compounding these issues, the impacts of climate change, i.e accelerated sea level rise, exacerbate the country's high susceptibility to natural disasters like flooding. To address these issues, former President Rodrigo R. Duterte issued Executive Order No. 74, s2019, rationalizing the approval process for reclamation projects towards an economically and environmentally sustainable resource development. The PRA is now under the control and supervision of the Office of the President, and the power to approve all reclamation projects was delegated to the PRA Governing Board. Pursuant to its mandate to integrate, direct and coordinate all reclamation projects for and on behalf of the National Government, the PRA shall seek advisory opinions from the National Economic Development Authority (NEDA), the Department of Environment and Natural Resources (DENR) and the Department of Finance (DOF).*

*All proposals for reclamation projects shall be accompanied by feasibility studies and final Environmental Impact Statement (EIS), Area Clearance and Environmental Compliance Certificate (ECC) from the DENR, hydrodynamic modelling and detailed engineering design, which shall include geotechnical investigation, Engineering Geological and Geohazard Assessment Report (EGGAR), Climate Change Adaptation Strategy, hydrographic, topographic and bathymetric plans / maps of the reclamation site and immediate vicinity as well as of the marine borrow pit areas, as the case maybe.*

*Lastly, as the regulator, we shall ensure that the projects we approved are sustainable. PRA applies best practices in the implementation of reclamation projects and monitors compliance with environmental conditions imposed by relevant agencies of government. Our commitment is to provide quality public service in the creation of well-planned and environmentally sustainable reclaimed lands, promotion of coastal protection and resilience, and efficient management of government properties for the benefit of the Filipino people.*

# Maximising Bioenergy Sustainability and Enabling the Sustainable Development Goals

Professor Mirjam Röder
Energy and Bioproducts Research Institute (EBRI)
Aston University
United Kingdom

## Abstract

*Societies around the world are facing a climate, energy and livelihood crisis. Bioenergy has the potential to address some of the challenges in mitigating climate change, providing renewable and affordable energy and supporting economic and societal resilience. Up to date, bioenergy is the dominating renewable energy source globally, offering high levels of flexibility and dispatchability. Bioenergy is also the only renewable energy source that can deliver carbon dioxide removal from the atmosphere when combined with carbon capture. These properties make bioenergy a critical approach on the path to energy security, net-zero and beyond.*
*As bioenergy is increasingly targeted within energy strategies of nations, demand for biomass resources will continue to grow. In addition, with other sectors transforming to biobased feedstocks as biomass is the only source of renewable carbon, biomass demand will grow even further. Sustainability is a primary issue for the continuously increasing demand for biomass for energy and other sectors. This means there is a potential for risks and benefits for people, development, natural systems, and climate change.*

*This talk will introduce the concept of bioenergy sustainability in different global regions, such as Southeast Asia, Africa, Europe and the Americas. Research findings will show how the sustainability of bioenergy includes far more aspects than those targeted within legislation – where emissions, land, and biodiversity are prioritised. Examples of assessing different aspects of sustainability, like environment, economy, and society, will be given. It will demonstrate how sustainability can be mapped to identify the synergies and trade-offs within bioenergy systems. Further, it will provide insights into how this can inform evidence-based decision making to enable targeted actions to mitigate risks and maximise and promote benefits supporting several different UN Sustainable Development Goals.*

# Sustainability Initiative of Mapúa University

Alvin R. Caparanga, PhD
Director, Mapúa Institute of Global Sustainability (MIGS)
Dean, School of Graduate Studies
Mapúa University
Philippines

## Abstract

*Mapua Institute for Global Sustainability (MIGS) has been established as a crucial step in the university's dedication to sustainable development. MIGS aims to tackle global and local sustainability challenges through an integrated approach that merges scientific knowledge with practical application. The institute focuses on urban sustainability, resource management, and policy advocacy while incorporating sustainability into campus operations. As a hub for thought leadership and community engagement, MIGS is committed to shaping a sustainable future and cultivating future leaders. In its first year, MIGS launched key programs, formed partnerships with local and international organizations to boost research and innovation, and implemented educational campaigns to raise environmental awareness among students and the community. These initial efforts underscore Mapua University's dedication to creating a sustainable future for all.*

# Wastewater as a Valuable Resource: Managing Health and Environmental Risks while Maximizing Cost-Effectiveness

Engr. Carlito M. Santos, Jr., CE, SE, GE
President, Uniklean Enviro Construction Corp.
Republic of the Philippines

## Abstract

*The increased production of wastewater due to continued urbanization and industria-lization may lead to serious public health problems, water quality and environment destruction, leading to a reduction in food supply if not given prompt and appropriate attention. However, with proper management, wastewater (WW), beyond being safely discharged to the environment, can be used as a resource for water conservation, preservation and food production. Application of appropriate WW treatment/s, and the intentional reuse of reclaimed WW should be incorpo-rated into the overall management of water resources. The effective and safe application of reusing WW involves two primary strategies: risk assessment and project safety planning. According to the WHO, the management of risk involves conducting an analysis of the entire production cycle; i.e. from waste generation to treatment to the consumption of the reclaimed water. A comprehensive knowledge of the WW reclamation system is necessary and a primary qualification to a WW reclamation system designer. This is to identify the necessary technology, appropriate strategy (or approach), and apply safety protection measures within the process design. This will reduce the risks at different points in order to arrive at agreed-upon health-based targets. These measures are used in combination with each other in a system; e.g. treatment of techniques; hydraulic retention; exposure control methods; produce disinfection and cooking; vector control; and chemotherapy and immunization. Determining the cost-effectiveness of different measures under local conditions requires both economic and public health analyses. In the United States, the five-year-long Monterey WW Reclamation Study for Agriculture (MWRSA) demonstrated not only the large scale water reclamation be accomplished but also the reclaimed water can be safely utilize for irrigation. In the Philippines, the author has already been involved in several local government, commercial, and residential projects showcasing WW treatment with safe water reuse, with applications ranging from toilet flushing, watering plants, cooling tower operations, truck cleaning, water replenishment for fish ponds (including ones for growing tilapia), and soil conditioning using sludge. As dwindling water supplies and pollution affect everyone, the appropriate WW reclamation system in the Philippines shall go beyond mere compliance to effluent standards but shall be applied, practiced to treat WW to address environmental and public health issues, utilize as a water resource for domestic, agricultural and food production. This WW that was commonly discharged formerly to environment could be a valuable resource to the society and aid in environmental sustainability and sustainable development.*

# ABSTRACTS

# Automobile Classification using Machine Learning and Accelerometer Readings in Intelligent Transport Systems

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*[c] USHER Technologies Inc., Quezon City, Philippines*
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## ABSTRACT

*This study investigates the use of accelerometer data for vehicle type classification within Intelligent Transport Systems (ITS), focusing on distinguishing between SUVs and sedans. Employing advanced machine learning models such as Convolutional Neural Networks (CNN), eXtreme Gradient Boosting (XGBoost), Support Vector Machines (SVM), and Long Short-Term Memory (LSTM), this research identifies effective frameworks for analyzing accelerometer data in both time and frequency domains. Rigorous data preprocessing techniques, including high-pass filtering, fast Fourier transform, and descriptive statistical extraction, enhance model performance. CNN achieved the highest accuracy in the time domain dataset (99.54%), while XGBoost excelled in the frequency domain (98.68%). The study highlights advancements in preprocessing and hyperparameter optimization, utilizing Bayesian Optimization on neural networks and Grid search on ensemble models, as well as 5-fold cross-validation on all models. The integration of these techniques resulted in robust automobile classification, potentially leading to the automated calibration of IRI (International Roughness Index) values. This research provides a comprehensive approach to vehicle classification, emphasizing the critical role of preprocessing and model tuning. Future work should explore broader datasets and additional vehicle types to further validate and extend these findings, promoting safer and more efficient transportation infrastructures.*

*Keywords:* Neural Networks, Ensemble Methods, Keras Tuner, Fast Fourier Transform, Segmentation

*Paper Reference Code:* ICSET-25001

# Application of Storing, Avoiding, Removing, Slowing (S.A.R.S.) Action in Enhancing the Building Efficiency and Thermal Environment of a Sports Complex

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## ABSTRACT

*In tropical countries, air-conditioning units in buildings consume significant energy and raise health and environmental concerns. These systems are being extensively used in such a way that they consume a high amount of energy and cause health and environmental issues. Extensive use of air-conditioning units was predicted to cause nearly 25% of global warming by 2050. The Philippines lacked sports facilities meeting international standards, leading to exclusion from major regional sporting events. Despite its past prominence, smaller ASEAN countries like Singapore and Vietnam have surpassed the Philippines in terms of sports facilities.*

*This research aims to design a Sports Complex for local athletes in the Philippines, focusing on how building efficiency and thermal comfort influenced building performance and users' productivity. Utilizing a mixed-method approach, including interviews, surveys, case studies, and personal observations, it examined architectural elements and other factors affecting users' experience and building performance.*

*Findings showed the deficiencies in sports facilities, thermal comfort, building efficiency, spaces, and resources. The study recommended applying the storing, avoiding, removing, and slowing action (S.A.R.S) for the design of the project, achieving the minimization of energy consumption, creating thermally comfortable spaces, and providing safe and accessible facilities for different types of sports. The conclusion visualized the facility as a place for fostering community engagement and productivity and enhancing sports enthusiasm in the Philippines.*

*Keywords:* Building efficiency, Thermal comfort, S.A.R.S. action, Passive design

*Paper Reference Code:* ICSET-25005

# A Survey on Household Energy Consumption Pattern in an Urban Community in Tondo, Manila

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## ABSTRACT

*The study is a survey on household energy consumption patterns in a community in Manila that intends to provide pertinent data on household energy consumption and energy efficiency with an emphasis on the use of lighting and cooling systems considering the environment and understanding of energy technologies in their energy consumption pattern. Area chosen is the Second District of Tondo, Manila focusing on Zone 15, and limits the study to Barangays 168 and 169. The research techniques used in gathering data are surveys, random sampling procedures, and purposive sampling in identifying and defining the site, its population, and the characteristics of the site and determining the required sample size. The study used a survey map flow to identify the chosen household for the written questionnaires. Questions revolve around the respondent's profile, the response to their energy consumption pattern and preferences, characteristics of building materials, and household awareness of energy technologies. Semi-structured interviews with the residents and personal observations help to know and determine the building and site configuration. The study identified factors that affect the household energy consumption pattern such as socio-economic profile, monthly income, number and type of appliances, the manner used, and the type of building materials used in the houses. The identified elements have significant influence on the factors in determining the increase in household energy consumption. Household income is a decisive factor in acquiring household appliances. Sustainable energy actions such as Energy Efficiency, Conservation, and Management/Utilization can help the residents to change their ways in their energy consumption patterns and preferences.*

*Keywords:* household energy consumption pattern, energy technologies, energy efficiency, energy saving appliances

*Paper Reference Code:* ICSET-25007

# Assessment of Food Waste in Marikina City's Food Establishments: A Comprehensive Waste Analysis and Characterization Study Towards Effective Food Waste Management Planning

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## ABSTRACT

*Marikina City implements safe waste disposal practices but faces challenges handling the high volume of waste. Despite having a bioreactor and composter processing 2,000 kg of organic materials daily, including kitchen waste and animal manure, the city still accumulates 20 tons of food waste daily, as revealed by the Chief of the City Environmental Management Office (CEMO). In this study, the proponents perform Waste Analysis Characterization Study (WACS) to quantify the generation of food waste in Marikina City. The WACS session happened for three (3) consecutive days, distributing the to 134 food establishments in Marikina city, consisting of 99 carinderias and 35 restaurants. The study revealed there was a significant production of 430.05 kg of food waste for day 1, making it the highest among all days, averaging 403.12 kg/day. The study also presented there is 3 kg/establishment • day and the average capita per day per establishment of Marikina City is 0.0429 kg/establishment • capita • day. The study also disclosed the prominent type of food waste that is being generated in Marikina City which is Grain/Starch. The characterization of food waste showed that Grain/Starch accounted for the largest proportion, specifically 54.1%. The next categories comprised Meat at 25.6%, Vegetables at 19.5%, and a negligible contribution from Dairy at 0.6%. The percentage distribution presented here offers vital information to researchers, highlighting the significant predominance of Grain/Starch as the main cause of food waste, accounting for more than half of the overall percentage share. Due to this information, the proponents were able to present a Food Waste Management Plan that is based on food waste hierarchy. The purpose of this study is to provide a framework for a food waste management plan for the municipality of Marikina City through determination and assessment of food waste generated by the municipality. The goal of the framework is to have a systematic plan for reduction in generation of food waste. This will be proposed to the CEMO that will be used for policy making.*

# An Innovative and Multifunctional Chitosan Based Films from Shrimp Shell Waste Incorporated with Jabuticaba Pomace Extract: Insights Into the Inactivation of Eschericha coli

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## ABSTRACT

*The growing attention on fresh-keeping packaging films has been fabricated to overcome food safety issues in the highly perishable meat industries. Chitosan (CTS)-based functional films have been widely used in food packaging and preservation to replace petroleum-based polymers. This study incorporated jaboticaba extract (JAE) into shrimp shell waste-derived CTS as a composite film for preserving pork loin at 4 °C for 21 days. Moreover, the quality changes, pH, total volatile basic nitrogen (TVBN), lipid oxidation levels, total bacterial count (TBC), color change during the storage period of fresh pork wrapped with polyethylene (PE) film, pure CTS film, CTS-JAE films were evaluated. After 18 days of storage, the pork packed with CTS-JAE films exhibited below the spoilage threshold: pH values (5.75), TVBN (14.4 mg/100g), thiobarbituric acid reactive substances (0.817 mg/kg), and bacterial growth (5.43 log CFU/g), which are significantly lower than those of the pork loin packed with PE film and without packaging. The shelf-life of fresh pork loin was effectively extended from 6 to 18 days by using CTS-JAE composite film at cold storage. Additionally, CTS-JAE 20% composite film demonstrated a 99.999% disinfection rate against gram-negative bacteria (E. coli) within 24 hours, showcasing superior antibacterial activity compared to other composite films. Specifically, E. coli exhibited alterations in surface morphology, losing its smooth surface and rod shape after the treatment. Therefore, developing long-lasting CTS-JAE films extends the freshness of meat and improves the storage quality, which has excellent potential as an alternative to conventional plastic packaging materials to enhance storage quality.*

*Keywords:* Chitosan-based film, Jaboticaba extraction, Pork preservation, Antimicrobial and Antioxidant, Active packaging

*Paper Reference Code:* ICSET-25011

# Herd Forecasting and Acceptance Analysis of Sustainable Meat Production Through 3D-Bioprinted Meat From Fish Stem Cell

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## ABSTRACT

*Sustainable production and consumption have been targeted in this study through the lens of 3D bioprinted fish meat using their stem cell. Adopting on the recent development from Stakeholder Foods Ltd, the cruelty-free and slaughter-free process has been seen to be promising as a future meat source. This study employed a consumption intention for acceptance analysis and forecasted the general population using an integrated machine learning algorithm of neural network and long short-term memory through MATALB R2021a. Using an established integrated framework of health belief model and values-beliefs-norms theory with theory of planned behavior concept, a purposive sampling approach on 738 valid respondent was carried out. It was seen that self-efficacy, perception of environmental concern, perceived values, personal beliefs, ecological worldview, health belief, and norms affected the positive consumption intention. It was implicated that high positive pro-environmental impact and perceived value were dominant variables affecting the herd acceptance of 3D bioprinted fish meat. Moreover, personal norms, though lowest significant variable, still promoted a moral implication to consider sustainable production and consumption to reduce negative environmental impact. This implicated the need for slaughter and cruelty-free alternative food source. Further policy and implications on sustainable production and consumption were developed.*

*Keywords:* 3D bioprinted fish meat, Consumption intention, Long Short-Term Memory, Neural network, Sustainable production and consumption

# Enhanced Visible Light-Driven Photodegradation Of Enrofloxacin With MXene@g-C3N4/MIL-101(Fe) Heterojunction

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## ABSTRACT

*In this work, the visible-light-driven MXene@g-C$_3$N$_4$/MIL-101(Fe) (MX@MCN) nanocomposites were fabricated by thermal solvent method with the well-deposition of g-C$_3$N$_4$/MIL-101(Fe) onto the surface of MXene nanosheet for the photodegradation of enrofloxacin (ENR) under visible-light irradiation. The MX@MCN nanocomposites exhibit high specific surface area, furnishing numerous reactive sites to expedite photocatalytic degradation of ENR. The MX@MCN nanocomposites exhibit a nearly complete removal efficiency with a rate constant of 0.069 min$^{-1}$ at pH 7. In addition, the impact of several environmental parameters including dosage, pH, initial ENR concentration, and inorganic ions on the photoactivity of MX@MCN was elucidated, and radicals of h$^+$ and O$_2{}^{\bullet-}$ are the primary reactive radicals for the ENR photodegradation. These findings highlight the exceptional photocatalytic activity of MX@MCN toward ENR removal,*

*Keywords:* Advanced oxidation processes; MXene nanosheets; metal-organic framework; indirect Z-scheme heterojunction; micropollutant

*Paper Reference Code:* ICSET-25013

# Operational Considerations For Direct Coal And Biomass Co-Firing In Circulating Fluidized Bed Boilers For Sustainable Energy Generation In The Philippines

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## ABSTRACT

*The study examines the feasibility of direct co-firing of coal and biomass in existing CFB boilers to increase biomass conversion and utilization in the Philippines using fuel characterization results, parameter projections, and fuel acceptance criteria from a 150 MW CFB boiler in Central Luzon. The study discusses the impacts of different fuel blends on plant performance, combustion requirements, ash deposition, and GHG emissions reduction. Rice husk showed the highest potential for direct co-firing with Indonesian sub-bituminous coal at 15.49%, while coconut shell and sugarcane bagasse blends had tolerable alkali content and ash deposition at 8.93% and 8.50%, respectively. Rice and corn straws showed the least potential for biomass utilization at 7.98% and 5.95%, respectively. Projections using Indonesian sub20 bituminous coal show strong technical feasibility for direct co-firing with biomass in existing coal-fired CFB boilers. However, Semirara sub-bituminous coal ash has inherently high Na2O content, leading to severe ash deposition and agglomeration tendencies and weak potential for direct co-firing with locally available biomass fuels. Co-firing implementation will be limited by the maximum possible biomass substitution rate that can reliably replace a fraction of coal-based power generation. Clear policies and regulatory support from DOE are needed to promote the adoption of coal and biomass co-firing technologies in power plants and boost the development of the country's RE sector. Direct co-firing can reduce emissions and enhance energy security in the Philippines, but realizing its full potential requires collaboration between government, industry, and research institutions.*

*Keywords:* Biomass Co-firing, CFB Boiler, Sustainable Energy, Direct Co-firing, Sub-bituminous Coal, Philippine Biomass

*Paper Reference Code:* ICSET-25014

# Empowering Rice Farming Communities In The Philippines Through Sustainable Rice Straw Bioenergy Solutions

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## ABSTRACT

*The Philippines relies heavily on rice cultivation for food security yet faces challenges with low yields and substantial rice imports despite being the 8th largest global producer. Additionally, rice production significantly contributes to greenhouse gas (GHG) emissions, requiring urgent action to meet climate targets while ensuring agricultural and food resilience.*

*To address these challenges, the Enhanced Rice Straw Biogas project with a biogas pilot facility in Laguna, Philippines, explores utilizing rice straw for energy in rice grain processing. The mass-energy balance of the rice straw-to-biogas system was evaluated to assess the operational conversion potential, followed by a Life Cycle Assessment (LCA) comparing emission performance with conventional straw management practices. With an annual straw processing capacity of 80 t, the theoretical conversion efficiency is 40%, yielding biogas to dry and mill 77 t of rice. This results in a 38% in GHG emission reduction compared to soil incorporation of straw. However, the pilot facility achieved a conversion efficiency of 6%, processing 12 t of rice annually, still reducing emissions by 24%. Utilizing rice straw for energy alleviates residue disposal burdens and adds value to rice production. A sustainability mapping highlights alignment with nine Sustainable Development Goals, fostering diverse socio-economic benefits and sustainable development. Adopting rice straw biogas systems represents a transformative shift towards a value-adding bioeconomic approach, with potential to significantly mitigate emissions from a critical GHG-emitting agricultural sector. Optimization, scaling up, and deployment elsewhere could make a substantial contribution to the decarbonization of the rice sector. However, the example of the pilot facility demonstrates that optimization is required for commercial viability. Additionally, effective policy frameworks are essential to encourage rice farming communities to adopt sustainable straw management practices and support the renewable energy.*

*Keywords:* Rice Straw, Sustainable Agriculture, Renewable Energy, Bioeconomy, Greenhouse Gas Emissions

*Paper Reference Code:* ICSET-25015

# Pyrolysis Of Tetrapod Energised Phase Change Material: Kinetics And Thermodynamic Analysis Using Coats Redfern Technique

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## ABSTRACT

*Phase change materials (PCMs) are actively used as energy storage materials amidst the question of their sustainability. Urging research focus on the energising PCMs via nanomaterials and concerns about environmental impacts of PCMs and its nanocomposites to promote sustainable practice are of serious concern. Herein, this research work explores the zinc oxide (ZnO) tetrapod nanomaterial energized organic PCMs for its sustainable degradation technique via pyrolysis. Tetrapods are 3D shaped nanoparticles with a central core and four nanorods separated at an angle of around 105°. This research reports two different types of ZnO tetrapod one with thin arms and another with thicker arms are dispersed with PCM at 2.0 wt.% to achieve increase in thermal conductance by 91-93%. The breakdown of PCM and nanocomposites is analysed through the Coats and Redfern approach, highlighting the kinetic and thermodynamic degradation mechanisms involved. Examination of kinetic and thermodynamic profiles of the degradation reaction mechanisms in the disposal of PCM and its nanocomposite, provides critical insights into the thermal parameters like activation energy (Ea); changes in enthalpy ($\Delta H$), Gibbs free energy ($\Delta G$), and entropy ($\Delta S$) necessary for large-scale operations and aids in understanding the complexities of the underlying chemical reactions. Tetrapod energized PCM exhibit reduction in Ea from to kJ/mol. Subsequently, this research work is substantially contributed towards the Sustainable Development Goals (SDG) of SDG-7 affordable and clean energy and SDG 12 responsible consumption and production towards sustainable future.*

*Keywords:* Phase change material; Kinetics; Thermal degradation; Sustainable disposal; Tetrapods; Nanomaterials

*Paper Reference Code:* ICSET-25022

# Design And Implementation Of Battery And Motor Health And Prognosis Maintenance System For E-trikes

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## ABSTRACT

*The reliability of electric vehicles relies greatly on the performance of their main components: electric motor and batteries. When these components fail, the e-trike faces complete malfunction. Even with the widespread adoption of electric vehicles, the industry still faces challenges, including the lack of proper maintenance practices and the labor-intensive nature of troubleshooting processes. To address these issues, the researchers have proposed a battery and motor health and prognosis maintenance system for the e-trikes. This proposed system not only provides real-time monitoring of battery and motor parameters but also incorporates a fault detection and isolation mechanism. Additionally, it integrates a prognostic capability, enabling e-trike owners to receive timely notifications about faults and anticipate their likely progression. The prototype was tested on one e-trike through controlled and field trials to validate the effectiveness of the system. The tests focused on the real-time monitoring of the battery and motor health, detecting faults such as external short circuits, open circuit, voltage fluctuations, excessive current and temperature, and prognosing them. The outcome of the tests conducted demonstrated the effectiveness of the device showing an acceptable accuracy on the real-time monitoring capability, fault detection, isolation, and prognostic system of the device. Overall, the results showed the device's precision, reliability, and effectiveness in monitoring, detecting, isolating, and prognosing faults in the battery and motor of e-trikes.*

*Keywords:* Electric vehicles, E-trikes, Battery and motor health monitoring, Fault detection, Fault isolation, Prognostic system

# Carbon Reduction Technology For Capturing Flue Gas CO2 by Recovering Calcium Ions From Fly Ash

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## ABSTRACT

*This study combines $CO_2$ chemical absorption with fluidized bed homogeneous crystallization to reduce emissions and recover high-purity calcium carbonate from fly ash. The process captures $CO_2$, converts it into carbonate ions, and reacts it with calcium-rich wastewater from fly ash washing. Using 4N HCl at a 3:1 liquid-to-solid ratio yields 26,040 mg/L of calcium ions. Simulations show removal and crystallization rates exceeding 96%, consistently producing calcite. Additionally, the study analyzes chloride salts and other interfering substances in calcium wastewater to determine optimal conditions for real-world applications, addressing carbon emissions and promoting waste reuse in industrial processes.*

*Keywords:* Carbon Dioxide Capture, Fluidized Bed Reactor, Homogeneous Crystallization Technology, Fly Ash, Calcium Carbonate

*Paper Reference Code:* ICSET-25024

# Design And Fabrication Of Integrated Multi-Channel Nutrient Film Technique (NFT) Hydroponics System And Pico-Hydroelectric Power System

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## ABSTRACT

*The Nutrient Film Technique (NFT) is a hydroponic system where plants receive nutrients via continuous circulation of water that utilizes a distribution pipe in a grow tray to pump water and bring nutrients to the plants from a reservoir. One of its drawbacks is the high electricity consumption due to the components and auxiliary devices used in its operation; thus, an effective solution to reduce the power consumption is still a subject for further research. In this study, the researchers designed and fabricated an integrated NFT hydroponics and pico-hydropower system utilizing Archimedes screw turbine. It was an attempt to harness the untapped energy from the continuous water dispatch of the NFT system. The researchers tested the integrated system to measure its actual power output which indicated the following values: 2.69 W water power, 2.30 W brake power, and 0.30 W generator power. The overall efficiency of the system was determined to be 11.15%. Various monitoring devices were evaluated ac-cordingly. Powering multiple sensors was proven feasible particularly those that have very low power consumption such as the DS18B20, DHT22, DHT11, and MPX10DP sensors through microcontrollers. Overall, the study was able to har-ness and generate pico-hydropower by integrating hydroponics and hydropower systems.*

*Keywords:* Hydropower, Integrated System, Nutrient Film Technique (NFT), Power Output, Untapped Water Power.

*Paper Reference Code:* ICSET-25025

# Revitalizing The Historic Urban Landscape Of The City Of Manila through Sustainable Urban Planning

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## ABSTRACT

*Sustainable cities are places that are planned and managed in consideration of the three pillars of sustainability namely: social; economic; and environmental impact without compromising the ability of future generations to experience the same. But the City of Manila experienced unprecedented growth and development that generated high levels of environmental damage and social dislocation; hence affecting the city's competitiveness, efficiency and livability and overall sustainability. In answering the question, "How can a heritage-driven economy contributes to the sustainability of the City of Manila; this study presents a culture-oriented economic development framework as means of improving the sustainability of the City of Manila. The framework promotes a heritage-driven economy that capitalizes on culture as the fourth pillar of sustainable development. This provides that through sustainable urban planning, culture and heritage can promote a cultural revitalization that will generate a creative economy and trigger employment opportunities resulting not only to direct and indirect economic benefits, but can also generate non-monetized benefits like personal-psychological reward of being proud to preserve the heritage. Through the use of key informant interviews, the findings recommend that a "Heritage-Driven Urban Revitalization Framework" can be considered for the revitalization of the historic urban landscape of the City of Manila. Under the framework, short-term strategies and long-term strategies are pursued aiming to offer a holistic improvement of the three facets of sustainable development. The short-term strategies focus on the physical revitalization of the urban fabric thus, covering the environmental factors categorized under the Planet sub-index of the Arcadis Sustainable Cities Index referring to efficient management of energy use, pollution and emission. While long-term strategies are aimed at economic revitalization and social revitalization covering the Profit sub-index, referring to economic performance and business infrastructure; and the People sub-index measuring social mobility and quality of opportunity in life. Therefore, a sustainable urban revitalization intervention has the power to breed physical, economic, and social sustainability for the City of Manila.*

*Keywords:* Sustainable Cities; Culture-Oriented Economic Development; Cultural Tourism; Sustainable Urban Planning; Historic Urban Revitalization; Heritage-Driven Economy

# Implications Of Conducive Learning Environment As A Form Of Expanded Learning Opportunity In Outcomes-Based Teaching And Learning: An Assessment Of The Learning Modality Preference Of University Students In General Education Courses

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## ABSTRACT

*In response to the calls raised the Commission on Higher Education, the X University adopted the educational framework of Outcomes-Based Education since 2012 which provide for an expanded opportunity. Since then, the university has innovated its learning. Given the variety of learning modality implement by the university from 2021-2024, this study reassesses the effectiveness of a fully online mode of learning by assessing the feedback of students about their mode of learning preference. Using a quantitative analysis of data, findings showed that it is important for students to feel comfortable and confident with their learning environment for effective learning to take place. From the eight quarters surveyed spanning from three academic years, learners expressed their preference for the Full Online Mode of learning. Moreover, the findings affirmed that all identified course outcomes in Readings in Philippine History (GED103), a general education course, have been achieved using the Full Online Mode of learning. This study concludes that general education courses which are mostly lecture classes and does not require the use of any special facilities and laboratories should capitalize on the expanded learning opportunities that comes with the usage of a Full Online Mode of learning.*

*Keywords:* outcomes-based education; full online class; distance learning; learning modality preference; conducive learning environment; learning motivation, expanded opportunities.

