ICOET

The International Conference on Ocean Engineering Technology 2025

Blue Economy: Advancing Engineering and Technology

Programme & Abstract Book

5 – 7 AUGUST 2025

UNIVERSITI MALAYSIA TERENGGANU

ICOET
The International Conference on Ocean Engineering Technology 2025
Blue Economy: Advancing Engineering and Technology

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Blue Economy: Advancing Engineering and Technology

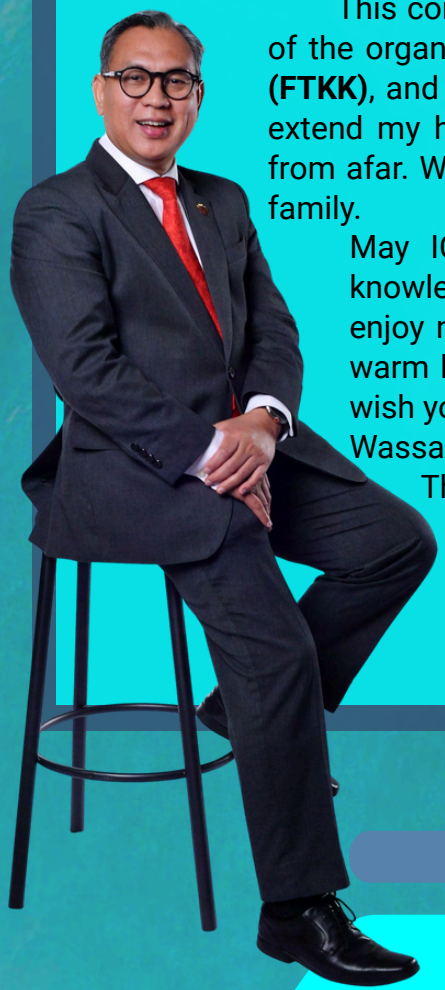
MESSAGE

Message From UMT Vice-Chancellor

Assalamualaikum warahmatullahi wabarakatuh,
Salam Sejahtera and warm greetings to all,

It is with great joy and pride that I welcome you to the **International Conference on Ocean Engineering Technology (ICOET 2025)**, hosted by **Universiti Malaysia Terengganu (UMT)**. We are truly honoured to have you join us here in the beautiful coastal city of Kuala Terengganu, where the sea meets knowledge and innovation.

This year's theme, "*Blue Economy: Advancing Engineering and Technology*," could not be more timely or more important. As we navigate the pressing challenges of climate change, sustainability, and marine resource management, the role of ocean engineering has become more critical than ever. ICOET 2025 provides an excellent platform for academics, researchers, engineers, and industry players from around the world to share their expertise, ideas, and solutions to ensure a sustainable future for our oceans and coastal communities. At UMT, we have always placed a strong emphasis on advancing marine-based science and technology. Hosting this conference reflects our deep commitment to not only academic excellence but also to fostering meaningful global partnerships. We are proud to bring together bright minds and passionate individuals who are collectively pushing the boundaries of innovation in maritime and ocean engineering.



This conference would not be possible without the dedication and hard work of the organizing committee from the **Faculty of Ocean Engineering Technology (FTKK)**, and the contributions of all speakers, presenters, and participants. I also extend my heartfelt appreciation to our international guests who have travelled from afar. We are delighted to welcome you to our shores and into our academic family.

May ICOET 2025 be a memorable experience for all. One filled with knowledge exchange, inspiring discussions, and new friendships. I hope you enjoy not only the academic programme but also the cultural richness and warm hospitality that Terengganu has to offer. Thank you once again, and I wish you a successful and rewarding conference.

Wassalamualaikum warahmatullahi wabarakatuh.

Thank you.

Prof. Ir. Ts. Dr. Mohd Zamri bin Ibrahim
Vice-Chancellor Universiti Malaysia Terengganu

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Message from the Dean FTKK

Assalamualaikum warahmatullahi wabarakatuh and greetings,

Distinguished guests, invited speakers, and valued participants, welcome to the International Conference on Ocean Engineering Technology (ICOET 2025), organized by the Faculty of Ocean Engineering Technology, Universiti Malaysia Terengganu.

With the theme "Blue Economy: Advancing Engineering and Technology," this conference reflects our commitment to sustainable thinking, high-impact innovation, and the development of balanced and resilient technology and engineering. In an increasingly complex and challenging world, mastering the latest technology and applying responsible innovation in engineering are key to global progress and well-being.

In the three-day conference, participants will have the opportunity to engage in scientific presentations that will strengthen knowledge and foster cross-disciplinary collaboration. I hope that the exchanges here will spark more progressive research and provide relevant solutions to global issues.

I would like to extend my sincere congratulations and appreciation to the organizers for the successful hosting of this conference. ICOET 2025 is not only an academic platform but also a dynamic space that unites researchers, academics, postgraduate students, and industry representatives from various backgrounds to exchange ideas, share knowledge, and build strategic collaborations for the advancement of future technologies.

I am truly proud of the commitment and dedication of all those involved in making ICOET 2025 a success, including the speakers, sponsors, volunteers, and the organizing committee who have worked tirelessly behind the scenes.

In conclusion, I hope that every participant will leave with not only knowledge and inspiration but also the motivation to continue striving for meaningful change. May ICOET 2025 be a catalyst for global research networks and a more sustainable and inclusive future.

Welcome, enjoy the conference, and I wish you all the best!

Thank you.

Prof. Ir. Dr. Mohammad Fadhli Ahmad
Dean
Faculty of Ocean Engineering Technology
Universiti Malaysia Terengganu

Message From Chairman

Assalamualaikum warahmatullahi wabarakatuh and Greetings,

Distinguished guests, speakers, participants, and colleagues,
On behalf of the Faculty of Ocean Engineering Technology, Universiti Malaysia Terengganu, and the organising committee, it is my honour to welcome all of you to the International Conference on Ocean Engineering Technology 2025 (ICOET 2025).

The strong interest and support from past ICOET conferences have encouraged us to continue this event on a biennial basis. This conference marks our effort to provide a platform for sharing knowledge, exchanging ideas, and building collaborations in the fields of ocean engineering, maritime technology, and environmental studies. The theme for our 1st ICOET is *Blue Economy: Advancing Engineering and Technology*. We are pleased to see such strong participation this year, with 49 researchers from Malaysia, Indonesia, Bangladesh, Pakistan, Egypt, and Spain. We are honoured to welcome four distinguished speakers and eight invited experts who will be sharing their insights and expertise throughout the event.

We are especially grateful to have the Laksamana Muda Dato' Ir. Ts. Mohd Shaiful Adli Chung Abdullah officiate the opening of ICOET 2025. His presence reflects the university's commitment to supporting academic excellence and research development.

One of the main goals of this conference is to ensure that the work presented is not only shared but also documented. Therefore, selected papers will be considered for publication in a Scopus-indexed journal after undergoing a strict review process in line with the journal's standards and guidelines.

I would like to take this opportunity to extend my sincere appreciation to the organising committee, whose efforts have been crucial in making this event a reality. I also thank the faculty members of the Faculty of Ocean Engineering Technology for their continuous support throughout the preparation process. Our sincere appreciation also goes to the keynote speakers, reviewers, advisory board members, participants, and sponsors. Your support and commitment are truly valued and have played a significant role in the success of this conference.

To all participants, I hope this conference will be a valuable and engaging experience. May it spark new ideas, foster meaningful discussions, and lead to lasting collaborations.
Thank you and Wassalam

Assoc. Prof. Dr. Ahmad Faisal bin Mohamad Ayob
Chairman of ICOET2025

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The International Conference on Ocean Engineering Technology 2025

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PLENARY SPEAKER

Plenary Speaker Biography

Laksamana Muda Dato' Ir. Ts. Mohd Shaiful Adli Chung Abdullah
Royal Malaysian Navy

Laksamana Muda Dato' Ir. Ts. Mohd Shaiful Adli Chung Abdullah has been the Chief Engineer of the Royal Malaysian Navy since 2018 and has served for 38 years. Graduated with a Bachelor of Mechanical Engineering with First Class from UTM, and a Master of Science Engineering with Distinction in Project Management from the University of New South Wales, Australia. Currently, he has 3 design rights registered under the Copyright Act. Throughout his service, Dato' Adli Chung has been the brainchild of various initiatives, programs and continuous improvements beyond the call of duty. Among them are Repowering, SMART Contract, SMART Refit, Obsolescence Program – OP, Re-Hull, ReCap. The initiative has successfully generated savings of up to RM500 million to the Government. Based on these high-impact achievements, in 2021 he was awarded the Navy Commander's Commendation Medal (PTL Commendation), which is the highest award and recognition in the RMN. He was also the first ATM member to be awarded the State-Level Maal Hijrah Figure, where he was crowned as the Hisbah Category Maal Hijrah Figure by the Melaka State Government in 2024.

Plenary Speaker Abstract

Laksamana Muda Dato' Ir. Ts. Mohd Shaiful Adli Chung Abdullah
Royal Malaysian Navy

BLUE ECONOMY: ADVANCING ENGINEERING AND TECHNOLOGY

The Blue Economy is central to Malaysia's sustainable development, leveraging its position as a maritime nation endowed with vast marine resources and strategic geographic advantage. In 2023, the United Nations Conference on Trade and Development (UNCTAD) ranked Malaysia fifth globally in the Liner Shipping Connectivity Index (LSCI), underscoring the country's strength in maritime logistics and infrastructure—core enablers of the Blue Economy.

Malaysia's maritime sectors extend beyond traditional activities such as shipping and fisheries to include offshore oil and gas extraction, maritime transport encompassing aerial logistics, marine tourism, maritime finance and coastal activities. These diverse sectors contribute substantially to the national GDP and spearhead Malaysia's ambition to position itself as a competitive and one of leading maritime hub in Southeast Asia.

Defence-related industries play an important role in supporting the Blue Economy, especially through engineering eco-system, namely as maintenance and repair (MRO) and Shipbuilding and Ship Repair (SBSR) couple up with current technologies on AI, UAV, and USV also help to boost Malaysia's economic growth. Nevertheless, the growth of the Blue Economy faces challenges from complex geopolitical and infrastructure issues. The ongoing South China Sea dispute, with overlapping claims including China's 'Nine-Dash Line', threatens Malaysia's Exclusive Economic Zone and affects resource security, maritime sovereignty, and regional for
stability. Concurrently, Thailand's developing land bridge project which and alternative could divert shipping traffic away from the Strait of Malacca, creating economic competition for Malaysia's key maritime routes. Facing both significant challenges and promising opportunities, Malaysia is at a critical crossroads. By strengthening regional cooperation, advancing technological capabilities, and building geopolitical resilience, Malaysia can fully unlock its Blue Economy potential. These efforts are essential not only for securing maritime sovereignty and economic growth but also for ensuring a sustainable and prosperous future for Malaysia's marine resources which will be covered in the session.

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KEYNOTE SPEAKER

Keynote Speakers

Prof. Dato' Dr. Kamaruzzaman Sopian
Universiti Teknologi PETRONAS
Malaysia

Prof. Dr. Mohamed Khayet
University Complutense of Madrid,
Spain

Prof. Drs.Ec. Ir. Riyanarto Sarno
Institut Teknologi Sepuluh Nopember,
Indonesia

Prof. Dr. Omar bin Yaakob
Universiti Teknologi Malaysia
Malaysia

Keynote Speaker Biography

Prof. Dr. Omar bin Yaakob
Universiti Teknologi Malaysia
Malaysia

Dr. Omar holds bachelor's, master's, and Ph.D. degrees from the University of Newcastle, UK. He began his academic career in 1983 as an assistant lecturer at Universiti Teknologi Malaysia (UTM), rising to senior professor in 2019. He has served on the UTM Senate and Board of Directors and is currently an adjunct professor in UTM's Faculty of Mechanical Engineering. Internationally, Dr. Omar is a Fellow of the Royal Institution of Naval Architects (RINA) and a UK Chartered Engineer (CEng). He actively contributes to RINA's Marine Environment Committee and is a pioneer in Malaysia's ocean renewable energy research. His expertise has influenced national policy through roles such as membership in MOSTI's Renewable Energy Sub-Committee. In 2012, he represented Malaysia at the UN Consultative Process on Oceans and the Law of the Sea. A founding member of SEAcORE, he also participates in the IOC-Westpac Working Group on Marine Renewable Energy and the Asian Wave and Tidal Energy Conference (AWTEC) committee. Nationally, he holds key appointments, including National Advisory Council for Education (NACE), Ministry of Education, National Task Force on Marine Environment, Ministry of Transport, and Malaysian Expert Group for IMO Gas Emission Control. Dr. Omar has represented Malaysia in IMO meetings on shipping energy efficiency and environmental policies. He is also a founding Fellow of the Academy of Professors Malaysia.

Keynote Speaker Abstract

Prof. Dr. Omar bin Yaakob
Universiti Teknologi Malaysia
Malaysia

FROM POTENTIAL TO PRACTICAL: REIMAGINING OCEAN ENERGY FOR MALAYSIA

This presentation explores the potential and challenges of ocean renewable energy (ORE) development in Malaysia, with a focus on realistic and locally adapted strategies. It introduces the main ocean energy sources—tidal range, ocean currents, waves, thermal gradients, and salinity differences—alongside their respective technologies such as tidal barrages, current turbines, wave energy converters, ocean thermal energy conversion (OTEC), and salinity gradient systems like reverse electrodialysis and pressure-retarded osmosis. While countries such as France, South Korea, China, and Canada have achieved operational full-scale projects, Malaysia faces significant limitations due to low resource density. Most Malaysian sites exhibit insufficient tidal ranges and weak wave energy flux, and areas with strong tidal currents are either remote or constrained by narrow channels, making large-scale energy harvesting technically and economically unfeasible. Compounding these issues are problems with unreliable data, overestimated projections, and lack of methodological rigor, which contribute to overly optimistic expectations. To address this, the presentation stresses the importance of distinguishing between theoretical, technical, and practical resource potential, and advocates for locally viable hybrid systems that combine various marine and solar technologies for remote or island communities. Universiti Teknologi Malaysia (UTM) has developed several lab-scale prototypes—including oscillating water columns, point absorbers, and Savonius-type turbines—now integrated into a Combined Ocean Renewable Energy System (CORES). Emphasis is also placed on matching energy devices to local environmental conditions, as imported systems often underperform. The presentation concludes with a call for strong government support, sound policy frameworks, and integrity in research, stressing that small-scale, hybrid, and localized ORE solutions—especially OTEC in regions like Sabah—hold the most promise for Malaysia's renewable energy landscape.

