الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيفرسيتي إسلام انتارابغسا ملسيا
Garden of Knowledge and Virtue

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ORGANIZED BY:
KULLIYYAH OF ENGINEERING

IIUM ENGINEERING CONGRESS 2022

9 - 10 AUGUST 2022
ONLINE CONFERENCE
KUALA LUMPUR, MALAYSIA

ICAMME
International Conference on Advances in Manufacturing and Materials Engineering

ICEPEE

ICCE 2022

Engineering Mathematics Without Bounds

8th ICOM 2022

Sponsored By:

MTD

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MESSAGE FROM THE PRESIDENT

YBhg. Tan Sri Samsudin Osman

President

International Islamic University Malaysia

Assalamu'alaikum wbt,

A very warm welcome to all participants of the IIUM Engineering Congress 2022 (IEC '22).

This year the IIUM Engineering congress features five conferences in different fields of Engineering, namely, the 5th International Conference on Advances in Manufacturing and Materials Engineering (ICAMME'22), 8th International Conference on Mechatronics Engineering (ICOM'22), the 6th International Conference on Mathematical Application in Engineering (ICMAE'22), the 1st International Conference on Civil Engineering (ICCE'22), and the 5th International Conference on Engineering Professional Ethics and Education which will cover Manufacturing & Materials Engineering, Mechatronics Engineering, Civil Engineering, Engineering Professional Ethics & Education as well as Mathematics in Engineering.

The main aim of the congress is to provide an opportunity for leading academicians, scientists, researchers and industry experts to discuss the latest advancements in the cross-multidisciplinary engineering fields and their research benefits to the entire mankind. ICE'22 will address multiple topics and issues of interest in the areas of Contemporary Materials, Additive and Smart Manufacturing, Green Energy and Sustainable Manufacturing, Artificial Intelligence and Machine Learning, Advanced Instrumentation and Control, Autonomous Vehicles, Robotics and Automation, Industrial Revolution (IR 4.0) Technologies, Structural Engineering, Transportation and Highway Engineering, Disaster Risk Management, Climate Change, Ethics in Engineering, Islamicization of Engineering Education, Humanising Engineering Education, Engineering Education for Sustainable Development, Mathematical Physics, Modelling & Simulation. At the end of the congress, it is hoped that this will lead to innovations and create new ideas in the respective field of engineering for the betterment of all humanity.

The participants of the Congress, I believe, are well aware of many serious, and arduous challenges as a global family that are bad for the whole world including economic, social, cultural, climate change, global warming and natural disaster due to wars, human activity COVID-19 pandemic and, ignorance resulting in the changing of ecosystems, food security, sea levels and droughts. Recently, we were attacked by tiny creatures that could hardly be seen but has brought terrible damage to the whole world. War and killing each other including innocent children in order to solve conflicts is uncivilised. Therefore, the participants from highly educated institutions and organizations in this congress can certainly make a difference especially, having a positive impact after understanding and realizing the responsibility. It is hoped that this will minimize the sufferings of all humanity in the world.

MESSAGE FROM THE PRESIDENT

Our role in this world should be to act as a 'mercy to all', to be a man of blessing and compassion for the entire mankind. Undoubtedly, I hope this would be the concern of this congress as a way to move forward, whereby IIUM can be the leading international centre of excellence in research, innovation and education and hence contribute to the improvement and uplifting of the quality of human life. Having said that, I would hope that this congress will also pay attention to the preservation of humankind, not only human beings but also other creations including animals, oceans and planets (environment), thus upholding the main concept of Rahmatan lil-'Alamin.

I look forward to learning the latest research findings from top academic researchers on the above-mentioned topics through practical exposure in the form of specialized sessions, technical sessions, poster presentations, and renowned speeches supporting the upcoming challenges to be faced and their potential solutions. We are indeed in a time of great innovation in the engineering discipline, therefore, we need to seriously rethink our role as elements and drivers of positive change in our respective societies and contribute through research and development. We need to change our views and see a different perspective on about technology, planets and the whole universe. This congress will promote a research culture that can contribute to restoring the progressive role via research finding dissemination, networking and collaboration with other researchers and academic institutions. The congress has already shaped up to be excellent, and the networking opportunities will prove to be outstanding as mentioned in this program book.

IIUM as an international institution in Malaysia plans to play its role as a Murabbi (i.e. patron, superior or guardian), as such, produces engineering and other graduates with taqwa, the enlightened souls of Allah SWT. I hope the academic staff members play their role to their fullest in achieving its vision and mission. I pray that our staff and graduates sincerely observe ethical conduct only for the sake of Allah SWT and choose the road to *istiqamah* – the steadfastness, and *falaah* - the ultimate victory.

I wish you all the best, especially, a decisive success of the congress.

Wassalamu'alaikum wrt. wbt.