*Paper Reference Code:* ICSET-25027

# Perceptions Of Manileño Informal Settlers: Cultivating Sustainable Urban Development Through Natural Language Processing

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## ABSTRACT

*Informal settlers residing in Manila City face limited access to resources that affect their daily lives. Their perceptions on five socio-economic factors (income-generating activities, livelihood improvement efforts, social networks, education, and healthcare) using natural language processing were assessed. Qualitative and quantitative data were collected from 116 Manileño informal settlers. Between the two classifiers, Random Forest performed well in deciphering informal settlers' perceptions of livelihood improvement efforts at 67.60% accuracy. Naïve Bayes excelled at evaluating informal settlers' income-generating activities, social networks, education, and healthcare, with an accuracy percentage of 69.00%, 84.50%, 74.00%, and 88.00%, respectively. The social network was found the most important factor (28.03%) in providing sustainable housing programs. Healthcare emerged second (27.33%), emphasizing affordable healthcare initiatives. Followed by livelihood improvement efforts (26.80%), which highlighted sustainable economic opportunities. Income-generating activities (11.25%) signaled a demand for stable jobs. Education was the lowest priority (26.80%) as urgent daily needs were prioritized over educational investment. This research also demonstrated the use of natural language processing in creating policies to promote sustainable urban development. Specifically, the top 20% subject sentiments were ranked as follows: money (29.74%), school (15.14%), medicine (13.75%), job (12.55%), food (10.02%), hospital (5.91%), capital (3.93%), laboratory (3.22%), supply (2.89%), and advice (2.85%). Moreover, the top 20% action verb sentiments were arranged as stated: lack (66.70%), help (25.75%), feel (4.06%), and need (3.49%). The study utilized these findings to enhance social support, economic stability, and access to essential services.*

*Keywords:* Squatter Settlements, Urban Planning, Socio-economic, Manila City, Natural Language Processing, Machine Learning Algorithm

*Paper Reference Code:* ICSET-25028

# The Effects Of Temperature On Biogas Production Rate And Purity

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## ABSTRACT

*Agricultural wastes specifically crop residues and animal waste are produced in enormous volumes, making them a reliable source of materials for biogas production. This study intends to investigate the effects of temperature in the performance of anaerobic digesters for biogas production. Each digester was filled with 1:1 ratio of substrate to water, containing 15 kg of cow dung and 3 kg of crop waste. These materials were mixed in the digesters maintained at temperatures of $50\pm2°C$ and $30\pm2°C$ corresponding to thermophilic and mesophilic biodigester set-ups, respectively. The digesters were maintained at these temperature levels for 75 days and biogas samples were collected for subsequent measurement of biogas production rate and purity. Thermophilic digester produced 48.4% more biogas and had a slightly higher pH (7.65) reading than the mesophilic digester (7.37) by the end of the observation period. However, the gas analysis through chromatography showed that the $CH_4$ and $CO_2$ content of the two treatments were not significantly different, as both showed almost the same $CH_4$ and $CO_2$ contents. $CH_4$ in the mesophilic set-up was $42\pm10\%$ while $53.5\pm10\%$ for its thermophilic counterpart. The $CO_2$ composition was $32.5\pm1\%$ and $35.5\pm1\%$ for the mesophilic and thermophilic set-ups, respectively. These results were supported by the energy content of the biogas as indicated by the wavelength of the flame color from the two treatments, which were both in the range of 460 to 620 nm, indicating that biogas from both set-ups are predominantly composed of methane. Conclusively, this study demonstrated that thermophilic anaerobic digesters may have higher biogas production rate, but biogas purity is not significantly different with that of a mesophilic counterpart.*

*Keywords:* methane, thermophilic, mesophilic, anaerobic digester, biogas purity

*Paper Reference Code:* ICSET-25030

# Sustainable Energy From The Deep: Assessing OTEC's Feasibility For The Philippine Archipelago

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## ABSTRACT

*The Philippines faces a rapidly growing demand for energy, primarily met by fossil fuels, which pose significant environmental and economic challenges. Ocean Thermal Energy Conversion (OTEC) technology, which generates electricity using the temperature differential between warm surface water and cold deep-sea water, presents a promising renewable energy alternative. This paper evaluates the feasibility of implementing OTEC in the Philippines, focusing on geographic suitability, potential energy output, environmental benefits, and associated challenges. Results suggest that the archipelago's tropical climate and vast marine resources offer optimal conditions for OTEC, which could support energy security and climate resilience goals. However, significant barriers exist, including high capital costs, technical limitations, and lack of regulatory support. Addressing these challenges through targeted policy initiatives and international collaboration could position OTEC as a valuable addition to the country's renewable energy portfolio.*

# Addressing Energy Storage Challenges For Sustainable Power Generation: A Comprehensive Review Focused On The Philippines

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## ABSTRACT

*The transition to renewable energy is a critical priority for the Philippines, but the integration of solar, wind, and other intermittent sources poses significant challenges due to the country's fragmented energy grid and vulnerability to natural disasters. This paper provides a comprehensive review of energy storage systems (ESS) and their potential to support sustainable power generation in the Philippines. It evaluates existing technologies such as lithium-ion batteries, pumped hydro storage, and liquid metal batteries, assessing their suitability for the country's unique geographic and socio-economic conditions. The analysis identifies major barriers to ESS deployment, including high capital costs, regulatory gaps, and logistical issues in off-grid areas. Case studies from countries like China, Australia, and Indonesia demonstrate successful ESS integration strategies, offering lessons for the Philippines. Ultimately, the paper concludes that while the Philippines faces considerable challenges in ESS adoption, strategic investments in emerging technologies like liquid metal batteries, combined with policy reforms, could enhance energy security and accelerate the transition to renewable energy.*

*Keywords:* Energy Storage Systems (ESS), Renewable Energy Integration, Philippine Energy Grid, Off-Grid Electrification and Lithium-Ion Batteries, Pumped Hydro Storage, Liquid Metal Batteries

*Paper Reference Code:* ICSET-25032

# Tri-X Modality Continuance: A Digital Learning Innovation In The Context Of The New Normal

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## ABSTRACT

*The objective of this study is to explore the determinants influencing STEM students' intention to continue using the Tri-X modality as their preferred learning approach. Tri-X, also known as Triple Experience, is Mapúa University's innovative hyflex learning system, offering students the flexibility to engage in classes in person, online, or asynchronously. Drawing upon the expectation-confirmation theory, this study expands its scope to include external factors such as information quality, access to technology, and institutional support to assess students' expectations, perceived performance, confirmation, and satisfaction, which collectively influence their intention to persist with Tri-X. Through a comprehensive analysis of data gathered from 600 respondents, employing Partial Least Squares Structural Equation Modeling (PLS-SEM), the study reveals significant insights. Specifically, it highlights that information quality and institutional support significantly impact perceived performance. Furthermore, access to technology influences both expectation and perceived performance. Conversely, perceived performance plays a pivotal role in confirming students' initial expectations, leading to heightened satisfaction with the Tri-X modality and consequently fostering their intention to continue its usage. These findings not only contribute to the understanding of student preferences and experiences within the Tri-X framework but also offer valuable insights for higher education institutions seeking to design and implement effective learning modalities, especially in the context of online classes. They serve as a robust framework for the development of student-centered learning approaches that prioritize satisfaction and intention to continue engagement.*

*Keywords:* tri-x, PLS-SEM, hylex learning, expectation-confirmation theory

*Paper Reference Code:* ICSET-25035

# Camera-Based Real-Time Indoor Fire And Smoke Detection Device With Integrated SMS And Alarm Notification System

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## ABSTRACT

*This research presents the development of a real-time fire and smoke detection device using a camera to explore a new solution for fire safety. The system uses a Raspberry Pi camera without any other sensors to monitor an indoor area. It also features an SMS module that will alert the user, an active buzzer that will trigger an alarm sound, and a backup power system in case of power interruption. It uses the YOLOv8 computer vision pre-trained model in its algorithm for detecting indoor fire and smoke. Real-time monitoring can be done by the user via the live video feed that can be opened on any browser from any device. The prototype demonstrated an average detection time of approximately 52.8 seconds for smoke and an average of 10 seconds for fire, indicating its responsiveness in various environments. Through camera calibration and testing, the prototype demonstrated an accuracy of 90% in detecting threatening smoke and 87.5% for fire, with perfect precision in both cases. The findings highlight the system's capability to distinguish between threatening and non-threatening scenarios, effectively minimizing false positives. The confusion matrix analyses yielded F1 scores of approximately 89% for smoke detection and 94.4% for fire detection, underscoring the robustness of the model. Overall, the results indicate that the camera-based method is a promising advancement in smoke and fire detection technology, paving the way for future research and improvements in safety systems.*

*Keywords:* Fire Detection, Smoke Detection, Computer Vision

*Paper Reference Code:* ICSET-25036

# Numerical Investigation Of Dipole Method To Enhance Leak Detection Of Landfill Liner

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## ABSTRACT

*This study uses numerical simulations to investigate the potential of the dipole method for detecting geomembrane leaks in operational sanitary landfills. The dipole method enables leak detection even when the geomembrane is covered. The numerical simulations revealed that the depth of the burial layer significantly reduces detection sensitivity and distorts signals due to interference from the current electrode. Adjusting the current electrode's position parallel (I2) to the survey line and superimposing signals enhanced weakened signals and corrected distortions caused by burial depth. Additionally, increasing the spacing between potential electrodes improved detection sensitivity, however the detection barely increased as spacing is greater than the burial thickness. These findings lead to an optimized survey using the dipole method, enhancing leak detection in landfill liners and preventing leachate contamination to the surrounding groundwater and soil.*

*Keywords:* Landfill, Electrical Method, Dipole Method, Leak Detection

*Paper Reference Code:* ICSET-25039

# Trends And Emerging Technologies In Marine Sediment Quality Detection: Advances In Acoustic Propagation, eDNA, Remote Sensing, And AUVs

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## ABSTRACT

*Challenges remain for environmental protection and health. Monitoring marine sediment quality is a critical indicator in providing insight in ecological dynamics and ecosystem health. Detecting pollutants like microplastics and metalloids are some of the acts of marine sediment quality detection with applied emerging technologies which plays a vital role in addressing global environmental challenges. Emerging technologies have provided methods that are efficient, innovative, precise, and quality assessments of sediment contamination.*

*This paper explores the advancements in key technologies to enhance detection accuracy and broadening application potential in environmental monitoring, industrial operations, and potential climate change studies. Key technologies include acoustic propagation for remote sensing, optical methods, and bioremediation techniques for detailed genetic analysis. Each offers significant advantages, high quality data sensing, large-area coverage, and non-invasive data acquisition. However, there are still challenges with every technology stipulated. The environment conditions, calibration, and high operation costs are some of the factors that need consideration.*

*The Integration of these emerging technologies with advancements in data analysis holds great promise which can transform and maximize the detection quality and accuracy for future environment and industrial and operations. This paper contributes to developing sustainable future-oriented studies strategies for marine sediment quality detection, monitoring, and ecosystem preservation, improved environmental responsibility, and resource management.*

*Keywords:* Acoustic Propagation, Detection Technology, Monitoring, Sediment Quality

*Paper Reference Code:* ICSET-25040

# DLS-Guided Preparation Of Chitosan-Carrageenan Nanoparticle

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## ABSTRACT

*The DLS-guided preparation of a chitosan/carrageenan nanoparticle followed a sequential process that includes selection of the chitosan molecular weight, carrageenan type, chitosan:carrageenan ratio, crosslinker type, and crosslinker ratio. Starting with a particle size of around 700 nm after the first stage, the size of the nanoparticle was sequentially reduced to around 350 nm. This was confirmed by AFM which showed particles of less than 200 nm. The first stage in the process determined the chitosan with the suitable molecular weight and the carrageenan type while the second stage determined the chitosan:carrageenan ratio. The third stage identified the appropriate crosslinker among STPP, citrate, and calcium chloride while the last stage identified the right amount of CaCl2 for additional crosslinking. These stages resulted in a formulation of 5:1:1:3 low molecular weight chitosan: kappa-carrageenan: STPP: CaCl2 nanoparticle. This sequential approach allows for a better understanding of how each variable influences nanoparticle characteristics that can ultimately lead to a more refined formulation for chitosan: carrageenan nanoparticle preparation. Through the use of renewable resources for various applications such as drug delivery systems and active packaging, the study also contributes to multiple facets of the SDGs like SDG 2,3,6, and 12.*

*Keywords:* DLS, Chitosan, Carrageenan, Nanoparticle

*Paper Reference Code:* ICSET-25041

# 3D Response Topology Optimization For Surface Finish, Material And Print Time Reduction Of FDM Fabricated PLA Parts.

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## ABSTRACT

*Additive Manufacturing (AM) is an advance manufacturing technology introduced during the 1980s. FDM and PLA is the most popular technology and materials used in today's market. FDM based AM is normally done by depositing melted material to a designated coordinated layer by layer until the desired product has been created. Surface defect known as staircase effect is a trade-off response in using AM. It was observed that adjusting printing parameters shall provide a better surface quality amongst products. Another consideration that needs to be address is the amount of time used to create a product together with its raw materials consumption. AM is considered as a slow process where it is not considered for large scale production. This study aims to identify what factors are significant, what level for each factor can be optimized and to generate a visual 2D response plot to be used as guide to future users and researchers of this field of study. It was observed that the common significant factor is nozzle diameter, wall thickness and layer height.*

*Keywords:* Additive Manufacturing, Surface Roughness, Build Time, Materials Consumption

*Paper Reference Code:* ICSET-25042

# CFD Simulation: Methane Flow In A Laboratory-Scale Rotary Dryer For Dewatered Sludge In A Municipal Wastewater Treatment Plant

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## ABSTRACT

*Methane is a byproduct of an anaerobic digester, and its properties can be observed in a simulation. Computational fluid dynamics simulates the methane flow inside a rotary dryer designed to dry biosolids from wastewater treatment plant dewatering facilities. The efficiency of the flow is observed to verify the heat flow within the dryer and to maximize the characteristics and heat transfer along the dryer. The impact of the heat produced inside the rotary drum is evaluated to verify the performance along the dryer and assess the viability of methane as a heat source in a rotary dryer. The result shows that the heat is focused on the inlet along the dryer and remains relatively constant after passing through the first area of the dryer.*

*Keywords:* ANSYS, biogas, dryer, methane, sludge, rotary

*Paper Reference Code:* ICSET-25043

# Integrating Sustainability With Country Branding: Quo Vadis Philippines?

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## ABSTRACT

*The study integrates two constructs – sustainability and country branding. Sustainability has gained attention in the past years with the United Nations (UN) and member countries adopting the 17 Sustainable Development Goals (SDGs) to achieve development and build more resilient and sustainable communities. Country branding has been widely used by countries to promote their identities and images abroad. Beyond economic gains, a strong country brand must also reflect its commitment to sustainability. This study is significant because it aligns branding to sustainability efforts of a country like the Philippines. Research studies that fuse the two constructs are scarce. The study is also novel not just because it addresses this scarcity but also because it paves the way for future research in this area especially in the Philippine context. It is also hoped that policymakers and other countries particularly developing ones could draw guidance from this study. The study shows the synergistic relationship between sustainability and country branding arguing that these two constructs are crucial for building a strategic development plan for the Philippines not just to attract tourists but more so importantly to better position itself in the global order. A case study approach was used in the study involving eight key informants using in-depth interviews and thematic analysis. The framework of co-creation was employed by treating the informants as stakeholders that could collaboratively contribute to the development of a more meaningful and sustainable strategy in country branding.*

*Keywords:* Sustainability, Country/Nation branding, Co-creation, Sustainable Development Goals

*Paper Reference Code:* ICSET-25044

# Develop a Solar-powered Fuzzy Logic Control (FLC) Ventilation and Thermoelectric

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## ABSTRACT

*Good ventilation is essential to keeping the house or facility in good condition. At the same time, it will provide thermal comfort to maintain the excellent health of its occupants. This research presents the development and validation of a solar-powered Fuzzy Logic-Controlled (FLC) ventilation and thermoelectric cooler (TEC)-based air conditioning system that utilizes solar power as the source of electricity and uses different control mechanisms. The system is mounted in a booth to evaluate the system's energy efficiency, and the power source depends on off-grid solar power. The system uses a microcontroller to automate ventilation and air conditioning. The coverage time is from 0600H to 2200H during the dry season from 01 to 05 May 2023 and the rainy season from 11 to 15 September 2023. The result demonstrates that the proposed system has higher energy efficiency than the Air-Conditioning Unit (ACU) across both seasons. During the dry season, the proposed system's Energy Efficiency Factor (EEF) is 26.84, surpassing the ACU's EEF of 11.05. Similarly, during the rainy season, the system achieves an EEF of 35.72, substantially outperforming the ACU's 8.74. This study highlights the proposed system's enhanced efficiency and emphasizes its potential to benefit the ecosystem by mitigating pollutants that pose risks to humans and other living organisms. Additionally, it supports adopting renewable energy sources, such as solar power, contributing to a more sustainable and environmentally friendly future.*

*Keyword:* Fuzzy logic-control, ventilation and air-conditioning, thermal comfort

*Paper Reference Code:* ICSET-25045

# Enhancing Employee Productivity And Satisfaction In Virtual Workplace Environments: Strategies For Improved Collaboration, Communication, And Team Dynamics

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## ABSTRACT

*Working remotely has gained popularity throughout the world, owing to the cultural trends, and technical improvements that provide flexibility, mobility, cost savings, and increased employee interactions. However, the majority of employees prepare for face-to-face meetings, which are necessary for engagement. Communication is essential for establishing trust and aligning people with corporate goals. The increase in remote work, particularly during the COVID-19 epidemic, has posed issues for team communication and participation. This study investigates virtual team management, focusing on the importance of leadership in maintaining team relationships and productivity. It tackles the sudden transition to remote work by suggesting techniques to increase communication, collaboration, and team dynamics to promote employee well-being and performance. An online survey of 260 respondents yields insights about maximizing productivity and enjoyment in virtual office environments.*

*Keywords:* Remote Work, PLS-SEM, Employee Productivity, Employee Satisfaction, Workplace Environment, Process Optimization

*Paper Reference Code:* ICSET-25047

# PM10 Dispersion Modelling Based On Physical Solar Model v3 And Digital Elevation Model From Synthetic Aperture Radar For Environment Management

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## ABSTRACT

*Particulate matter (PM10) concentrations in the air have increased over the years due to myriad industrial activities. In this study, PM10 dispersion in a proposed open pit mining project in Tampakan, South Cotabato, Philippines was modeled using AERMOD, an air pollution dispersion standard for static emitters. Hourly meteorological data from 2011 - 2020 in the satellite-based Physical Solar Model v3 (PSM v3) were integrated with a digital elevation model from synthetic aperture radar (SAR)-based terrain data to generate a dispersion map of air pollutants surrounding the open pit site. Different concentration levels of PM10 were dispersed westward due to the combined effects of mountainous and hilly terrains in the vicinity and an average wind speed of 1.38 m/s directed 240° southwest of the open pit. Based on the 15 µg/m3 concentration level set by the WHO as the global minimum air quality guideline, the dispersion coverage area is 153.77 km2. Compared to the 60 µg/m3 level set by the Philippine National Ambient Air Quality Standards, the dispersion area is 3.82 km2 with its farthest point not exceeding 1 km from the site. These values suggest that the predicted PM10 concentration around the site is minimal, and the present data may serve as baseline for environmental management should mining activities commence. By utilizing publicly available and up-to-date meteorological and high-resolution terrain data, this work shows that PM10 dispersion modeling is a feasible tool to predict air quality not only in areas with extensive industries but in remote areas with open pit mines.*

*Keywords:* PM10 Dispersion Model, Air Quality, AERMOD, Open Pit Mine

*Paper Reference Code:* ICSET-25048

# Identification Of Prevalent Diseases In Ipomoea Batatas L. (Sweet Potato) Plant Using ResNet50 Through Data Augmentation

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## ABSTRACT

*Sweet potato plays a vital role in the Philippines, both in terms of food security and its contribution to the economy. Despite its benefits, the crop is vulnerable to diseases that can impact its yield and quality. This study explores the use of a deep learning model, ResNet50, through data augmentation, to identify common diseases affecting sweet potato plants. By analyzing images of leaves and tubers, which typically show early symptoms, this approach aims to enable timely detection and intervention. The study assesses the accuracy and 1 reliability of this method for identifying disease types, indicating its potential as a practical tool to support improved crop management and productivity for sweet potato farmers.*

*Keywords:* Ipomoea Batatas L., Sweet Potato Disease Detection, ResNet50, Data Augmentation

*Paper Reference Code:* ICSET-25049

# Assessing The Bioelectric Potential of Zingiber officinale (Ginger) Root Extract In An H-Type Double Chamber Microbial Fuel Cell

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## ABSTRACT

*This study investigates the impact of varying concentrations of Ginger (Luya) extract on the bioelectric performance of a double-chamber microbial fuel cell (MFC), focusing on key parameters such as voltage, electric current, electric power, current density, and power density. The experiment was conducted over 60 minutes with recordings taken at 5-minute intervals across three set-ups: control, concentrated (100% Luya solution), and half-diluted (50% Luya solution) Luya solutions. Results indicated a gradual increase in all measured parameters over time for each set-up. As the concentration of Luya extract decreased, a corresponding decline in voltage, electric current, power output, current density, and power density was observed. The addition of Luya extract, especially in higher concentrations, significantly enhances overall energy production. The study was conducted in triplicates (three trials per set-up). The experiment also revealed that the MFCs improved in efficiency and stability over time, with the highest performance observed during the final trial. The concentrated Luya extract greatly enhances the performance of MFCs, suggesting it as a promising additive for boosting microbial activity and increasing energy output in these systems. The findings underscore the importance of optimizing Luya extract concentration to maximize the efficiency and electricity generation potential in a double-chamber microbial fuel cell.*

*Keywords:* bioelectric performance, energy production, ginger extract, microbial fuel cell (MFC)

*Paper Reference Code:* ICSET-25050

# Predicting Water Availability In The Angat Reservoir In The Philippines Under Climate Change Scenarios Using HEC-HMS

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## ABSTRACT

*The Angat reservoir is a critical water source for Metro Manila, supplying 90% of the region's water demands and supporting agriculture and hydropower. However, its reliance on rainfall makes it highly vulnerable to climate change impacts. This study evaluates the long-term effects of climate change on the Angat watershed's water availability using the Hydrologic Engineering Center-Hydrologic Modelling System (HEC-HMS). Historical rainfall data (1994–2023) and future projections based on the RCP8.5 climate scenario were used to simulate hydrological responses under varying conditions. The findings reveal significant reductions in wet-season rainfall and outflows, with peak wet-season outflows decreasing by up to 18% compared to historical levels. The increase in low-outflow days during the dry season underscores heightened risks of water scarcity. This study emphasizes the importance of adaptive water management strategies, including optimized reservoir operations, supplementary water sources, and watershed conservation. By integrating climate projections and hydrological modelling, this research provides actionable insights to safeguard water security in Metro Manila and neighbouring provinces against climate change.*

*Keywords:* Climate change, Rainfall Patterns, HEC-HMS, Water Supply, Angat Reservoir

*Paper Reference Code:* ICSET-25051

# The Effects Of Ferric Oxide On Anaerobic Co-Digestion Of Slaughterhouse Wastewater And Food Waste For Biogas Production

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## ABSTRACT

*The anaerobic digestion of slaughterhouse and food waste has been investigated by several academics, who have identified both the obstacles, and the potential associated with this process. There has been a scarce amount of research that tackle the concept of adding ferric oxide ($Fe_2O_3$) to the process of anaerobic co-digestion of slaughterhouse wastewater with food waste for biogas production; hence, this study aims to bridge this presented knowledge gap. To analyze the biogas yield in co-digesting FW and SHWW as well as the effect of ferric oxide, five (5) anaerobic digestions will be conducted on a batch-feeding process. Four (4) shall be prepared with varying amounts of said iron-based material. Furthermore, the supplementation of $Fe_2O_3$ yields improved %TS and %VS reduction in comparison to the control. The decrease in BOD and COD after 30 days of digestion shows that $Fe_2O_3$ aids in the elimination of biodegradable organic matter by coagulating and precipitating suspended solids. The increase in biogas production was evident in the reactors with $Fe_2O_3$ compared to the control. Moreover, the iron-based material acted as a catalyst by reducing inhibitory compounds, increasing biogas production and effluent quality, as well as amplifying DIET. Nonetheless, it is deduced that the optimal amount of $Fe_2O_3$ is 0.5 g in an 800 mL working volume, incorporating higher amounts will lead to an undesirable performance in biogas production. Other than that, kinetic study is also conducted and the mathematical model using the Logistic Function accurately predicted methane yield and process dynamics, showing its industrial applicability.*

*Keywords:* Anaerobic digestion, biogas, ferric oxide, food waste, slaughterhouse wastewater

*Paper Reference Code:* ICSET-25052

# A Detection Method For Floating Debris In Waterways Using YOLOv9

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## ABSTRACT

*The Philippines is home to vast networks of waterways which serve as a vital resource for communities. However, waterways are subject to pollutions such as the accumulation of debris. The Pasig River releases an approximate 32 to 64 thousand tons of plastic every year and is one of the most polluting rivers in the world. This study explores the development of a YOLOv9 model for detecting floating debris in waterways, focusing on the classification of various debris types such as garbage, leaves, branches, and aquatic plants. The study involved creating a dataset from images of floating debris on the Pasig River, training the model, and evaluating its performance. The YOLOv9 GELAN C variant was utilized, and hyperparameter tuning was conducted to optimize the performance of the model. The model attained promising results for detecting floating debris with overall scores of 86.9%, 90.2%, and 78.8% for mAP@50, precision, and recall respectively. The model excelled in classifying aquatic plants but faced challenges with garbage classification. Future recommendations include addressing dataset imbalance, and adding variances when acquiring images, such as different camera angles, to improve the robustness of the model. Additionally, the researchers suggest exploring other data preprocessing techniques and hyperparameter optimization beyond just batch size, as these could potentially further enhance the performance of the model.*

*Keywords:* YOLOv9, Object detection, Dataset, Floating debris

*Paper Reference Code:* ICSET-25053

# Enhancing Salago Fiber-Epoxy Composites With Sodium Bicarbonate Treatment

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## ABSTRACT

*Natural fibers are gaining significant interest as sustainable, cost-effective, and renewable alternatives to synthetic materials in the industrial sector. The use of natural fibers in composites promotes sustainability by reducing environmental impact, fostering circular economies, and improving economic well-being. One natural fiber that exhibits good tensile strength but still has limited use in polymer composites is salago fiber. In this study, sodium bicarbonate-treated Salago fiber was used as a reinforcement for an epoxy-based composite to study the effect of NaHCO3 treatment on the mechanical and thermal properties of the Salago fiber-epoxy composite. FTIR analysis showed that treatment of Salago fiber with sodium bicarbonate removed or reduced the amount of hemicellulose and lignin in the fiber, which resulted in improved compatibility between the epoxy matrix and the fiber, as also shown by the SEM images. This also improved the thermal stability of the natural fiber composite as indicated by an increase in degradation temperature in the TGA curve. Although the mechanical properties such as tensile strength, tensile modulus, flexural strength, and flexural modulus were not significantly enhanced by the use of NaHCO3-treated fibers, the results are still better than previously reported studies that used NaOH-treated Salago fiber. The use of NaHCO3-treated Salago fiber as an environmentally friendly substitute for synthetic fiber can therefore lead to the development of a cost-efficient and renewable material for different industries, especially those that require good thermal stability.*

*Keywords:* Salago fiber, natural fiber composite, epoxy, sodium bicarbonate, alkaline treatment