Keynote Speaker Biography

Prof. Dato' Dr. Kamaruzzaman Sopian
Universiti Teknologi PETRONAS
Malaysia

Prof. Dato' Dr. Kamaruzzaman Sopian is a renowned academic and researcher in renewable energy, currently serving as Professor of Mechanical Engineering at Universiti Teknologi PETRONAS (UTP). He is currently the Head of the Centre for Renewable Intelligent Sustainable Power, at UTP. With over three decades of experience, his work has focused on solar energy systems, hybrid renewable integration, energy efficiency, and sustainable cooling technologies. He has led numerous national and international research collaborations in photovoltaic-thermal (PVT) systems, solar-assisted heat pumps, hydrogen energy, and innovative energy storage solutions. His research aims to address real-world challenges in decarbonization, climate resilience, and energy access, especially within the context of tropical and developing regions. Prof. Sopian has published more than 600 peer-reviewed papers and is one of Malaysia's most cited researchers in the field of renewable energy. He has been listed among the world's top 1 % most influential scientists and recognized as a Web of Science Highly Cited Researcher from 2019 to 2023. His scientific excellence has earned him numerous awards, including the World Renewable Energy Network Pioneer Award, the Islamic Development Bank Prize for Science & Technology, the ASEAN Energy Awards, and the Malaysia Green Technology Award. He regularly advises governmental bodies and international agencies on energy transition policies and renewable energy deployment. Prof. Sopian remains committed to advancing clean energy technologies and building resilient, inclusive energy systems that support global net-zero carbon goals.

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Keynote Speaker Abstract

Prof. Dato' Dr. Kamaruzzaman Sopian
Universiti Teknologi PETRONAS, Malaysia

SOLAR PHOTOVOLTAIC-THERMAL (PVT) TECHNOLOGIES: INTEGRATING POWER AND HEAT FOR NET-ZERO ENERGY SYSTEMS

Photovoltaic-Thermal (PVT) technologies are a powerful solar energy system revolution with the capability of delivering electricity and useful thermal energy from a single integrated collector in parallel. The revolutionary potential of PVT systems is explored in this keynote address in an effort to untap net-zero energy targets, particularly in applications with combined electrical and thermal loads such as buildings, industry, agriculture, and data centers. The presentation emphasizes cutting-edge innovation in PVT collector design, such as hybrid air- and water-based systems, nanofluid and phase change material (PCM) augmentation, and passive cooling technologies. Case studies and model results illustrate the efficiency improvement, enhanced energy yield, and lifecycle cost savings realized from integrated PVT applications versus single-purpose PV or thermal installations. The presentation also addresses deployment strategy for various climatic regions, including tropical and desert climates, and speaks about the potential of PVT in enabling decentralized, resilient, and inclusive energy infrastructure. PVT technologies offer a scalable and sustainable pathway to an integrated, resilient, and net-zero energy system by combining thermal recuperation with electricity generation.

Keynote Speaker Biography

Prof. Dr. Mohamed Khayet
University Complutense of Madrid, Spain

Dr. Mohamed Khayet is the director of the “Membranes and Renewable Energies (MER)” Research Group at the University Complutense of Madrid (UCM), Professor (Applied Physics Area) at the Faculty of Physical Sciences (UCM) (Department of Structure of Matter, Thermal Physics and Electronics), and Associated Researcher in Madrid Institute for Advanced Studies on Water (IMDEA Water). He obtained his Ph.D. (1997) in Physical Sciences and has carried out various research stays in international institutions (Industrial Membrane Research Institute in Ottawa, Canada; Institute of Nuclear Chemistry and Technology in Warsaw, Poland; Centre for Clean Water Technologies at the University of Nottingham in UK; Singapore Membrane Technology Centre and Nanyang Technological University in Singapore, Yale University in New Haven, USA; University of California Berkeley in USA, etc.). Among other grants, he obtained the Fulbright Grant (2019). He is an expert in membrane science, nanotechnology, and renewable energy. He has coordinated several national and international projects funded by different institutions (European Union, Middle East Desalination Research Centre, Spanish Ministries, Companies such as Abengoa, etc.) on membranes and modules engineering for different separation processes. He published over 200 papers in international journals, filed 6 International Patents, published 5 books, and various book chapters in the field of membrane science and related technology. Among other recognitions, he was awarded the Prince Sultan Bin Abdulaziz International Prize for Water (PSIPW) in 2012. He edited various special issues in international journals such as Desalination, Polymers and Membranes. He acted as Editor of the international Journal “Desalination” (2018-2022) and served as associate editor of different journals. Currently, he is a member of the Editorial Board of various journals related to water treatment, renewable energy, nanotechnology, membrane science, and separation processes.

Keynote Speaker Abstract

Prof. Dr. Mohamed Khayet
University Complutense of Madrid, Spain

ADVANCES IN MEMBRANE ENGINEERING FOR DESALINATION BY MEMBRANE DISTILLATION

Seawater desalination is considered the most sustainable and economical technology for drinking water production. Currently, the desalination market is mainly dominated by thermal distillation (TD) and reverse osmosis (RO) technologies. However, TD is energy-intensive, and although RO specific energy consumption is very low (1.8 kWh/m3), its recovery factor is only 50% due to technical limitations. Furthermore, RO has a high environmental impact due to the discharged brines. For these reasons, there has been a huge interest in developing new technologies that could be driven by low-exergy sources (e.g., waste heat, solar energy) such as Membrane Distillation (MD). This can be operated at atmospheric pressure; it is not limited by the osmotic phenomena (i.e., it can treat high saline waters up to their saturation, approaching zero liquid discharge, ZLD); and can achieve water recoveries greater than 85%. However, MD technology has not yet been widely implemented at an industrial level, mainly due to two major challenges: i)- Lack of membranes specifically designed for MD, and ii)- Temperature and concentration polarization phenomena that reduce MD thermal efficiency and water production rate. In this keynote, after the introduction of the current state of MD technology and its membrane engineering, some case studies of nanofibrous-engineered membranes with different materials, structures, and characteristics will be presented. These include mixed matrix, surface modified, nature-inspired, solar or photothermally-heated membranes, and recycled end-of-life RO membranes and discarded modules contributing to the long-awaited circular economy and sustainability in membrane science and the water sector.

Keynote Speaker Biography

Prof. Drs.Ec. Ir. Riyanarto Sarno
Institut Teknologi Sepuluh Nopember, Indonesia

An experienced computer science professor with more than 600 publications and many international and national researches. He graduated M.Sc and Ph.D in Computer Science in 1987 and 1992, respectively. He was promoted as a full professor in 2003. He has been invited as Keynote Speakers in national and international conferences as well as workshops. He is also an experienced consultant in Information System Audit, Governance and Policies. His research interests include Artificial Intelligence in Health Applications, Big Data, Internet of Things, Intelligent Business Processes, and Smart Grids. He has established many international academic collaborations in computer science areas. He received many awards, such as: the most productive publications from the Minister of Higher Education and Research Indonesia in 2019; the most productive Scopus publications from the Minister of Higher Education and Research Indonesia in 2020; top 2% World Ranking Scientists by Stanford University in 2020 to 2024; the Hitachi Award in 2023; and many other awards from universities. The h-index Scopus 32, and Google Scholar 43.

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Keynote Speaker Abstract

Prof. Drs.Ec. Ir. Riyanarto Sarno
Institut Teknologi Sepuluh Nopember, Indonesia

MACHINE LEARNING, DEEP LEARNING AND GENERATIVE ARTIFICIAL INTELLIGENCE FOR ELECTRONIC NOSE IMPLEMENTATION

Research and development of Electronic Nose implementations have been growing very fast. In this presentation, the electronic nose design, signal preprocessing and signal processing will be elaborated. Signal preprocessing requires analysis of signal filtering and removing signal outliers. Signal processing requires machine learning methods and deep learning methods and generative artificial intelligence. The electronic nose systems have been implemented for classifying: (i) pork, beef, chicken and lamb ; (ii) chivet coffee and natural coffee; (iii) the ripeness of fruits; (iv) green tea; (v) Covid-19; (vi) chronic obstructive pulmonary disease (COPD); (vii) ashma; (viii) tuberculosis. The electronic nose sensors can generate information signals which often include noises. Several types of noises include spikes, baseline drift, low-frequency noise, white noise and artifact noise. An optimal filtering method is required to remove the noise during the preprocessing. The filtering methods are low-pass filter, high-pass filter, band-pass filter, Notch filter. Common filter algorithms are also employed, such as moving average filter, Savitzky-Golay filter, and Kalman filter. Metrics for evaluating filter performance are Root Mean Squared Error (RMSE), Signal-to-Noise Ratio (SNR), Peak Signal-to-Noise Ratio (PSNR), Mean Absolute Error (MAE). Also, metrics for evaluating filter effectiveness are noise reduction, signal preservation, distortion. The methods for processing electronic nose signals include machine learning methods deep learning methods and generative artificial intelligence. The signal processing can be in time domain and frequency domain. Fourier transform is used to convert a signal from time domain to frequency domain. Then, spectral analysis is used to analyze the frequency content of a signal. Machine learning consists of supervised learning[24], unsupervised learning and Reinforcement learning. Deep Learning consists of Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Generative Adversarial Networks (GAN), Autoencoder, Long Short-Term Memory (LSTM), and Deep Reinforcement learning.

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INVITED SPEAKER

ICOET2025 Invited Speakers

Dr. Mohd Nor Faiz Norrrahima
Universiti Pertahanan Nasional Malaysia
Title:
Nanocellulose for Maritime Innovation: Advancing Applications

Mdm Sri Widias Tuti Asnam Rajo Intan
Malaysian Industry-Government Group for High Technology Malaysia
Title:
Malaysian Shipbuilding /Ship Repair Industry Outlook

Komander Ir. Dr. Arman Ariffin
Royal Malaysian Navy
Title:
Organisational Restructuring for Effective Defence Capability Development in Malaysia's Maritime Security Context

Assoc. Prof. Dr. Nazaitulshila binti Rasit
Universiti Malaysia Terengganu Malaysia
Title:
Innovative Supplementation for Sustainability: Copperas and Its Role in Boosting Biogas Generation from Anaerobic Digestion

ICOET2025 Invited Speakers

Prof. Dr. M.Iqbal Saripan
Universiti Putra Malaysia
Title:
Region-Based Subtraction of Relationship Array (R-SoRA) Algorithm for Efficient Stereo Matching for Stereo Vision System

Prof. Ir. Dr. Fauziahanim Che Seman
Universiti Tun Hussein Onn
Title:
Propagation Studies And Performance Evaluation Of LoRa Heltec Modules In Suburban And Challenging Environments

Assoc. Prof. Dr. Mohd Asamudin A. Rahman
Universiti Malaysia Terengganu
Title:
Vortex-Induced Vibration: From Engineering Fundamentals to Renewable Ocean Energy

Prof. Ts. Dr. Aeslina Abdul Kadir
Universiti Tun Hussein Onn
Title:
Upcycling Hazardous Waste into Building Materials: Investigating Engineering Properties and Leaching Behaviour for Sustainable Development


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ACADEMIC WORKSHOP

Workshop Foundation of Data Analysis in Applied Science

The ability to analyze and interpret data is an important skill in both academic study and professional practice. This course introduces students to key statistical methods, including data visualization, hypothesis testing, t-tests, ANOVA (analysis of variance), correlation, and regression analysis. These tools are essential for making informed, evidence-based decisions in various fields. A distinctive feature of this course is the use of appropriate software for data analysis. Data visualization will be conducted using the R programming language, which is widely used for its ability to produce high-quality and reproducible graphs. Students will learn the basics of R and how to create visual representations that help reveal patterns and trends in data.Other statistical techniques—such as hypothesis testing, t-tests, ANOVA, correlation, and regression—will be carried out using Microsoft Excel, which offers practical tools and functions suitable for beginner-level statistical analysis. Students will work with real datasets and case studies to strengthen their understanding of how these methods apply to real-world problems. By the end of the course, students will be able to choose and apply the right statistical methods, understand and interpret the results, and communicate their findings clearly through visual and written formats.

This course is suitable for students from various backgrounds, including science, business, environment, and social sciences, who wish to develop strong data analysis skills for academic or career purposes.

Dr. Ku Mohd Kalkausar Ku Yusof
Speaker of Workshop Foundation of Data Analysis in Applied Science

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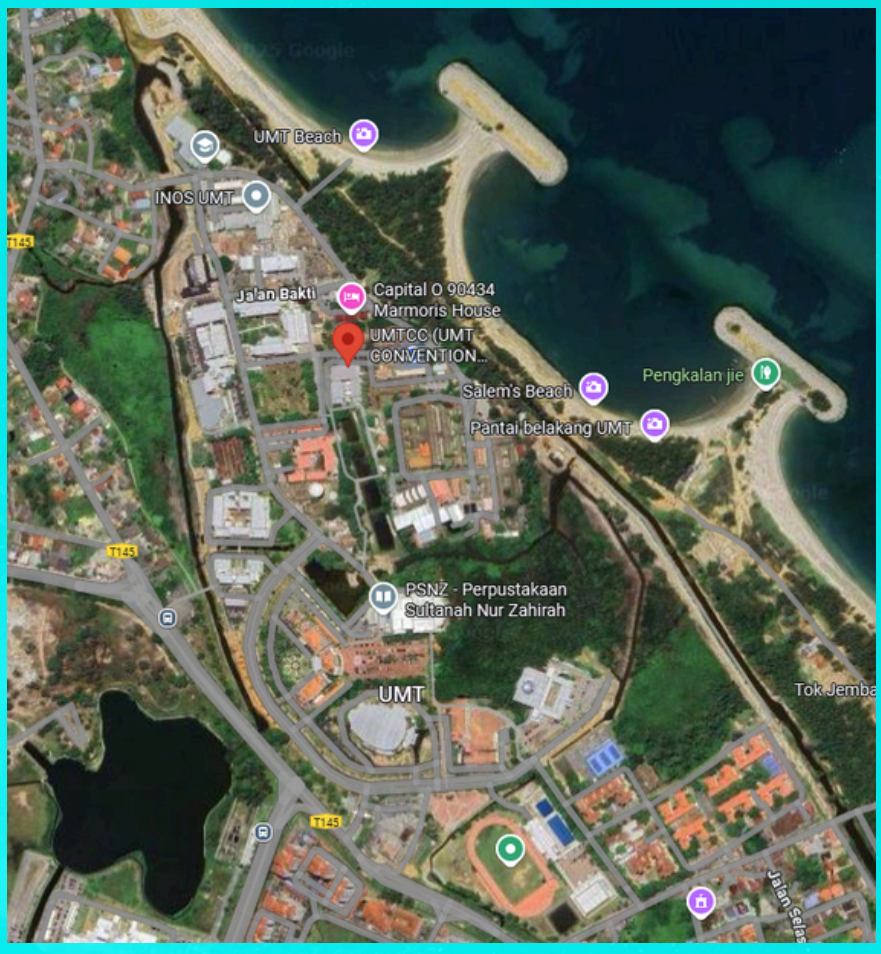
MAP & VENUE OF ICOET2025