*Paper Reference Code:* ICSET-25054

# Improving Properties of Nito Fiber-Epoxy Composites With Peracetic Acid Treatment

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## ABSTRACT

*This study aims to develop and characterize epoxy composites reinforced with nito fibers, a natural fiber extracted from the stem of Lygodium, a climbing fern native to the Philippines. Nito fibers were treated with Peracetic Acid (PAA) to modify their surface and remove some of the hemicellulose and lignin. Fourier Transform Infrared (FTIR) Analysis was performed to identify the chemical changes in the treated and untreated fibers. The epoxy composites were prepared with different weight percentages of nito fibers (2.5 wt.%, 5 wt.%, and 7.5 wt.%). The composites' mechanical, morphological, and thermal properties were evaluated using tensile and impact tests, scanning electron microscopy (SEM), and thermogravimetric analysis (TGA). The results showed that the 7.5 wt.% composites had the highest tensile strength of 57.2 MPa and impact strength of 59.9 J/m among the composites. The SEM images revealed that the PAA treatment improved the fiber-matrix adhesion and reduced the fiber pull-out and voids. The TGA results indicated that the thermal stability of the composites increased with the increase in fiber content, with the 7.5 wt.% composites having the highest onset degradation temperature of 368.76 °C.*

*Keywords:* Nito Fibers, Peracetic Acid (PAA), Epoxy Composites

*Paper Reference Code:* ICSET-25055

# Sustainable Business Strategy And Open Innovation Build-Up On Consumer Loyalty From Rewards And Gamification Programs

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## ABSTRACT

*Customer loyalty is about the inclination of a customer to purchase goods or services from a specific brand or business regularly. To strategize, businesses adopted several gamification techniques and loyalty programs to obtain customer's patronage and actual purchase. The objective of this study was to examine how purchasing loyalty programs and gamification affect customer behavior and actual loyalty behavior. This study utilized the extended Theory of Planned Behavior (TPB) to analyze the factors that influence the customers' purchasing and loyalty behaviors. With the use of Structural Equation Modeling (PLS-SEM), the study interpreted the different relationships between the factors that affect the behaviors of the consumer. The study highlights how participation intention driven by the gamification and rewards type plays a big role towards their loyalty to the brand. It also emphasizes the understanding of consumer preferences and how it is critical to the success of the loyalty programs to increase customer engagement. By understanding the results, the study conveys the significance of gamification in purchasing loyalty programs. Its ability to create interactive and enjoyable experiences for consumers improves their connection and motivates them to continue participating in the loyalty programs of the brands, leading to positive and actual purchase. This research provides actionable suggestions to the business owners by customizing their loyalty programs to address their customers' needs. By incorporating gamification techniques such as challenges and tasks, brands can provide a unique approach to gain customer satisfaction.*

*Keywords:* Consumer Behavior, Gamification, Loyalty, Rewards Program, Sustainable Business Strategy

*Paper Reference Code:* ICSET-25056

# A Sustainable Approach Prediction On Preparation And Mitigation Intention For Flash Flood Using Neural Network-Based Decision Support System

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## ABSTRACT

*The Philippines is highly vulnerable to flash floods due to its location in the Pacific typhoon belt. Effective disaster mitigation requires understanding factors that influence people's preparation intentions. However, prior research has largely overlooked the role of sociodemographic factors. This study aimed to forecast and assess the factors influencing Filipinos' intentions to prepare for flash floods using a framework, integrating both protection motivation theory and the theory of planned behavior with data from 401 respondents collected via Google Forms and Face to Face dissemination. Using principal component analysis (PCA) and machine learning models, specifically artificial neural networks (ANN) and long short-term memory (LSTM), the study examined the sociodemographic profile of samples in conjunction to the constructs of the integrated PMT and TPB framework. PCA identified age, education, and income as significant demographic predictors, while ANN and LSTM models achieved moderately high accuracy of 76.43% R2 value in forecasting preparedness intentions and 1.0741 updated root mean square error, respectively. Results highlighted significance of all constructs – attitude, perceived severity, subjective norm, perceived behavioral control, knowledge, and perceived severity – to one's flash flood preparation and mitigation intentions. The results indicate the relevance of combining demographic and psychological views, offering local governments and sustainable disaster management organizations insights into targeted actions. By providing a classification and predictive output, alongside the novel constructed framework that can be adapted to different high-risk situations, this study could help to reduce the risk of natural disasters and advances sustainable development goals pertaining to the creation of resilient communities. It also shows the possibility for increased forecasting accuracy in natural disaster preparedness research using advanced machine learning.*

*Keywords:* Behavioral Intention, Flash Flood Preparedness, Predictive Modeling, Principal Component Analysis, Protection Motivation Theory, Theory of Planned Behavior

*Paper Reference Code:* ICSET-25057

# Predicting Actual Purchase Of Consumers From Online Live Selling Using Neural Network-Based Decision Support Systems: A Case Study In The Philippines

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## ABSTRACT

*With live streaming sales gaining traction on platforms like TikTok and Facebook, this research aimed to bridge a gap in literature that has primarily assessed purchase intention. This study specifically examined the factors that influence the actual purchase behavior of consumers from online live selling in the Philippines. An extended theory of planned behavior framework was utilized, wherein 444 responses were analyzed using purposive sampling technique through principal component analysis (PCA), neural network analysis, and long short-term memory (LSTM). The PCA results revealed that marital status had the most significant impact on consumers' actual purchase behavior. Based on participant demographics, it was inferred that single individuals may be more inclined to purchase through online selling as they can make quicker decisions without needing to consult a partner. On the other hand, the results of the neural network analysis with 95.92% prediction showed that customer perceived value had the most significant impact on consumers' actual purchase behavior. This suggests that consumers are more likely to purchase when they feel relaxation, confidence, trust, and excellent service quality during their online live shopping experience. E-commerce businesses can use these findings to develop strategies that enhance key attributes, especially with LSTM predictions showing a high likelihood of actual purchase at only 0.24336 root mean square error. Sustainability implications were also discussed to guide the actions of stakeholders and businesses. Lastly, the study's framework and tools can be applied or extended by future researchers to further explore consumer behavior in online live selling.*

*Keywords:* Actual Purchase, E-commerce, Machine Learning, Online Live Selling, Prediction

# A Comprehensive Analysis Of Factors Impacting User Engagement In Online Adaptive Learning Systems Using Machine Learning Algorithm

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## ABSTRACT

*As educational institutions increasingly adopt online adaptive learning (OAL) systems, understanding what drives student engagement is crucial for effective implementation. However, existing models often lack integration of both intrinsic and extrinsic motivational factors. This study addresses this gap by investigating the factors influencing student engagement with OAL systems, integrating the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and Self-Determination Theory (SDT). Combining UTAUT2's behavioral and technological constructs with SDT's intrinsic components—autonomy, competence, and relatedness—this study offers a comprehensive model for understanding engagement in adaptive learning environments. To analyze the data, Principal Component Analysis (PCA) was applied to reduce dimensionality, while Artificial Neural Network (ANN) and Long Short-Term Memory (LSTM) models were used to predict engagement with high accuracy. Results indicate that behavioral intention, perceived autonomy, and relatedness are significant predictors of engagement, with ANN achieving a predictive accuracy of 90.85% and LSTM reducing forecasting error (RMSE) to 0.57021. The study's findings suggest that institutions should enhance technological and motivational support for OAL systems to maximize student engagement. The integration of UTAUT2 and SDT, along with advanced analytical methods, provides a robust framework capturing complex, non-linear engagement patterns. Future research could apply this combined framework to other educational technologies, exploring its potential for broader applicability in diverse learning contexts.*

*Keywords:* Artificial neural network; educational technology; long short-term memory; online adaptive learning; principal component analysis

*Paper Reference Code:* ICSET-25059

# Understanding Actual Cancel Culture Behavior Using Machine Learning: Examining The Interplay Of Gen Z's Justice Perceptions And Behavioral Domains

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## ABSTRACT

*Cancel Culture is an online social practice where individuals and organizations are publicly criticized, ostracized, or boycotted online in response to perceived offenses. The prevalence of this practice among Gen Z, a generation where social media and social movements are an integral part of their lifestyle, makes them an important factor in understanding the dynamics and motivating factors behind cancel culture. While there are studies on cancel culture, studies on the relationship between Gen Z and cancel culture remain sparse. This study investigated the factors influencing cancel culture participation among Gen Z in the Philippines through the integration of the Theory of Planned Behavior (TPB) and Belief in a Just World (BJW) domains. Using a dataset from 147 Gen Z who practice cancel culture, analysis using the Random Forest classification algorithm and its feature importance ranking has been identified. It was seen that the intention to participate in cancel culture was the most significant predictor of actual cancelling behavior, surpassing the influence of procedural and distributive justice perceptions by 8 times. TPB domains such as attitudes, subjective norms, and perceived behavioral control played significant roles, but all domains of justice perceptions demonstrated limited direct predictive power, suggesting its influence to be indirect. Moreover, demographic analysis has shown Gen Z's heavy reliance on social media, spending at least 3 hours per day consuming online content on Facebook, Instagram, and YouTube - their top preferred social media platforms. The same analysis has shown that they typically unsubscribe from, block, and downvote the target of their cancelling behavior, strongly suggesting the non-confrontational nature of Gen Z. These results provide valuable implications for policymakers, educators, marketers, and social media platforms, offering actionable insights that may facilitate healthier online environments, improve content moderation, and promote constructive accountability.*

*Keywords:* Belief in A Just World; Cancel Culture; SDG16; Social Justice; Sustainability

# Assessment Of Extant PCR Primers To SARS-CoV-2 Genomes From The Philippines

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## ABSTRACT

*The 2019 novel coronavirus disease (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) triggered a pandemic that caused a major health scare across the globe. The Philippines is one of the countries that have been drastically affected by COVID-19, reaching thousands of cases each day with new emerging local SARS-CoV-2 variants. With the rapid spread and mutation of the disease, the need for an accurate diagnostic tool for detecting SARS-CoV-2 has become urgent. The present study utilized an in silico descriptive research design to analyze the accuracy of the WHO-recommended RT-PCR primer and probe assays binding regions against 34 Philippine SARS-CoV-2 genomes collected from NCR dating from March 2020 to August 2021. Among the ten primer and probe assays, it was observed that seven assays perfectly matched the Philippine SARS-CoV-2 sequences at the stated threshold of 0.5%. US-CDC-N-2 from the USA, Charité-E from Germany, and CN-CDC-ORF1ab from China showed perfect matches (100%) with the coronavirus sequences. Furthermore, CN-CDC-N from China, NIID-JP-N from Japan, and Charité-ORF1b from Germany contained significant mismatches in the primer sequences. No considerable mutations were found in any of the probe- binding regions.*

*Keywords:* COVID19, SARS-Cov2, diagnostic tool, RT-PCR, primers, mutation

*Paper Reference Code:* ICSET-25066

# Predicting The Philippines' CO2 Emissions And Its Primary Contributors Using Deep Neural Network

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## ABSTRACT

*Carbon dioxide (CO2) emissions have drastically increased over the past decades. There have been significant developments on the prevention and mitigation of the effects of CO2 emissions to the environment. In this paper, we applied deep neural network to create a model to predict short to long-term CO2 emissions using publicly available datasets for the Philippines. We also studied the effects of various sources of CO2 emissions, and explored on the possible mitigation measures that the Philippines can utilize to minimize CO2 emissions. Our model showed great accuracy for predicting short-term CO2 emissions. The model achieved high correlation and low relative error indicate its accuracy in capturing the CO2 emission patterns and general trends. We found that the cement, coal, and gas were the top contributors for CO2 emissions in the Philippines. This study may offer valuable guidance for organizations striving to mitigate climate change impacts. These findings not only contribute to the academic discourse on emission forecasting but also emphasize the potential of artificial intelligence as a strategic tool in environmental planning and policy development, initiating for a data-driven climate action in the Philippines. However, further confirmations are necessary to evaluate the accuracy of the deep learning model in predicting future CO2 emissions.*

*Keywords:* Carbon capture, CO2 emissions, Deep learning, Prediction, Source contribution

# Designing A Branch Replenishment System Of ABC Company: A Case Study

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## ABSTRACT

ABC Company is one of the most preferred distribution companies in the Philippines and has been in the industry for several years. The company operates its eight warehouses with its main warehouse located in National Capital Region. The company is having a weekly branch replenishment from its main warehouse to its seven other branches using its existing branch replenishment system. There are three main actors involved in the transfer process- the system controller of the shipping warehouse, the inbound-outbound personnel, and the system controller of the receiving warehouse.

For the past years of its operation, the company continuously encountered system variances which affected most of its supply planning decisions. This problem was not able to be solved by the company's annual inventory count. This study aims to identify the root cause of ABC Company's reoccurring system variance using the Swimlane Diagram and Why-why diagram and propose a system design that will address the limitations of the existing system. Information System tools like Swimlane Diagram, Data Flow Diagram and Use Case Diagram were used to create a proposed system design. Swimlane Diagram presents the breakdown of activities of the proposed process per job, data flow diagram shows the flow of data in the system and Use Case Diagram illustrate how the actors interact with the proposed system.

*Keywords:* System variance, Branch replenishment, Swimlane diagram, Data flow diagram, Use case

# A Novel Biodegradable Chitosan-Based Films Reinforced With Citral Oil Nanoemulsion Encapsulating Anthocyanins With Enhanced Multi-Functionality

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## ABSTRACT

*As the global population grows, the use of petrochemical plastic materials has increased significantly. Although these materials are convenient and have excellent properties, the widespread use of petroleum-based plastic packaging materials has led to environmental problems, primarily due to their non-renewability and non-biodegradability [1] . Therefore, eco-friendly green alternatives, such as biodegradable packaging materials, have garnered widespread attention. Chitosan (CTS) is widely used in food packaging systems due to its non-toxicity, renewable and good film-forming properties. This study encapsulates citral oil nanoemulsion (CON) encapsulating jaboticaba (Plinia cauliflora) extract (JAE) and into shrimp shell waste-derived CTS as a composite membrane. The physical, mechanical, and structural functional properties were analyzed, and its degradation in six type of soils was observed. In addition, the appearance and weight loss of polyethylene (PE) film, pure CTS film, CTS-JAE films, CTS-CON films and CTS-JAE-CON films in soil during 5, 10, 15, 20 and 30 days were also compared. After 20 days of burial in soil, the initially smooth films exhibited damage, partial shedding, and the formation of porous pits. Compared to PE film, the CTS-JAE-CON film showed color darkening after being buried in soil for 20 days, indicating its biodegradability. Notably, compared to the pure CTS film and the CTS-JAE films, the CTS-JAE-CON films has a higher antioxidant capacity against DPPH free radicals. The antioxidant activity of the CTS-JAE-CON 10% film against DPPH reached 97.4% within 20 hours, demonstrating superior antioxidant ability compared to other composite films. Therefore, the development of biodegradable CTS-JAE-CON films, may have less environmental impact and be a suitable alternative to petroleum-based plastic packaging materials.*

*Keywords:* Chitosan-based film, Fruit peel extraction, Citral oil nanoemulsion, Antimicrobial and Antioxidant
*Paper Reference Code:* ICSET-25069

# Avian Pro: Intelligent Robot For Philippine Sparrow Detection And Deterring Using Laser Pointer

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## ABSTRACT

*Pests are organisms that feed on crops or plants, often causing extensive damage that can significantly reduce agricultural yields. In the Philippines, bird pests are especially common in the southern and northern regions of Luzon, posing a major challenge for farmers. However, current methods of protection, such as killing birds or using traditional scarecrows, are neither sustainable nor environmentally friendly. There is a growing need for eco-friendly, innovative solutions that balance effective pest control with long-term agricultural sustainability. The primary objective of this study is to develop a system for detecting and deterring the Philippine Sparrow, a common bird pest in Calamba, Laguna, using a laser pointer as a non-lethal deterrent. The research focuses on creating a detection and deterrent system utilizing image processing, machine learning, and a Raspberry-Pi microcomputer to accurately identify and target bird pests, specifically the Philippine Maya. This approach aims to provide a sustainable, technology-driven solution for mitigating bird pest issues while minimizing environmental impact. The system achieved an effective detection up to a maximum range of 10 to 11 meters, with factors such as sunlight and prototype positioning significantly influencing detection accuracy and laser pointer performance. In terms of power consumption, the servo motors and green laser module are activated only when bird pests are detected, operating for 10 to 15 minutes per activation within a 2-hour time frame. This low-power design reduces energy usage, lowering operational costs and minimizing environmental impact. When integrated with a solar power setup, the system becomes an ideal, sustainable solution for eco-friendly pest management in agricultural fields.*

*Keywords:* Philippine sparrow, Pest management, Sustainable agriculture, Laser,

*Paper Reference Code:* ICSET-25070

# Strategies For Continuous Improvement In Multinational Maintenance Operations: A Quality Management Perspective

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## ABSTRACT

*In today's worldwide Industrial landscape, international maintenance operations are critical to the efficiency and lifespan of complex systems, machinery, and infrastructures. This country's operations frequently employ a workforce from a diverse cultural background, each with its own set of unique skills and expertise. The general globalization of the maintenance workforce brings benefits and challenges, as cultural beliefs and variations influence communication and problem-solving methodologies. Traditional quality management systems frequently identify it as ineffective in handling this complexity, possibly risking operational effectiveness and reliability. Scopus will be used to locate relevant journals for the theoretical framework in creating the literature review. This review will be supplemented with a bibliometric analysis using VOS Viewer to highlight trends, and research gaps for improvement in the literature. The expected results include insights into obstacles and effective approaches for managing ethnically diverse maintenance teams, developing a holistic framework that integrates cultural intelligence with QMS, and the empirical data regarding the impact of cultural intelligence in quality management methods and operational outcomes.*

*Keywords:* Quality Management System, Cultural Intelligence, Multi-cultural, Maintenance, Operation.

*Paper Reference Code:* ICSET-25071

# Baselining Carbon Emissions In Vertical Socialized Housing Using Life Cycle Assessment

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## ABSTRACT

Demand for affordable housing in cities in the Philippines is driving the public sector, to develop vertical socialized housing. However, sustainable housing solutions must take a holistic approach by considering its environmental impact in increasing carbon footprint. To assess the carbon emission of multi-story socialized housing throughout its life time, the life cycle assessment (LCA) is among the appropriate methods to use.

This study used Life Cycle Assessment (LCA) to evaluate the baseline environmental performance of a prototype 5-story socialized housing building from the National Housing Authority (NHA). The research employed scoping, inventory analysis, impact assessment, and interpretation methodologies. One Click LCA, a software for building-specific life cycle assessment, was employed for inventory and impact evaluation.

The primary components in the case study were steel and concrete, resulting in the most significant cumulative environmental impact. The findings indicated that vertical structures and façades emit more carbon than substructures, horizontal structures (beams, floors, and roofs), and other components collectively. Operational energy consumption, responsible for more than 90% of global warming potential, constitutes the life cycle stage with the most significant environmental impact.

The major issue encountered in the use of LCA in this study is the availability and quality of material data. Although databases used are peer-reviewed and verified, its application must still be carefully scrutinized because of the diversity how material markets operate in different contexts. Ideally, the country should attempt developing its own LCA database that incorporates commonly used materials and our own indigenous materials to increase LCA reliability.

*Keywords:* Life Cycle Assessment, Socialized Housing, Environmental Impact, Carbon Emissions

*Paper Reference Code:* ICSET-25072

# Risk Management In Adopting Green Supply Chain Practices In The Manufacturing Set-Up

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## ABSTRACT

Sustainable solutions have become imperative for businesses, especially the manufacturing sector, to adopt because of the heavily increasing pressure driven by the masses, institutions, and the government. One of the most significant areas that is greatly affected in adopting green practices is the supply chain. Supply chain operations involve systems, organizations, and practices to fulfill the movement of goods or services from vendors to customers. In a manufacturing set-up, supply chain processes include purchasing, logistics, warehousing, planning, and manufacturing which are all relevant in delivering the finished goods to the customers. Identifying the risks of alternative solutions and assessing them are vital to come up with a mitigation plan prior implementing them. In this study, experts from a chemical manufacturing company in the Philippines, who are directly involved in its supply chain operations, are interviewed to determine the process steps that have alternative green practices. The study makes use of a systematic literature review (SLR) methodology to identify and analyze the risks involved in these green practices that are alternatives to the conventional supply chain practices determined from the interviews. The risk assessment is conducted through a brainstorming session with the experts and based on the risk assessment, recommendations are made to manage and mitigate the risks identified. The study contributes to the scarce references that tackle risk analysis and management of green practices in the manufacturing industry and importantly, the study contributes in bridging the gaps related to sustainable practices in supply chain.

*Keywords:* Green supply chain, Risk management, Risks in sustainability, Green manufacturing, Systematic literature review

*Paper Reference Code:* ICSET-25075

# Theoretical, Experimental And Numerical Evaluation of Double Plate Metallic Slit Damper In Reinforced Concrete Frames

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## ABSTRACT

*This study assessed six double plate metallic slit damper (DPMSD) specimens using theoretical calculations and experimental data. As a result, DPMSD 1-2, DPMSD 6-6, and DPMSD 7-7 are identified as the top three performing dampers. They are then integrated into a structure made of reinforced concrete frames (RCF). Four models are developed using MIDAS Gen. Model 1 represents the structure without dampers. Models 2, 3, and 4 are the models incorporated with DPMSDs. These models are analyzed using three distinct sets of time history data with varying seismic intensities and shaking durations. Earthquakes such as Northridge (1994), El Centro (1940), and Kobe (1995) are used to provide a broad understanding of the structural performance of the RCF under different seismic conditions. The results of the integration and analysis demonstrated that the addition of the DPMSDs in RCF significantly enhanced its dynamic performance.*

*Keywords:* double plate metallic slit damper, reinforced concrete frames, MIDAS Gen, different seismic conditions

*Paper Reference Code:* ICSET-25076

# PaMaNa Ferry Complex: Sustaining A Transit Network Along The Blue Heritage

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## ABSTRACT

*The paper revolves around an integrated waterway transit system in Metro Manila linking the cities of PaMaNa (Pasay, Malabon, Manila, and Navotas). In pursuit of honouring the vibrant waters of the urban sphere, the study regards them as the Blue Heritage that has pivotally rendered resources across different lines of generations.*
*Rooted in the significance of sustaining a transit network, it encompasses the humane language of visions, design strategies, and innovations through the following aspects: SDG 6—Clean Water and Sanitation, SDG 9—Industry, Innovation, and Infrastructure, SDG 11—Sustainable Cities and Communities, and SDG 14—Life below Water.*

*As it is envisioned to rise in the heart of Navotas Tourism Site Map, it involves in-city, intercity, and interregional linkages approved by the Metropolitan Manila Development Authority under four (4) phases of development. Through a mixed-method approach, the data involve the perceptions and experiences of college-age and working-age intercity dependents of Navotas City, MMDA administrative officers of the eleven (11) stations of Pasig River Ferry Service, administrative and security officers of Esplanade Seaside Terminal, and the Director, Architect, Architectural Apprentices, and GIS Specialist and Researcher of WTA Architecture and Design Studio. With the findings, the study deductively imbibes Herron's Urban Design Framework, Asset-Based Community Development, Network Theory, and other sub-theories. This approach permits strengthened connectivity between the facility, the users, and the Blue Heritage. In turn, this study mobilizes the umbrella of architecture and urban design in empathizing with intercity dependents.*

*Keywords:* Waterway Transit System, Blue Heritage, Linkages, Urban Sphere, Intercity Dependents

# Scalable And Sustainable Carbon-Neutral Autonomous Decentralized DC Grid Configuration for Wide-area and Broadband Smart Agricultural System

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## ABSTRACT

*In recent years, smart agriculture, including image analysis using AI, has become more sophisticated in order to improve agricultural productivity. This requires a large capacity of communication, and the configuration of a power distribution network that can support it sustainably is important. On the other hand, in response to environmental issues such as global warming, carbon-neutral systems that utilize renewable energy sources to reduce carbon emissions to virtually zero are expected. We have been investigating a smart agricultural system that uses renewable energy as a power source and incorporates adaptive power-saving operation in cameras, various sensors, and communication devices, enabling sustainable zero-carbon operation even in environments that handle large amounts of data such as high-resolution images. In this paper, we propose a configuration that is highly scalable and sustainable by adopting an autonomous, decentralized inter-microcell cooperation that connects the microcells of this system using DC power distribution network, which is highly compatible with solar power generation and can be easily configured. Scalability is achieved by essentially connecting the cells in multiple stages in a cascade fashion using optical fibres and low-resistance power lines. Sustainability is achieved by autonomously transitioning the voltage potential between cells to an equilibrium state, so that the system works to mitigate imbalances in power generation and power consumption between microcells. Even if a generator in one of the microcells fails, the power supply to network devices and sensors can be maintained by autonomous power supply from other cells. To verify this proposal, we connected three microcells and verified their operation. We confirmed stable system operation can be expected even in October, when the hours of daylight are the shortest during the agricultural work season.*

*Keywords:* Smart grid, DC micro-rid, Carbon neutral, Optical network, Autonomous power distribution network, Smart agriculture

*Paper Reference Code:* ICSET-25078

# Advancing Community Resilience Through Sustainable Disaster Management: The Development of TheArk Multi-Sensor Flood Safety and Alarm System

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## ABSTRACT

*This study focuses on reducing life-threatening risks in flood-prone areas, addressing the urgent need for enhanced community safety during La Niña seasons. Significant concerns to public health and safety are posed by the recurrent problems of Leptospira bacteria, Escherichia coli, and electrical hazards in floodwaters, as well as the growing size of floods in terms of flow and height. Furthermore, communities frequently lack timely and reliable information about the circumstances of remote sites and the threats around their territories, which increases the likelihood of avoidable loss. To address these critical challenges, this study suggests developing the Smart Multi-sensor Flood Safety & Alarm System (TheArk), a novel device designed to address a variety of threats during natural catastrophes. TheArk includes modern sensors that detect microbial contamination, electrical risks, water levels, fires, earthquakes, tsunamis, and volcanic activity. Its real-time alert system and GPS technology provide timely warnings and location-based updates, allowing communities to take proactive safety precautions. TheArk provides a comprehensive solution to improve disaster preparedness and reduce risks from natural disasters such as La Niña. This study emphasizes the potential of multi-sensor technology to save lives, build community resilience, and transform disaster management techniques in vulnerable locations.*

*Keywords:* Fire, La Niña, Microbial Contamination, Multi-sensor, Safety, Volcanic Eruption

*Paper Reference Code:* ICSET-25079

# Solar-Powered Irrigation Monitoring With LSTM-Based Optimization

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## *ABSTRACT*

*This study develops a Solar-Powered Free-Flowing Irrigation Monitoring System integrated with Long Short-Term Memory (LSTM) for optimizing water distribution in agricultural settings. Traditional irrigation systems in the Philippines often face inefficiencies, such as water mismanagement and inconsistent crop growth, due to lack of real-time monitoring. To address this, the proposed system uses solar energy, IoT-enabled sensors, and data analytics for dynamic water distribution based on real-time conditions. The system employs ultrasonic sensors (HC-SR04) for water level measurements and GSM modules for remote data transmission. LSTM-based time series analysis is used for predicting optimal irrigation schedules and flow rates. A user-friendly Graphical User Interface (GUI) allows farmers to monitor key parameters such as water levels and flow rates. The system's accuracy, demonstrated through predictive model validation, minimizes deviations from actual irrigation schedules, ensuring efficient water usage. This research contributes to sustainable agricultural practices, providing a reliable tool for optimizing irrigation in remote areas and enhancing overall crop productivity.*

*Keywords:* Solar-Powered Irrigation, Long Short-Term Memory, Optimization, Water Distribution, IoT Sensors, Agriculture

*Paper Reference Code:* ICSET-25080

# Service Factor Analysis For Sustainable Operations of Micro-Enterprise Business: A Customer Satisfaction Evaluation For Beauty Salon Shops In The Philippines

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## ABSTRACT

*The growing demand for grooming services highlights the need to understand the service factors driving customer satisfaction and sustainability, especially for micro-enterprises competing with larger businesses. While the beauty industry's global growth is well-documented, there is limited research on service factors impacting micro-enterprise salons in the Philippine context. This study addresses this gap by focusing on the factors influencing customer satisfaction and sustainable operations. The objective was to analyze the relationships between service quality and customer satisfaction in Philippine beauty salons, using an integrated Expectancy-Confirmation Theory (ECT) and SERVQUAL model with higher-order partial least squares structural equation modelling (SEM-PLS). A total of 458 valid responses were collected through purposive sampling. The findings revealed that the SERVQUAL dimension of responsiveness significantly impacts customer satisfaction, underscoring the importance of delivering prompt, complete, orderly and readily available services. This study offers insights for improving service quality and aligning business practices with Sustainable Development Goals (SDG 9, 3, and 8). The main contribution is the development of an integrated framework for assessing and improving service quality and sustainability in micro-enterprise beauty salons. Future research could extend this model to other service industries, explore the role of emerging trends like digital transformation and sustainability, and examine changes in customer satisfaction over time.*

*Keywords:* Beauty Salon, Micro-enterprise Business, Expectancy-Confirmation Theory, SERVQUAL, SEM-PLS, Sustainability, Customer Satisfaction.

*Paper Reference Code:* ICSET-25081

# Optimization Of Ultrasound-Assisted Polysaccharide Extraction From Okra Using Deep Eutectic Solvents: Process Efficiency And Bioactivity

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## ABSTRACT

This study explores ultrasound-assisted extraction (UAE) of polysaccharides from okra (Abelmoschus esculentus) using deep eutectic solvents (DES) as green extraction agents. Okra, a nutrient-rich crop with bioactive properties, remains underutilized in health-related industries. Conventional extraction methods often degrade bioactive compounds and lack efficiency for large-scale applications. To address these limitations, this study investigated the use of DES, a novel green solvent, coupled with UAE to optimize the extraction process while preserving the bioactivity of the polysaccharides. This study aimed to optimize DES-UAE extraction process, characterize the extracted polysaccharides, and evaluate their antioxidant properties. Single-factor experiments and response surface methodology (RSM) were used to refine the extraction parameters. The results showed that DES-based UAE significantly enhanced the yield and antioxidant activity of okra polysaccharides compared to conventional methods. The optimized extraction conditions achieved high efficiency while maintaining the structural integrity and bioactivity of the polysaccharides. FTIR analysis confirmed the presence of key functional groups such as hydroxyl (O-H), carbonyl (C=O), and ether (C-O), indicating the structural integrity of the extracted polysaccharides. The antioxidant activity, assessed through the DPPH radical scavenging assay, demonstrated strong free radical scavenging capabilities. Among the tested DES formulations, the CCA-based DES exhibited the highest antioxidant activity at both 0.1 mM and 0.2 mM DPPH concentrations, highlighting its efficiency in preserving bioactive compound. These findings suggest DES-UAE as a sustainable and efficient method for extracting bioactive polysaccharides, with applications in food, pharmaceutical, and cosmetic industries. Future research will explore the molecular composition and bioactivities of these polysaccharides, advancing eco-friendly and scalable extraction technologies.

*Keywords:* Okra polysaccharides, deep eutectic solvents (DES), ultrasound-assisted extraction (UAE), green extraction, antioxidant activity, response surface methodology (RSM), sustainable extraction, bioactive compounds.

*Paper Reference Code: ICSET-25082*

# Multi-Criteria Evaluation Of Renewable Energy Supplies Of The Luzon Grid Using AHP

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## ABSTRACT

*With the impending power outages and blackouts that are experiencing in Luzon and the depleting conventional sources for energy conversion, there is a need to prioritize the use of renewable energy. The increase of production of energy supply from renewable energy in recent years indicates the potential of these resources to provide an adequate supply in the Luzon cluster area. Three of the highest energy productions of the country – Hydro, Solar and Wind could help produce 31.7 of the total energy supply. This study aims to compare the common renewable energy sources connected to the Luzon Grid in terms of Technical, Economic, Social, and Environmental Impact. Using an Analytical Hierarchy Process approach, we aim to determine the best source of renewable energy for development prioritization. The results show that among the 3 renewable energy supply, wind energy have the highest score in terms of the aforementioned criteria. Wind energy is recommended to be prioritize in the implementation of additional energy supply in the Luzon Grid.*

*Keywords:* Renewable Energy, Luzon Grid, Analytical Hierarchy Process

*Paper Reference Code:* ICSET-25085

# Evaluation Of Various Combination Ratios Of Mangosteen Pericarp And Ti Plant-Based Dyes For Grätzel Cell Efficiency Using Response Surface Methodology

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## ABSTRACT

*This study investigates the performance of combining natural dyes from Mangosteen pericarp and Ti plant leaves as sensitizers for Grätzel cells. Using Response Surface Methodology (RSM) with a Box-Behnken Design, the research evaluates the effects of dye combination ratios, dye soaking time (DST), and light soaking time (LST) on Grätzel cell efficiency. UV-Vis spectrophotometry was employed to analyze the light absorption characteristics of the natural dyes, revealing that a 2:8 ratio (20% Mangosteen pericarp dye and 80% Ti plant dye) exhibited the highest peak absorbance of 0.4685 at 665.452 nm. Grätzel cells with this 2:8 ratio achieved the highest average efficiency of 0.1989% under optimal conditions of 48 hours DST and 2.55 hours LST. While extended DST improved efficiency, longer LST and a higher proportion of Ti plant dye negatively impacted stability and performance. Statistical analysis indicated significant interactions among the parameters, with efficiency varying based on the dye composition and soaking durations.*

*Keywords:* Grätzel cell, Combination Ratio, Dye Soaking Time, Light Soaking Time, Response Surface Methodology

*Paper Reference Code:* ICSET-25086

# Development Of Geiger-Müller Survey Meter With Switching Boost Converter and ESP8266 Microcontroller For Public Access Of Environment Radiation Data Through Safecast Database

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## ABSTRACT

*Ionizing radiation in high doses can cause damage to organisms if not detected immediately. Survey meters are one of the few instruments that can detect radiation in the environment but is often not easily available for public use. In this study, we developed a low-cost survey meter to detect, record, and map radiation data which can be uploaded to the Safecast database, the largest repository of environmental radiation data available to the public. The survey meter uses a boost converter for the Geiger-Müller probe which operates at 500 V. The response of the survey meter was tested using a Cs137 source at varying distances, showing an inverse square law response with an R2 value of 0.9925. Moreover, a calibration factor of 1.04 at a maximum dose rate of 10.0 µSv/hr was measured, which would allow accurate detection of acute radiation exposure. In-situ measurements around Manila City, Philippines recorded an average radiation dose rate of 0.0813 µSv/hr, which indicated safe levels of radiation. The corresponding location tag of each radiation measurement has an average GPS horizontal dilution of position of 1.89, which is within the acceptable value of < 2.0 to denote high location precision. The uploaded data to the Safecast radiation database showed no losses in data transfer and are compatible for public access and environment monitoring of radiation hotspots in Manila.*

*Keywords:* Geiger-Müller probe, environment monitoring, ionizing radiation, survey meter, boost converter

*Paper Reference Code:* ICSET-25088

# EPC-APL-Based Real-Time Filipino Sign Language (FSL) Interactive Tutoring Device

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## ABSTRACT

This research addresses the communication barriers faced by the 1.23% of the Philippine population with hearing and speech disabilities, emphasizing the need for effective FSL learning tools. While traditional sign language systems often neglect non-manual signals critical for accurate interpretation, this research proposes a portable, user-friendly device leveraging Support Vector Machines (SVM), Convolutional Neural Networks (CNN), and OpenCV for enhanced gesture recognition and real-time feedback. The system utilizes MediaPipe Hands for precise hand landmark detection and employs normalized coordinates to maintain accuracy across varying screen resolutions.

Evaluation of the system demonstrated robust performance, with over 90% accuracy, precision, recall, and F1-scores in recognizing FSL alphabets and gestures, though challenges remain with gestures involving subtle or overlapping features. The device integrates a 1080p webcam, a 7-inch LCD screen, and an interactive Graphical User Interface (GUI) to support learning modules, including tutorials, quizzes, and real-time error correction. This research contributes to bridging the communication gap by offering a tool that fosters mutual understanding and inclusivity between the Deaf and hearing communities while promoting Filipino Sign Language learning in a culturally sensitive manner.

# Real-Time Detection Of Children Ages 3 to 12 Using YOLOv7 Tiny In Raspberry Pi With SMS Notifications

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## ABSTRACT

This study presents a real-time child detection system aimed at improving safety and monitoring through the use of YOLOv7-Tiny for age classification (3-5, 6-9, 10-12, and Adult). The system employs a Raspberry Pi and two CCTV cameras to provide accurate detection within a 10-meter range, functioning effectively under various lighting conditions. When a child is detected, an SMS notification containing a link to the captured image is sent via PhilSMS. The system also offers real-time monitoring, detection history logs, and optimized camera angles to minimize blind spots. This study highlights the system's capability to enhance surveillance and contribute to child protection efforts.

*Keywords:* YOLOv7-Tiny, Age Detection, Image Annotation, CCTV surveillance, PhilSMS Notifications

*Paper Reference Code:* ICSET-25091

# Design Of Poultry Online Market And Breeding Platform Based On User Requirements

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## ABSTRACT

*The conceptual design for an online breeding platform and marketplace that is suited to user needs in the poultry farming industry is presented in this article. To satisfy the various needs of breeders and customers, the platform combines advanced breeding management capabilities with e-commerce features for purchasing and selling poultry. The study's emphasis on user-centered design reveals important features, such as systems for classifying chicken suitable for production or cockfighting, which provide consumers with customized breeding and purchase alternatives. The study collects data on user demographics, experiences, strengths, weaknesses, and areas for improvement using standardized questionnaires that make use of the Six Thinking Hats and Design Thinking approaches. Results show that users are responding favorably to the platform's usability, functionality, and interface, and their input is directing a strategic plan for progressive platform enhancements. The study positions the platform as a useful tool in the changing poultry market by offering practical suggestions for improving user happiness and resolving possible issues.*

*Keywords:* Chicken and breeding platform, User requirements and experience, Data Analysis, Improvements, Poultry Farming
.

*Paper Reference Code:* ICSET-25092

# Actual Quantification Of 3PL (Third-Party Logistics) Costs In Food Distribution O QSR's (Quick Service Restaurants) In Quezon City

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## ABSTRACT

*QSR, in short of Quick Service Restaurants, is a specific type of restaurant characterized both by cuisine and table seating and is usually availably ready for dine in and take-away. The pandemic spiked the demand for mobile ordering and contactless delivery. The delivery costs and fee attracts consumers and influences their purchasing patterns. However, lack of knowledge on how to fees were calculated, a model that will quantify the cost of both the merchant's and the 3PL's logistic physical distribution services based on the given parameters of the physical distribution services in the Quezon City are provided for the end-users to have a reference to the costs that the merchants and 3PL's are asking for their services. A literature review was conducted to provide known parameters that affects the delivery fee of the delivery services. Travel Distance, Packaging or Logistics Costs, Value of Time and Energy Consumed where factors that dictates the movement of the delivery fee from time to time. The survey revealed perceived disadvantages and advantages of third-party logistics in delivering the goods from the quick service restaurants. The regression model shows the relationship of the predictors of logistic cost of third-party logistics services for online food delivery. The Travel Distance, Packaging costs and value of time were factors that will support the model as derived with their positive coefficients. On the other hand, Energy suggested its negative coefficients to be of less consideration based on the equation model. To further fine tune the derived equation model, it is essential to evaluate the model that will represent the data being treated using EDA and Python Programming. Based on the results and findings, consumers perceived the aid of third-party logistics as the delivery provider given their delivery fees more advantageous than disadvantageous. Further recommendation to the third – party logistics that caters quick – service restaurants to have proper screening of delivery riders to ease the worry of the consumers. Further recommendation to the QSR's to have proper crew assigned to online services and not on shuffling of crew based on their shift. This action can ensure that crew can be focused on the quality of the products being delivered to the consumer. To the transport authority/ government to improve laws and orders that will improve the sustainability of motorcycle as the primary mode of delivery.*

*Keywords:* Quick-Service Restaurants, Third – party logistics, exploratory data analysis, Python, sustainable public transport

*Paper Reference Code:* ICSET-25093

# Raspberry Pi-Based Attendance System Using YOLO And DeepFace

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*ABSTRACT*

*This study introduces a real-time attendance system using YOLO for facial detection and DeepFace for facial recognition, executed on a Raspberry Pi 5. Designed to rectify inefficiencies in conventional attendance systems, the technology provides a contactless and precise solution appropriate for educational and professional settings. YOLOv5 was determined to be the most effective version for face identification, attaining a balance between accuracy (97.23%) and inference speed (18 seconds). ArcFace had the greatest accuracy in face recognition at 97.18%, demonstrating consistent performance under many settings, including low illumination and increased distances. The research evaluated the impacts of illumination, distance, and facial orientation, revealing best identification at brightness levels of 201–300 lux, distances of 2.90–3.66 meters, and direct face-to-camera alignment. The system achieved over 96.5% identification accuracy, demonstrating remarkable dependability and adaptability to real-world conditions. Moreover, it substantially decreased manual labor, providing a scalable and effective solution for attendance monitoring in educational institutions. This study underscores the transformational capacity of face recognition technology in automating attendance monitoring, mitigating hardware limitations, and enhancing detection efficacy in real-world scenarios. The suggested solution highlights the effective use of artificial intelligence to improve operational efficiency and precision.*

*Keywords: Attendance, Facial Recognition, YOLO Algorithm, DeepFace Algorithm, Raspberry Pi 5, Automated Tracking System*

*Paper Reference Code: ICSET-25094*

# Photogrammetric Survey Of Cebu City's Rainwater Catch Basins Basis For A Proposed Rainwater Resource Management And Flood Mitigation

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## ABSTRACT

*Water scarcity and flooding are contradictory yet overlapping issues that coexist in most highly urbanized and developed cities. Issues of large and dense urban populations, limited resources, and stressed resource mismanagement are common causes of urban centers' persistent water shortages while simultaneously grappling with flooding during heavy rainfall events. This study considers the feasibility of deploying urban rainwater harvesting systems in highly urbanized and flood-prone locations. The dual-purpose technology attempts to reduce flooding while increasing clean water supply, contributing to sustainable urban water resource management. To validate this concept, a review of existing rainwater harvesting systems was conducted, drawing on best practices from around the world. Photogrammetric and spatial analysis were employed for estimating the volume and flow of rainwater. According to the calculation, the annual rainwater harvest totals 4.6 M cubic meters for both North Reclamation and downtown Cebu City. Given the urban space constraints, the proposed design is a below-ground large capacity retention tank that would be installed along the stretch of Sanciangko St. downtown Cebu City and J.de Vera St. North Reclamation with a length of 840m and 653m, respectively.*
.

*Keywords:* Rainwater Harvesting, Cebu City flood Mitigation, Photogrammetric and Spatial Analysis, sustainable water resource management, SDG 6 clean water and sanitation,

*Paper Reference Code:* ICSET-25095

# Factors Influencing The Balance Of Career And Academic Pursuit for Young Professionals (Aged 24-29): A Structural Equation Modelling Approach

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## ABSTRACT

*Balancing career and academic pursuits are a pressing challenge for young professionals aged 24-29. This study employs a Structural Equation Modelling (SEM) approach to investigate the factors influencing this balance. A sample of fifty (50) young professionals participated in an online survey containing 10 questions covering Career Success Indicators, Academic Success Indicators, Psychological and Emotional Stress Factors, and Balanced Career and Academic Performance Indicators. The study reveals the significance of job satisfaction, opportunities for career growth, and academic relevance. Stress resilience, well-being, support networks, and structured routines also play crucial roles. These findings offer valuable insights for individuals and educational institutions seeking to empower young professionals in harmonizing career and academic aspirations. Moreover, the SEM framework provides a robust foundation for future research in this critical area.*

*Keywords:* Structural Equation Modelling Approach, Career and Academic Balance

*Paper Reference Code:* ICSET-25096

# Integrating Sustainability And Quality Management Systems In The Supply Chain Department Of A Pizza Chain In The Philippines: A Structural Modelling Approach

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## ABSTRACT

*This study aims to explore the integration of sustainability and quality management systems within the supply chain department of a pizza chain in the Philippines. Integrating sustainability and quality management is crucial for organizational performance in light of the growing environmental concerns and the demand for strict quality standards. Moreover, this research aims to assist the supply chain department of pizza chains in enhancing their sustainability and operational efficiency through the application of Structural Equation Modeling (SEM). SEM is an effective statistical method that enables researchers to look at intricate correlations between different variables. SEM can help determine the important variables that affect the supply chain's quality and sustainability, as well as how these variables interact. The study's conclusions provide useful information for business professionals acting as a roadmap for negotiating the complexities of integrating quality management and sustainability in the Philippine pizza chain market. Eventually, its findings are expected to have practical applications not only for the supply chain department of a pizza chain in the Philippines but also for other food businesses or sectors seeking to improve their quality and sustainability practices.*

*Keywords:* Sustainability, Quality Management Systems, Structural Equation Modelling, Supply Chain, Pizza Chain

*Paper Reference Code:* ICSET-25097

# Development And Application Of A Waterproofing Membrane Using Recycled Polystyrene For Enhanced Structural Water And Moisture Protection

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## ABSTRACT

*Polystyrene is one of the most widely used polymers across various industries, but it poses significant environmental challenges due to its difficult disposal. This study proposes a solution by reformulating polystyrene waste into a new waterproofing membrane for the construction sector. The demand for effective waterproofing in the Philippines is particularly high due to the country's tropical climate. This work aims to address two objectives: managing polystyrene waste and meeting the practical needs of the construction industry. The membrane is designed to be durable, capable of withstanding temperature changes, photodegradation, mechanical stress, and water exposure. The study explores the feasibility of using polystyrene-based membranes as a more practical and sustainable alternative to traditional waterproofing materials.*

*Keywords:* Waterproofing, Hydrophobicity, Polymer membrane, Waste management, Chemical innovation

*Paper Reference Code:* ICSET-25098

# 3D Printed Shoe Dryer Housing For Durability And Moisture Resistance with PETG

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## ABSTRACT

*Shoe dryers are important in maintaining footwear hygiene and lifespan, especially in a climate like the Philippines, which only has sunny and rainy seasons. However, the commonly used ABS housings have durability and moisture absorption limitations. Thus, this study investigates the suitability of PETG as an alternative for shoe dryer housings. PETG is a glycol-modified polyethylene terephthalate due to its structure, thermal stability, tensile strength, and slower moisture absorption; it lessens the chance of shoe dryer breakage, internal degradation, or inefficiency. PETG was characterized by impact resistance, contact angle, tensile, and hardness strengths according to ASTM D638, ASTM D785, and ASTM D256. The technical data sheet of each material was referenced for the thermal characterization and moisture absorption. The same characterizations were performed on ABS, and the results were compared. Although PETG displayed a lower impact strength and contact angle, PETG has a slower moisture absorption rate, can handle operating temperatures for shoe dryers, and has better tensile strength than ABS. In conclusion, PETG can be an alternative to ABS for shoe dryer housings because it handles the needed conditions for a shoe dryer while improving tensile strength and moisture absorption rates.*

*Keywords:* PETG, ABS, Durability, Moisture Absorption Rate, Alternative Housing

*Paper Reference Code:* ICSET-25099

# Empowering Supply Chain Resiliency through Data Analytics and Advanced Technology Systems for Streamlined Efficiency Among Manufacturers, Distributors, and Suppliers: A Bibliometric Overview

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## ABSTRACT

*The evolution of supply chain resiliency and sustainability research based on 826 valid documents published over the period of 2020-2024. Indeed, the dataset is diverse and includes 485 journal articles, 224 conference papers, 67 book chapters, among others, from 2,551 contributors. There are 2,308 unique keywords; thus, this research proves that this area is quite multidisciplinary and involves collaboration. The analysis indicates a tremendous growth of publication output, reaching the peak in 2023 with 248 publications and then slightly decreasing in the year 2024. Therefore, the trend underlines increased interest in the use of modern technologies and sustainable practices while overcoming different global supply chains. Certain key themes highlighted are the supply chain, blockchain, Internet of Things, Industry 4.0, and much more. These technologies enabled a lot of transparency, actual time monitoring, and operational effectiveness that further helped create an agile and resilient supply chain. Mapping was done using VOS Viewer to visualize keyword relationships for the identification of research hotspots and interdisciplinary applications. Sustainability Switzerland, Procedia Computer Science, and IEEE Access have been found leading sources, thus emphasizing again the convergence of sustainability with digital innovation and industrial practices. It gives an overview of the changing dynamics in supply chain studies and the need for collaboration across disciplines in developing sustainable technology-driven solutions. Advanced technologies and sustainability are core to resilient supply chains that can respond to contemporary global challenges.*

*Keywords:* supply chain resiliency, sustainability, blockchain, IoT, Industry 4.0, bibliometric analysis

*Paper Reference Code:* ICSET-25101

# Vehicle Violation Detection Using Faster R-CNN And 4 SPP-Net In Bike Lane Traffic System

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## ABSTRACT

*In 2020, during the global COVID-19 pandemic, public transportation was significantly restricted, leading to a surge in bicycle usage. To accommodate the growing number of cyclists, governments introduced guidelines for dedicated bicycle lanes. However, compliance by motor vehicles with these guidelines was often poor. Both cars and motorcycles used the bike lane as if it didn't exist. It is imperative to keep track of these violators so that they would give space for cyclists due to the fear of being caught. To find the better outcome, the researchers developed two algorithms for comparison. Both algorithms utilized Faster R-CNN as the base model, but one was enhanced with Spatial Pyramid Pooling Network (SPP-net. To test the accuracy and speed of each algorithm, the researchers used street view CCTV footages taken from Pasig City Hall. Training datasets were gathered from the internet and has been subjected to a few preprocessing steps. After the research, it was found out that the base algorithm has a faster and more accurate detection compared to the algorithm with SPP-net.*

*Keywords:* Faster R-CNN, SPP-net, AP (Average Precision), Total Loss

*Paper Reference Code:* ICSET-25102

# Determining the Economic Order Quantity (EOQ) of ABC Company's Best-Selling Products Using POM-QM for Windows Software

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## ABSTRACT

*This study aims to determine the Economic Order Quantity (EOQ) and the re-order point of ABC Company's Best-Selling Products. ABC Company is a start-up e-commerce brand selling sport-related tools and accessories in Shopify. The data used for the analysis was gathered from the interview with the company's head of the supply chain and the 2022 sales data provided. The best-selling SKUs were determined using the Pareto Diagram and the optimal order quantity and re-order point were computed using the POM-QM for Windows Software. The results of this study show that four out of 82 SKUs make up 80% of the company's sales- P000007, P000019, P000009 and P000022. The computation of EOQ and re-order point shows 1,691 optimal order quantity and six annual orders for P000007; 1,637 optimal order quantity and six annual orders for P000019; 1,505 units and five annual orders for P000009; and 1,189 units and four annual orders for P000019. In addition, the result also shows that ABC Company could have saved $ 4,370.62 in annual cost for 2022, which is equivalent to 14.49% annual cost savings by comparing the company's existing method with that of the EOQ approach.*

*Keywords:* EOQ, POM-QM, re-order point, inventory management, Ecommerce

*Paper Reference Code:* ICSET-25103

# Image Classification Model For Data Sentry Of Plant Diseases Using Convolutional Neural Networks

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## *ABSTRACT*

*This study examines the effectiveness of using machine learning-based image recognition model for classifying common diseases in crops. This study addresses the critical need for swift and accurate disease identification in agriculture, particularly focusing on enhancing food security by preserving crop yield through early intervention. The study employs a dataset from the study of Mafi, et. al., about eggplant disease recognition composed of thousands of images representing seven distinct eggplant disease classes, with each class containing approximately 1600 images. Through extensive pre-processing and image augmentation techniques, the dataset is standardized to ensure compatibility with the model. Additionally, a data acquisition framework was developed, integrating frontend capabilities to highlight image capturing and database as sensor data storage. A graphical user interface (GUI) is also designed to provide stakeholders with practical tools for swift disease identification. The convolutional neural network (CNN) model achieves an average accuracy of 94% in classifying diseases, indicating its effectiveness in recognizing plant disease. Overall, this research contributes to the advancement of agricultural productivity and the reduction of crop losses through the capabilities of a machine learning method.*

*Keywords: Image classification* model, Data-sentry, Plant leaf diseases, Convolutional neural network

*Paper Reference Code:* ICSET-25104

# Classification And Detection For Oryza Folia (Palay Leaf) Disease:
# A Comparative Analysis with YOLOv5

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## ABSTRACT

*This study demonstrated the effectiveness of the YOLOv5 object detection model in automating the classification and detection of six common diseases affecting the Palay (rice) leaves using advanced machine learning techniques, the model was able to reliably diagnose diseases from leaf images, addressing an important problem in agricultural production. The image classification model training progresses through 30 epochs and shows significant improvement in its performance on the training model as it reaches 0.989 or 98% accuracy at the end of the training. The classification result for bacterial blight that is predominant in the subject oryza folia was successfully classified by the model, this can also be compared visually to accurately having 50% bacterial blight, also based on the model's performance as the accuracy yield starting at 36.1% to 98% in image classification. The system model allows for early intervention and mitigation strategies, reducing potential yield losses due to crop diseases.*

*Keywords:* YOLOv5, Web-based system, Image classification and detection, Oryza folia, Bacterial blight, Blast, Bacterial leaf streak, Brown spot, Leaf scald, Narrow brown spot, Red stripe, Tungro

# Adsorption Of Nitrate In Simulated Contaminated Groundwater Using Activated Carbon From Cassava (*Manihot esculenta*) Stem Impregnated With Na+ From NaCl Solution

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## ABSTRACT

*Nitrate contamination of groundwater poses a critical environmental and public health challenge worldwide. Adsorption, among the various mitigation strategies, particularly when surface modifications are applied, garnered significant attention for its ability to achieve enhanced effectiveness in nitrate removal processes. This study presents the effect of sodium ion (Na+) impregnation from sodium chloride (NaCl) on activated carbon derived from cassava stems for the removal of nitrate from simulated contaminated groundwater. The study employed a combination of field-emission scanning electron microscopy (FESEM) and energy dispersive X-ray spectroscopy (EDX) analysis to investigate the surface morphology, chemical composition, and concentration of elements before and after the adsorption process. Batch adsorption experiments were conducted to examine the influence of impregnation concentration and adsorbent dosage on the efficiency of nitrate removal. Results showed that impregnation of sodium ions enhanced the porosity of the activated carbon structure and increasing the impregnation concentration and adsorbent dosage significantly improved the nitrate removal efficiency. Activated carbon treated with a 7 M NaCl solution exhibited the highest removal efficiency. The analysis of adsorption isotherms revealed that the activated carbon adhered to the Langmuir model, whereas the activated carbon impregnated with Na+ adhered to the Freundlich model. The kinetics investigation demonstrated that the activated carbon followed pseudo-first order kinetics, while the impregnated activated carbon conformed to pseudo-second order kinetics. The findings of this study revealed the potential of impregnating activated carbon from cassava stems as a promising solution for nitrate removal in contaminated groundwater.*

*Keywords:* Nitrate, Groundwater, Adsorption, Cassava stem, Impregnation, Sodium chloride

*Paper Reference Code:* ICSET-25106

# Integration Of YOLOv8 And Gas Sensors (MQ136 & MQ137) For Freshness Classification Of Chicken, Pork, And Beef Meat Samples

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## ABSTRACT

*This research paper introduces an integrated system for assessing meat freshness by combining computer vision with gas sensor technology. Using the YOLOv8 algorithm, the system performs image-based analysis of chicken, pork, and beef meat samples to detect visual indicators of freshness. In parallel, MQ136 and MQ137 sensors monitor volatile gases, specifically ammonia and hydrogen sulfide, which are released as meat deteriorates. By cross-examining image data with gas emissions, the system classifies meat samples into "fresh," "slightly fresh," or "not fresh." This approach, designed for accuracy and portability, contributes to food safety standards and aligns with SDG 12 by promoting responsible consumption and reducing waste. The proposed prototype demonstrates a potential application for real-time meat freshness monitoring in both industrial and consumer contexts. The system underwent meticulous testing, including preliminary and actual testing phases, to validate its performance. Preliminary testing revealed a correlation between meat weight and gas emissions, which informed the development of a polynomial regression equation for classification. The integrated system achieved an impressive accuracy rate of approximately 97.20% in classifying meat freshness, although some misclassifications were noted among closely related categories. The gas sensors effectively monitored gas levels, providing critical data that enhanced the reliability of the freshness assessment. Overall, this research aligns with the United Nations Sustainable Development Goal 12, focusing on responsible consumption and production by reducing food waste and improving food safety. The findings underscore the potential of combining computer vision and gas sensing technologies to create a robust, user-friendly solution for meat quality monitoring, with recommendations for expanding the dataset and refining sensor calibration to further enhance system accuracy and applicability across various meat types.*

*Keywords:* Meat freshness, YOLOv8, gas sensors, computer vision, ammonia detection, hydrogen sulfide detection, food safety, meat classification, sustainable food systems, SDG 12