ICOET2025 MAP



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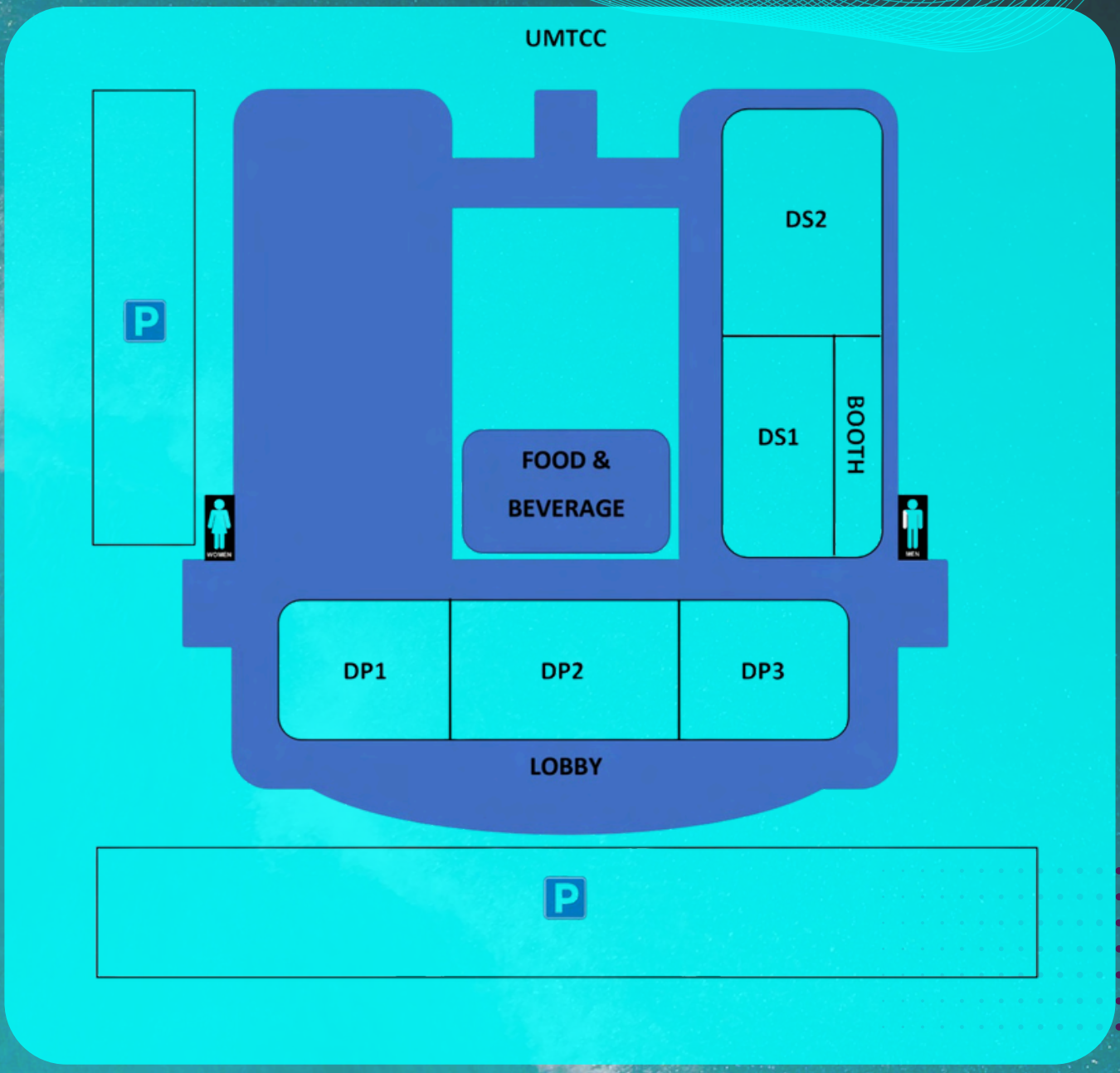
ICOET2025 VENUE



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PROGRAM SCHEDULE

PROGRAM SCHEDULE

Date : 5 - 7 August 2025 (Tuesday-Thursday)
Time : 8.00 a.m. – 5.30 p.m
Venue : UMT Convention Center (UMTCC)

DAY 1 - 5th August 2025 (Tuesday)

Malaysia Time (MYT / UTC+8)	Agenda	Venue and remarks
9 am– 12.30 pm	Registration (up to 11.00 am for participants joining Cultural Visit)	UMTCC
9 am- 12.30 pm	Workshop: Introduction to Environmental and Applied Science Data Analysis	CAD Lab (Parallel with Excursion at Lambo Sari)
11.00 -11.30 am	Departure to Lambo Sari, Seberang Takir	
11.30 am -1 pm	Cultural Visit	LamboSari , Seberang Takir Packed lunch provided at Lambo Sari
1.00 – 2.00 pm	Lunch and Solat Break	
2.00 – 3.30 pm	Cultural Visit	
3.30 – 4.00 pm	Depart to Terengganu Drawbridge	
4.00 – 5.30 pm	Free and easy at Terengganu Drawbridge	Drawbridge Kuala Terengganu
5.30 pm	Depart to UMT End of Day 1	

PROGRAM SCHEDULE

DAY 2 - 6th August 2025 (Wednesday)

Malaysia Time (MYT / UTC+8)	Agenda	Venue/ remarks
8.15 - 9.00 am	Registration and Arrival of Guests (Breakfast provided)	UMT Convention Centre & Seminar Rooms (DS2, DP2, DP3)
9.00 – 10.00 am	Invited and Oral Presentation Sessions (2 parallel sessions) Invited: 1. Prof. Madya Dr. Mohd Asamudin A Rahman (Room: DP2) 2. Prof. Madya Dr. Nazaitulshila Rasit (Room: DP3) Oral Presentation Sessions	
10.20 – 11.15 a.m	**Opening Ceremony of ICOET 2025:** • National Anthem and UMT Cita Warisan • Doa Recitation • UMT Corporate Video • Welcoming Remarks by The Honourable Prof. Suriyani binti Muhamad, Deputy Vice Chancellor (Academic and International), Universiti Malaysia Terengganu	
11.15 – 11.45 p.m	Plenary Talk and Opening Ceremony by The Honourable Laksamana Muda Datuk Ir. Ts. Shaiful Adli Chung *Tentera Laut Diraja Malaysia*	
11.45 – 11.50 p.m	• Montaj	
11.50 - 12.00 p.m	MoU Signing Ceremony between Caidmark Sdn Bhd and UMT Startup VGS Labs Sdn Bhd	
12.00 – 12.30 p.m	**Keynote Speech 1** Prof. Dr. Omar Bin Yaakob Track 1: From Potential to Practical: Reimagining Ocean Energy for Malaysia	
12.30 -12.40 p.m	• Token of Appreciation • Group Photography Session	
Lunch Break (12.40 – 2.30 pm)		
2.30 – 3.00 pm	**Keynote Speech 2** Dato. Prof. Dr. Kamaruzzaman Sopian, Universiti Teknologi Petronas Track 2: Delivering Carbon-Free Baseload Power for Malaysia's Net-Zero Transition	Seminar Rooms (DS2, DP2, DP3)
3.00 – 5.00 pm	Invited and Oral Presentation Sessions (3 parallel sessions) Invited: 1. Dr. Mohd Nor Faiz bin Norrahim (Room: DP2) 2. Prof Dr M.Iqbal Saripan (Room: DS2) 3. Komander Ir Dr Arman bin Ariffin TLDM (Room: DP3) Oral Presentation Sessions	
4.00-6.00 pm	Afternoon tea break	
8.00 -10.00	Dinner	Lakse Cafe
End of Day 2		

PROGRAM SCHEDULE

DAY 3 - 7th August 2025 (Thursday)

Malaysia Time (MYT / UTC+8)	Agenda	Venue/ remarks
9.00– 9.30 am	**Keynote Speech 3** Prof. Drs. Ec. Ir. Riyanarto Sarno Institut Teknologi Sepuluh Nopember Surabaya Track 3: Machine Learning, Deep Learning and Generative Artificial Intelligence for Electronic Nose Implementation	UMT Convention Centre & Seminar Rooms (DS2, DP2, DP3)
9.30 am - 10.00 am	Coffee break	
10.00 am– 12.00 pm	Invited and Oral Presentation Sessions (3 parallel sessions) Invited Speaker: 1. Prof. Ir. Dr. Fauziahanim binti Che Seman (Room: DS2) 2. Prof Ts. Dr. Aeslina Abdul Kadir (Room: DP2) 3. Sri Widias Tuti binti Asnam Rajo Intan (Room: DP3) Oral Presentation Sessions	
Lunch Break (12.30 – 2.30 pm)		
2.30 – 3.00 pm	**Keynote Speech 4** Prof. Dr. Mohamed Khayet Souhaimi University Complutense of Madrid, Spain Track 4: Advances in Membrane Engineering for Desalination by Membrane Distillation	UMT Convention Centre & Seminar Rooms (DP2)
3.00- 3.10 pm	**Closing Ceremony of ICOET 2025** Arrival of VVIP	
3.10- 4.10	• Doa Recitation • Closing Remarks by Conference Chair, ICOET 2025 • Closing Speech by Dean, Faculty of Ocean Engineering Technology, Prof. Ir. Dr. Mohammad Fadhli Ahmad • Announcement of Best Presenter Awards • ICOET 2025 Closing Montage • Group Photo Session	
4.10 – 4.30	Afternoon tea break	
End of ICOET Conference		

*Breakfast,lunch and afternoon tea break will be served at the open air common area outside DS1

ICOET

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Blue Economy: Advancing Engineering and Technology

PARALLEL SESSION

6 AUGUST 2025 (WEDNESDAY)

Venue/ Time (Malaysia Time)	DS2	DP2	DP3
0900	**Invited Speaker** **Prof Madya Dr. Mohd Asamudin A Rahman** Title: Vortex-Induced Vibration: From Engineering Fundamentals to Renewable Ocean Energy		**Invited Speaker** **Prof. Madya Dr. Nazaitulshila Rasit** Title: Innovative Supplementation for Sustainability: Copperas and Its Role in Boosting Biogas Generation from Anaerobic Digestion
0920	**Shin Yang Group**		**IKA Works Sdn Bhd**
0935	**Prigel Venture Sdn Bhd**		PICOET008
0950	PICOET012		PICOET022
1005	PICOET015		PICOET023
1020	**Opening Ceremony/Plenary Speaker/ MOU** **DP2**		
1200	**Keynote Speaker 1** Prof. Dr. Omar Bin Yaakob Universiti Teknologi Malaysia **DP2**		
	LUNCH/BREAK		
1430	**Keynote Speech 2** Dato. Prof. Dr. Kamaruzzaman Sopian, Universiti Teknologi Petronas **DP2**		
1500	**Invited Speaker** **Prof Dr M.Iqbal Saripan** Title: Region-Based Subtraction of Relationship Array (R-SoRA) Algorithm for Efficient Stereo Matching for Stereo Vision System	**Invited Speaker** **Dr. Mohd Nor Faiz bin Norrahim** Title: Nanocellulose for Maritime Innovation: Advancing Applications	**Invited Speaker** **Komander Ir Dr Arman bin Ariffin** Title: Organisational Restructuring for Effective Defence Capability Development in Malaysia's Maritime Security Context
1520	PICOET014	PICOET024	PICOET017
1535	PICOET044	PICOET026	PICOET018
1550	PICOET045 (Online)	PICOET029	PICOET035
1605	PICOET011	PICOET038	RICOET001 (Online)
1620	RICOET004 (Online)	RICOET002 (Online)	RICOET007 (Online)
1635	RICOET008 (Online)	RICOET005 (Online)	RICOET009 (Online)
1650	RICOET003 (Online)	RICOET006 (Online)	PICOET010 (Online)

7 AUGUST 2025 (THURSDAY)

Venue/ Time (Malaysia Time)	DS2	DP2	DP3
0900	**Keynote Speech 3** Prof. Drs. Ec. Ir. Riyanarto Sarno Institut Teknologi Sepuluh Nopember Surabaya **DP2**		
1000	**Invited Speaker** **Prof. Ir. Dr. Fauziahanim binti Che Seman** Title: Propagation Studies and Performance Evaluation of LoRa Heltec Modules in Suburban and Challenging Environments	**Invited Speaker** **Prof. Ts Dr Aeslina Abdul Kadir** Title: Upcycling Hazardous Waste into Building Materials: Investigating Engineering Properties and Leaching Behaviour for Sustainable Development	**Invited Speaker** **Mdm Sri Widias Tuti binti Asnam Rajo Intan** Title: Malaysian Shipbuilding /Ship Repair Industry Outlook
1020	PICOET021	PICOET031	PICOET032
1035	PICOET030	PICOET033	PICOET036
1050	PICOET037	PICOET034	PICOET040
1105	PICOET039	PICOET043	PICOET041
1120	PICOET048	PICOET047	PICOET051
1135	PICOET025	PICOET049	PICOET042
1150	PICOET028	PICOET050	PICOET046
LUNCH/BREAK			
1430	**Keynote Speech 4** Prof. Dr. Mohamed Khayet Souhaimi University Complutense of Madrid, Spain **DP2**		
1500	**Closing Ceremony** **DP2**		

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ABSTRACT PRESENTER

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COMPUTER APPLICATIONS IN OCEAN ENGINEERING TECHNOLOGY

Conf. ID: PICOET014

CHARACTERIZATION OF NONLINEAR INTERNAL WAVES IN THE SOUTHWEST SULU SEA: INSIGHTS FROM SATELLITE AND IN-SITU OBSERVATION

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Abstract

Nonlinear internal waves, also known as solitons, are significant oceanographic phenomena that can influence offshore operations, marine navigation, and environmental stability. The Sulu Sea, shaped by complex bathymetry and tidal forcing, is recognized for the frequent occurrence of solitons; however, detailed characterization of these waves remains limited. This study addresses that gap by investigating the occurrence, structure, and propagation behaviour of nonlinear internal waves in the region. A combination of satellite-based and in-situ observational techniques was employed to provide a comprehensive analysis. Sentinel-1 synthetic aperture radar (SAR) imagery was used to detect surface expressions of internal waves, while a moored Acoustic Doppler Current Profiler (ADCP) recorded subsurface current variations over a three-month period to capture soliton events. The satellite analysis revealed internal wave signatures in 72-77% of the images examined. In-situ measurements identified over 100 soliton events, with individual wave durations ranging from 4 to 12 minutes and wave packets lasting up to 3 hours. Soliton propagation was predominantly shoreward toward the southwest, with some events directed west and south. SAR imagery indicated soliton packet spacing between 15-20km, and inter-soliton spacing of 250-400m, with estimated propagation speeds reaching up to 0.45m/s. The predominance of upward-propagating solitons, which are typically less visible in satellite imagery, highlights the critical role of in-situ measurements. These findings confirm the presence of distinct soliton types and emphasize the value of integrating satellite and in-situ methods to capture the full spectrum of internal wave dynamics, particularly in the Southwest Sulu Sea.