# Optimizing Gasoline Desulfurization: A Multi-Objective Fuzzy Systems Approach

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## ABSTRACT

*Ultrasonic-assisted oxidative desulfurization (UAOD) is utilized to lessen environmental problems due to sulfur emissions. The process uses immiscible polar solvents and ultrasonic waves to enhance desulfurization efficiency. Prior research focused on comparing the effectiveness of UAOD for gasoline using response surface methodology. This study evaluates the desulfurization efficiency and operating costs, including ultrasonic power, irradiation time, and oxidant amount to determine optimal conditions. The study used a multi-objective fuzzy optimization (MOFO) approach to evaluate the economic viability of UAOD for gasoline. It identified upper and lower boundaries and then optimized the desulfurization efficiency and operating costs while considering uncertainty errors. The fuzzy model employed max-min aggregation to optimize the degree of satisfaction on a scale from 0 (unsatisfied) to 1 (satisfied). Optimal conditions for gasoline UAOD were found at 445.43 W ultrasonic power, 4.74 min irradiation time, and 6.73 mL oxidant, resulting in a 66.79% satisfaction level. This yielded a desulfurization efficiency of 78.64% at an operating cost of 13.49 USD/L. Compared to the traditional RSM optimum conditions, the process of the present study is 13.50% faster, uses 4.22% less power, requires 16.50% less oxidant, and is 10.54% cheaper. This is all possible with an efficiency decrease of only 2.70%, which is a good compromise given the substantial reduction of cost and operating conditions. The solutions provided by MOFO demonstrate not only economic viability through decreased overall operating costs and simplified process conditions but also offer valuable insights for optimizing prospective future industrial-scale UAOD processes.*

*Keywords:* Desulfurization, Fuzzy Optimization, Gasoline, Pareto Front, Ultrasound

*Paper Reference Code:* ICSET-25108

# Smart Corn (Zea mays indenata) Analysis Network For Disease Detection Through Artificial Intelligence

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## ABSTRACT

*This study determined the role of Convolutional Neural Network (CNNs) for corn disease detection in different soil treatment. Understanding the significance of corn as a staple food for rural households in the Philippines, the research answered the questions of climate change and poor soil conditions which impair the quality and yield of corn. By employing a Randomized Complete Block Design, various soil treatments, including sulfato, complete fertilizer, and urea, were analyzed alongside a control group of clay-loam soil without fertilizer. The results suggested that the type of soil treatment applied had a substantial contribution to the disease in corn plants. Specifically, corn blight and gray leaf spot were more prevalent in the control and urea-treated plots, while healthier plants were more commonly found in the sulfato and complete fertilizer treatments. This finding underscored the importance of selecting appropriate soil treatments in agricultural practices to enhance disease management and improve overall crop health. This study emphasized the potential of AI technologies in accurately detecting diseases, providing farmers with critical insights for effective soil management strategies.*

*Keywords:* Corn diseases, Convolutional Neural Networks, soil treatments, disease detection, artificial intelligence

*Paper Reference Code:* ICSET-25109

# Advancing Road Safety and Mobility: Vision AI and Deep Learning for Pedestrian and VRU Real-Time Detection, Pose Estimation, and Tracking in Autonomous Vehicle Towards Safe and Robust Sensor-Perception System of AV Development

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## ABSTRACT

*This study introduces a unified framework for real-time pedestrian and Vulnerable Road User (VRU) detection, pose estimation, and tracking, addressing the limitations of traditional independent systems. By integrating these tasks into a single multi-task learning architecture, the model enhances robustness, efficiency, and accuracy while significantly reducing latency and computational overhead. The framework is optimized for dynamic, high-risk environments such as intersections and urban areas with complex scenarios involving occlusions and mixed traffic conditions. Experimental results demonstrate superior performance compared to baseline YOLOv8 configurations, achieving [mAP@0.5](mailto:mAP@0.5) of 57.2%, OKS of 76.1% on the COCO dataset, MOTA of 67.1%, and IDF1 of 64.3% on the MOT17 dataset. Additionally, the model achieved a Re-ID accuracy of 56.5% on a custom dataset, showcasing robust identity maintenance in dense, occluded environments. Real-world testing at NTU campus and CETRAN proving grounds validated the system under diverse environmental and traffic conditions, reinforcing its practical applicability. While challenges persist in extreme scenarios, this unified framework represents a significant advancement in autonomous vehicle perception systems, providing a scalable and efficient solution for enhancing safety and navigation in urban environments. The framework contributes to advancing intelligent systems and technology applications in smart urban mobility for sustainable development.*

*Keywords:* Pedestrian and VRU Detection; Pose Estimation; Tracking; Deep Learning; YOLOv8

*Paper Reference Code:* ICSET-25111

# Assessing Daylighting Performance And Visual Comfort Of Shopping Malls In The Province Of Cavite, Philippines

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## ABSTRACT

*In the tropical Philippines, shopping malls serve as cooling centers and cultural hubs, remaining vital even during the COVID-19 pandemic. However, their traditional enclosed designs often limit natural light integration. Retail experts advocate "demalling," which introduces daylight into retail spaces to foster connections between people and nature.*

*While daylighting research is prevalent in offices and schools, shopping malls remain underexplored. This study evaluates daylighting strategies—Clerestory, Floor-to-Ceiling, and Skylight windows—focusing on visual comfort in Cavite's malls. Using surveys, HDR luminance mapping, and simulations, the study links user perceptions to luminance levels.*

*Results show visual comfort depends more on the interaction of daylight with indoor elements than glare. Effective navigation mitigates occasional glare discomfort. For instance, Imus Mall's clerestory windows achieve optimal illuminance (100–3000 lux), enhancing visual comfort and reducing artificial lighting dependence. Conversely, Bacoor Mall's strategies provide less than 15% useful daylighting, with most areas falling below or exceeding optimal illuminance, highlighting the need for improvement.*

*Recommended thresholds for optimal comfort are clerestory windows below 520 cd/m², skylights under 2250 cd/m², and floor-to-ceiling windows between 1600–5300 cd/m². These values, tailored for dynamic user environments like malls, can guide designs for improved comfort. Integrating these thresholds and using daylighting simulation tools during the design phase can significantly enhance visual satisfaction in Philippine malls.*

*Keywords:* Luminance, Daylighting, Visual Comfort, Indoor Environment, Shopping mall

*Paper Reference Code:* ICSET-25112

# Data Compression In Wireless Sensor Nodes With The Application of Structural Health Monitoring

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## ABSTRACT

*This study presents a novel data compression approach for structural health monitoring (SHM) using sensor networks deployed on Padre Burgos Bridge. To address the limitations imposed by limited bandwidth and power resources, a two-layer compression technique incorporating Minimalist, Adaptive, and Streaming (MAS) and Run-Length Encoding (RLE) algorithms is proposed. Sensor nodes collect real-time vibration, temperature, and other relevant data. The proposed system effectively reduces data volume by 52.63% to 52.97% using MAS and 19.91% to 31.28% using RLE. Moreover, it significantly lowers power consumption during data transmission, achieving a reduction of 53.55% to 55.95% with MAS and 23.41% to 33.97% with RLE. These findings demonstrate the potential of data compression techniques to enhance the operational efficiency and longevity of sensor networks for structural health monitoring applications. Additionally, the proposed method maintains the accuracy of the extracted features, ensuring reliable structural health assessment. The results of this study provide valuable insights into the design and implementation of efficient data management strategies in SHM systems.*

*Keywords:* MAS, RLE, Structural Health Monitoring, Data Compression, Wireless Sensor Node

*Paper Reference Code:* ICSET-25113

# Evaluating Green Transportation Practices: Assessing Perceptions of E-Bike Adoption on Supply Chain Efficiency in Transportation Logistics

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## ABSTRACT

*As the demand for global logistics and transportation rises, the industry faces increasing pressure to implement sustainable methods, minimizing carbon emissions and improving operational efficiency. E-bikes have surfaced as a viable green transportation option, particularly in urban environments, where they can help ease traffic congestion and reduce reliance on fuel. This research investigates the incorporation of e-bikes in the logistics sector of the Philippines, concentrating on the effects of e-bike utilization on supply chain efficiency and delivery systems. Using the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM), the research aims to analyze perceptions toward e-bike adoption. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), this research assesses the impact of perceived ease of use, perceived usefulness, and green transportation awareness on both the intention and actual use of e-bikes. Results reveal that cost efficiency, environmental consciousness, and user attitudes play a crucial role in e-bike adoption, reinforcing their effectiveness in improving logistics efficiency and encouraging sustainable practices. Moreover, this research aims to guide logistics stakeholders in making informed decisions about green transportation options. Ultimately, the study emphasizes the potential of e-bikes to aid in creating an environmentally friendly logistics system, promoting sustainable development within the industry.*

*Keywords:* Theory of Planned Behavior; Technological Acceptance Model; PLS-SEM; Green Technology; E-bikes

*Paper Reference Code:* ICSET-25114

# Enhancing Thermal Comfort And Movement In Public Markets Through Informed Space Syntax Approach: A Case Study Of Lipa City Public Market

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## ABSTRACT

*The traditional Filipino "palengke" is a vital part of daily life in Filipino communities, serving as a central hub that embodies the social, cultural, and economic essence of Philippine society. However, these historical spaces are under threat from the rise of supermarkets, outdated layouts, and thermal discomfort. These challenges are not just compromising the appeal and functionality of palengkes, but also threatening their very existence. This study explores how users interact with the market's environment and how Space Syntax, combined with environmental data, can optimize spatial layout and thermal comfort. Data collection included user surveys on heat, humidity, and airflow alongside environmental measurements. Researchers used Computational Fluid Dynamics (CFD) simulations and Space Syntax analysis to examine the relationship between spatial configuration and thermal dynamics, identifying opportunities for improvement. Findings reveal that market temperatures often exceed comfort standards set by ASHRAE 55 (23°C to 27°C), Code of Sanitation of the Philippines (26.7°C, and 60% relative humidity), and an empirically derived comfort range (26°C to 28.5°C). Congested areas, particularly in grocery and wet sections, experience the worst conditions. Space Syntax analysis showed that areas with better spatial integration, such as main hallways, benefit from improved airflow. CFD simulations underscored the role of layout in airflow patterns. Recommendations include redesigning market layouts to reduce congestion, improving ventilation with natural cooling elements, and utilizing technology for real-time monitoring. By addressing these issues, the study aims to enhance the user experience and ensure the competitiveness of palengkes amid rapid modernization.*

*Keywords:* Thermal comfort, Space syntax, Computational fluid dynamics, Public market

*Paper Reference Code:* ICSET-25115

# Artificial Intelligence For Membranes To Derive As Alternative Approach Towards Carbon Neutrality

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## ABSTRACT

In recent years, artificial intelligence (AI) and technologies have significantly improved, enabling the efficient resolution of complex problems across various domains. One notable application is in the field of wastewater treatment, where stringent demands for energy-efficient solutions have driven the adoption of fiber membranes for industrial wastewater filtration. High energy consuming means high carbon dioxide emissions. These membranes have the potential to substantially reduce energy consumption while treating wastewater. Their performance depends on a understanding of the interrelationships between key factors, including membrane material, water contact angle, pressure, permeability, and selectivity coefficient which can be directly correlated with the machine learning providing a closer step towards carbon neutrality.
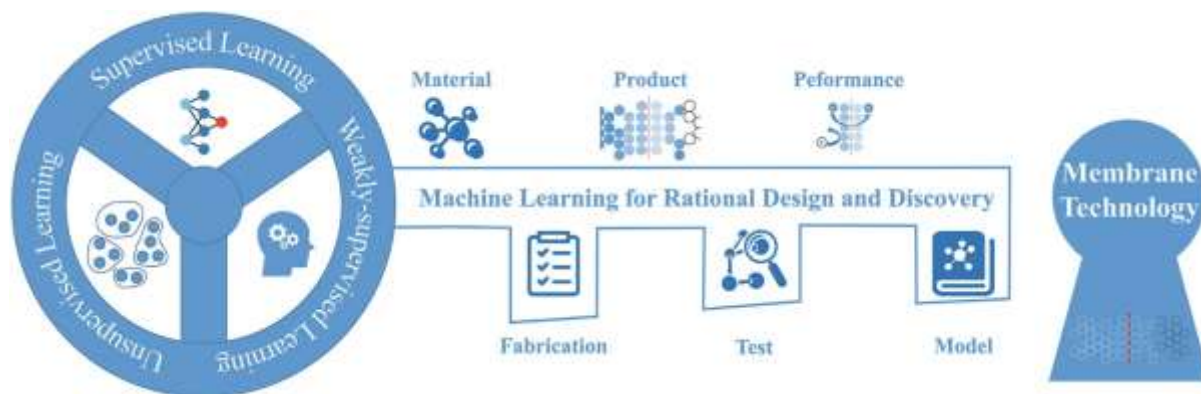
*Keywords:* Artificial neural network; Membrane separation; Wastewater treatment

# Feasibility Of TDR Cable Installation With Inclinometer Casing For Integrated Landslide Monitoring

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## ABSTRACT

*Time domain reflectometry (TDR) cable installation with inclinometer was generally not recommended for landslide monitoring due to significant loss of sensitivity to shear displacement. Nevertheless, co-installation is much more economical and attunes the respective limitations of each technology. While this has been wished for by users, it has not been accepted as good practice. This study investigates the factors influencing the TDR response when installed with an inclinometer casing and explores feasibility of co-installation and optimize its performance.*

*Keywords:* Shear displacement, large direct shear box, TDR, inclinometer, landslide

*Paper Reference Code:* ICSET-25117

# Advancing Road Safety Through Autonomous Mobility Research: Towards Safe and Robust Sensor-Perception System and Artificial Intelligence in Autonomous Vehicle

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## ABSTRACT

*This study addresses the critical challenges in developing robust and reliable sensor-perception systems for autonomous vehicles (AVs), focusing on improving road safety and supporting sustainable urban mobility. Aligned with the United Nations' Sustainable Development Goals (SDGs) 3, 11, and 13, the research integrates multimodal sensors (cameras, LiDAR, and radar) with advanced AI algorithms to enhance detection accuracy, robustness, and real-time performance in dynamic environments.*

*Key contributions include a comprehensive framework for detecting and recognizing traffic lights, road signs, pedestrians, and vulnerable road users (VRUs). The system demonstrates significant improvements in performance metrics, achieving a mean Average Precision (mAP@0.5) of 96% for traffic sign detection, precision and recall above 93% for pedestrian detection, and real-time inference latency under 50 ms. Additionally, the framework addresses challenges like class imbalance and environmental variability through data augmentation and transfer learning, improving detection reliability across diverse scenarios, including low-light and adverse weather conditions.*

*The framework was validated using both virtual simulations and real-world environments, such as the CETRAN test track, NTU campus, and theme park. Real-world testing highlighted the system's capability to reduce perception failures by 20% compared to state-of-the-art benchmarks, enhancing safety and reliability for low-speed zones and high-density traffic conditions.*

*This research advances the field of autonomous mobility by proposing a scalable and adaptable perception system that improves detection accuracy, quantifies robustness, and validates safety models. The results demonstrate its potential to reduce accidents, align with sustainability goals, and support the global push for safer and more sustainable autonomous transportation systems.*

*Keywords:* Artificial Intelligence, Autonomous Vehicle, Sensors, Perception, Computer Vision

*Paper Reference Code:* ICSET-25118

# High Temperature Mechanical Response And Dynamic Phase Transformation Behavior Of Carbon Steels: A Concise Review

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## ABSTRACT

*This literature review examines the extensive research on carbon steels, focusing on their microstructural characteristics, mechanical properties, and applications across various industries. Carbon steels, primarily composed of iron and carbon, exhibit a diverse range of properties influenced by carbon content, alloying elements, and processing techniques. The review highlights key advancements in understanding dynamic transformations, constitutive modeling, and the role of microstructural analysis techniques such as scanning electron microscopy (SEM) and electron backscatter diffraction (EBSD). By synthesizing findings from multiple studies, this review aims to provide a comprehensive overview of the current state of knowledge on carbon steels, addressing their performance in challenging environments, implications for material selection, and future research directions to optimize their use in engineering applications.*

*Keywords:* Carbon Steels, Phase Transformations, EBSD

*Paper Reference Code:* ICSET-25119

# The Impact Of Sustainable Packaging On Consumer Attitudes And Purchasing Behavior In The Philippine E-Commerce Market

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## ABSTRACT

*In the Philippines, where environmental issues such as plastic pollution are particularly concerning, consumers are showing a stronger preference for sustainable options. With the rapid growth of the e-commerce market, it also helped increase the economy of the Philippines however it also poses challenges such as its contribution to plastic waste. This research aims to incorporate the Theory of Planned Behavior (TPB) together with constructs such as Environmental Concern (EC) and Perceived Environmental Knowledge (EK) in investigating how sustainable packaging practices influence consumer attitudes and purchasing decisions in the Philippines. Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized to measure the causal relationship of the constructs. The result reveals that all the latent variables of consumer behavior show significant effect. It indicates that sustainable packaging has the highest significant relationship with behavior, suggesting that promoting these practices can effectively drive eco-friendly consumer actions. Overall, this study underscores the necessity for businesses to foster positive environmental attitudes through education and engagement to meet the rising demand for sustainable products in the local market.*

*Keywords:* Theory of Planned Behavior; Environmental Concern; Perceived Environmental Knowledge; Partial Least Squares Structural Equation Modeling

*Paper Reference Code:* ICSET-25120

# Effect of Sodium Hydroxide Etching And Ultraviolet Sterilization On The Compressive Properties Of 3D-Printed Polylactic Acid (PLA) Lattice Structures For Cell Osseointegration

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## ABSTRACT

*Additive manufacturing's (AM) growth has been exponential over the years and has surpassed different innovations and inventions. In the medical industry, AM has been utilized to make scaffolds and implants using Polylactic acid (PLA). Using X-ray CT scanning and AM technology, medical practitioners would manufacture patient specific designs that can be modified for better cell adhesion. Surface modification such as etching can activate the surface of a material and can create micro to nano scale adjustments. The present study explores the effect of Sodium Hydroxide (NaOH) etching and ultraviolet (UV) sterilization on the compressive and surface properties of PLA lattice structures. Etching time significantly affects the weight of the samples since the percent difference between 2 hours and 4 hours etching increased from 11.15 to 29.03 for 70% porosity. The surface roughness also increased from 1.096 μm to 1.307 μm and optical images show formation of micropores for etched samples. Wettability was also tested and the contact angle and results show that the PLA samples transitioned from hydrophilic to hydrophobic surfaces after 4 hours of etching. The compressive stress shows a decreasing trend as the porosity and etching time increases. However, unetched 60% porosity shows a compressive stress similar to that of the trabecular bone with 7.40 MPa. This study provides additional insights on the 3D printing community for biomedical applications that certain parameters can be adjusted to fit the necessary criteria for successful operation.*

*Keywords:* Additive Manufacturing, Surface Modification, Lattice Structure, Topology Optimization

*Paper Reference Code:* ICSET-25121

# *Revita Rogue:* A 2D Post-Apocalyptic Survival

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## ABSTRACT

*Solid waste pollution has led to ecological and public health crises in the Philippines, compounded by a lack of awareness regarding sustainable waste management and its impact on climate change. Revita Rogue: A 2D Post-Apocalyptic Survival Environmental Game addresses this issue by immersing players in a post-apocalyptic world where they experience the consequences of improper waste management. The game incorporates mechanics such as exploration, survival, recycling, and crafting to encourage sustainable behavior and environmental empathy. Targeted at young Filipinos aged 13–21, the game runs on Android devices, featuring real-time day/night cycles, trapping-based combat, and an offline mode to regulate player progression.*

*Developed using the Unity engine with C# and Agile Kanban methodology, the project followed a structured game development process. Quantitative research, including a paired Z-test and ISO 25010 quality assessments, evaluated the game's functionality, usability, and impact on environmental awareness. Results indicated a significant increase in environmental awareness among players, with the game achieving high ratings in portability (4.61) and performance efficiency (4.63).*

*The findings demonstrate that Revita Rogue effectively promotes environmental awareness, aligning with Sustainable Development Goal 13 (Climate Action). Recommendations for future iterations include enhancing usability, expanding platform support, and integrating partnerships with educators and NGOs to amplify its impact. The project highlights the potential of gamification as a tool for environmental education and behavior change.*

*Keywords:* Computer Games, Environmental Games, Environmental Awareness, Climate Action, Android Devices

*Paper Reference Code:* ICSET-25122

# Floating Pico-Hydroelectric Turbine: A Portable Alternative Energy Source For Remote Areas With Flowing Bodies Of Water

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## ABSTRACT

*The escalating demand for electricity due to rapid population growth underscores the urgency of exploring alternative energy sources, particularly in remote areas. This study focuses on the development and testing of a portable pico-hydroelectric turbine aimed at providing a safe and clean energy supply for basic needs in remote areas, such as lighting and phone charging. The prototype, made of stainless steel, has four 6-inch diameter floats, four pulleys, two V-belts, and critical electrical components such as a 12V DC IC-type alternator, a 12V DC battery, and a 200-watt 12V DC to 220V-240V AC inverter. The prototype was tested in Nagcarlan River, Liliw Laguna, with data collected using a multimeter to assess various performance characteristics. Through a series of trials, the study assesses the performance in terms of voltage, frequency, and power output, as well as its practical applications for two home lights and one phone charging. The findings are intended to contribute and provide significant insights for future study and prototype enhancements for future generations. The study can be used on any flowing body of water with moderate to high current flow. The data gathered from the testing showed a 220V-240V AC, 57.9 Hz, and at least 50 watts from 2 light bulbs and 1 phone charger. The stored-up energy could last up to 1 hr and 30 mins. As an alternative energy source, the study could be a reliable alternative source for remote area's electricity generation.*

*Keywords:* Alternative source of energy, Remote areas, Pico-hydroelectric turbine, IC-type alternator, Electricity generation

*Paper Reference Code:* ICSET-25123

# Utilization Of Agro-Based Natural Fiber Composite In Floor Tiles Production

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## ABSTRACT

*The global agricultural sector generates approximately 23.7 million tons of food daily, causing significant environmental pressures that adversely impact soil, air, and water resources, thereby threatening population health and ecosystem sustainability. This study investigates the chemurgical potential of agro-based natural fiber composites, specifically banana, bamboo, and activated carbon fibers, in producing eco-friendly floor tiles. These fibers were selected for their abundance, renewability, and ability to enhance composite mechanical properties. The production process involved precise calculation and mixing of fibers to create various composite samples, which were then subjected to Compression Strength, Water Absorption, Impact Resistance, and Aggregate Impact tests. Results showed that the 15% activated carbon mixture (Mixture C) had the highest average compression strength at 14.134 MPa, while the 30% banana and bamboo fiber mixture (Mixture AB) had the lowest at 1.4593 MPa. The 30% banana fiber mixture (Mixture A) demonstrated the highest water absorptivity at 53.27%, whereas the 15% activated carbon mixture (Mixture C) had the lowest at 18.28%. In impact resistance, only the 25% banana fiber mixture (Mixture A) and the 30% bamboo fiber mixture (Mixture B) passed, showing superior resilience. The aggregate impact test classified the 15% activated carbon mixture as strong. The study successfully highlights the potential of agro-based natural fibers in creating eco-friendly floor tile materials. The activated carbon mixture excelled in compression strength, the banana mixture in water absorptivity, and the banana and bamboo mixtures in impact resistance, making them suitable for applications requiring durability against external forces.*

*Keywords:* composite, chemurgical potential, natural fibers, pysico-chemical-mechanical properties, floor tiles

# Evaluation Of Corrosion And Scaling Propensity In Swimming Pool Water Through Langelier Saturation Index (LSI) In Selected Swimming Pools In Negros Oriental

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## ABSTRACT

*This research conducted a comprehensive assessment of pool water quality using the Langelier Saturation Index (LSI) to determine the corrosive or scaling potential in five swimming pools located in Negros Oriental. The study focused on crucial water chemistry parameters, including pH, temperature, total dissolved solids (TDS), alkalinity, and calcium hardness (CH), to analyze the LSI values. For conducting this study three samples are taken from each selected swimming pools and will be measured primarily by using the Multi-Parameter Water Quality Meter. The tools used in analyzing and interpreting the data are the LSI equation with the formula, LSI = pH – pHs. Data was collected and summarized in tables, showcasing the in-situ water conditions and LSI values for each pool. The results revealed significant variations in water conditions across the pools, with some pools showing a tendency towards scale formation, while others demonstrated serious corrosion potential. The LSI values emphasized the importance of water balance to prevent the accumulation of mineral deposits and deterioration of pool equipment. Recommendations include regular water testing and adjustments to maintain balanced water conditions, employing pool water treatments, expanding the sample size, considering external factors, and educating pool owners on water quality. By implementing these recommendations, pool owners can enhance water quality, reduce the risks of corrosion and scaling, and ensure a safe and enjoyable swimming experience for all users.*

*Keywords:* LSI, pool water quality, corrosion and scaling potential

*Paper Reference Code:* ICSET-25125

# Non-Intrusive Coconut Maturity Characterization Using Ultrasonic Wave Analysis With Machine Learning-Based Maturity Level Identification

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## *ABSTRACT*

*This research presents the development of a non-intrusive coconut maturity characterization system utilizing ultrasonic wave analysis and signal processing, combined with machine learning-based maturity level identification. The primary objectives include prototyping the system, gathering data for characterization, collecting ultrasonic data across various maturity stages, and investigating feature derivatives to build and evaluate the performance of machine learning models such as deep neural networks, support vector machines, and random forests in combination with advanced signal processing techniques. This study provides valuable insights for researchers interested in non-intrusive coconut maturity assessment methodologies and holds potential applications in enhancing agricultural practices and fruit maturity assessment techniques.*

*Keywords:* Coconut Maturity Characterization, Ultrasonic Wave Analysis, Machine Learning

*Paper Reference Code:* ICSET-25126

# Abundance, Spatial Distribution, And Characteristics Of Microplastics In The Agricultural Soils Of Canlaon City, Negros Oriental, Philippines

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## ABSTRACT

*Microplastic (MP) contamination in cultivated or agricultural soils has become an important area of focus within the agricultural sector. This study aimed to investigate the abundance, spatial distribution, and characteristics of MPs in the Philippine's agricultural soils, especially in Canlaon City, the fruit and vegetable capital of Negros Oriental province. A total of 54 composite soil samples, each consisting of 5 subsamples, were collected from 9 randomly selected stations. Density separation and filtration methods were employed to extract MPs from the soils. Characterizations of the MPs were carried out using stereomicroscopy and Fourier-transform infrared (FTIR) spectroscopy. All soil samples contained MPs with an average of 596 MP items kg$^{-1}$ of soil. The most observed types of MPs were PET (55%), PE (23%), PP (20%), and Polyamide (1%). Various shapes of MPs were exhibited, including fibers (61%), fragments (32%), films (7%), and granules (1%). Predominant MP colors are blue (29%), transparent (26%), and white (19%). Moreover, the most prevalent size category was 2000-1000 µm. However, there was no significant difference in microplastic abundance between the sampling stations. Our study revealed a close association between the abundance and distribution of MPs in the soil and various farm cultural management practices in the area. It is recommended that there must be policies that should prioritize minimizing microplastic introduction into agricultural soils by promoting best management practices, regulating plastic use in farming, and investing in research on alternative materials and long-term impacts. Spatial distribution of microplastic abundance in the nine stations across the agricultural soils of Canlaon City, Negros Oriental, Philippines*

*Keywords: Agricultural Soil, Microplastics, Farm Cultural Management Practices, FTIR Spectroscopy*
*Paper Reference Code:* ICSET-25128
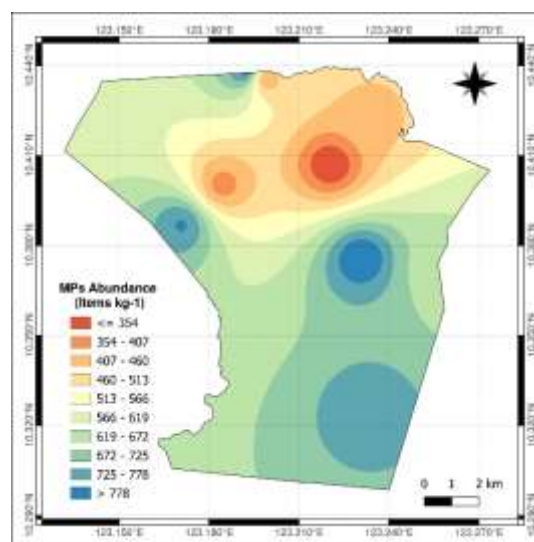
# Plasma Gasification Waste From The Philippines: A Simulation And Optimization Study

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## *ABSTRACT*

*Plasma gasification presents a promising alternative for waste management and sustainable energy production in the Philippines, as it is capable of efficiently converting solid wastes to synthesis gas fuel. This study focused on the simulation and optimization of a plasma gasification operation applied to municipal solid waste (MSW) sampled from Los Baños, Laguna, Philippines. The study aimed to reinforce relevant research gaps through maximizing the operation's energy efficiency while minimizing undesired components in the output syngas. Aspen Plus was utilized to model and simulate the plasma gasification operation and was supplemented by MATLAB for data treatment and optimization through Response Surface Methodology (RSM). It was determined that the $H_2$, $CO_2$, and $H_2O$ content of the syngas increased as the plasma steam content, equivalently the SFR increased. The syngas' CO and $N_2$ content increased as the plasma air content, equivalently the ER increased. It was also determined that the operation's Cold Gas Efficiency increased as SFR and ER were simultaneously increased and decreased, respectively. Based on the conducted RSM optimization of the operation's trends, it was concluded that the respective optimal values of ER and SFR were 0.09 and 0.25, connected to minimal content of $H_2$, $CO_2$, and $H_2O$.*

*Keywords:* Plasma Gasification, Municipal Solid Waste, Synthesis Gas, ER, SFR, Cold Gas Efficiency (CGE)

*Paper Reference Code:* ICSET-25129

# WanderWatch: A Door-Activated Wearable Alert System for Patients with Dementia

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## ABSTRACT

Dementia affects millions of people all over the globe and is a major concern to global health. worry with a new diagnosis every three seconds. Symptoms often begin around age 65, with memory loss affecting daily tasks such as navigation, raising safety concerns for patients. This study aims to improve patient safety and ease caregiver burden by notifying caregivers when a patient leaves the house, reducing the need for continuous monitoring. The project introduces WanderWatch, A wearable alert device designed specifically for dementia patients. Testing demonstrated that WanderWatch significantly reduced response times, achieving a major reduction in median response time compared to baseline methods, thus increasing the effectiveness of caregiver alerts. Furthermore, WanderWatch is significantly more affordable than comparable technologies on the market, making it a cost-effective solution. The initial detection range of 20 meters was refined to three feet to improve accuracy and reduce false alarms, ensuring more reliable detection and timely alerts. This enhancement makes WanderWatch a valuable tool for supporting caregivers and improving patient monitoring.