Keywords : Nonlinear internal waves; Solitons; Sulu Sea; SAR; in-situ observation; ADCP

Conf. ID: PICOET044

DEVELOPMENT OF DEEP LEARNING YOLOV5 BASED REAL-TIME MULTI SPECIES FISH DETECTION AND COUNTING: PERFORMANCE ANALYSIS IN AQUACULTURE ENVIRONMENTS

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Abstract

This study successfully developed a real-time fish classification and counting system for six fish species using the YOLOv5 deep learning object detection model, which leverages Artificial Neural Networks (ANN) for accurate and real-time object detection, distinguishing it from conventional machine learning approaches. The system achieved an F1-score of 0.87 and a precision confidence curve with an all-classes value of 1.00 at a confidence level of 0.920, demonstrating the model's reliability in object detection and classification. Real-time testing showed that the system could operate quickly and accurately under various environmental conditions, with an average inference speed of 30 FPS. However, several challenges remain, such as sensitivity to low-light conditions. Overall, this system has significant potential for applications in aquaculture, particularly for automated and real-time fish monitoring. With compatibility through the ONNX format, the system is also flexible for integration into IoT-based devices or cross-platform applications, providing a solid foundation for further advancements in computer vision-based fish monitoring technology.

Keywords : Deep learning; YOLOV5; Fish classification methods; Computer Vision; Real-time fish Counting

Conf. ID: PICOET045

DRILL MARGIN OPTIMIZATION FOR ENHANCED THERMOMECHANICAL PERFORMANCE IN DRY DRILLING OF TI-6AL-4V

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Abstract

The titanium alloy Ti-6Al-4V's affinity for tools and low thermal conductivity makes dry drilling particularly difficult because of resultant high cutting forces, surface damage, and significant tool wear. This publication examines the effects of drill margin geometry, specifically margin width (MW) and margin height (MH), on thermomechanical characteristics in dry machining processes. A 5 mm wide drill bit was selected to investigate MW and MH, increasing by 1% to 10%, which resulted in 20 combinations. Each configuration was subjected to maximum temperature, torque, and thrust force to assess effectiveness. Research results show that margin geometry significantly affects drilling performance. In the MWxMH5 group, where the fixed MH is 5%, the MW9MH5 configuration, with MW at 9%, had the lowest thrust force at 1046.21 N and a reduced maximum temperature of 325.23 °C. This indicates better chip evacuation and thermal control. In the MW5xMH configuration group with MW fixed at 5%, the maximum temperature of 259.42 °C and low force of 925.21 N were achieved using the MW5MH4 configuration at 4% MH. In analyses having outlier examples like the MW5MH7 configuration, severe forces were seen that again pointed out the design relationship of balancing margins. The findings confirm that fully optimized drill margins have the ability to greatly enhance performance for a dry drilling application in titanium alloys. These results provide the meaningful basis to build better cutting tool designs and sustainable method for manufacturing. The future work will focus on predictive modelling and industrial optimization.

Keywords : Ti-6Al-4V; Dry drilling; Drill margin geometry; Thrust force; Thermal performance

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ELECTRICAL AND ELECTRONIC TECHNOLOGY

Conf. ID: PICOET021

EFFECT OF PLASMA TREATMENT ON ELECTRODE SURFACE IN ENHANCING EFFICIENCY OF HYBRID SOLAR CELL

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Abstract

Hybrid solar cells, also known as Dye-Sensitized Solar Cells (DSSCs), offer a potential route toward flexible and efficient photovoltaic systems. Its combination of organic and inorganic materials offers a promising route to efficient and affordable solar energy. However, achieving high Power Conversion Efficiency (PCE) and long-term stability remains a challenge. The electrodes in these cells play a crucial role in efficient electron transport and minimizing charge recombination. Plasma treatment using an Atmospheric Pressure Plasma Jet (APPJ) of electrode surfaces can enhance conductivity, surface morphology, and catalytic activity. The plasma exposure time on the electrode surface and the distance between them remain poorly understood and underexplored. This research aims to investigate the impact of electrode characteristics, including treatment exposure time and distance, on the PCE of DSSCs, which combine organic and inorganic materials to enhance solar energy capture. TiO2 thin films were exposed to APPJ treatment for different periods of time, namely 5, 7, 9, and 15 minutes, and at controlled distances of 0.5 mm, 1.5 mm, 2.0 mm, as well as without treatment. Subsequently, surface morphology, chemical composition, and electrical properties were analysed. Finally, electrodes treated in this manner were fabricated and tested for PCE evaluation. The findings showed that solar cell efficiency increased by up to 60% under 15 minutes of plasma treatment compared to the untreated sample. For distances, 0.5 mm was the most effective distance for achieving a balanced and functional surface structure. From the results, PCE can be increased by plasma treatment in modifying electrode structures.

Keywords : DSSC; PCE; ITO; Plasma Treatment; APPJ; Surface Morphology

Conf. ID: PICOET030

SIMULATION OF LORA MESH AND STAR NETWORK TOPOLOGIES WITH ENERGY CONSUMPTION ANALYSIS ACROSS SPREADING FACTORS USING MATLAB

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Abstract

LoRa technology is extensively applied in Low Power Wide Area Networks (LPWAN) due to its ability to support long-range communication with minimal power consumption. In most implementations, LoRa networks adopt a star topology, where all end devices communicate directly with a central gateway. Although this architecture is simple and easy to deploy, it poses limitations in terms of communication range, typically reaching up to 20 km in rural areas and only 5 km in urban environments. To address these constraints, this study investigates the adoption of a mesh network topology, enabling nodes to forward data through intermediate devices before reaching the central gateway. This multi-hop approach is expected to enhance coverage and improve data delivery reliability. The aim of this research is to assess the feasibility and performance of a LoRa mesh network through simulation using MATLAB. The study involves the development of a mesh network model, simulation of the network under certain conditions, and performance evaluation based on communication distance, number of alive nodes, and energy consumption. The simulation excludes interference, latency, and path loss to focus on the structural and energy-related behaviour of the network. By examining the impact of node connectivity and multi-hop routing, the study highlights the potential of mesh topology in extending communication range and maintaining reliable performance, despite an anticipated increase in power usage. The outcomes of this research are expected to contribute to the development of scalable and energy-efficient IoT solutions, particularly in scenarios where broader coverage and system resilience are essential.

Keywords : LoRa Mesh Network; LPWAN Simulation; Multi-hop Communication; Energy Consumption Analysis

Conf. ID: PICOET037

PERFORMANCE EVALUATION OF UNDERWATER OPTICAL WIRELESS COMMUNICATION CHANNEL UNDER VARYING WATER TYPES, TEMPERATURES, AND FLOW CONDITIONS

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Abstract

Underwater Optical Wireless Communication (UOWC) enables high-speed, low-latency data transmission in underwater environments but is highly sensitive to environmental factors like absorption, scattering, and turbulence. This study evaluates UOWC performance under varying channel conditions using a Visible Light Communication (VLC) transceiver. Experiments employed green and blue light sources LED tested across different water types (clearwater, seawater, fishpond, tap), temperatures (26°C, 28°C, 30°C), and water flow rates (slow, moderate, high). Signal attenuation was measured over distance using an oscilloscope, and attenuation coefficients were estimated via the Beer-Lambert Law. Results indicate that clear water at 26°C with minimal flow provided optimal conditions, yielding the lowest attenuation coefficient of 0.0162 cm^{-1}. Conversely, fishpond water, higher temperatures, and fast flow produced the highest attenuation at 0.0738 cm^{-1}. Green LEDs demonstrated better performance than blue LEDs, likely due to lower scattering and absorption in clear water. These findings underscore the importance of environmental factors in UOWC design and deployment, providing guidance for improving system reliability and efficiency in real-world underwater applications.

Keywords : Underwater optical wireless communication; LED; Turbulence factors; Attenuation coefficient

Conf. ID: PICOET039

PRELIMINARY STUDY ON THE INVESTIGATION OF THE POTENTIAL OF STAR ANISE (ILLICIUM VERUM) AND CINNAMON (CINNAMOMUN VERUM)AS ADSORBENT IN MAKEUP REMOVER CLEANSING EMULSION

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Abstract

The growing demand for eco-friendly and skin-safe cosmetics has driven interest in replacing synthetic ingredients with natural alternatives. This preliminary study explores the use of Illicium verum (star anise) and Cinnamomum verum (cinnamon) as natural adsorbents in cleansing emulsions for makeup removal. Both powders were characterized using Brunauer–Emmett–Teller (BET) analysis to determine surface area and porosity, Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups, and X-ray Diffraction (XRD) to examine crystallinity. BET results showed mesoporous structures, with cinnamon exhibiting a higher surface area (3.4454 m^2/g) and pore volume (0.004214 cm^3/g) than star anise (1.8897 m^2/g, 0.003253 cm^3/g). FTIR spectra confirmed the presence of functional groups such as O–H, C=O, and C–O, indicating adsorption potential. XRD analysis revealed mainly amorphous structures, which are favorable for adsorption. Cleansing emulsions containing 1%, 2%, and 3% of each adsorbent were formulated and tested on human volunteers. Skin Analyzer assessments before and after application measured hydration, elasticity, and sebum levels. The 3% cinnamon emulsion yielded the most notable improvements, with hydration increasing from 255 µS to 446 µS and sebum levels decreasing from 53 to 26 $\mu g/cm^2$. Visual observation also confirmed superior makeup removal with this formulation. These results suggest that cinnamon and star anise are promising, sustainable ingredients for natural skincare products, offering both functional efficacy and environmental benefits.

Keywords : Natural adsorbent; Star anise; cinnamon; Cleansing emulsion; Skincare Formulation; adsorptive properties

Conf. ID: PICOET048

INTERACTIVE INDUCTION MOTOR FAULT SIMULATION MODEL FOR UNDERGRADUATE ELECTRIC MACHINERY COURSE

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Abstract

Induction motors are a cornerstone of industrial applications due to their reliability and efficiency, making them essential components in undergraduate electrical engineering curricula. However, students often face challenges in grasping the complex behaviors of these motors under fault conditions, particularly in diagnosing subtle mechanical issues. One such fault, parallel misalignment, significantly affects motor performance and may lead to severe operational disruptions if not properly understood. This study presents the development of an advanced, simulation-based induction motor model aimed at enhancing student understanding of fault dynamics. Developed using MATLAB and Simulink, the model enables users to simulate varying degrees of parallel misalignment and observe real-time impacts on critical motor parameters. This hands-on learning tool is designed to strengthen conceptual understanding and diagnostic capabilities by offering interactive scenarios and guided exercises. The proposed model serves as a comprehensive educational platform for teaching motor fault analysis, incorporating Motor Current Signature Analysis (MCSA) techniques and fault visualization features. By providing a practical, exploratory environment, this approach promotes deeper student engagement and supports the development of industry-relevant troubleshooting skills. Ultimately, the model aims to bridge the gap between theoretical learning and practical application in electric machinery courses, preparing students for real-world engineering challenges.

Keywords : Induction motor; Motor Current Signature Analysis (MCSA); Fault Diagnosis; Misalignment; MATLAB/Simulink; Education

Conf. ID: RICOET004

RAIN ATTENUATION ANALYSIS FOR DESIGNING UAV DATA LINK ON MMWAVE BAND

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Abstract

When designing mmwave-band data links for UAV communication systems, accounting for rain attenuation is critical due to the high susceptibility of mmwave-band frequencies to rain-induced signal degradation. This study enhances the accuracy of link margin analysis by incorporating detailed rainfall intensity data and predictive modeling. It evaluates Surabaya's updated regional rainfall rate distribution and benchmarks it against global standards such as ITU-R PN.837-1 and Crane's rainfall model. Regions with similar climatic conditions to Surabaya are selected for comparative analysis. Using both Rec. ITU-R P.618-8 and the Crane model, rain attenuation is simulated based on frequency, link distance between Unmanned Aerial Vehicles (UAVs) and wireless sensor on the ground, and time availability. The findings confirm that the Crane model often predicts higher attenuation values due to its dynamic handling of slant path lengths and rain height variations. This suggests that using both models in tandem allows for more robust link design under Surabaya's increasingly variable rainfall conditions. The study contributes to the improvement of UAV communication system reliability in rain-prone environments by recommending optimal modeling approaches and updated regional rainfall data for accurate attenuation prediction.

Keywords : mmwave; Rain Attenuation; Rainfall Intensity; UAV link

Conf. ID: RICOET008

INVESTIGATION OF THE IMPACT OF SOLAR PHOTOVOLTAICS CONFIGURATION TO PV INVERTER PERFORMANCE BASED ON REAL-TIME DATA ANALYSIS METHOD

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Abstract

The availability of electrical energy in the PV system depends on the Inverter. Inverter failure causes no electrical energy to be delivered to the load. The precision of the configuration of the solar panel greatly influences the performance of the inverter. The configuration aims to adjust the maximum voltage and current of the solar panel with the MPPT Inverter to produce maximum power, following the Inverter's capacity. Misconfiguration results in power loss, excessive power, and inverter damage. This paper aims to investigate the performance of the 40 kW Inverter for two years while operating with two types of configurations. Data collection is carried out in real-time on the input and output sides of the Inverter using Haiwell PLC type AC10S0R and HMI CS7-W. The voltage, current of each MPPT and DC power are the input data of the Inverter. The voltage, current of each phase, active power, reactive power, apparent power, and generated energy are the output data of the inverter. Data analysis was carried out by comparing the input and output parameters of the inverter in each configuration. The results of the investigation show the performance level of the Inverter with two different configurations.

Keywords : PV Configuration; Power generation; Inverter Performance; Real-time

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ENVIRONMENTAL AND RENEWABLE ENERGY TECHNOLOGY

Conf. ID: PICOET008 (online)

THE OFFSHORE WIND ENERGY POTENTIAL AT SELECTED SITES IN MALAYSIA BY USING REANALYSIS DATASET

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Abstract

This study investigates the long-term offshore wind energy potential at three selected coastal sites in Malaysia—Kijal, Langkawi, and Kudat—using ERA5 reanalysis datasets. The objective is to assess the preliminary feasibility of offshore wind power generation by analyzing historical wind speed and power density data. Wind characteristics at typical modern turbine hub heights are evaluated using statistical approaches and standard wind energy assessment methodologies. Among the sites studied, Kudat shows the highest potential for offshore wind development, while Kijal and Langkawi exhibit moderate potential with noticeable seasonal variability. These findings provide updated insights into Malaysia's offshore wind resource and may serve as a basis for further investigation. The use of high-resolution ERA5 data enables a consistent evaluation of long-term wind conditions and seasonal trends, offering a useful starting point for assessing energy yield potential. While further site-specific studies are necessary, the results may inform early-stage planning and support broader discussions on renewable energy development in Malaysia.

Keywords : Reanalysis Data ERA5; Renewable Energy; Offshore Wind Energy; Malaysia; Wind Speed

POST-TREATMENT TECHNOLOGY AND DIGESTATE MICROBIAL POPULATION DYNAMICS OF PALM OIL MILL EFFLUENT FOR BIOFERTILIZER APPLICATIONS

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Abstract

The palm oil industry generates large volumes of palm oil mill effluent (POME), posing significant environmental challenges. Anaerobic digestion (AD) of POME produces a nutrient-rich digestate with potential as a biofertilizer. Nevertheless, the efficacy of the digestate for agricultural applications is influenced mainly by both the post-treatment strategies as well as the compositions and roles of its microbial populations. This investigation highlights several post-treatment technologies such as drying, ultra- filtration/reverse osmosis (membrane separation), plant growth promoting microbes (PGPM) inoculants/biofertilizer, composting and ascertains the effects of dynamic microbial communities in the digestate fertilizer. High-profile sequencing analysis published data was used to assess microbial shifts during pre-treatment and post-treatment, disclosing a raise in the abundance of valuable plant growth-enhancing microbes and a notable decrease in harmful and pathogenic microorganisms. The outcomes indicated that the proposed post- treatment strategies not only enhance the safeness and steadiness of the digestate fertilizer but also improve its agricultural benefits. This study will help in the development of eco-friendly biofertilizer alternatives from agricultural-industry waste and encourage full circular economy operations across the palm oil mill industries.

Keywords : Anaerobic Digestion; Digestate; Post Treatment; Biofertilizer; Application

Conf. ID: PICOET023

OPTIMISATION OF AMMONIUM ION SELECTIVITY FROM PALM OIL MILL EFFLUENT DIGESTATE (POMED®) USING CENTRAL COMPOSITE DESIGN OF RESPONSE SURFACE METHODOLOGY

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Abstract

This research work presents an innovative solution for optimising the selective ionisation of ammonium (NH4+) in palm oil mill effluent digestate (POMED®) using an ammonium ion-selective solution (AISS). POMED® is a by-product of the anaerobic digestion that is nutrient-rich and has significant potential as a bio-based fertiliser. Raw digestate experiences nitrogen losses when applied directly due to ammonia volatilisation. An AISS, which incorporates acetic acid and sodium acetate, was thus found to enhance NH4+ ionisation while minimising the loss of gaseous nitrogen. Optimisation of the three primary variables, pH (4 to 6), temperature (50 to 90 °C), and contact time (90 to 180 min), was performed using a Central Composite Design (CCD) under Response Surface Methodology (RSM). The DR2800 HACH spectrophotometer was used to measure the concentration of NH4+, and the results were analysed using Design-Expert (v23.1.1) software. To ensure statistical validity, 20 experiments were conducted in triplicate. The ANOVA analysis revealed that pH was the factor influencing ammonium ionisation with the greatest intensity, and the quadratic model demonstrated high predictive power (R2 = 0.9508). The optimal selective ionisation conditions were determined at pH 4.000, temperature 50 °C, and a contact time of 100.221 minutes, yielding the maximum concentration of NH4+ at 17.323 mg/L. When assessed under these conditions, the agreement between NH4+ values from experimental verification, 17.90 mg/L, was nearly identical. This work enhances the feasibility of using an in situ AISS system alongside statistical optimisation tools to improve ammonium recovery from organic effluents, thereby contributing to sustainable agriculture.

Keywords : Ammonium ionisation; POMED®; ion-selective solution; RSM-CCD; Process optimisation

Conf. ID: PICOET024

OPTIMAL SIZING OF POWERTRAIN COMPONENTS FOR A FUEL CELL RECREATIONAL ELECTRIC BOAT (FCREB) BASED ON POWER REQUIREMENT ESTIMATION

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Abstract

Proper sizing of powertrain components is critical in the design of Fuel Cell Recreational Electric Boats (FCREBs) to ensure energy efficiency, system reliability, and optimalperformance under varying operational conditions. This study presents an optimal sizing methodology based on power requirement estimation for the powertrain components of a FCREB. The research involves an in-depth analysis of how to determine appropriate sizing by considering hull resistance, hydrostatic and boat properties, propulsive efficiency, propulsion power, boat power demands, and steady-state boat speed to calculate real-time propulsion power requirements. Based on these estimations, the sizes of key powertrain components—including the Proton Exchange Membrane Fuel Cell (PEMFC) stack, battery energy storage system (ESS), and electric machine (EM) are determined. This calculation method can serve as a reference for sizing the powertrain components of other recreational electric boats.

Keywords : Fuel Cell Recreational Electric Boat (FCREB); Powertrain Component Sizing; Propulsion Power Demand; Proton Exchange Membrane Fuel Cell (PEMFC); Hydrogen Boat

Conf. ID: PICOET026

SOIL LOSS AND SEDIMENT YIELD AT PAKA RIVER BASININTEGRATING RIVER MORPHOLOGY INTO BASIN SCALE-ENVIRONMENTAL ENVIRONMENT: A CASE STUDY OF PAKA AND KERTIH RIVER MALAYSIA

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Abstract

This study examines the role of river morphology in Integrated River Basin Management (IRBM) by focusing on the Sungai Paka and Sungai Kertih river basins in Malaysia. It is divided into two key phases: the land phase and the routing phase. The land phase analyzes basin morphometry, sinuosity, soil loss, and sediment yield, providing insights into erosional processes and sediment dynamics. The routing phase investigates sediment transport and deposition, offering an understanding of sediment mobilization across the river systems. Results indicate notable differences in soil loss and sediment yield between the two basins, largely due to their size and morphometry. Sungai Paka, a larger basin with a complex drainage network, has a higher sediment yield, especially in its flatter areas where sediment accumulates. However, it also shows more localized erosion in steeper sections. In contrast, Sungai Kertih, a smaller basin with steeper gradients, experiences higher soil loss and faster sediment transport due to shorter streams and higher relief, concentrating runoff and causing more erosion. The study highlights how basin size and morphology influence sediment dynamics, with larger basins like Sungai Paka having extensive deposition zones, while smaller, steeper basins like Sungai Kertih exhibit rapid erosion and efficient sediment transport. The findings emphasize the importance of both land and routing phases in hydro-morphological assessments for effective IRBM, supporting sustainable land use, soil and water conservation, and sediment management.

Keywords : Integrated River Basin Management (IRBM); River morphology; erosion; Sedimentation; Sediment transport

Conf. ID: PICOET029

HYDROGEOCHEMICAL EVIDENCE OF SEAWATER INTRUSION IN THE COASTAL GROUNDWATER OF THE LANGAT RIVER BASIN, MALAYSIA

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Abstract

Coastal aquifers are essential freshwater sources for many communities but face increasing salinisation pressure due to rapid development and excessive groundwater extraction. In the Langat River Basin along the west coast of Peninsular Malaysia, intensified urban and industrial activities have raised concerns about seawater intrusion into shallow groundwater systems. This study evaluates the extent and hydrogeochemical characteristics of groundwater salinisation in the basin. Groundwater samples were collected from selected wells and analysed for major ions, electrical conductivity (EC), total dissolved solids (TDS), and salinity. Data interpretation involved graphical tools such as Piper diagrams and statistical correlation matrices to identify ion dominance and mixing processes. The results reveal high concentrations of chloride (up to 7,660 mg/L) and sodium (up to 2,870 mg/L), with a dominant Na–Cl water type, indicating significant marine influence. Strong correlations among Cl^-, Na^+, Mg^{2+}, and TDS further support seawater mixing as a primary salinisation mechanism. The Piper diagram shows a clear shift from freshwater to saline facies, particularly in downstream and coastal areas. These hydrogeochemical signatures confirm ongoing seawater intrusion driven by groundwater over-abstraction and land use change. The study underscores the urgent need for sustainable coastal aquifer management and continuous monitoring to safeguard freshwater supplies in vulnerable coastal zones.

Keywords : Coastal aquifer; Piper diagram; Groundwater quality; Coastal zone management

Conf. ID: PICOET031

MICROBUBBLE INTERVENTION FOR ALGAL FOULING CONTROL IN MEMBRANE PROCESSES

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Abstract

Algal fouling remains a persistent challenge in membrane-based water treatment systems, leading to reduced permeability, increased operational costs, and frequent cleaning cycles. Traditional physical and chemical cleaning methods can be ineffective against biofilms or harmful to membrane integrity over time. This study explores the application of microbubble (MB) technology as an innovative and sustainable method for algae fouling mitigation in membrane filtration systems. Microbubbles, typically less than 50 microns in diameter, possess unique physicochemical properties such as high surface area, prolonged residence time, and spontaneous collapse-induced shear forces that enhance their cleaning potential. Laboratory-scale experiments were conducted using synthetic algal solutions to simulate fouling conditions on polyvinylidene fluoride (PVDF) ultrafiltration membranes. Microbubbles were generated using a pressurized gas dissolution method and introduced into the membrane module during both filtration and cleaning phases. The effects of MB flow rate, bubble size distribution, and contact time were systematically evaluated. Results demonstrated significant improvement in membrane flux recovery (up to 85%) compared to conventional water flushing, with minimal membrane damage. Moreover, the cleaning efficacy increased when microbubbles were used in combination with low concentrations of surfactants or oxidants. The study highlights the potential of microbubble-assisted cleaning as a non-invasive, energy-efficient alternative for algae fouling control. It offers promising implications for extending membrane lifespan and reducing reliance on harsh chemical cleaning protocols. This work contributes to the growing field of advanced fouling mitigation strategies and supports the integration of microbubble technology into future water and wastewater treatment processes.

Keywords : Microbubble technology; Algal fouling; Cleaning

Conf. ID: PICOET033

TITANIUM DIOXIDE SOL–GEL/ZINC OXIDE SOL–GEL AND TITANIUM DIOXIDE SOL–GEL/POWDERED ZINC OXIDE-COATED CLAY BEADS IN PHOTOCATALYTIC REACTOR

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Abstract

In this study, titanium dioxide/zinc oxide composites are synthesized using a sol-gel approach and immobilized on clay beads using a dip-coating technique. Varied composites were produced using varied ratios of titanium dioxide to zinc oxide. Four titanium dioxide/zinc oxide layers were applied to clay beads for the immobilization process. The beads were then dried in an oven at 100°C for 30 minutes and then calcined at a rate of 2°C per minute up to 500°C. Energy Dispersive Spectroscopy and Scanning Electron Microscopy were used to characterize the coated beads. Using methylene blue as a model pollutant, photocatalytic degradation studies were performed to evaluate their performance. Clay beads treated with 100% titanium dioxide exhibited the highest methylene blue degradation efficiency. Following five consecutive recyclability tests, the photocatalytic performance of all titanium dioxide/zinc oxide composites remained intact. The goal of this work is to show how to immobilize single and composite photocatalysts on clay beads with exceptional photocatalytic capabilities for wastewater treatment in a way that is economical, scalable, and repeatable.

Keywords : Clay Beads; Immobilization; Photocatalyst; Photocatalysis; Recyclability

Conf. ID: PICOET034

WATER QUALITY TARGET (WQT) STUDY OF THE SETIU RIVER, TERENGGANUR

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Abstract

The Setiu River plays a vital role in sustaining freshwater ecosystems and supporting local communities through its environmental services. However, increasing concerns over pollution have raised the need for a systematic evaluation of its water quality. This study aims to assess the water quality status of the Setiu River and determine its beneficial uses based on the National Water Quality Standards (NWQS). The research also proposes Water Quality Targets (WQT) that reflect the river's intended uses and evaluates the need for pollutant load reduction. A total of 25 sampling stations comprising 7 upstream, 6 midstream, and 12 downstream points were selected for data collection. Sampling was carried out during both dry and wet seasons to capture seasonal variations in water quality. Beneficial uses were identified for each river segment, and corresponding WQTs were established. The assessment employed a loading-based approach (kg/day) instead of traditional concentration-based units, providing a more accurate reflection of pollutant mass flows. Key water quality parameters analyzed included turbidity, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), pH, ammoniacal nitrogen (NH_3-N), and total suspended solids (TSS). Results indicated that the water quality across all segments met the proposed targets, and no impairments were detected. Consequently, pollutant load reductions are not required at this stage. The study concludes that the Setiu River currently maintains sufficient capacity to support its ecological and socio-economic functions, reinforcing its status as a valuable freshwater resource.

Keywords : Water Quality Assessment; Impairment; Pollutant Load Evaluation; Beneficial Uses

Conf. ID: PICOET038

VALORISATION OF FISH BONE WASTE INTO HYDROXYAPATITE FOR ENVIRONMENTAL AND CATALYTIC APPLICATIONS

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Abstract

The high consumption of fish has led to the generation of significant fish waste, particularly fish bones, which are commonly discarded and contribute to environmental pollution. This study proposes a sustainable approach by converting fish bone waste into hydroxyapatite (HAP), a calcium-rich material, for dual applications: as an adsorbent in wastewater treatment and as a catalyst in green chemical synthesis. Fish bones were cleaned, dried, ground, and calcined at temperatures between 400°C and 1000°C. The synthesized HAP was characterized using SEM, BET, XRD, FTIR, TGA, TPD-NH_3, and TPD-CO_2. The results revealed well-formed HAP with high surface area and thermal stability, indicating its suitability for environmental and catalytic uses. As an adsorbent, HAP effectively targets metal ion removal from wastewater due to its porous structure and surface reactivity. As a catalyst, HAP was tested in the transesterification of glycerol with dimethyl carbonate to produce glycerol carbonate; a safer and greener alternative to phosgene-based synthesis. Product analysis via FTIR and GC-MS demonstrated its catalytic potential. This research aligns with Sustainable Development Goal (SDG) 13 by reducing waste, minimizing reliance on commercial catalysts, and promoting low-cost, eco-friendly materials. The findings support the circular economy and demonstrate the feasibility of transforming food waste into valuable functional materials.