*Keywords:* Dementia, Wearable technology

*Paper Reference Code:* ICSET-25130

# Investigation Of Drowsiness Detection Using Combined Electro-Encephalography, Inertial Measurement Unit, And Computer Vision For A Smart Helmet

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## ABSTRACT

This study investigated drowsiness detection with the use of electroencephalography (EEG), inertial measurement unit (IMU), and computer vision (CV) for a smart helmet. The study was conceptualized with the growing concern on drowsy-driving-related incidents especially with motorcycle drivers. It has been recorded that 22.59% of road accidents in Manila are motorcycle-related. In Cebu City, at least 1,558 motorcycle-related accidents were tallied from January to July of 2023. Previous implementations of the smart helmet used supervised learning to identify drowsiness which requires constant human interaction to know one's state, either drowsy or awake, however this needs pre-existing labeled data which may affect the generality and applicability of the helmet for practical use. To give aid, the researchers investigated unsupervised learning, while retaining the use of the three mentioned sensors. As an initial investigation, K-Means unsupervised clustering algorithm was utilized and compared with a Neural Network Architecture detector. Discussion regarding the development, data gathering and results are presented.

*Keywords: Drowsy Driving, Electroencephalography, Inertial Measurement Unit, Computer Vision,* Unsupervised Machine Learning, Pruning

# Monitoring Of Reinforced Concrete Under Wet-And-Dry Cycling Conditions By Electrical Resistivity Measurements

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## ABSTRACT

*This study investigates the electrical resistivity (ER) of reinforced concrete subjected to wet-and-dry cycling and varying chloride concentrations, aiming to understand its applicability for monitoring concrete durability and corrosion progression. Reinforced concrete slabs and beams were prepared and exposed to saturation conditions with 0.0 M, 0.5 M, and 3.0 M NaCl solutions under full wetting and wetting-and-drying cycles. Electrical resistivity measurements were performed weekly over 52 weeks using a Wenner probe device. Accelerated corrosion tests were also conducted on reinforced concrete beams using impressed current to evaluate the combined effects of moisture, chloride ingress, and corrosion. Results showed that chloride concentration significantly influences electrical resistivity, with higher concentrations reducing ER due to increased ionic conductivity. Wet-and-dry cycling caused fluctuations in ER, highlighting the dynamic effects of moisture. Corrosion progression increased ER variability, with distinct trends between wet and dry conditions. Spatial ER mapping confirmed ionic diffusion between regions with different chloride concentrations, emphasizing the need for careful monitoring in saline environments. These findings demonstrate the potential of electrical resistivity as a non-destructive method for assessing concrete durability and corrosion, contributing to the design and maintenance of resilient infrastructure systems.*

*Keywords:* Electrical Resistivity, Reinforced Concrete, Wet-and-Dry Cycling, Chloride Concentration, Corrosion Monitoring, Non-Destructive Testing

*Paper Reference Code:* ICSET-25134

# Activate Learning On Rural Areas (ALORA): Offline Learning Management System For Elementary Students In Rural Area Using RPi And Nose JS Express

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## ABSTRACT

*The study sought to address the plight of elementary students and teachers in the Philippines who have poor internet connectivity, which can lead to educational inequity. Two-thirds of Filipino elementary kids aged 7 to 14 use mobile devices, yet the country's internet speed is inadequate. This problem is exacerbated in disadvantaged communities where access to the internet is limited. ALORA is an offline learning management system (LMS) that allows primary students and instructors to communicate for digital learning without internet access. e goal was to create a system that extends signal range, an LMS with core features, and to evaluate the system's hardware and software using a throughput analysis and acceptance models. Due to decreased signal strength and rising noise levels, ALORA has challenges maintaining constant connectivity over long distances. The throughput performance demonstrated that the network was transferring data at a consistent pace over different distances, which is consistent with the expected behavior of wireless communication systems. According to the 5-point Likert scale results, both students and instructors deemed ALORA to be a valuable and safe system. Wireless communication technologies may result in lower signal strength and increased noise levels, making it difficult to maintain continual contact over extended distances. Hence, by providing offline digital learning, ALORA can facilitate education access for students who struggle with poor internet connection, therefore promoting education equality. The findings of the study may be valuable to the Philippine government, non-governmental organizations, and other parties concerned in expanding access to education in underprivileged communities.*

*Keywords:* Learning management system (LMS), Digital learning, Throughput, Signal strength, Wireless communication

*Paper Reference Code:* ICSET-25135

# Smartphone Sensing For Road Anomaly Detection In Bicycle Transportation

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## ABSTRACT

*Bicycle transport is increasingly recognized as a sustainable urban mobility solution, with many cities investing in cycling infrastructure. Effective infrastructure design requires assessing road conditions, especially for irregularities like speed bumps. This study presents a methodology for detecting road anomalies using unsupervised machine learning. Linear acceleration data was collected using an iPhone 13 and the G-Field Recorder app, yielding 267 samples of z-axis acceleration signals over a 300-meter University of the Philippines - Los Banos campus road segment with five rubber speed bumps. Data preprocessing involved digital reorientation, high-pass filtering, and stationarity testing. A sliding window approach was applied to extract time-domain features such as descriptive statistics, moving average, and autocorrelation.*

*Anomaly detection using K-Means (KM) and Isolation Forest (IF) algorithms revealed IF as marginally superior, achieving a weighted F1 score of 0.98 compared to KM's 0.97. IF effectively identified anomalies, while KM (k=2) showed consistent detection with minimal false negatives and positives, indicating robustness. Notably, KM has the potential to detect multiple types of anomalies by increasing the number of clusters, which could improve its versatility in varied road conditions. These findings validate the methodology's utility in identifying road irregularities, supporting the development of bicycle-friendly infrastructure for sustainable urban transport.*

*Keywords: Urban planning, Smartphone sensing, Unsupervised machine learning, Anomaly detection, Feature extraction*

*Paper Reference Code:* ICSET-25136

# Establishing Parameters For Electricity Savings Potential Through Targeted Energy Audit: A Case Study in Lanit Jaro Socialized Housing Iloilo City

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## ABSTRACT

*Iloilo City experiences an average of 5.7 power interruptions annually. To address this, the government is focusing on identifying electricity-saving potentials, particularly in the residential sector. This paper presents an energy audit of socialized housing, using a convergent parallel method with both qualitative and quantitative data from survey questionnaires. Various models, including descriptive analysis, Principal Components Analysis, and regression methods, were employed to analyze factors affecting household energy consumption. The study found an average household size of 4.74, monthly consumption of 50-100 kWh, and electricity bills of Php 1,000. Key variables, such as attitudes towards sustainability and appliance usage, were major contributors to electricity consumption. The energy audit identified ten key parameters for reducing electricity use, with one particularly effective in the Lanit Jaro Socialized Housing: Passive Solar Design and Orientation. By optimizing building orientation, window placement, and shading, this approach can reduce heating and cooling energy consumption by up to 30% compared to conventional designs. Positioning openings to face east enhances natural ventilation, improving energy efficiency and reducing reliance on mechanical cooling. The study's findings provide valuable insights for guiding government bodies, concessionaires, and stakeholders in recalculating electricity pricing, designing sustainable layouts, and developing energy-efficient housing.*

*Keywords: Energy efficiency, natural lighting, natural ventilation, building electricity audit, multiple regression analysis*

*Paper Reference Code:* ICSET-25137

# Evaluation Of Microwave Power, Irradiation Time, And Ethanol Concentration On Phenolic Extraction From Ripe Mango (*Mangifera indica L.*) Peels Using Box-Behnken Design

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## ABSTRACT

*This study investigates the influence of key parameters on the extraction of phenolic compounds (PC) from ripe mango (Mangifera indica L. var. Carabao) peels using Microwave-Assisted Extraction (MAE) combined with Response Surface Methodology (RSM) and a Box-Behnken Design (BBD). The parameters evaluated include ethanol concentration (50%, 65%, 80%), microwave power (450 W, 630 W, 810 W), and irradiation time (30 s, 105 s, 180 s). Total phenolic content (TPC) was quantified using the Folin-Ciocalteu method, revealing that the extraction conditions—810 W microwave power, 105 s irradiation time, and 80% ethanol—yielded the highest TPC of 235.245 mg GAE/g dry weight (DW) solely for the BBD runs. Conversely, the lowest TPC (53.095 mg GAE/g DW) was obtained with 60% ethanol, 30 s irradiation time, and 450 W microwave power. The results suggest that higher microwave power facilitates cell wall disruption and enhances extraction efficiency, while prolonged exposure to heat can degrade phenolic compounds. Statistical analysis confirmed that all individual parameters significantly ($p < 0.05$) affected TPC. However, the interaction between ethanol concentration and irradiation time was not statistically significant ($p > 0.05$).*
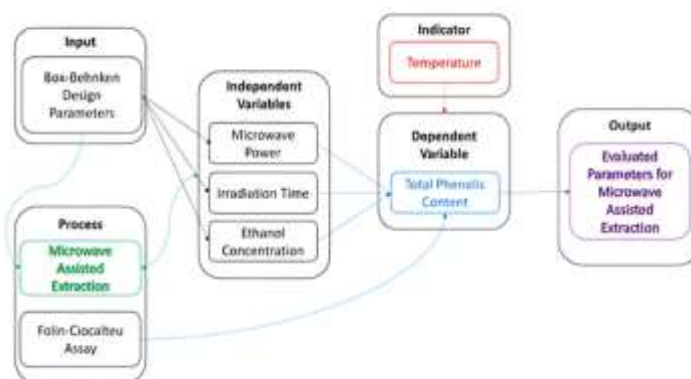
*Keywords:* Phenolic Compounds, Microwave-Assisted Extraction, Mango Peels, Response Surface Methodology, Box-Benkhen Design

*Paper Reference Code:* ICSET-25138

# Temperature Increase In The Philippines: The Case Of 3 Metro Manila Communities

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## ABSTRACT

*The 2023 was recorded as the warmest year in modern temperature records Years prior to this (2010-2023), the global temperature increase has been at record high as documented by weather observatories globally. The condition of living in warmer environs impacts urban planning decisions. Although research in this field is growing, it is notable that planning for extreme heat remains an area of development where there is a lack of existing case studies and researches in the local setting. In analyzing the aspects of this issue, global data is informative. However, a localized perspective and understanding of urban warming based on vernacular conditions may give more insights for planners. Unique and country-based conditions will further inform urban heat assessment process and gain insights on exploring specific intervention options in mitigating extreme heat impacts. The following are the some of the documented impacts of temperature increase in the Philippines from 2023-2024, namely: Significant increase of air conditioner purchase, overwhelmed power grids in Luzon, Visayas and Mindanao with warnings of frequent brownouts and power outage, higher electrical costs increased investment on solar panels, class cancellations and shortened classes due to high heat index, deaths (94 deaths in 2022 and 7 deaths in 2024) and heat-related illnesses (77 cases, 2024 and 512 cases, 2023), reduction of economic aggregate output growth by 0.37 percentage point. Considering three (3) highly urbanized cities in the Philippines as cases in point, the study quantified how the warming manifested in some cities of the country based on a 42-year historical temperature record. Moreover, it analyzed a studied zone within a 3-kilometer radius considering land uses and area distribution, natural features and built environment. The study acquired mean of temperature data and area tabulations. It performed map analysis and field observations. A noticeable pattern of complex land use system with varied building typologies (a mix of one-storey, two-storey, low rise, midrise and high-rise), presence of natural water bodies (ex. Manila Bay, Pasig River, Cavite Coastal, which act as heat absorbers), high built up area with no open space and heavily asphalted environments are remarkable in zones with increased temperature. On the contrary, land use system that are dominantly institutional, having simpler and more organized morphology and block systems, presence of significant green spaces and blue areas which reduce the net area of concrete pavements and communities located in higher altitude and elevation have a decreased temperature reading.*

*Keywords:* Temperature increase, global warming, extreme heat planning

*Paper Reference Code:* ICSET-25139

# Upcycling Marine Waste Paints To Sustainable Polymer Blends And Composites

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## ABSTRACT

*Waste and surplus paints pose significant environmental and health risks due to improper disposal, leading to pollutants that affect ecosystems and human health. Transforming these hazardous wastes into useful materials can mitigate these issues. In the marine industry, paints are essential for shipbuilding and maintenance. These paints, when mixed with nano clay and silicon oxide nanoparticles, can be repurposed for 3D printing. The binders in marine paints, combined with these additives, create new materials suitable for 3D printing, offering heat resistance and durability.*

*The 3D printing, particularly Fused Deposition Modeling (FDM), provides numerous benefits: faster production compared to traditional methods, lower labor, material, and operational costs, minimal impact from trial and error during prototyping, customizable designs, and the use of recycled materials, reducing waste. This technology can produce precise marine parts, prototypes, and tooling with complex geometries and fine details. It supports the creation of thorough prototypes, precise molds, and intricate manufacturing tools, integrating diverse colors and materials efficiently.*

*By addressing paint waste through 3D printing, we can reduce environmental pollutants, promote sustainability, and enhance the marine industry's efficiency and innovation. This approach ensures a cleaner environment and better health outcomes.*

*Keywords*: 3D printing, Marine Paints, Nano Clay, Marine Industry

*Paper Reference Code:* ICSET-25140

# Installing A Solar Panel Street Lights With CCTV Camera In Tarlac, Philippines' National Road: A Sustainable Study On Risk Assessment

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## ABSTRACT

*Solar energy is a renewable resource, and it may be used to generate electricity directly through or indirectly through concentrated solar energy or solar panels (photovoltaic cells). One of the ground-breaking advancements in solar technology is the elegantly designed solar LED streetlight with CCTV camera. A fantastic way to prevent crime, monitor traffic and establish safe cities. LED lamp, CCTV, a motion sensor, a Li-ion battery, a smart charging and discharging controller, and a driver are all included into the design. This article is based on a case study of a Philippine National Road that is experiencing difficulties. Due to the lack of nighttime street lighting and CCTV cameras that may capture activity on the road, this Tarlac route was extremely prone to accidents. Many people break the specific regulations that apply to the National Road, especially during rush hours. Even enforcers disregard the aforementioned rules and regulations due to their lack of concern for the possible impact and danger on the road. This study's objective is to determine whether there are any possible hazards related to employing solar panels to power street lighting and CCTV cameras. The decision-making technique Analytic Hierarchy Process was used to identify and further quantify these risks (AHP). Using solar LED street lights with CCTV cameras will demonstrate whether or not this is a wise choice. It does not, however, come without a cost to move toward a more efficient and sustainable energy future. LEDs and solar power are undoubtedly viable options when it comes to reducing our consumption in a sustainable and effective manner.*

***Keywords:*** *Solar Panel Streetlights, CCTV, Camera, Risk Management*

*Paper Reference Code:* ICSET-25141

# Tugon Pangkalikasan: Foundational Participatory Action Research Towards Building A Framework For Ecological Action

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## ABSTRACT

*This participatory action research project aims to provide a framework for ecological action which may be utilized as a basis for module-making for environmental awareness-raising, and facilitating dialogue and action for the community of Sitio Kayreyna, Brgy. Lumaniag, Lian, Batangas to address the perceived ecological waste problem. The study aims to examine the participant's view on whether the waste problem is caused either by the community's complacency or by a bigger problem which goes beyond them. Hence, with the problem stated, the study seeks to provide an answer to the main question: What is the existential value of waste in terms of either its effect on the volition for action of the participating community or the causation for non-volition of action of the latter? Using Naess' deep ecological approach and Leopold's land ethics, a paradigmatic framework for the community's ecological action on waste management is developed from the participant's insights and reflections. From the thematic analysis of the responses, the researchers identified three main themes which are the components of the framework, namely: awareness-raising, community participation, and collective action.*

*Keywords:* Waste problem, awareness-raising, community participation, collective action, proper waste management

*Paper Reference Code:* ICSET-25142

# Whole Genome Sequence Analysis Of H9N2, H17N10, And H18N11 Bat Influenza A Virus

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## ABSTRACT

*Chiroptera or bats are unique mammals that has the capacity to fly. Greatly recognized due to their role in the food chain and the environment. Furthermore, they retain a reputation as one of the largest reservoirs of viruses with zoonotic disease potentials. Lately, bat-borne viruses such as SARS-Cov-2, EBOV, and more showed transmission to humans that caused disease and pandemic that became a challenge to modern society. Bats being one of the global species prompts a potential threat for human life, domestic or companion animals, agricultural livestock, wildlife reserve, and other bats. In this study, multiple sequence alignment (MSA) approach on the available nucleotide and protein sequences of bat influenza A virus (BIV) were performed, this includes H9N2, H17N10, and H18N11. Segment 2 (PB1) is observed to be strongly conserved while segment 6 (NA) are highly mutated. Conserved sequences suggest a potential primer design for detection of influenza virus in bats, likewise, a target for a long-term vaccine and antivirals while highly mutated sequence may serve as a seasonal target. Addressing bat-borne diseases is crucial for both human health, environmental sustainability, and animal health as it helps mitigate the risks of zoonotic transmissions. Computational biology approach is a steppingstone for primer and vaccine design for detection and prevention. However, experimental studies are still required paving the way for clinical use of possible vaccine target against bat influenza virus.*

*Keywords:* Bat influenza virus, multiple sequence alignment, vaccine development, zoonotic diseases

*Paper Reference Code:* ICSET-25143

# Wastewater As Valuable Resource: Health And Environmental Risks While Maximizing Cost Effectiveness

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## ABSTRACT

*The increased production of wastewater due to continued urbanization and industrialization may lead to serious public health problems, water quality and environment destruction, leading to a reduction in food supply if not given prompt and appropriate attention. However, with proper management, wastewater, beyond being safely discharged to the environment, can be used as a resource for water conservation, preservation and food production. Application of appropriate wastewater treatment/s, and the intentional reuse of reclaimed wastewater should be incorporated into the overall management of water resources. The effective and safe application of reusing wastewater involves two primary strategies: risk assessment and project safety planning.*

*According to the WHO, the management of risk involves conducting an analysis of the entire production cycle; i.e. from waste generation to treatment to the consumption of the reclaimed water. A comprehensive knowledge of the wastewater reclamation system is necessary and a primary qualification to a wastewater reclamation system designer. This is to identify the necessary technology, appropriate strategy (or approach), and apply safety protection measures within the process design. This will reduce the risks at different points in order to arrive at agreed-upon health-based targets. These measures are used in combination with each other in a system; e.g. treatment of techniques; hydraulic retention; exposure control methods; produce disinfection and cooking; vector control; and chemotherapy and immunization. Determining the cost-effectiveness of different measures under local conditions requires both economic and public health analyses.*

*In the United States, the five-year-long Monterey Wastewater Reclamation Study for Agriculture (MWRSA) demonstrated not only the large scale water reclamation be accomplished but also the reclaimed water can be safely utilized for irrigation. In the Philippines, the author has already been involved in several local government, commercial, and residential projects showcasing wastewater treatment with safe water reuse, with applications ranging from toilet flushing, watering plants, cooling tower operations, truck cleaning, water replenishment for fish ponds (including ones for growing tilapia), and soil conditioning using sludge.*

*As dwindling water supplies and pollution affect everyone, the appropriate wastewater reclamation system in the Philippines shall go beyond mere compliance to effluent standards but shall be applied, practiced to treat wastewater to address environmental and public health issues, utilize as a water resource for domestic, agricultural and food production. This wastewater that was commonly discharged formerly to environment could be a valuable resource to the society and aid in environmental sustainability and sustainable development.*

*Keywords: closed loop recycling, domestic wastewater,* reuse, sustainability, water resource

*Paper Reference Code:* ICSET-25144

# Application Of Value Analysis And Engineering To The Energy Management Sustainability Practices Of Private Academic Institution

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## ABSTRACT

*This study explored the application of Value Analysis (VA) and Value Engineering (VE) in improving the energy management sustainability practices of a private academic institution in the Philippines. With the increasing use of energy across the institution and along with the need for sustainability, institutions of higher learning are under pressure to find ways to operate efficiently while being green. This study adopted a qualitative assessment of electricity consumption patterns from 2022 to 2024, including interview with an accredited Pollution Control Officer of the Department of Environment and Natural Resources (DENR). The results revealed that there has been a significant increase in electricity expenditure as different operational activities were conducted in campuses after pandemic, showing that energy management will be an important practice for the private academic institution. Recommended energy management practices that can be applied in the private academic institution are: Conduct a Comprehensive Energy Audit, Upgrade to Energy-Efficient Equipment, Implement Renewable Energy Solutions, Optimize Operational Schedules, Install Building Management Systems, Adopt Energy-Saving Behaviors, Optimize HVAC Usage, Upgrade Lighting Systems, and Reduce Standby Power Loss. The results of this study can be used as the reference by other private academic institutions to apply energy management practices within their campuses.*

*Keywords: Energy management, sustainability, value engineering, higher education institutions, renewable energy*

*Paper Reference Code:* ICSET-25145

# Big Data Analytics In Customer Behavior And Market Trends:

# A Systematic Literature Review

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## ABSTRACT

*The integration of Big Data Analytics has strongly influenced customer behavior. The use of this systematic review is to be able to explore the potential of the usage of Big Data to offer deep insights into what the market has been watching out for: customer preferences and behaviors. The current literature has already been out to enhance the marketing and customer experiences, but there is more to improve particularly at analyzing how the data-driven economy could be able to affect consumer's trust and loyalty over time. Utilizing the PRISMA methodology, the review synthesizes literature and evaluates the benefits of big data through customer analytics. The systematic review consists of: reviewing and identifying the initial topics, looking at the research questions, identifying the research databases and reading the articles that will be used to write this systematic literature review. The databases that were accessed for this review were as follows: Science Direct, Scopus, Web of Science, Emerald Insight and SpringerLink. The findings ensure that the current knowledge has optimized businesses marketing strategies and transformed customer experiences. It ends with realizing the transformative potential of big data in identifying customer behavior and promoting marketing trends for the growth of the business.*

*Mapping was done using VOS Viewer to visualize keyword relationships for the identification of research hotspots and interdisciplinary applications. Sustainability Switzerland, Procedia Computer Science, and IEEE Access have been found leading sources, thus emphasizing again the convergence of sustainability with digital innovation and industrial practices. It gives an overview of the changing dynamics in supply chain studies and the need for collaboration across disciplines in developing sustainable technology-driven solutions. Advanced technologies and sustainability are core to resilient supply chains that can respond to contemporary global challenges.*

*Keywords*: big data analyrics, sustainability customer behaviour, market trends, systematic analysis

*Paper Reference Code:* ICSET-25147

# Design of an Embedded System for Real-Time Tomato Leaf Disease And Fruit Quality Monitoring

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## ABSTRACT

*Tomato production in the Philippines faces significant challenges due to diseases affecting both leaves and fruits, resulting in yield losses and economic setbacks for farmers. Early and accurate detection of these diseases is essential to mitigating their impact and improving crop yield and quality. This study aimed to develop an embedded system that uses a PTZ camera to detect, classify, and monitor tomato leaf diseases and fruit quality in real time, employing advanced machine learning (ML) techniques. An image dataset, consisting of 3,567 total images, was created, featuring the four most common tomato leaf diseases in the Philippines—Yellow Leaf Curl, Leaf Mold, Early Blight, and Late Blight—along with a Healthy class and two fruit quality categories: Fresh and Rotten. Two object detection algorithms, YOLOv8n and Faster R-CNN, were used to develop the models for the system. Results indicated that the YOLOv8n model outperformed the Faster R-CNN model across all evaluation metrics used in this study. The YOLOv8n model achieved an mAP50 of 89.00%, an F1 score of 79.11%, and an inference speed of 100.60 FPS. However, when optimized for real-time detection by converting to TensorFlow Lite (TFLite) format, there was a notable decrease in mAP50 and F1 scores, with values dropping to 61.10% and 60.91%, respectively. The average FPS of the TFLite model without quantization was 4.10, but with intentional frame-skipping, it increased to 9.05 FPS. Overall, the prototype demonstrates potential as a real-time solution for early disease detection and fruit quality monitoring in tomato farming, offering the possibility of enhancing yield and reducing the need for labor-intensive monitoring.*

*Keywords:* Tomato Disease Detection, Object Detection, Pan-tilt-zoom Control, Real-time Processing

*Paper Reference Code:* ICSET-25148

# Material Reusability In Mine Waste: A Review On Utilization Of Gold Ore Tailings In Concrete Production

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## ABSTRACT

*The rapid urbanization of the world has increased the demand for construction materials and minerals, expediting the extraction of natural resources like natural sand and valuable minerals such as gold. The latter has consequently fast-tracked the production of mine waste, one of which is gold tailings. Considering this situation, the utilization of tailings has been the focus of research in recent years as potential alternatives to construction materials. However, the literature investigating the incorporation of Artisanal and Small-scale Mining Recycled Gold Tailings (ASM RGT) into concrete is currently hard to grasp because of its scarcity. This paper reviews the studies on ore-tailing concrete to understand better how gold ore tailings have been integrated into concrete production. To aid in the scoping review process, the methodology used by O'Flaherty and Phillips was adopted, which was composed of five stages. After applying search terms and criteria for inclusion and exclusion, 16 articles were gathered. Based on the result of the scoping review, the current trend for the implementation of RGT as an alternative for fine aggregates and cement was discovered. RGT exhibited positive results when used as partial replacements for cement and fine aggregates. The research on these wastes has also demonstrated their wide applicability to various concrete structures, among which are Ultra High-Performance Concrete (UHPCs), Autoclaved Aerated Concrete (AACs), Ordinary Portland Cement (OPCs), concrete bricks, and shotcrete. The researchers recommend investigating the properties of RGT to optimize the performance of different concrete structures.*

*Keywords:* Gold Tailings, Fine Aggregates, Concrete, ASM, Environment Risk, Tailings Management

*Paper Reference Code:* ICSET-25149

# Photodegradation Of Methylene Blue Dye Using Natural Hematite From Aqueous Solution

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Mary Donnabelle Baleda [b]

[a] *Institute of Civil Engineering, University of the Philippines, Quezon City, 1101 Philippines*
[b] *Department of Mining, Metallurgical, and Material Engineering, University of the Philippines Diliman, Quezon City 1101 Philippines*
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## *ABSTRACT*

*The present work investigated the use of natural hematite (NH) as a photocatalyst for the degradation and removal of methylene blue (MB) dye from aqueous solutions under UV-C irradiation. Scanning electron microscopy was used to determine the surface morphology of NH. Batch experiments were performed to assess the effect of contact time, catalyst dosage, and pH on the photodegradation efficiency of MB dye. The degradation efficiency of MB dye using UV, NH, NH+UV, NH+ $H_2O_2$, NH+UV+$H_2O_2$ was determined to be 6.24%, 23.73%, 66.14% and 100%, respectively. As the contact time and NH dosage was increased, an improved removal rate of 99.7% at 3.5 g for 120 min under UV light irradiation was attained. Acidic pH environments were found to favor the degradation of MB dye. Results of the kinetic study show the first-order model ($R^2 = 0.971$) can best describe the photocatalytic degradation of MB dye using NH under UV-C irradiation. Overall, this study shows the potential of NH as a cost-effective and sustainable photocatalyst for wastewater treatment.*