Keywords : Fish bone; Hydroxyapatite; Catalyst; Adsorbent; Glycerol carbonate; Sustainability

Conf. ID: PICOET043

STUDY THE DEHYDROGENATION PROPERTIES OF LiAlH4 WITH THE ADDITION OF TiH2 AND ZrF4 CATALYSTS

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Abstract

Solid-state hydrogen storage, particularly through complex hydrides like LiAlH4, has garnered attention due to its high hydrogen capacity of 10.5 wt.%. However, its practical application is hindered by challenges such as high decomposition temperatures, slow dehydrogenation kinetics, and irreversibility under moderate conditions. To overcome these limitations, the incorporation of catalysts or additives, have been explored to enhance its hydrogen storage performance. In this study, the catalytic effects of TiH2 and ZrF4 in varying proportions on the dehydrogenation properties of LiAlH4 were investigated using pressure-composition-temperature (PCT) analysis and differential scanning calorimetry (DSC). The co-doped composite, LiAlH4+10 wt.% TiH2+10 wt.% ZrF4, exhibited a significantly reduced onset decomposition temperature of 94.4 °C and a total hydrogen release capacity of 6 wt.%. Isothermal decomposition tests revealed that the composite released 2.1 wt.% hydrogen within 120 minutes. To further understand the catalytic mechanism of TiH2 and ZrF4 in enhancing the dehydrogenation characteristics of LiAlH4, structural and morphological analyses were conducted using x-ray diffraction (XRD), scanning electron microscopy (SEM), and Fourier-transform infrared spectroscopy (FTIR). The findings highlight the synergistic catalytic effects of TiH2 and ZrF4, offering a promising pathway for improving the practicality of LiAlH4 in solid-state hydrogen storage applications.

Keywords : Hydrogen storage; Lithium alanate; Complex hydride; Dehydrogenation; Catalytic

Conf. ID: PICOET047

MARINE RENEWABLE ENERGY IN SOUTHEAST ASIA: THE POTENTIAL, GOVERNMENT POLICIES AND CHALLENGES

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Abstract

Marine energy is untapped and provides great potential for future energy resources especially in producing electricity. For the next decade, the demand for electricity expected would be increase and the world is transitioning from fossil fuels to renewable energy. Recently, the use of fossil fuels can bring more harm, unabated climate change may endanger for future developments, especially for economic growth and expose population health in serious risk. The majority of the world's population originated from Asia regions vulnerable to these impacts and they are highly responsible in producing for more than half of the CO2 production globally. This keynote speech will focus on the potential of marine renewable energy as a future source in generating electricity in Asia territory focusing on southeast region. This continent has vast coastlines, potentially for marine energy production and perhaps could minimising the trends of climate change in the near future. Currently, the device technology for wave energy harnessing is extensively develop and explored worldwide. The working principal including the categories of the available wave energy converter (WEC) devices are also highlighted in this plenary session.

Keywords : Renewable Energy; Government Policies; Device Technologies; Wave energy; Tidal energy

Conf. ID: PICOET049

SIMULATION-BASED EVALUATION OF ENERGY EFFICIENCY AND EMISSIONS FOR GREEN PUBLIC BUS TECHNOLOGIES IN KUALA TERENGGANU USING ADVISOR

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Abstract

This study focuses on the transformation of Bas Kite, a local intra-city public bus service in Kuala Terengganu, into a green mobility solution through the adoption of Hybrid Electric Vehicles (HEVs), Electric Vehicles (EVs), and Hydrogen Fuel Cell technologies. The research employs the Advanced Vehicle Simulator (ADVISOR), a MATLAB-based simulation platform, to analyze and compare the energy consumption and system efficiency of the existing diesel-based Bas Kite fleet if replaced with HEV, EV, and fuel cell variants. Simulation scenarios are based on actual urban drive cycles and route profiles typical of Bas Kite operations, incorporating Terengganu's local traffic and environmental conditions. Key performance indicators include energy usage per kilometer, powertrain efficiency, and potential carbon emission reductions. This study aims to provide empirical data to support sustainable urban mobility strategies under the Smart Terengganu initiative. The findings offer strategic insights for local government, transport planners, and relevant stakeholders in advancing the transition towards a low-emission, high-efficiency public transport system tailored to the specific needs of the Kuala Terengganu.

Keywords : Public Bus; ADVISOR; Fuel Cell Bus; Electric Bus; Simulation

Conf. ID: PICOET050

OPTIMIZING BIOCHAR-COAL CO-COMBUSTION FOR CLEANER ELECTRICITY IN MALAYSIA: SYNERGIES, CHALLENGES, AND OPPORTUNITIES

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Abstract

The continued operation of coal-fired power plants in Malaysia poses a significant barrier to achieving national decarbonization goals. Co-combustion of biochar with coal offers a practical and transitional strategy to reduce greenhouse gas emissions while enhancing combustion performance. This study reviews the synergistic effects of biochar–coal co-firing, emphasizing Malaysian biomass resources, particularly palm oil residues. Blending ratios of 10–20% biochar have been identified as optimal for improving combustion efficiency, lowering activation energy, and reducing emissions of NO_x, SO_2, and particulate matter. Drawing from both global studies and local applications, including palm biomass integration, the review also outlines key technological, logistical, and policy challenges that must be addressed to enable large-scale implementation of biochar co-firing in Malaysia's power sector.

Keywords : Biochar, Co-combustion, Palm biomass, Emission reduction, Malaysia energy transition

Conf. ID: RICOET002

RESPONSE SURFACE-BASED OPTIMIZATION OF AC-WC CONTAINING INDUSTRIAL BY-PRODUCT PALM OIL CLINKER AND PG 70 ASPHALT

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Abstract

The growing demand for environmentally friendly infrastructure materials has encouraged the exploration of alternative resources in asphalt mixture design. Palm oil clinker (POC), an industrial by-product, and PG 70 asphalt binder are considered sustainable components for asphalt concrete wearing course (AC-WC) mixtures. However, conventional AC-WC mixtures still face challenges in striking a balance between mechanical performance and sustainability. Therefore, this study aims to identify the optimum cmposition of POC and PG 70 asphalt that meets performance standards while supporting sustainable development. Specifically, the study evaluates the Marshall properties of AC-WC mixtures utilizing POC as a substitute for fine aggregate and PG 70 asphalt as binder. Response Surface Methodology (RSM), combined with Central Composite Design (CCD) and a quadratic model involving two factors, was used to analyze and optimize the mixture. The proportion of POC varied in five levels, ranging from 0% to 100%, while asphalt content was tested at 5.47%, 5.97%, and 6.47%. The optimum mix was achieved at an asphalt content of 5.861% and a POC of 9.134%, resulting in a stability value of 1763.55 kg, a flow of 4 mm, a VIM of 4.13%, a VMA of 17.77%, and a VFA of 75.52%. Retained stability after 24-hour immersion at 60°C reached 91.62%, indicating strong moisture resistance. The desirability value of 0.462 reflects a moderate level of optimization. In conclusion, the combined effects of POC and PG 70 asphalt can be effectively utilized to produce high-performance and sustainable AC-WC mixtures that meet technical specifications and are environmentally sustainable.

Keywords : Marshall ; Palm Oil Clinker; PG 70 ; Response Surface Methodology

Conf. ID: RICOET005

PERFORMANCE ANALYSIS OF AN OFF-GRID-CONNECTED ROOFTOP SOLAR PV SYSTEM IN BANJAR SERANG REGENCY INDONESIA

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Abstract

One significant energy source that plays a crucial role in meeting the government's new renewable energy mix (EBT) target of 23% by 2025 is solar power, specifically through a Solar Power Plant (PLTS). PLTS offers numerous advantages over other EBT sources, including the widespread availability of solar radiation throughout Indonesia, ease of construction and installation, and sufficiently developed and tested technology. Consequently, this research aims to evaluate the significant energy potential present in simple houses, which can support government programs. The potential electrical energy that can be generated from PLTS in Serang City is 2383.6 kWh annually, with an average monthly output of 198 kWh. The month with the highest potential is September, with 214.2 kWh, while January has the lowest potential at 186.2 kWh. The construction of PLTS does require installation costs, which are still relatively high. Hence, economic calculations that account for the initial investment needed are essential. In undertaking this research, the author performed a technical and financial analysis of using off-grid connected PLTS on the roofs of simple houses with Homer Pro software, resulting in a price calculation indicating an initial investment cost of Rp. 24,694,000, and an electricity price of Rp. 1,444 per kWh. The payback period for the research is 8.1 years, leading to a cumulative profit by the 25th year of Rp. 81,806,700, along with a Return on Investment (ROI) of 335.4% and a positive Net Present Value (NPV) of Rp. 82,006,472, thus indicating that this research is viable.

Keywords : Homer; New renewable energy; Economic calculations; Net Present Value; Solar radiation

Conf. ID: RICOET006

ANALYSIS OF THE EFFECTIVENESS OF ELECTRICITY SUPPLY RELIABILITY FROM OFF-GRID-CONNECTED ROOFTOP SOLAR PV SYSTEM IN RESIDENTIAL INDONESIA

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Abstract

There are many advantages that PLTS has compared to other EBT sources, including the ability of solar radiation to be spread throughout all regions of Indonesia, ease of construction and installation, and technology that has been sufficiently developed and tested. Therefore, this research aims to determine the large energy potential contained in simple houses to participate in the achievement of government programs. The potential electrical energy that can be produced from PLTS is 2383.6 kWh in a year with an average monthly value of 198 kWh. The greatest potential in a month is in September with 214.2 kWh, while the lowest is in January with a potential of 186.2. The construction of PLTS requires installation expenditure which is still expensive. Therefore, economic calculations that include the amount of initial investment that must be provided are needed. In writing this research, the author carried out a technical and financial analysis of the use of off-grid connected PLTS on the roof of a simple house using Homer Pro software, with the results of a price calculation where the initial investment cost was Rp. 24,694,000 and the price of electricity is Rp. 1,444 /kWh. Payback The research period is 8.1 years, producing a cumulative profit in the 25th year, namely Rp. 81,806,700, the Return on Investment (ROI) value was 335.4%, and a positive Net Present Value (NPV) was obtained, namely Rp. 82,006,472, then this research can be said to be feasible.

Keywords : Homer; New renewable energy; Economic calculations; Net Present Value; Solar radiation

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Blue Economy: Advancing Engineering and Technology

MARITIME TECHNOLOGY AND NAVAL ARCHITECTURES

Conf. ID: PICOET010

TOWARDS AUTONOMOUS SHIPPING: A HUMAN-CENTRIC STUDY OF BANGLADESHI MARITIME PROFESSIONALS

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Abstract

The maritime industry is undergoing a paradigm shift with the emergence of autonomous ships, offering potential benefits in safety, efficiency, and environmental sustainability. These vessels, powered by artificial intelligence, machine learning, and integrated sensor technologies, promise to reduce operational costs, enhance navigational safety, and support global decarbonization efforts. However, the successful adoption of such technologies requires more than technical readiness, it depends significantly on human, organizational, and regulatory dimensions. This study investigates the potential adoption of autonomous ships from the perspective of Bangladeshi maritime professionals, a workforce segment that plays a vital role in global shipping. The research focuses on three key constructs: seafarer perception, safety and risk management, and organizational resources, examining their direct relationships with autonomous ship adoption. A structured quantitative approach is employed, utilizing a 40-item questionnaire aligned with theoretical models such as the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), and Resource-Based View (RBV). Data will be collected from 150 Bangladeshi captains and chief officers through purposive sampling. Descriptive analysis will be performed using SPSS, while hypothesis testing will be conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS. The findings are expected to highlight both enablers (e.g., career advancement, AI-driven safety systems) and barriers (e.g., cybersecurity risks, regulatory uncertainty) influencing the readiness to adopt autonomous ships. This study will provide practical insights for policymakers, maritime companies, and training institutions, particularly in developing regions. It contributes to bridging the gap between technological advancement and human-centric maritime operations.

Keywords : Autonomous Ship; Artificial Intelligence; Navigational Safety

Conf. ID: PICOET012

THE RELEVANCE OF CONDITION MONITORING IN THE ERA OF AI IN MARINE APPLICATIONS

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Abstract

Many sectors have seen radical change because of artificial intelligence (AI), and the marine industry has seen major changes, especially in condition monitoring procedures. To identify irregularities, anticipate malfunctions, and maximize maintenance, condition monitoring entails the ongoing evaluation of the health of the equipment and systems. AI integration into condition monitoring systems has grown in importance in the maritime industry, where operational safety and equipment dependability are crucial. Conventional monitoring techniques frequently depend on reactive maintenance and recurring inspections, which can lead to unscheduled downtime, higher expenses, and safety hazards. Conversely, AI-enhanced condition monitoring systems use sensor fusion, machine learning, and advanced data analytics to provide real-time diagnoses and prediction insights. In the AI era, condition monitoring affects marine applications like engine performance, propulsion systems, and auxiliary machinery. AI algorithms analyze massive sensor data to detect wear, vibration, and heat irregularities, enabling predictive maintenance. These capabilities improve safety, environmental compliance, life-cycle costs, and operating efficiency. AI-driven systems can adapt to changing operating conditions and learn from past trends to improve accuracy and reliability. The use of AI in condition monitoring offers a proactive approach to maintenance and operational management, marking a paradigm leap in marine engineering. In a world that is becoming more automated and digital, this transformation is crucial to maintaining sustainable and effective maritime operations.