*Keywords:* First-order model, Methylene blue, Natural hematite, Photocatalysis

*Paper Reference Code:* ICSET-25150

# Water In Crisis: Case Studies From Rural Bangladesh, Watersheds Of Southern California, And The Ocean In The Philippines

Robert Kurkjian [a*], Matthew Karanian [b]

[a] *Environmental Strategies International, Pasadena, California,*
[b] *Arroyo Seco Foundation, Pasadena, California*
*[robert@phase5environmental.com](mailto:robert@phase5environmental.com)*

## ABSTRACT

*Many drinking water aquifers in Bangladesh are contaminated with naturally occurring arsenic. Because of this, tens of millions of people have been exposed to unsafe levels of this toxic metalloid. Practical solutions to treating contaminated groundwater are expensive and often difficult to implement. Technical solutions are expensive, and when implemented in rural areas, are prone to failure because of inadequate operations and maintenance programs and also because of the unavailability of equipment and supplies. Sustainable solutions have been elusive and populations therefore continue to be exposed to unsafe levels of arsenic. In the mountains of northern Los Angeles, streams have historically sustained native trout populations, which migrated to and from the ocean. However, with the onset of longer and hotter dry seasons and less precipitation, groundwater supplies are stressed. Consequently, more stream water is diverted and more groundwater withdrawn for residential use. As a result, less environmental water is available for trout and other wildlife. Dams and other constructed barriers along the mountain streams trap the fish, making it impossible for them to continue their migration cycle to the ocean. In oceans around the world, including in the Philippines, critical habitats such as coral reefs, sea grass, and mangroves have been impacted by warming temperatures, coastal development, and other human activities. Citizen scientists working with nonprofit organizations are monitoring the changing conditions. The information they gather is shared with stakeholders to assist with education and restoration efforts.*

### Conclusions

*To conserve and protect water resources, sustainable solutions need to be further evaluated and developed. Warming global temperatures are exacerbating water shortages. Organizations working with citizens scientists can be part of the effort to educate stakeholders environmental conditions to assist with developing solutions and advocate for advancing policies to protect public health and restore environmental ecosystems.*

*Keywords: Water, streams, sustainable solutions, fish, conservation and restoration*

*Paper Reference Code:* ICSET-25151

# Status Of Plastic Wastes Management In The Philippines

Maria Antonia Tanchuling [a,b], Benedict Requejo [b], Ezra Osorio [b], Ma. Brida Lea Diola [a]
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## ABSTRACT

*This study describes the status of plastic waste management in the Philippines. Using Mass Flow Analysis (MFA) based on 2019 data, the quantities of plastics produced, consumed, collected, recovered, leaked and disposed are estimated. The resulting MFA shows the points which needs addressing in the waste management value chain to be able to minimize leakage and maximize recycling rates. It is estimated that the total plastic consumption is 2.15 million tons in a year. Out of this amount, only 9 percent is being recycled in the country. The resins that are being recycled are clear PET, hard HDPE, and PP. Low value plastics composed of multi-layer and film plastics are not recovered. The reasons for the low recycling rate can be attributed to multiple factors such as logistical difficulty in collecting wastes from remote areas such as islands, lack of recycling infrastructure, and the highly popular use of multi-layer sachets for packaging single-use products. Despite the enactment of the comprehensive Ecological Solid Waste Management Act in 2000, the study reveals that the plastic leakage rate is high at 33 percent. This can be evidenced by published studies which indicate that the Philippines rank as the 3rd largest contributor to marine plastics.*

*Field surveys conducted in several rivers in the National Capital Region and select tourist islands reveal that plastics abound in the water environment. The typical plastic items found are plastic bottles and caps, shampoo sachets, single-use carrier bags and snack wrappers.*

*The current efforts of different sectors in addressing the plastic waste problem will be presented. Recommendation solutions to minimize plastic leakage will be proposed, which consists of interventions both at the downstream side such as improving waste management infrastructure, and at the upstream side which entails minimizing plastic consumption.*

*Keywords:* solid waste management, marine plastics, leakage, recycling rate

# Streamflow Enhancement And Habitat Restoration In The Arroyo Seco Watershed Of Los Angeles, California

Matthew Karanian [a]*, Robert Kurjian [a,b], Gary Sikkens [a], and Arev Markarian [a]

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[b] *Environmental Strategies International, Pasadena, California*
*[mkaranian@mac.com](mailto:mkaranian@mac.com)*

## ABSTRACT

*The demand for water by the ever-expanding populace of metropolitan Los Angeles has led to a degradation of surface water conditions and a depletion of ground water aquifers throughout the region. The environmental stresses to the region's waters are evident in the Arroyo Seco watershed, where its primary waters have been channelized, obstructed, diverted, and over-consumed.*

*The Arroyo Seco of Los Angeles includes a 47 square mile watershed that stretches from the San Gabriel National Monument in the mountains above Los Angeles, to the urbanized lands of Pasadena and Los Angeles County. The waters of the Arroyo Seco are fed by these mountains. Some of the water recharges the aquifer, and some water eventually finds its way to the Pacific Ocean. Before the waters of the Arroyo can infiltrate the ground or reach the Pacific, however, large volumes are diverted for use by the region's population. This has led to a degradation of the natural habitat, harm to the aquatic life in the waters-- including to a native species of trout-- and a depletion of ground water supplies.*

*Conservation groups are working to mitigate the harm to aquatic life by reducing the impact of streamflow barriers, reducing water diversion intended for residential lawns, and by allowing more water to flow to spreading basins where they can recharge the aquifer. They are also working to mitigate the harm to the region's ecology by educating about the importance of native plants, by mapping the distribution of important native plants in the Arroyo, and by propagating and distributing native plants to replace non-native invasive plants. Groups are removing non-native plants from public lands, to discourage their spread.*

*Watershed and habitat restoration with native plants will help preserve the ecology of the region, encourage the survival of pollinators, and also reduce consumption of our finite water supply.*

*Keywords:* Water, streams, native plants, conservation, and restoration

*Paper Reference Code:* ICSET-25153

# Authors Index

# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES (ICSET 2025)

## ICSET 2025 Working Program
Host: *Edward Jay M. Quinto, PhD*

January 20, 2025  -  Onsite Registration (in front of Maynila Ballroom, Manila Hotel)

January 21, 2025  -  Opening, Plenary Session and Welcome Dinner with Cultural Show *at Maynila Hall, Manila Hotel*

| Time | Details |
|---|---|
| *08:00 - 08:30* | Registration |
| *08:30 - 08:35* | Invocation & National Anthem |
| *08:35 - 08:50* | *Welcome Remarks* **Dodjie S. Maestrecampo, PhD** President & CEO, Mapúa University, Philippines ICSET 2025 Chair |
| *08:50 - 09:05* | *Opening Remarks* **Ming-Chun Lu, PhD** Honorary Chair National Chung Hsing University, Taiwan |
| *09:05 - 09:35* | *Plenary Speaker 1* **Gary Dirks, PhD** Senior Director of Global Futures Laboratory Arizona State University, USA |
| *09:35 - 10:00* | Q & A Online Awarding of Plaque Group Photo (Online and Onsite) |
| *10:00 - 10:30* | Break: AM Snacks Networking |
| *10:30 - 11:00* | *Plenary Speaker 2* **Tsair-Fuh Lin, PhD** Immediate Past President Chinese Institute of Environmental Engineering, Former Vice President for Research and Development Director, Water Quality Research Chair Professor, Department of Environmental Engineering National Cheng Kung University, Taiwan |

# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES (ICSET 2025)

| 11:00 - 11:30 | Plenary Speaker 3<br>**Francisco G. Delfin, Jr., PhD**<br>President & CEO<br>PetroGreen Energy Corporation, Philippines |
|---|---|
| 11:30 - 11:50 | Open Forum |
| 11:50 - 12:00 | Awarding of Plaque to Speakers |
| 12:00 - 13:00 | Lunch Break |
| 13:00 - 13:30 | Plenary Speaker 4<br>**Engr. Adam C. Abinales, CE**<br>President<br>National Association of Mapúa Alumni, Philippines |
| 13:30 - 14:00 | Plenary Speaker 5<br>**Yoshikazu Miyanaga, PhD**<br>President & CEO<br>Chitose Institute of Science & Technology, Japan |
| 14:00 - 14:30 | Plenary Speaker 6<br>**Atty. Joseph John Literal**<br>Assistant General Manager, and Spokesperson<br>Philippine Reclamation Authority, Philippines |
| 14:30 - 14:50 | Open Forum<br>Awarding of Plaque to Speakers |
| 14:50 - 15:20 | MOU Signing<br>1. Philippine Reclamation Authority, Philippines<br>2. Aston University, United Kingdom |
| 15:20 - 15:40 | PM Snacks |
| 15:40 - onwards | Poster & Exhibit Viewing in front of Maynila Ballroom |
| 18:00 - 20:30 | Welcome Dinner with Cultural Show (Please see below Details) |

# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES (ICSET 2025)

## ICSET 2025 Welcome Dinner
*Host: Mr. Patrick Glenn O. Acorin*

**January 21, 2025 - Welcome Dinner & Cultural Show**
*Maynila Ballroom Hall, Manila Hotel*

| | |
|---|---|
| 18:00 - 18:30 | Assembly |
| 18:30 - | **Opening Proper**<br>Welcoming and Parade of Guest and Introduction per Country by Host |
| | **Philippine National Anthem**<br>Mapua Cardinal Singers |
| | **Culture Appreciation Symbolic Activity**<br>Lighting of the Cultural Symbol |
| | **Dinner Ready** |
| | **Traditional Culture Dance**<br>Folklorico Cardinales de Mapua Dance Group |
| | **Original Pilipino Music (OPM) Medley**<br>Mapua Cardinal singers |
| | **"Tinikling" Dance** |
| -20:30 | **Awarding Ceremony of "Best National Costume"** |

# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES (ICSET 2025)

## ICSET 2025 Working Program
*Host: Edward Jay M. Quinto, PhD*

| January 22, 2025 | - Plenary Lecture @ Maynila Hall Parallel Technical Sessions @ Acacia Hall, Sampaguita A, B, & C |
|---|---|
| 08:30 - 08:40 | Recap from Host |
| 08:40 - 09:05 | *Plenary Speaker 7* **Mirjam Roder, PhD** Professor & Director Energy & Bioproducts Institute Aston University, Birmingham, United Kingdom |
| 09:05 - 09:25 | *Plenary Speaker 8* **Alvin R. Caparanga, PhD** Director, Institute of Global Sustainability Dean, School of Graduate Studies Mapúa University, Philippines |
| 09:25- 09:45 | *Plenary Speaker 9* **Engr. Carlito M. Santos, Jr., CE, SE, GE** President & CEO Uniklean Enviro Construction Corp., Philippines |
| 09:45 - 10:00 | Open Forum Awarding of Plaque to Speakers |
| 10:00 - 10:20 | AM Snacks at Respective Session Rooms *Note: Please proceed to your respective meeting room assignments* |
| 10:20 - 12:05 | AM Parallel Technical Sessions (Onsite and Online) *Please see Detailed Program* |
| 12:05 - 13:15 | Lunch Break at Maynila Ballroom Hall |
| 13:15 - 15:00 | PM Session 1 Parallel Technical Sessions (Onsite and Online) *Please see Detailed Program* |
| 15:00 - 15:30 | PM Snacks at Respective Session Rooms |

# INTERNATIONAL CONFERENCE ON SUSTAINABLE ENVIRONMENTAL TECHNOLOGIES (ICSET 2025)

| | |
|---|---|
| 15:30 - 16:30 | PM Session 2 Parallel Technical Sessions (Onsite and Online) *Please see Detailed Program* |
| 16:30 onwards | Please visit https://icset2025.mapua.edu.ph/ for updates |
| 17:30 | End of Poster Viewing |
| **January 23, 2025  -** | **University Networking Tour & Awarding Ceremony** |
| | **University of the Philippines Diliman** **Mapua University, Makati  Extension Campus** |
| 07:20 - 07:30 | Assembly @ Manila Hotel Lobby |
| 07:30 – 09:00 | Travel to the University of the Philippines Diliman, Quezon City |
| 09:00 – 11:00 | Presentations, Networking College of Engineering,  University of the Philippines Diliman |
| 11:00 – 12:15 | Travel to Mapua University Makati Extension Campus Pablo Ocampo Sr. St., Makati City |
| 12:15 – 13:30 | Lunch @ G/F Mapua Makati |
| 13:30 – 15:00 | Campus Tour and Networking Mapua University Makati Extension Campus |
| 15:00 – 14:30 | Awarding Ceremony @ Mapua Cardinal Cinema |
| 14:30 – 17:30 | Back to Manila Hotel |

# ICSET 2025 Parallel Technical Sessions Working Program

| Period | Sampaguita A | Acacia Hall | Sampaguita B | Sampaguita C |
|---|---|---|---|---|
| 10:00 – 10:20 | AM BREAK @ Respective Meeting Room | | | |
| AM Session | Plastics, and Solid Wastes | Advanced Manufacturing, and Responsible Production | Zero Hunger Technology, Sustainable Supply Chain | Disaster Risk Reduction, Climate Action, Water Crisis |
| Speaker/Lead Presenter | Dr. Maria Antonia Tanchuling, UPD | Shaun Angelo C. Aranez, DOST | Muhammad Imran | Dr. Robert Kurkjian |
| Session Chair | Dr. Cybelle Concepcion M. Futalan, UPD | Dr. Aldrin Calderon, MU | Prof. Yu-Wei Chang NTOU | Dr. Robert Kurkjian |
| Session Co-Chair | Dr. Khylle Glainmer Quiton | Dr. Joseph Albert Mendoza | Dr. Michelle Almendrala | Dr. Thaddeus P. Lawas |
| Secretariat Team Coordinator | Xperto Chloie Victoria | Xperto John Paolo Reta | Xperto Billy Joe Bernardo | Xperto Melchora Cabelis |
| 10:20 – 10: 35 | ICSET 25152 | ICSET 25121 | ICSET 25082 | ICSET 25151 |
| 10:35 – 10:50 | ICSET 25011 | ICSET 25041 | ICSET 25058 | ICSET 25048 |
| 10:50 – 11:05 | ICSET 25052 | ICSET 25042 | ICSET 25104 | ICSET 25051 |
| 11:05 – 11:20 | ICSET 25106 | ICSET 25054 | ICSET 25105 | ICSET 25057 |
| 11:20 – 11: 35 | ICSET 25128 | ICSET 25055 | | ICSET 25095 |
| 11:35 – 11:50 | ICSET 25138 | | | ICSET 25117 |
| 11:50 – 12:05 | | | | |
| 12:05 – 13:15 | LUNCH BREAK @ Maynila Hall | | | |

| PM Session A | Infrastructure & Sustainable Communities | Good Health & Well-Being | Energy Efficiency and Sustainable Energy | Supply Chain Optimization & Sustainability |
|---|---|---|---|---|
| Speaker/Lead Presenter | Matthew Karanian | Marineil C. Gomez | Dr. Kalidasan Balasubramanian | Marlon Llana |
| Session Chair | Dr. Francis Aldrine A. Uy | Dr. Jonathan WL Salvacion Philippines | Dr. Kalidasan Balasubramanian Malaysia | Dr. Josephine D. German |
| Session Co-Chair | Dr. Cris Edward F. Monjardin | Dr. Jeremiah Millare | Dr. Blessie A. Basilia | Dr. Klint Allen Marinas |
| Secretariat Coordinator | Chloie Victoria Xperto | Josel Godezano Xperto | Xperto Billy Joe Bernardo | Xperto Melchora Cabelis |
| 13:15 - 13:30 | ICSET 25153 | ICSET 25143 | ICSET 25022 | ICSET 25119 |
| 13:30 – 13:45 | ICSET 25001 | ICSET 25012 | ICSET 25005 | ICSET 25050 |
| 13:45 – 14:00 | ICSET 25023 | ICSET 25066 | ICSET 25007 | ICSET 25081 |
| 14:00 – 14:15 | ICSET 25026 | ICSET 25122 | ICSET 25015 | ICSET 25132 |
| 14:15 – 14:30 | ICSET 25028 | ICSET 25130 | ICSET 25030 | ICSET 25135 |
| 14:30 – 14:45 | ICSET 25094 | ICSET 25150 | ICSET 25014 | ICSET 25080 |
| 14:45 – 15:00 | ICSET 25111 | | ICSET 25045 | |
| 15:00 – 15:30 | PM BREAK @ Respective Meeting Room | | | |
| PM Session B | | Carbon Reduction, Environmental Sustainability | | Geochemistry, Agrogeology, and Geotechnical Eng'g |
| Speaker/Lead Presenter | | Prof. Ruey-An Doong | | Ella Nicole Sarmiento |
| Session Chair | | Dr. Angelo Earvin S. Choi | | Dr. Ma. Carmencita B. Arpa |
| Co-Chair | | Dr. Jacque Lyn Gabayno | | Dr. Loucel E. Cui |
| 15:30 – 15:45 | ICSET 25118 | ICSET 25013 | ICSET 25050 | ICSET 25039 |
| 15:45 – 16:00 | ICSET 25134 | ICSET 25043 | ICSET 25052 | ICSET 25076 |
| 16:00 – 16:15 | | ICSET 25024 | ICSET 25086 | |
| 16:15 – 16:30 | | ICSET 25078 | ICSET 25123 | |

# A] ORAL DECK PRESENTATION

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| **Session Theme: Plastics, and Solid Wastes** | | | | |
| Speaker/Lead Presenter: Dr. Maria Antonia Tanchuling, College of Engineering, University of the Philippines Diliman | | | | |
| Session Chair: Dr. Cybelle Concepcion M. Futalan, College of Engineering, University of the Philippines Diliman | | | | |
| Session Co-Chair: Dr. Khyle Glainmer Quiton | | | | |
| Moderator/Coordinator: Xperto/Crizzle Joy Abad | | | | |
| Venue: *Sampaguita A* | | | | |
| 1 | 25152 | Status of Plastic Waste Management in the Philippines | Maria Antonia Tanchuling, Benedict Requejo, Ezra Osorio, Ma. Brida Lea Diola | Dr. Maria Antonia Tanchuling |
| 2 | 25011 | An Innovative and Multifunctional Chitosan-Based Films from Shrimp Shell Waste Incorporated with Jabuticaba Pomace Extract: Insights into the Inactivation of Escherichia coli | Ying Chen Chen, Chic-Huang Weng, Shang-Ming Huang, Jing-Hua Tzeng, Jenn-Wen Huang, Channat Chokejaroenrat, Yao-Tung Lin | Ying Chen Chen |
| 3 | 25052 | The Effects of Ferric Oxide on Anaerobic Co-digestion of Slaughterhouse Wastewater and Food Waste for Biogas Production | Steffany Marie Nina B. Santos, Kyle Adrienne T. Valenzuela, Michelle C. Almendrala, Louise Grace S. Avena-Ardeta | Kyle Adrienne T. Valenzuela |
| 4 | 25053 | A Detection Method for Floating Debris in Waterways Using YOLOv9 | Jan Edgar E. Tupas, Miguel T. Soniel, Christian Henry Miguel E. Caruz, Darryll B. Babar, John Paul Q. Tomas | Miguel T. Soniel |
| 5 | 25106 | Adsorption of Nitrate in Simulated Contaminated Groundwater Using Activated Carbon from Cassava (*Manihot esculenta*) stem impregnated with NA+ from NaCL Solution | Eden S. Erasga, Rachel Cabilangan, Angel Catherine Pedrigal, Marie Claire Pregnero | Eden S. Erasga |
| 6 | 25128 | Abundance, Spatial Distribution, and Characteristics of Microplastics in the Agricultural Soils of Canlaon City, Negros Oriental, Philippines | Monshyne Cabual, Christine Mae Elnas, Jhon Paul Sullera, Fatim Tubil, Merivic Catada, Abner Bucol, Lilibeth Bucol, Edwin Romano, Jr. | Edwin Romano, Jr. |
| 7 | 25138 | Evaluation of Microwave Power, Irradiation Time, and Ethanol Concentration on Phenolic Extraction from Ripe Mango (*Mangifera indica L.*) Peels Using Box-Behnken Design | Tristan Roy Panaligan, Danielle Raine Acantilado, Julian Cergio Gayagoy, Alainah Pearl Ramos, Jesusino Aquino | Julian Cergio Gayagoy |

| Session Theme: Advanced Manufacturing, Responsible Production |
|---|
| Speaker/Lead Presenter: Shaun Angelo C. Aranez, Department of Science and Technology |
| Session Chair: Dr. Aldrin Calderon, Mapua University |
| Session Co-Chair: Dr. Joseph Albert Mendoza, Mapua University |
| Moderator/Coordinator: Xperto/John Paolo Reta |
| Venue: *Acacia Hall* |

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| 1 | 25121 | Effect of Sodium Hydroxide Etching and Ultraviolet Sterilization on the Compressive Properties of 3D-Printed Polylactic Acid (PLA) Lattice Structures for Cell Ossointegration | Shaun Angelo Aranez, Jenny Lyn Laga, Lumen Milo, Marianito Margarito | Shaun Angelo Aranez |
| 2 | 25041 | DLS-Guided Preparation of Chitosan-Carrageenan Nanoparticle | Carlo S. Emolaga, Lumen C. Milo, Blessie A. Basilia | Carlo S. Emolaga |
| 3 | 25042 | 3D Response Topology Optimization for Surface Finish, Material and Print Time Reduction of FDM Fabricated PLA parts | Charles Edward Alviar, Blessie A. Basilia | Dr. Charles Edward Alviar |
| 4 | 25054 | Enhancing Salago Fiber-Epoxy Composites with Sodium Carbonate Treatment | Frederick Amiel S. Bearneza, Vincent Ian B. De Vera, Carlo S. Emolaga, Jeremiah C. Millare | Carlo S. Emolaga |
| 5 | 25055 | Improving Properties of Nito Fiber-Epoxy Composites with Peracetic Acid Treatment | Precious Gloriel D. Caperocho, Maria Goretti T. Ydulzura, John Alec Mari C. Cosico, Carlo S. Emolaga, Jeremiah Millare | John Alec Mari C. Cosico |

| Session Theme: Zero Hunger Technology & Sustainable Supply Chain |
|---|
| Speaker/Lead Presenter: Muhammad Imran |
| Session Chair: Prof. Yu-Wei Chang, National Taiwan Ocean University, Taiwan |
| Session Co-Chair: Dr. Michelle Almendrala, Mapua University |
| Moderator/Coordinator: Xperto/Billy Joe Bernardo |
| Venue: *Sampaguita B* |

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| 1 | 25082 | Optimization of Ultrasound-Assisted Polysaccharide Extraction from Okra Using Deep Eutectic Solvents: Process Efficiency and Bioactivity | Muhammad Imran, Shang-Ming Huang, Chih-Huang Weng, Yao-Tung Lin | Muhammad Imran |

| 2 | 25058 | Predicting Actual Purchase of Consumers from Online Live Selling Using Neural Network-Based Decision Support Systems: A Case Study in the Philippines | Rommualdo D. Aguas, Jr., John Dave Concepcion, Ardvin Kester S. Ong | John Dave Concepcion |
| 3 | 25104 | Image Classification Model for Data Sentry of Plant Diseases Using Convolutional Neural Networks | Jose B. Lazaro, Jr., John Rafael L. Jocson | Jose B. Lazaro, Jr. |
| 4 | 25105 | Classification and Detection by *Oryza Folia* (Palay Leaf) Disease: A Comparative Analysis with YOLOv5 | Jose B. Lazaro, Kate Carolyn Fernando, Clarenzz Bryan Pinera, Angelica Roll | Jose B. Lazaro, Jr. |

**Session Theme: Supply Chain Optimization & Sustainability**

Speaker/Lead Presenter: Marlon Llana

Session Chair: Dr. Michael N. Young, Mapua University

Session Co-Chair: Dr. Josephine D. German, Mapua University

Moderator/Coordinator: Xperto/Melchora Cabiles

Venue: *Sampaguita C*

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| 1 | 25119 | High Temperature Mechanical Response and Dynamic Phase Transformation Behavior of Carbon Steels: A Concise Review | Marlon Llana, Blessie A. Basilia, Clodualdo Aranas, Jr. | Marlon Llana |
| 2 | 25050 | Assessing the Bioelectric Potential of *Zingiber officinale* (Ginger) Root Extract in an H-Type Double Chamber Microbial Fuel Cell | Anya Guadalupe Abella, Juliana Mae Martinez, Marineil Gomez | Juliana Mae Martinez |
| 3 | 25081 | Service Factor Analysis for Sustainable Operations of Micro-Enterprise Business: A Customer Satisfaction Evaluation for Beauty Salon Shops in the Philippines | Madonna Andrada, Ardvin Kester S. Ong, Michael N. Young | Madonna Andrada |
| 4 | 25132 | Investigation of Drowsiness Detection Using Combined Electroencephalography, Inertial Measurement Unit, and Computer Vision for a Smart Helmet | Ayesha Chryll Ardona, John Jimmy Arseo, Reo Anne Dela Rita, John Roy Dalin, Luis Gerardo Canete | Luis Gerardo Canete |
| 5 | 25135 | Activate Learning on Rural Areas (ALORA): Offline Learning Management System for Elementary Students in Rural Area using RPi and Nose JS Express | Kristine Joyce Ortiz, Aira Dinglasan, Carl Justin Ordiz, David Genesis Pedeglorio | Kristine Joyce Ortiz |
| 6 | 25080 | Solar-Powered Irrigation Monitoring with LSTM-Based Optimization | Adrian Obado, Juliana Diane Tanhueco, Glenn Magwili | Adrian Obado |

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|---|---|---|---|---|
| **Session Theme: Infrastructure and Sustainable Communities** | | | | |
| Speaker/Lead Presenter: Matthew Karanian | | | | |
| Session Chair: Dr. Francis Aldrine A. Uy, Mapua University | | | | |
| Session Co-Chair: Dr. Cris Edward F. Monjardin, Mapua University | | | | |
| Moderator/Coordinator: Xperto/Crizzle Joy Abad | | | | |
| Venue: *Sampaguita A* | | | | |
| Item | Paper Code | Presentation Title | Authors | Presenter |
| 1 | 25153 | Streamflow Enhancement and Habitat Restoration in the Arroyo Seco Watershed of Los Angeles, California | Matthew Karanian, Robert Kurkjian, Gary Sikkens, and Arev Markarian | Matthew Karanian |
| 2 | 25001 | Infrastructure Audit for a Resilient and Sustainable Rapid Visual Inspection of Buildings in the Philippines: USHER RVI App Case Study | Michael B. Baylon, Francis Aldrine A. Uy, Roy G. Gallardo, John Michael M. Villaber | Michael Baylon |
| 3 | 25023 | Design and Implementation of Battery and Motor Health ad Prognosis Maintenance System for E-Trikes | Maria Rafaela Padua, John Lloyd Michael Pangan, Alexander Caesar Parantar, Kristian Carlo Victorio | Maria Rafaela Padua |
| 4 | 25026 | Revitalizing the Historic Urban Landscape of the City of Manila Through Sustainable Urban Planning | Geoffrey Cruz | Geoffrey Cruz |
| 5 | 25028 | Perceptions of Manileno Informal Settlers: Cultivating Sustainable Urban Development Through Natural Language Processing | Danica Mariz B. De Guzman, Maela Madel Cahigas | Dr. Maela Madel Cahigas |
| 6 | 25094 | Raspberry Pi-Based Attendance System Using YOLO and DeepFace | Renz Ricar M. Fajardo, Aliyah T. Laurea, Febus Reidj Cruz | Aliyah T. Laurea |
| 7 | 25111 | Advancing Road Safety and Mobility: Vision AI and Deep Learning for Pedestrian and VRU Real-Time Detection, Pose Estimation, and Tracking in Autonomous Vehicle | Joseph De Guia | Joseph De Guia |
| 8 | 25118 | Advancing Road Safety Through Autonomous Mobility Research: Towards Safe and Robust Sensor-Perception System and Artificial Intelligence in Autonomous Vehicle | Joseph De Guia, Madhavi Devaraj | Joseph De Guia |
| 9 | 25134 | Monitoring of Reinforced Concrete Under Wet-And-Dry Cycling Conditions by Electrical Resistivity Measurements | Kevin Paolo Robles, Jung-Jae Yee, Seong-Hoon Kee | Kevin Paolo Robles |