Keywords : Condition Monitoring; Artificial Intelligence (AI); Marine Applications

Conf. ID: PICOET015

NUMERICAL SIMULATION OF SHALLOW WATER INFLUENCE ON WAVE-MAKING RESISTANCE OF AN AUV

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Abstract

Autonomous underwater vehicles (AUVs) operating in shallow coastal waters experience complex hydrodynamic interactions that can significantly impact their performance. In such conditions, wave-making resistance becomes a dominant component of total resistance. This study investigates the influence of shallow water depth on the wave-making resistance of an AUV using Volume of Fluid (VOF)-based computational fluid dynamics (CFD) simulations in ANSYS Fluent. The model geometry is based on the DARPA SUBOFF AFF-8 configuration. Simulations were conducted at three Froude numbers (0.23, 0.467, and 0.512), while maintaining a constant submergence depth of 1.1 times the hull diameter (D). To examine bottom proximity effects, total water depth was varied from 2.5D to 8.0D. The simulations employed two turbulence models, k–ω SST and Transition SST, to capture near-wall and transitional flow behaviour. The numerical setup was validated against experimental resistance data in calm water. Results indicate a significant increase in wave-making resistance at reduced water depths, primarily due to enhanced wave-body and wave-bottom interactions. Comparisons between turbulence models also revealed slight differences in resistance predictions. These findings highlight the importance of accounting for shallow water effects in the hydrodynamic design and mission planning of AUVs deployed in littoral areas.

Keywords : Wave-making resistance; Shallow water; AUV; CFD; VOF

Conf. ID: PICOET016

BRIEF VIEW OF SHIP REPAIR AND SHIP BUILDING (SBSR) AT SARAWAK

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Abstract

Sarawak is a key location for shipbuilding and ship repair in Malaysia, with several established yards focused on both new construction and maintenance. These shipyards cater to a variety of vessel types, including offshore support vessels (OSVs), utility vessels, tugboats and barges. Shipyard are fixed facilities with dry-docks and fabrication equipment capable for building a new vessel and docking the vessel repair activities. The Malaysia Shipbuilding and Ship repair (SBSR) industry especially especially in East Malaysia has developed from the establishment from the small shipyards to larger-capacity shipyards. However, consistent patterns of delays in delivering of project may consequence the company's profit as well as image. This sharing will address the issues of ship building and ship repair issue (SBSR) at Sarawak and also the important of understanding of the industry direction with utilize of all availability resource to overcome existing challenges.

Keywords : Ship Building; Ship Repair; Maritime

Conf. ID: PICOET017

BOAT SERVICE DEVELOPMENT IN MELAKA

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Abstract

This proposal outlines the strategic initiative to develop a comprehensive boat service network in Melaka, designed to capitalize on the state's growing maritime economy and rising tourism potential. Situated along the vital Strait of Melaka—one of the world's busiest shipping lanes—Melaka is uniquely positioned to benefit from increasing offshore activities, including those led by Petronas, MISC Berhad, and regional LNG and Ship-to-Ship (STS) transfer operations. The proposed boat service aims to support not only tourism and coastal mobility but also commercial logistics and offshore personnel transport needs. Key components include passenger ferries, high-speed shuttles, crew transfer vessels (CTV), and specialized charter services for marine-related operations. This initiative is aligned with the surge in offshore energy activities and the need for reliable, compliant, and efficient maritime support services in Melaka waters. Infrastructure development will include jetty upgrades, floating pontoons, service terminals, and safety-compliant docking facilities, with potential integration into STS zones and LNG support frameworks. This project also targets collaboration with oil & gas stakeholders to provide auxiliary marine support, enhancing Melaka's maritime ecosystem. By combining tourism, logistics, and offshore support services, the development positions Melaka as a dual-purpose maritime hub—serving both leisure and commercial sectors—while promoting public-private partnerships (PPP), sustainable marine transport, and regional economic growth.

Keywords : Melaka boat service; Maritime economy; Coastal mobility; Maritime hub

Conf. ID: PICOET018

CII COMPLIANCE AND CO_2 EMISSION TRENDS FOR MALAYSIAN-FLAGGED SHIPS FROM 2019–2022

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Abstract

This study examines Carbon Intensity Indicator (CII) compliance and CO_2 emission trends among Malaysian-flagged ships from 2019 to 2022. A total of 493 vessels were analyzed, comprising six primary ship types: bulk carriers, container ships, general cargo ships, LNG carriers, ro-ro cargo ships (vehicle carriers), and tankers, operating on four fuel types across main and auxiliary engines. CO_2 emissions were calculated based on fuel consumption and emission factors by the Third IMO GHG Study 2014. Findings indicate that LNG carriers were the largest CO_2 contributors, emitting a total of 8.47 million tonnes (61.34%), followed by tankers (2.79 Mt, 20.19%) and container ships (1.36 Mt, 9.87%). Stacked bar charts highlighted LNG carriers as the dominant group in poor CII ratings. CII ratings, derived from attained-to-reference ratio thresholds, showed that 84% of LNG carriers, 69% of ro-ro vessels, and 66% of tankers were classified in lower performance categories (C, D, or E). A temporal analysis revealed a decline in total CO_2 emissions from 3.51 Gt in 2019 to 3.33 Gt in 2021, followed by a rebound to 3.60 Gt in 2022, likely reflecting post-COVID operational recovery. Correlation analysis demonstrated strong positive relationships between deadweight tonnage, gross tonnage, and CO_2 emissions ($r > 0.74$). The CII ratio exhibited moderate correlations with both attained and reference CII values. These results provide critical insights into emission behavior and vessel efficiency, contributing to Malaysia's maritime decarbonization roadmap in line with IMO compliance targets.

Keywords : CII rating; CO2 emissions; Malaysian vessel emissions

Conf. ID: PICOET032

INFLUENCE OF RAMP SHAPE GEOMETRIES ON OVERTOPPING BREAKWATER FOR ENERGY CONVERSION

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Abstract

Overtopping Breakwater for Energy Conversion (OBREC) is a hybrid coastal structure that integrates a traditional breakwater with a wave energy converter (WEC), enabling the capture of incoming wave energy by channeling overtopped water into an elevated reservoir. Since the energy output of OBREC is directly proportional to the volume of overtopped water, optimizing the geometrical design of the structure particularly the ramp is crucial for improving energy conversion efficiency. Previous research has primarily focused on linear ramp geometries, with limited attention to alternative ramp shapes and their influence on overtopping performance.This study investigates the impact of various ramp shape parameters on overtopping wave discharge using both numerical simulations via FLOW-3D and physical model experiments under typical Malaysian wave conditions. Seven ramp geometries, including linear, parabolic, sinusoidal, and cubic shapes, were evaluated for their efficiency. Results show that the cubic ramp produced the highest overtopping discharge, achieving an average increase of 30.12% compared to the standard linear ramp. The average discrepancy between simulated and experimental overtopping results across all ramp types was only 5.8%, indicating strong model reliability. These findings offer a data-driven advancement in OBREC development and present a promising avenue for maximizing wave energy harvesting in real-world coastal applications.

Keywords : OBREC; Overtopping; Ramp Shape; Wave Energy Converter

Conf. ID: PICOET035

CONVOLUTIONAL NEURAL NETWORK APPROACH FOR APPLIANCE-LEVEL LOAD DISAGGREGATION IN NILM

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Abstract

The rapid advancement of smart energy systems has increased the demand for accurate and scalable energy monitoring solutions. Non-Intrusive Load Monitoring (NILM) has emerged as a promising technique for disaggregating total household energy consumption into individual appliance-level usage without the need for multiple sensors. This study proposes a deep learning-based NILM model using Convolutional Neural Networks (CNNs) to estimate the power consumption of a refrigerator from the aggregate household load, utilizing publicly available global datasets. The CNN architecture is trained on a sliding window of main power signals and is designed to capture temporal and spatial patterns that distinguish the refrigerator's unique consumption behavior. Comprehensive experiments are conducted using preprocessed data from the REDD dataset, focusing exclusively on the fridge. The model is evaluated for both regression (power estimation) and binary classification (ON/OFF state). Key performance metrics including Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), R^2 score, and Mean Absolute Percentage Error (MAPE) are calculated to assess prediction accuracy. Additionally, detailed visualizations such as loss curves, actual vs predicted power graphs, residual plots, and cumulative error curves are provided to interpret model performance. Results demonstrate that the proposed CNN model achieves robust disaggregation accuracy and effectively generalizes across unseen test samples. This study not only validates the efficacy of CNNs in appliance-level load prediction but also lays a strong foundation for future work on multi-appliance classification and real-time NILM deployment on low-power embedded systems.

Keywords : Non-Intrusive Load Monitoring (NILM); Convolutional Neural Networks (CNN); Energy Disaggregation; Fridge Power Estimation; Smart Energy Systems

Conf. ID: PICOET036

NOISE REMOVAL ON MARINE AND SHIP STRUCTURES

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Abstract

Marine and ship structures are susceptible to corrosion due to the harsh sea environment. The integrity of materials on these structures deteriorates as a result of constant exposure to seawater and the atmosphere. Technological advancements have enabled the remote survey and inspection of corrosion on marine structures using Remote Inspection Technology (RIT) vehicles. Drone, crawler, and remotely operated underwater vehicle (ROUV) are key components of RIT. Videos and images of marine structures are recorded and captured, allowing for further corrosion analysis to be conducted remotely. However, the captured videos and images may contain noise that can obscure features and cause blurriness around corrosion boundaries. This occurs because RIT data acquisition can be affected by sea, ship, and wind conditions. Therefore, a noise removal algorithm is proposed to reduce blurriness on images of marine structures. First, the captured images will be pre-processed with a Wiener filter, which will filter the entire pixel array in the image. Subsequently, the proposed method will be evaluated using Mean Absolute Error (MAE), Mean Squared Error (MSE), and Structural Similarity Index (SSIM). The results indicate that the proposed method effectively improves image quality using the Wiener filter. This is supported by promising MAE, MSE, and SSIM values, demonstrating that the Wiener filter can correct pixel intensities to address blurriness, thereby enhancing the distinction of corrosion boundaries.

Keywords : Marine structure; Ship structure; Corrosion; Remote inspection technology; Wiener filter

Conf. ID: PICOET040

EVALUATION OF NEUROEVOLUTIONARY APPROACH TO NAVIGATE AUTONOMOUS SURFACE VEHICLES IN RESTRICTED WATERS

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Abstract

Unmanned autonomous surface vehicles (ASVs) carry out tasks beyond human limitations, such as offshore surveillance, offshore target detection, search & rescue (SAR), bathymetry and coastal monitoring. An ASV equipped with sensors and decision-making support may operate for long duration and distances without human intervention. Although ASVs can perform autonomous navigation safely and accurately in open waters, there is a gap in the study of ASVs for berthing and river transportation. This paper uses a neuroevolution algorithm to train ASV navigation in restricted waters. Two scenarios are investigated using preliminary training data; autonomous manoeuvring in an inland waterway and autonomous berthing with the assistance of path trajectory. This work employs a geofencing method to assist ASV navigation owing to the limited detection range of distance sensors. Although the ASVs are trained for restricted waters, the results show that the proposed algorithm can adapt to different waterway environments. It demonstrated that the neuroevolutionary technique is robust and efficient for controlling ASVs in restricted waters.

Keywords : Neuroevolution; autonomous surface vehicle (ASV); Autonomous manoeuvring and berthing; geofencing; Restricted waters

Conf. ID: PICOET041

PLANT-BASED SEAGRAPE EPOXY COATING FOR CORROSION PROTECTION OF MILD STEEL IN MARINE ENVIRONMENTS

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Abstract

Mild steel is widely utilized in marine infrastructure due to its mechanical strength and cost-effectiveness. However, its susceptibility to corrosion in saline environments poses significant durability and environmental concerns. This study investigates the development of an environmentally friendly epoxy coating incorporating Caulerpa lentillifera (seagrape) extract for enhanced corrosion protection of mild steel in marine environments. The functional groups present in the extract were identified using Fourier Transform Infrared (FTIR) spectroscopy, confirming the presence of bioactive compounds, including polyphenols and antioxidants. Surface morphology and film integrity were examined using scanning electron microscopy (SEM). The modified coatings containing seagrape extract at concentrations of 1 to 5 wt% were applied to mild steel substrates and evaluated for corrosion performance using electrochemical impedance spectroscopy (EIS) in a 3.5% NaCl solution. The results demonstrated that coatings containing seagrape extract significantly reduced corrosion current density and improved protection efficiency compared to the unmodified epoxy. This enhanced performance is attributed to the synergistic effect of the bioactive compounds with the epoxy matrix, which improved both barrier properties and electrochemical stability. Overall, these findings emphasize the potential of plant-based additives in epoxy coatings as a sustainable and effective strategy for corrosion control in marine environments.

Keywords : Plant-based epoxy; Seagrape extract; Mild steel; Electrochemical analysis; Corrosion protection

Conf. ID: PICOET051

INFLUENCE OF STEEL GRADE AND DEFECT INTERACTION ON THE COLLAPSE PRESSURE OF SUBSEA PIPELINES

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Abstract

As oil and gas operations expand into deeper waters, the collapse pressure of pipelines has become a critical design factor due to the elevated external pressures. Simultaneously, corrosion-induced defects continue to pose reliability concerns. This study investigates the influence of interacting defects on the collapse pressure of pipelines made from different steel grades—API 5L X42, X52, X65, and X80—under deepwater conditions. Two defect configurations were analyzed: longitudinally aligned defects, which run parallel to the pipeline axis and are separated by intact wall sections, and circumferentially aligned defects, which are directly opposite each other and fully overlap along the pipe's length. A finite element model of an X65 pipeline, with dimensions of 5000 mm in length, 273 mm in outer diameter, and 12 mm in wall thickness, was used for simulations. External pressure was applied to the pipeline surface, and fixed boundary conditions were imposed at both ends. A parametric study on the effects of normalized longitudinal and circumferential defect spacing, as well as varying defect depths and material grades was conducted. Greater spacing between defects reduces their interaction and increases the collapse pressure. X80 demonstrated the highest collapse pressure and the lowest sensitivity to defect interaction. X52 exhibited the strongest defect interaction effect but slightly outperformed X65 in terms of collapse pressure. X42 showed the weakest performance overall. Additionally, increasing defect depth led to a greater interaction effect, further compromising collapse resistance. In the future, the effect of more complex defect geometry or a wider range of materials may also be studied.