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|---|---|---|---|---|
| **Session Theme: Good Health and Well-Being** | | | | |
| Speaker/Lead Speaker: Marineil C. Gomez | | | | |
| Session Chair: Dr. Jonathan W.L. Salvacion, Mapua University | | | | |
| Session Co-Chair: Dr. Jeremiah Millare, Mapua University | | | | |
| Moderator/Coordinator: Xperto/Josel Godezano | | | | |
| Venue: *Acacia Hall* | | | | |
| Item | Paper Code | Presentation Title | Authors | Presenter |
| 1 | 25143 | Whole Genome Sequence Analysis of H9N2, H17N10, and H18N11 Bat Influenza A Virus | Brian Harvey Villanueva, Kuo-Pin Chuang, Marineil Gomez | Marineil Gomez |
| 2 | 25012 | Herd Forecasting and Acceptance Analysis of Sustainable Meat Production Through 3D-Bioprinted Meat from Fish Stem Cell | Ardvin Kester S. Ong, Michael N. Young, Josephine D. German, Maela Madel L. Cahigas, Klint Allen A. Marinas | Dr. Ardvin Kester S. Ong |
| 3 | 25066 | Assessment of Extant PCR Primers to SARS-CoV-2 Genomes from the Philippines | Arianne Marie Cortez, Vianne Francesca Fallarme, Jia Judilla, Ramos Palmares, Jr., Marineil Gomez | Marineil Gomez |
| 4 | 25122 | Revita Rogue: A 2D Post-Apocalyptic Survival | John Lawrence L. Frecia, Ervin R. Lacuarta, Zhanelle Kattrice B. Oriola, Adrean Jan G. Quidor, Ms. Charlene I. Vergara-Gonzales, Ma. Carmela M. Racelis, Leonard L. Alejandro | Adrean Jan Quidor |
| 5 | 25130 | Wanderwatch: A Door-Activated Wearable Alert System for Patients with Dementia | Cedrick Von Diones, Chloe Ross Campomanes, Xayida Pasalgon | Cedrick Von Diones |
| 6 | 25150 | Photodegradation of Methylene Blue Dye Using Natural Hematite from Aqueous Solution | Jinin A. Gasalatan, Jeanmeal Sheanne L. Esguerra, Cybelle Concepcion M. Futalan, Mary Donnabelle Balela | Dr. Cybelle Concepcion M. Futalan |

**Session Theme: Energy Efficiency, and Sustainable Energy**

Speaker/Lead Presenter: Dr. Kalidasan Balasubramanian, Sunway University, Malaysia

Session Chair: Dr. Kalidasan Balasubramanian, Sunway University, Malaysia

Session Co-Chair: Dr. Blessie A. Basilia, Mapua University

Moderator/Coordinator: Xperto/Billy Joe

Venue: *Sampaguita B*

| Item | Paper Code | Presentation Title | Authors | Presenter |
|------|-----------|--------------------|---------|-----------|
| 1 | 25022 | Pyrolysis of Tetrapod Energised Phase Change Material: Kinetic and Thermodynamic Analysis Using the Coats-Redfern Technique | Kalidasan Balasubramanian, Adarsh Kumar Pandey, Yogendra Kumar Mishra, Saidur Rahman | Kalidasan Balasubramanian |
| 2 | 25005 | Application of Storing, Avoiding, Removing, Slowing (S.A.R.S.) Action in Enhancing the Building Efficiency and Thermal Environment of a Sports Complex | Sheila V. Elardo, Amiel John M. Parreno | Sheila V. Elardo |
| 3 | 25007 | A Survey on Household Energy Consumption Pattern in an Urban Community in Tondo, Manila | Sheila V. Elardo, Maria Beatrice Portillano, Michelle Jewel Rodriguez | Sheila V. Elardo |
| 4 | 25015 | Empowering Rice Farming Communities in the Philippines Through Sustainable Rice Straw Bioenergy Solutions | Czaneil Gomez, Samuel Sogbesan, Katie Ching, Mirjam Roder | Czaneil Gomez |
| 5 | 25030 | The Effects of Temperature on Biogas Production Rate and Purity | Romeica Noe Z. Ramorin, Christian Mark M. Felix, Roger Jay L. De Vela | Roger Jay L. De Vela |
| 6 | 25014 | Operational Considerations for Direct Coal and Biomas Co-firing in Circulating Fluidized Bed Boilers for Suitable Energy Generation in the Philippines | Renz Lui B. Del Rosario, Jaime P. Honra, Ricky D. Umali | Renz Lui B. Del Rosario |
| 7 | 25045 | Develop a Solar-Powered Fuzzy Logic Control (FLC) Ventilation and Thermoelectric Cooler (TEC)-Based Air Conditioning System | Adrian P. Almarez | Adrian P. Almarez |
| 8 | 25052 | The Effects of Ferric Oxide on Anaerobic Co-Digestion of Slaughterhouse Wastewater and Food Waste for Biogas Production | Steffany Marie Nina B. Santos, Kyle Adrianne T. Valenzuela, Michelle C. Almendrala, Louise Grace S. Avena-Ardeta | Michelle C. Almendrala |
| 9 | 25086 | Evaluation of Various Combination Ratios of Mangosteen Pericarp and Ti- Plant-Based Dyes for Gratzel Cell Efficiency Using Response Surface Methodology | Tristan Roy Panaligan, Alyza Anzano, Bruce Benjamin De Leon, Ronesse Angel Rellin, Jesusino Aquino | Bruce Benjamin De Leon |
| 10 | 25123 | Floating Pico-Hydroelectric Turbine: A Portable Alternative Energy Source for Remote Areas with Flowing Bodies of Water | Maria Carmela Capul, Jhoncell Loyola, Kyla Marie Mostizo, Fiacre Duncan Oida | Maria Carmela Capul |

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|---|---|---|---|---|
| **Session Theme: Disaster Risks Reduction, Climate Action and Water Crisis** | | | | |
| Speaker/Lead Presenter: Robert Kurkjian, PhD - Environmental Strategies International, USA | | | | |
| Session Chair: Robert Kurkjian, Ph.D - Environmental Strategies International, USA | | | | |
| Session Co-Chair: Thaddeus P. Lawas, PhD - University of the Philippines Los Banos | | | | |
| Moderator/Coordinator: Xperto/Melchora Cabelis | | | | |
| Venue: *Sampaguita C* | | | | |
| Item | Paper Code | Presentation Title | Authors | Presenter |
| 1 | 25151 | Water in Crisis: Case Studies from Rural Bangladesh, Watersheds of Southern California, and the Oceans of the Philippines | Robert Kurkjian, Matthew Karanian | Robert Kurkjian, PhD |
| 2 | 25048 | PM 10 Dispersion Modelling Based on Physical Solar Model v3 and Digital Elevation Model from Synthetic Aperture Radar for Environment Management | Kristofer R. Sano, Cris Edward F. Monjardin, Jacque Lynn F. Gabayno | Kristofer R. Sano |
| 3 | 25051 | Predicting Water Availability in the Angat Reservoir in the Philippines Under Climate Change Scenarios Using HEC-HMS | Cris Edward F. Monjardin, Angela S., Parais, John Carlo F. Recta, Kristyll Evanie Wagan, Kevin Paolo Robles | Kevin Paolo Robles, PhD |
| 4 | 25057 | A Sustainable Approach Prediction on Preparation and Mitigation Intention for Flash Flood Using Neural Network-Based Decision Support System | Jan Gabriel Garbo, Terrence Manuel Palad, France Eunice Fabon, Ardvin Kester S. Ong | Terrence Manuel Palad |
| 5 | 25095 | Photogrammetric Survey of Cebu City's Rainwater Catch Basins | Randy Salazar, Everhero Kenneth Ruiz, Yuri Sesican | Randy Salazar |
| 6 | 25117 | Feasibility of TDR Cable Installation with Inclinometer Casing for Integrated Landslide Monitoring | Chia-Ling Chiang, April Mae Enero, Hao-Ruei Jhan, Delia B. Senoro, Chih-Ping Lin | April Mae Enero |

| Session Theme: Carbon Reduction & Environmental Sustainability | | | | |
|---|---|---|---|---|
| Speaker/Lead Presenter: Prof. Ruey-An Doong | | | | |
| Session Chair: Dr. Angelo Earvin S. Choi, De La Salle University | | | | |
| Session Co-Chair: Dr. Jacque Lynn F. Gabayno, Mapua University | | | | |
| Moderator/Coordinator: Xperto/Josel Godezano | | | | |
| Venue: *Acacia Hall* | | | | |
| Item | Paper Code | Presentation Title | Authors | Presenter |
| 1 | 25013 | Enhanced Visible Light-Driven Photodegradation of Enrofloxacin with MXene@g-C3N4/MIL-101(Fe) Heterojunction | Zhi-Fuh Lin, Prashanth Venkatesan, Ruey-An Doong | Ruey-An Doong |
| 2 | 25043 | CFD Simulation: Methane Flow in a Laboratory-Scale Rotary Dryer for Dewatered Sludge in a Municipal Wastewater Treatment Plant | Chris Anthony B. Javier, Jaime P. Honra | Chris Anthony B. Javier |
| 3 | 25024 | Carbon Reduction Technology for Capturing Flue Gas CO2 by Recovering Calcium Ions from Fly Ash | Ming-Chun Lu, Po-Yang Lu | Po-Yang Lu |
| 4 | 25078 | Scalable and Sustainable Carbon-Neutral Autonomous Decentralized DC Grid Configuration for Wide-Area and Broadband Smart Agricultural System | Shunsuke Yoshihara, Sogo Kuroda, Akira Watanabe, Naoto Yoshimoto | Shunsuke Yoshihara |

| Session Theme: Geochemistry, Agrogeology, and Geotechnical | | | | |
|---|---|---|---|---|
| Lead Speaker: Ella Nicole Sarmiento | | | | |
| Session Chair: Dr. Ma. Carmencita B. Arpa, Mapua University | | | | |
| Session Co-Chair: Dr. Loucel E. Cui, University of the Philippines Los Banos | | | | |
| Moderator/Coordinator: Xperto/Melchora Cabelis | | | | |
| Venue: *Sampaguita C* | | | | |
| Item | Paper Code | Presentation Title | Authors | Presenter |
| 1 | 25039 | Numerical Investigation of Dipole Method to Enhance Leak Detection of Landfill Liner | Chong-Yu Huang, Ella Nicole Sarmiento, Ayra Mae M. Mascarina, April Mae P. Enero, Delia B. Senoro, Chih-Ping Lin | Ella Nicole M. Sarmiento |
| 2 | 25076 | Theoretical, Experimental, and Numerical Evaluation of Double Plate Metallic Slit Damper in Reinforced Concrete Frames | John Mark Payawal, Don-Keon Kim, Cris Edward Monjardin, Kevin P. Robles | John Mark Payawal |

# B] ONSITE POSTER PRESENTATION (January 21 – 22, 2025)

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| Coordinator: Eugene P. Lazo, Chloie Anne B. Victoria | | | | |
| 1 | 25025 | Design and Fabrication of Integrated Multi-Channel Nutrient Film Technique (NFT) Hydroponics System and Pico-Hydroelectric Power System | Cyrel Justine Lonzame, Scott Aaron P. Sumagui, Kerwin Ray S. Marbella, Rem Angelo C. Rivera, Reylina Garcia Tayactac, Igmedio F. Isla, Jr., Jaime P. Honra, Ricky D. Umali | Reylina Tayactac |
| 2 | 25027 | Implications of Conducive Learning Environment as a form of Expanded Learning Opportunity in Outcomes-Based Teaching and Learning: An Assessment of the Learning Modality Preference of University Students in General Education Courses | Geoffrey Rhoel C. Cruz | Geoffrey Rhoel C. Cruz |
| 3 | 25031 | Sustainable Energy from the Deep: Assessing OTEC's Feasibility for the Philippines Archipelago | Louiereine C. Penilla | Louiereine C. Penilla |
| 4 | 25032 | Addressing Energy Storage Challenges for Sustainable Power Generation: A Comprehensive Review Focused on the Philippines | Edwin L. Licos, Jr., Ricky D. Umali | Ricky Umali |
| 5 | 25035 | Tri-X Modality Continuance: A Digital Learning Innovation in the Context of the New Normal | Dr. Ma. Janice J. Gumasing | Dr. Ma. Janice J. Gumasing |
| 6 | 25040 | Trends and Emerging Technologies in Marine Sediment Quality Detection: Advances in Acoustic Propagation, eDNA, Remote Sensing, and AUVs | Eiffel Vincent C. Manansala, Delia B. Senoro | Eiffel Vincent C. Manansala |
| 7 | 25044 | Integrating Sustainability with Country Barnading: *Quo Vadis* Philippines | John Xavier S. Chavez | John Xavier S. Chavez |
| 8 | 25049 | Identification of Prevalent Diseases in *Ipomoea Batatas* (Sweet Potato) Plant Using ResNet50 Through Data Augmentation | Elaine Angela Ceballos, Gabriel Esley Javier, Charmaine Paglinawan | Elaine Angela Ceballos |
| 9 | 25053 | A detection method for floating debris in waterways using YOLOv9 | Jan Edgar E. Tupas, Miguel T. Soniel, Christian Henry Miguel E. Caruz, Darryll B. Babar, John Paul Q. Tomas | Miguel T. Soniel |
| 10 | 25056 | Sustainable Business Strategy and Open Innovation Build-Up on Consumer Loyalty from Rewards and Gamification Program | Ardvin Kester S. Ong, Rae Joie N. Alayra, Benedict Christian R. Calimag, Chaed Zaynah Tolentino, Ma. Janice Gumasing | Chaed Zaynah Tolentino |

| 11 | 25059 | A comprehensive analysis of factors impacting user engagement in online adaptive learning systems using machine learning algorithm | Carlos Enrique V. Altamirano, John Matthew S. Elamparo, Ardvin Kester S. Ong | John Matthew Elamparo |
| 12 | 25060 | Understanding Actual Cancel Culture Behavior Using Machine Learning: Examining The Interplay of Gen Z's Justice Perceptions and Behavioral Domains | Cheselle Jan Roldan, Ardvin Kester Ong, John Mark Lorkan J. Cea | Cheselle Roldan |
| 13 | 25067 | Predicting the Philippines' C02 Emissions and its Primary Contributors using Deep Neural Network | Xyryll Kadatuan, Roden Lengson, Rhiane Josephine Tan, Niobi Reign Guinto, Andrei Joshua Catli, Joseph Albert Mendoza | Xyryll Kadatuan |
| 14 | 25068 | Designing a Branch Replenishment System of ABC Company: A case study | Tennessee Khayte Bayot, Klint Allen A. Marinas, Satria Persada | Tennessee Khayte Bayot |
| 15 | 25069 | A Novel Biodegradable Chitosan-based Films Reinforced with Citral Oil Nanoemulsion Encapsulating Anthocyanins with Enhaned Multi-functionalit | Shih-Syuan Lin, Ying-Chen Chen, Girma Sisay, Hsin-Tang Lin, Yao-Tung Lin | Shih-Syuan Lin |
| 16 | 25072 | Baselining carbon emissions in vertical socialized housing using life cycle assessment | Rodel Conti Balbastro | Rodel Conti Balbastro |
| 17 | 25075 | Risk management in adopting green supply chain practices in the manufacturing set-up | Michael Andrew O. Yagin, Klint Allen A. Marinas | Michael Andrew Yagin |
| 18 | 25077 | PaMaNa Ferry Complex: Sustaining a transit network along the blue heritage | Jan Laren B. Bagonoc, Ar. Demetrio D. Alcaraz, Jr. | Jan Laren Bagonoc |
| 19 | 25079 | Advancing Community Resilience Through Sustainable Disaster Management: The Development of TheArk Multi-Sensor Flood Safety and Alarm System | Zachary Rylo Maceda, Maria Angela San Pedro, Madylaine G. Delfin | Zachary Rylo Maceda |
| 20 | 25085 | Multi-Criteria Evaluation of Renewable Energy Supplies of the Luzon Grid using AHP | Alexander Nicole Tan, Joshua Santos, Anak Agung Ngurah Perwira Redi | Alexander Nicole Tan |
| 21 | 25088 | Development of Geiger-Muller survey meter with switching boost converter and ESP8266 microcontroller for public access of environment radiation data through Safecast database | Kristofer R. Sano, Jessie Jaye Balbin, Jacque Lynn Gabayno | Kristofer Sano |
| 22 | 25092 | Design of Poultry Online Market and Breeding Platform Based on User Requirement | Paul Jerome Samosino, Grace Lorraine Intal, Jaymar Solis, Christian Nodado | Grace Lorraine Intal |
| 23 | 25093 | Actual Quantification of 3PL (Third-Party Logistics) Costs in Food Distribution of QSR's (Quick Service Restaurants) in Quezon City | Geoffrey L. Cueto, Yon Andrei C. Lopez, Cris Edward F. Monjardin | Yon Andrei Lopez |

| 24 | 25098 | Development and Application of a Waterproofing Membrane Using Recycled Polystyrene for Enhanced Structural Water and Moisture Protection | Juan Benigno A. Luarca, Gavin John M. Agustin, Juan Emmauel M. Espino, Marlo Benedict A. Pajarillo, and Blessie A. Basilia | Juan Benigno Luarca |
|---|---|---|---|---|
| 25 | 25099 | 3D Printed Shoe Dryer Housing for Durability and Moisture Resistance with PETG | Gabrielle T. Torres, Maxime Alcala, Russel Roy Y. Amor, Ariell D. Lovenia, and Blessie A. Basilia | Gabrielle Torres |
| 26 | 25103 | Determining the Economic Order Quantity (EOQ) of ABC Company's Best – Selling Products using POM-QM for Windows Software | Tennessee Khayle Bayot, Klint Allen A. Marinas, Anak Agung Ngurah Redi | Tennessee Khayte Bayot |
| 27 | 25108 | Optimizing Gasoline Desulfurization: A Multi-Objective Fuzzy Systems Approach | Stephen Correa, Kate Andre Alviar, Angel Nicole Arbilo, Angelo Earvin Choi | Angelo Earvin Choi |
| 28 | 25109 | Smart Corn (*Zea mays indenata*) Analysis Network for Disease Detection through AI | Patcris Moncada, Shiela Tirol, Nino Abao | Patcris Moncada |
| 29 | 25113 | Data Compression in Wireless Sensor Nodes with the Application of Structural Health Monitoring | Juan Gabriel P. Potestades, Meo Vincent C. Caya, Febus Reidj G. Cruz | Juan Gabriel Potestades |
| 30 | 25114 | Evaluating Green Transportation Practices: Assessing Perceptions of E-Bike Adoption on supply Chain Efficiency in Transportation Logistics | Rae Joie N. Alayra, Benedict Christian R. Calimag, Chaed Zaynah C. Toletino, Jodi Marie V. Vistan, Klint Allen A. Marinas | Rae Joie N. Alayra |
| 31 | 25115 | Enhancing thermal comfort and movement in public Markets through informed space syntax approach: A case study of Lipa City Public Market | Angela Nicole Garing, Sierra Margaret Gutierrez | Angela Nicole Garing |
| 32 | 25116 | Artificial Intelligence for Membranes to Derive as Alternative Approach Towards Carbon Neutrality | Yi Liu, Chang Tang Chang | Yi Liu |
| 33 | 25136 | Smartphone Sensing for Road Anomaly Detection in Bicycle Transportation | Thomas Anthony Ortiz, Anton Domini Sta. Cruz, Rob Christian Caduyac | Thomas Anthony Ortiz |
| 34 | 25140 | Upcycling Marine Waste Paints to Sustainable Polymer Blends and Composites | Edgardo Apitana, Michelle Almendrala, Blessie Basilia | Edgardo Apitana |

# C] ONLINE POSTER PRESENTATION (January 22, 2025; 10:00 – 14:00)

| Item | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| Session Chair: Dr. Jacque Lynn F. Gabayno; | | | | |
| Moderator/Coordinator: Xperto | | | | |
| 1 | 25047 | Enhancing Employee Productivity and Satisfaction in Virtual Workplace Environments: Strategies for Improved Collaboration, Communication, and Team Dynamics | Benjamin Bisco, Jr., T.K. Bayot, M.S. Orticio, B.L. Ressureccion | Benjamin Jr. T. Bisco |
| 2 | 25070 | Avian Pro: Intelligent Robot for Philippine Sparrow Detection and Detering using Laser Point | Mae Garcillanosa, Jennifer Dela Cruz, Carl Mariz Bathan, Carlos Lyan De Guzman, Ryan Christian Vidal | Mae Garcillanosa |
| 3 | 25091 | Real-Time Detection of Children Ages 3 to 12 using YOLOv7-Tiny in Raspberry Pi with SMS Notifications | Elaiza hillary C. Apanto, Kallista Coleen T. Antenor, Joseph Bryan G. Ibarra | Elaiza Apanto |
| 4 | 25096 | Factors Influencing the Balance of Career and Academic Pursuit for Young Professionals (Aged 24-29): A Structural Equation Modeling Approach | Anna Pearl B. Iglesia | Anna Pearl B. Iglesia |
| 5 | 25097 | Integrating Sustainability and Quality Management Systems in the Supply Chain Department of a Pizza Chain in the Philippines: A Structural Modelling Approach | Anna Pearl B. Iglesia, Klint Allen A. Marinas | Anna Pearl B. Iglesia |
| 6 | 25101 | Empowering Supply Chain Resiliency through Data Analytics and Advanced Technology Systems for Streamlined Efficiency Among Manufacturers, Distributors, and Suppliers: A Bibliometric Overview | Niña Chayanne M. Caling, Satria Persada | Niña Chayanne M. Caling |
| 7 | 25107 | Integration of YOLOv8 and Gas Sensors (MQ136 & MQ137) for Freshness Classification of Chicken, Pork, and Beef Meat Sample | Amier Nicolette P. Argueza, Maria Sophia Senillo, Marloun Sejera | Amier Argueza/ Senillo |
| 8 | 25124 | Utilization of Agro-based Natural Fiber Composite in Floor Tiles Production | Christian Cyrus Hadlocon, Paul Kenneth Paras, Razzell Dunque, John Ralph Acosta, Johann Heinrich Malongo, Marilou Tomentos | Johann Heinrich |
| 9 | 25125 | Evaluation of Corrosion and Scaling Propensity in Swimming Pool Water through Langelier Saturation Index (LSI) of Selected Swimming Pools in Negros Oriental | Queenie Alayson Ocampo, Raymund Senador, John Deo Soligan, Johann Heinrich Malongo, Geraldine Quinones | Geraldine Quinones |
| 10 | 25137 | Establishing Parameters for Electricity Savings Potential through Targeted Energy Audit: A Case Study in Lanit Jaro Socialized Housing, Iloilo City | John Paul Amada, Sheila Elardo | John Paul Amada |

| 11 | 25141 | Installing a Solar Panel Street Lights with CCTV Camera in Tarlac, Philippines' National Road: A Sustainable Study on Risk Assessment | Mark Alvin Paloma Montino, Klint Allen Marinas | Mark Alvin Montinio |
| 12 | 25142 | Tugon Pangkalikasan: Foundational participatory action research towards building a framework for ecological action | Rodrigo Emil Carreon, Nino Randy Flores | Rodrigo Emil Carreon |
| 13 | 25147 | Big Data Analytics in Customer Behavior and Market Trends: A Systematic Literature Review | Nina Chayanne Caling, Satria Persada | Nina Chayenne Caling |

## D] ONLINE ORAL PRESENTATION (January 22, 2025; 10:00 – 14:00)

| Period | Paper Code | Presentation Title | Authors | Presenter |
|---|---|---|---|---|
| Session Chair: Dr. Jacque Lynn F. Gabayno | | | | |
| Coordinator: Xperto | | | | |
| 10:20 – 10: 35 | 25010 | Assessment of Food Waste in Marikina City's Food Establishments; A Comprehensive Waste Analysis and Characterization Study Towards Effective Food Wastes Management | Nelmar P. Porlaje Shawn Andrei V. Buenaventura Clark Dominique L. Cadion | Nelmar Porlaje |
| 10:35 – 10:50 | 25071 | Strategies for Continuous Improvement in Multinational Maintenance Operations: A Quality Management Perspective | Benjamin T. Bisco, Jr.. Klint A. Marinas | Benjamin T. Bisco, Jr.. |
| 10:50 – 11:05 | 25102 | Vehicle Violation Detection Using Faster R-CNN and SPP-net in Bike Lane Traffic system | Hartford Aaron T. Ang Jaan Gabriel E. Ricaforte John Paul Q. Tomas | Hartford Aaron T. Ang |
| 11:05 – 11:20 | 25112 | Assessing Daylight Performance and Visual Comfort of Shopping Malls in the Province of Cavite, Philippines | Sierra Margaret Y. Gutierez, Angela Nicole D. Garing | Sierra Margaret Y. Gutierez |
| 11:20 – 11: 35 | 25120 | The Impact of Sustainable Packaging on Consumer Attitudes and Purchasing Behavior in the Philippine E-Commerce Market | Alyannah Ysabel V. Almario, Alyssa Grace P. Bernadas, Juliene Danielle P. Maiquez, Rohn Xavier R. Yambot, Klint Allen A. Marinas, and Mary Joyce Nicole Manalo | Mary Joyce Nicole Manalo |
| 11:35 – 11:50 | 25126 | Non-Intrusive Coconut Maturity Characterization using Ultrasonic Wave Analysis with Machine Learning-Based Maturity Level Identification | Ben Cesar I. Cadungog, Ivan Michael Jon Galicia, Rhett Joshua L. Surban, Philip Virgil B. Astillo, Alvin Joseph S. Macapagal | Ivan Michael Jon Galicia |

| 11:50 – 13:15 | | LUNCH BREAK | | |
|---|---|---|---|---|
| 13:15 – 13:30 | 25129 | Plasma Gasification of Municipal Solid Waste from the Philippines: A Simulation and Optimization Study | Peter Julian N. Ungsod, Angelo D. Maalihan, Joseph Albert M. Mendoza | Angelo D. Maalihan |
| 13:30 – 13:45 | 25139 | Temperature Increase in the Philippines: the Case of the 3 Metro Manila Communities | Marie Grace Patadlas | Marie Grace Patadlas |
| 13:45 – 14:00 | 25145 | Application of Value Analysis and Engineering to the Energy Management Sustainability Practices of a Private Academic Institution | Katrina L. Lee Madylaine G. Delfin | Katrina L. Lee |
| 14:00 – 14:15 | 25148 | Design of an Embedded System for Real-Time Tomato Leaf Disease and Fruit Quality Monitoring | Jamaica Jel F. Lopez, Allen Ace R. Uy, Marlon V. Maddara, Vince Jebryl G. Montero | Vince Jebryl G. Montero |
| 14:15 – 14:30 | 25149 | Material Reusability in Mine Waste: A Review on Utilization of Gold Ore Tailings in Concrete Production | Juren Michael B. Padin, Kit Lester P. Balayo, Evan Myles S. Rapanot, Gernelyn T. Logrosa | Gernelyn Lagrosa |
| 14:30 – 14:45 | 25089 | EPC-APL-based Real-Time Filipino Sign Language (FSL) Interactive Tutoring Device | Jesma M. Amit, Coleen Cate P. Francisco, Charmaine C. Paglinawan | Coleen Cate P. Francisco |
| 14:45 – 15:00 | 25036 | Camera-Based Real-Time Indoor Fire and Smoke Detection Device with Integrated SMS and Alarm Notification System | John Patrick De Guzman, Francis Tristan Diaz, Joseph Bryan Ibarra | Francis Tristan Diaz |

# International Organizing Committee

| Name | Affiliation | Country |
|------|-------------|---------|
| COO-Alejandro H. Ballado | Mapua Malayan Colleges Mindanao | Philippines |
| Dr. Robert Kurkjian | Environmental Strategies International | USA |
| Prof. Alvin R. Caparanga | Institute of Global Sustainability, Mapua University | Philippines |
| Prof. Bonifacio T. Doma, Jr. | Mapua University | Philippines |
| Prof. Delia B. Senoro | Mapua University | Philippines |
| Prof. Changha Lee | College of Engineering, National Seoul University | South Korea |
| Prof. Chang-Tang "Robert" Chang | National Ilan University | Taiwan |
| Prof. Maria Antonia N. Tanchuling | College of Engineering, University of the Philippines | Philippines |
| Prof. Meng-Wei "Peter" Wan | Chia Nan University of Pharmacy and Science | Taiwan |
| Prof. Mirjam Roeder | Aston University | United Kingdom |
| Prof. Yao-Tung Lin | National Chung Hsing University | Taiwan |
| Prof. Rajamohan Vasudevan | College of Engineering, Vellore Institute of Technology | India |
| Prof. Ruey-An Doong | National Tsing Hua University | Taiwan |
| Prof. Tsair-Fuh Lin | National Cheng Kung University | Taiwan |

# International Technical Committee

| Name | Affiliation | Country |
|------|-------------|---------|
| Dr. Alben Bagabaldo | US Berkeley | USA |
| Dr. Alvin R. Caparanga | Mapua University | Philippines |
| Dr. Annabelle Vilando | Bicol State College of Applied Science and Technology | Philippines |
| Dr. Angelo Irvin S. Choi | De La Salle University | Philippines |
| Dr. Bibin John | Vellore Institute of Technology | India |
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