Keywords : Collapse Pressure; Subsea Pipelines; Corrosion Defects; Steel Grade (API 5L X42–X80); Finite Element Analysis (FEA)

Conf. ID: RICOET001

DETERMINATION OF MARINE CONSERVATION AREAS IN WEST ACEH USING THE FUZZY TOPSIS METHOD

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Abstract

West Aceh has significant marine resource wealth but faces serious pressures such as overfishing and ecosystem degradation. Determining the right marine conservation area is important to maintain the sustainability of these resources. The main problem in this study is determining the priority of marine conservation areas in West Aceh by considering various criteria involving uncertain and subjective data. This study aims to apply the Fuzzy TOPSIS method in determining the priority of conservation areas based on ecological, social, and economic criteria. This study uses a literature study approach and secondary data analysis. Quantitative and qualitative data are fuzzified using triangular fuzzy numbers, and the weight of the criteria is obtained through the Fuzzy AHP method. Alternative areas are analyzed using Fuzzy TOPSIS to calculate the level of closeness of each alternative to the ideal solution. The results show that the Ujong Baroh area has the highest closeness coefficient value, followed by Pasi Aceh, Pulau Weh, and Meulaboh, which reflects the optimal balance between criteria. The main conclusion of this study is that the Fuzzy TOPSIS method is effective in dealing with uncertainty and providing accountable recommendations for marine conservation decision making in West Aceh. This model is also relevant to be applied to other areas with similar characteristics.

Keywords : Marine conservation; Fuzzy TOPSIS; Multi-criteria assessment

Conf. ID: RICOET007

CONVOLUTIONAL NEURAL NETWORK-BASED DEBLURRING FOR CORROSION IMAGE PREPROCESSING IN SHIP STRUCTURE CORROSION INSPECTION

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Abstract

Under challenging maritime environments, where images are often degraded due to motion blur, poor lighting, and water interference. This research focuses exclusively on image deblurring as a preprocessing stage to enhance corrosion analysis in ship structures. A Convolutional Neural Network (CNN)-based deblurring framework designed to restore structural details in blurred corrosion images captured from real ship environments. Unlike conventional filtering or blind deconvolution techniques, the CNN model is trained end-to-end to learn the intricate patterns of blur and recover sharp features critical for accurate corrosion identification. The training dataset comprises synthetically blurred and real-world blurred corrosion images from various ship components, including hulls, decks, and superstructures. The proposed CNN architecture employs multiple convolutional layers with residual connections to effectively reconstruct sharp textures while suppressing noise. Quantitative assessments using PSNR, SSIM, and edge preservation metrics demonstrate that the CNN-based method significantly improves image clarity compared to traditional deblurring techniques. By enhancing image quality prior to segmentation or classification, this preprocessing step contributes to more accurate and reliable corrosion inspection outcomes. The results confirm the potential of deep learning-based deblurring as a valuable preprocessing tool in automated maritime inspection systems. Future integration of this module with downstream corrosion inspection algorithms offers a complete and robust AI pipeline for structural health monitoring in the shipping industry.

Keywords : Corrosion Detection; Image Deblurring; Convolutional Neural Network (CNN); Ship Structure Inspection; Image Preprocessing

Conf. ID: RICOET009

TRANSFORMING MARITIME MANUFACTURING: ADAPTING LEAN PRINCIPLES FROM AUTOMOTIVE TO SHIPBUILDING

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Abstract

The maritime manufacturing sector is undergoing a paradigm shift as it seeks to enhance operational efficiency and global competitiveness. This article examines the adaptation of Lean principles originally developed within the automotive industry into the context of shipbuilding, an industry marked by complex, large-scale, and project-based production. While Lean manufacturing emphasizes waste elimination, streamlined workflows, and customer-driven value creation, its application in shipbuilding requires significant adjustment due to differences in production scale, customization, and process variability. By exploring the core Lean principles value, value stream, flow, pull, and perfection, this study highlights their relevance in transforming traditional shipyard operations. It emphasizes the importance of leadership commitment, workforce involvement, and the integration of smart technologies in overcoming implementation challenges. The findings suggest that adopting a Lean mindset, supported by tools such as Value Stream Mapping and pull-based systems, offers a strategic pathway toward more agile, sustainable, and efficient ship production.

Keywords : Lean Manufacturing; Shipbuilding; Process Optimization; Waste Elimination; Continuous Improvement

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Conf. ID: PICOET011

POLYALTHIA LONGIFOLIA EXTRACTS AS CORROSION INHIBITOR FOR MILD STEEL CORROSION IN SEAWATER MEDIA

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Abstract

Metal degradation caused by corrosion is common in harsh environment such as seawater. The demand for an eco-friendly corrosion protection is necessary. This study investigates the corrosion inhibition potential of Polyalthia longifolia leaf extract (PLE) as a green inhibitor for mild steel in artificial seawater. The extract was prepared via simple maceration, using 80% ethanol as the solvent. In this experiment, varied PLE concentration for corrosion inhibitor (CI) ranging from CI 1 (0 g/L), CI 2 (1.25 g/L), CI 3 (2.50 g/L), CI 4 (5.00 g/L), and CI 5 (10.00 g/L) were prepared to be tested for 120 hours. Characterizations of the immersed mild steel in the inhibitors was carried out by Fourier transform infrared (FTIR) spectroscopy, ultraviolet-visible (UV-Vis) spectroscopy, weight loss measurement (WLM), electrochemical impedance spectroscopy (EIS), potentiodynamic polarization (PDP), and scanning electron microscopy/energy dispersive x-ray (SEM/EDX). Results demonstrated that the highest PLE concentration, CI 5 exhibited the highest inhibition efficiency, with WLM and EIS values of 76.0% and 71.28%, respectively. Following that, CI 5 has the lowest corrosion rate of 0.060 mm/year. The SEM/EDX analysis supported these findings by revealing a smooth and minimal corrosion products on mild steel's surface. Next, the EDX confirmed a high iron (Fe) content (97.23%), suggesting the PLE has the potential in inhibiting corrosion activities in corrosive environment. Conclusively, this study highlights the PLE as a promising green corrosion inhibitor for mild steel in aggressive marine environments, offering a sustainable replacement to conventional toxic inhibitors.

Keywords : Mild Steel; Corrosion; Inhibitors; Polyalthia longifolia; Marine environment

Conf. ID: PICOET025

ASSESSMENT OF HYDROLOGICAL ALTERATION USING HYDRA-EFLOW FOR DUNGUN RIVER

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Abstract

Hydra-Eflow tool is a comprehensive solution for assessing hydrological alterations and their potential environmental consequences. Its ability to analyze discharge time series data and calculate Hydrologic Alteration Indices on Rivers (IAHRIS) is used for identifying deviations from natural hydrological patterns. The tool's modules for data quality verification, frequency analysis, alteration analysis, and environmental flow prescription provide a holistic approach to understanding and managing hydrological alterations. The inclusion of expert-based recommendations and an adjacency matrix to guide further studies and model development adds an extra layer of utility. The case study conducted on the Dungun River demonstrates the effectiveness of Hydra-Eflow in identifying alterations in a hydrometric station. After performing an structured analysis for the hydrologic alteration, it was found that the following altered indices have a great impact for the environmental system: HAI2, HAI5, HAI9, HAI15, HAI16, and HAI21. These alterations could potentially affect the following enviromental aspects: Base flow, W. depth, Wet P, Velocity, Laminar, Turbulent, Connectivity, Mass exch., Riv.shape, Sediments, Riffles, Pools, Terraces, Roughness, Bedrock exp., Nutrients, Org.matter, Vegetation, Biodiversity, Spawning, and Invasors. Hydra-Eflow supplied information to improve the heuristics of hydrologic alteration in the Dungun River Basin.

Keywords : Hydra-Eflow; Hydrological Alteration; Structured Analysis; IAHRIS

Conf. ID: PICOET028

A NON-FUNCTIONAL REQUIREMENT QUALITY FRAMEWORK FOR APIS: AN INDUSTRY PERSPECTIVE

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Abstract

Coastal aquifers are essential freshwater sources for many communities but face increasing salinisation pressure due to rapid development and excessive groundwater extraction. In the Langat River Basin along the west coast of Peninsular Malaysia, intensified urban and industrial activities have raised concerns about seawater intrusion into shallow groundwater systems. This study evaluates the extent and hydrogeochemical characteristics of groundwater salinisation in the basin. Groundwater samples were collected from selected wells and analysed for major ions, electrical conductivity (EC), total dissolved solids (TDS), and salinity. Data interpretation involved graphical tools such as Piper diagrams and statistical correlation matrices to identify ion dominance and mixing processes. The results reveal high concentrations of chloride (up to 7,660 mg/L) and sodium (up to 2,870 mg/L), with a dominant Na–Cl water type, indicating significant marine influence. Strong correlations among Cl^-, Na^+, Mg^{2+}, and TDS further support seawater mixing as a primary salinisation mechanism. The Piper diagram shows a clear shift from freshwater to saline facies, particularly in downstream and coastal areas. These hydrogeochemical signatures confirm ongoing seawater intrusion driven by groundwater over-abstraction and land use change. The study underscores the urgent need for sustainable coastal aquifer management and continuous monitoring to safeguard freshwater supplies in vulnerable coastal zones.

Keywords : Non-Functional Requirements; Application Programming Interface; Software development practices; API quality; Non-Functional Requirement Quality Framework

Conf. ID: PICOET042

ASSESSMENT OF LOW-COST MONITORING DEVICE PERFORMANCE IN AGRICULTURAL ENVIRONMENTS

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Abstract

This study aims to evaluate whether the low-cost device can be used to assess workers' exposure in occupational settings. Workers' personal dust exposure was measured using two direct-reading monitors: the Dylos DC1700 (a low-cost aerosol monitor) and the TSI SidePak AM520 (a research-grade aerosol photometer for respirable dust). Both monitors were placed together in a small, modified backpack carried by the workers during their work shifts. A total of 42 workers from five rice mills located on the east coast of Peninsular Malaysia participated in the study. Best-fit curves were generated to compare the performance of the Dylos DC1700 with the research-grade monitor in estimating respirable dust exposure. The performance of the Dylos DC1700 was then further evaluated. Results: The Dylos DC1700 showed a non-linear (quadratic) relationship with the TSI SidePak AM520, strongest at Workplace E (R^2 = 0.79). Bias ranged from −2.98 (underestimation) at Workplace D to +2.75 (overestimation) at Workplace B. MAE and CvMAE indicated the best model performance at Workplace E. Although the Dylos DC1700 demonstrates potential for monitoring, its performance may be compromised under high dust concentrations, indicating the need for cautious interpretation in heavily contaminated agricultural environments.

Keywords : Dylos DC1700; Low-cost device; Respirable dust; Rice mills

Conf. ID: PICOET046

SHIELD DIAGRAM AND STABILITY OF AMOUR LAYER FOR ROCK REVETMENT IN RIVER

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Abstract

In engineering, particularly in riverbank rock sizing, various empirical equations are used to satisfy regulatory and verification requirements. However, these equations often yield significantly varied results, leading to reliance on subjective professional judgment. Despite ongoing efforts to validate these equations with laboratory and field data, there remains a clear gap—a standardized, quantitative framework for objectively comparing equation performance and identifying tendencies to overestimate or underestimate rock sizes under different flow conditions. This study addresses the critical knowledge gap by converting each rock sizing equation into equivalent critical shear stress values, systematically plotted onto the Shields diagram, a widely used dimensionless graphical tool in sediment transport engineering for determining critical shear conditions. A consistent set of hydraulic conditions, including constant water depth, rock specific gravity, and Froude number below 0.95, was maintained to ensure fair comparison. This novel Shields-based approach reveals that several conventional equations tend to underestimate rock sizes, especially in the high Reynolds number region. Consequently, the methodology offers a transparent and robust means to assess the conservativeness and validity of rock sizing equations, enhancing consistency and reliability in riprap design.

Keywords : Revetment; Amour Layer; Shield Diagram; Rock sizing; Stability

Conf. ID: RICOET003

PERFORMANCE ANALYSIS OF THE URBAN DRAINAGE SYSTEM IN MEULABOH FOR SURFACE RUNOFF USING EPA SWMM 5.2.4 AND MITIGATION STRATEGIES

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Abstract

Urban infrastructure development often faces challenges in managing surface runoff during periods of intense rainfall intensity, which can lead to waterlogging and flooding. This issue is caused by drainage systems having inadequate capacity to accommodate runoff volumes, as well as by the dominance of impermeable surfaces, which reduce infiltration capacity. This study aims to evaluate the condition of the drainage system in the urban area of Meulaboh using the EPA SWMM software version 5.2.4. based on field data and other supporting data. The simulation results indicate that the existing drainage system is not performing effectively to manage surface runoff. Simulations conducted using 5-year return period rainfall data with a rainfall depth of 111.39 mm indicated that as many as 62 nodes and 129 drainage channels, or 52% of the total 246, in 41 sub-catchments experienced overflow. This condition is caused by inadequate dimensions of existing, sediment accumulation, and increasing impervious land surfaces. As a mitigation strategy, it is necessary to explore the application of environmentally friendly drainage planning approaches based on the Low Impact Development (LID) concept while considering the area's physical and hydrological characteristics. The LID planning includes Rain Barrels (RB), Bioretention Cells (BC), Infiltration Trenches (IT), Vegetative Swales (VS), and Permeable Pavements (PP). This conceptual approach is expected to improve the drainage system in Meulaboh City in the future, thereby ensuring sustainability.

Keywords : Surface Runoff; Inundation; Drainage System; EPA SWMM 5.2.4; Low Impact Development (LID)

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MiGHT
Malaysian Industry-Government Group for High Technology

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Unlock the Power of Your Data. Make Better Decisions. Faster.

What We Do

VSG builds novel systems for integrating, managing and analyzing data at scale. We help organizations transforms complex, siloed data into actionable insights.

Industries We Serve

- **Government & Defense**
  Education and simulation training.
- **Metocean and Offshore**
  Extreme events prediction at sea. Dashboard and decision making systems. Marine Engineering and Vessel Analysis (Ships, Boats, ROVs).
- **Energy and Manufacturing**
  Predictive maintenance, supply chain optimization.

Our Core Solutions

- **Physics-Based Simulators**
  - PhysX driven simulation platform for ships and remotely operated vehicles.
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  - Customized dashboards.
  - Calculation engines for data crunching and analysis.
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Graduate Management & Research Complex
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The RV 8 Rotary Evaporator Starter Package

/// All-inclusive setup for your needs

RC 2 lite
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> Adjustable temperature from RT to -10 °C
> Fast cooling with 400 W power
> Liquid level indicator
> Easy-to-clean design

RV 8
Rotary Evaporator

> Automatic lift during power outage
> Up to 300 rpm
> Large, bright digital display
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> 4 L heating bath

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> Condensate trap for pump protection
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> Quiet operation

5 years warranty*

RV 8 Rotary evaporator package:

RM 35,XXX

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> RV 8 rotary evaporator: **RM 15,XXX**
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Valid until 30th September 2025

* 5-year warranty for the rotary evaporator, 3 years for peripherals devices

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