YBhg. Tan Sri Samsudin Osman
President
International Islamic University Malaysia

MESSAGE FROM THE RECTOR

Professor Emeritus Tan Sri Dato' Dzulkifli Abdul Razak

Rector

International Islamic University Malaysia

Assalamu'alaikum wbt,

A warm welcome to all participants of the IIUM Engineering Congress 2022 (IEC '22). The main objective of organising this Congress is to provide an international technical forum for engineers, academicians, scientists and researchers to present results of ongoing research in different areas related to Contemporary Materials, Additive and Smart Manufacturing, Green Energy and Sustainable Manufacturing, Artificial Intelligence and Machine Learning, Advanced Instrumentation and Control, Autonomous Vehicles, Robotics and Automation, Industrial Revolution (IR 4.0) Technologies, Structural Engineering, Transportation and Highway Engineering, Disaster Risk Management, Climate Change, Ethics in Engineering, Humanising Engineering Education, Engineering Education for Sustainable Development, Mathematical Physics, Modelling and Simulation with five conferences namely, 5th International Conference on Advances in Manufacturing and Materials Engineering (ICAMME'22), 8th International Conference on Mechatronics Engineering (ICOM'22), 6th International Conference on Mathematical Application in Engineering (ICMAE'22), 5th International Conference on Engineering Professional Ethics and Education and 1st International Conference on Civil Engineering (ICCE'22).

It is crucial to understand that the Congress will act as a medium for disseminating engineering research and innovation to interested parties. I hope this discussion will be interconnected with one another to create a realisation of the meaning of engineering education in the context of humanising education. Therefore, the outcome of the discussion can benefit society for the advancement of mankind with the current technology. Sometimes the market-driven technology is simply used without any awareness of its downside. Therefore, we need to question whether our engineering technology is in line with the ethics, values and morality relevant to the Maqāsid al-Sharic ah, the Sustainable Development Goals and other global agenda to safeguard humanity.

We live in a troubled time, don't we? We are bombarded with challenges around us. Climate change, global warming and natural disaster due to many reasons such as wars, human activities and fossil fuel burning are changing our ecosystems. Climate change can give rise to a lot of disasters for the people and we have not yet found sustainable ways on how to deal with it completely and comprehensively. COVID-19 pandemic has shaped rush petition for essential healthcare equipment and some other requirements for advanced information technologies applications. IR 4.0, known as the fourth industrial revolution, has the potential to accomplish those requirements for the COVID-19 catastrophe. This revolution started with the applications of advanced manufacturing and digital information technologies, but not without downside that has yet to be fully invested. I believe the participants of the Congress from highly educated institutions can certainly make the desired change and improve the current conditions to minimise the suffering of billions of people globally under the tagline 'no one left behind.'

MESSAGE FROM THE RECTOR

One of the prioritised educational goals of this University, therefore, is to nurture students and staff with balanced and harmonious education (insan sejahtera) and create a better civilisation that are more 'humane' and conscious being human in the context of insan sejahtera, for the sake of Divine Mercy to all humankind. The aim is to protect and preserve faith, life, intellect, progeny, and property towards the nurturing of insan sejahtera. Therefore, IIUM Engineering Congress 2022 is a platform to achieve the aim and meet the global sustainable development goals (SDGs) that can lead to the mercy for all (Rahmatan lil-Ālamīn).

I would like to congratulate the Kulliyyah of Engineering for organising this auspicious event and I strongly hope this platform can be used to achieve our valuable IIUM Vision and Mission and also those of the other participating institutions. I wish everyone a good deliberation and discussion and pray to Allāh subhā nahū wata ālā for His Blessing and Guidance.

Wassalamu'alaikum wrt. wbt.

Prof. Emeritus Tan Sri Dato' Dzulkifli Abdul Razak
Rector of International Islamic University Malaysia

MESSAGE FROM THE CONGRESS CHAIRMAN

Assoc. Prof. Dr. Sany Izan Ihsan

Dean

Kulliyyah of Engineering

Assalamu'alaikum wbt,

It is my utmost pleasure to welcome all participants to the IIUM Engineering Congress 2022 (IEC'22). This year the IIUM Engineering congress features five conferences in different fields of Engineering. These are the 5th International Conference on Advances in Manufacturing and Materials Engineering (ICAMME'22), the 8th International Conference on Mechatronics Engineering (ICOM'22), the 6th International Conference on Mathematical Application in Engineering (ICMAE'22), the 5th International Conference on Engineering Professional Ethics and Education (ICEPEE'22), and the 1st International Conference on Civil Engineering (ICCE'22)

The main objective of organizing this congress is to provide a medium for institutions and industries to share ideas and knowledge, exchange information, innovations, and problem-solving techniques. We are proud to have good expertise in many engineering areas and look forward to establish meaningful collaborations for mutual benefits.

This year congress will continue to be conducted in virtual form. We hope that this virtual congress will run smoothly to meet its objectives and all participant will be able to get full benefit.

I would like to take this opportunity to express my heartfelt appreciation to all parties who have directly and indirectly contributed towards the success of this auspicious event, especially the committed and passionate committee members. May Allah SWT reward you greatly for your good efforts.

Thank you very much for your participation and we welcome you again to IIUM Engineering Congress 2022.

Wassalamu'alaikum wrt. wbt.

Assoc. Prof. Dr. Sany Izan Ihsan
Dean of Kulliyyah of Engineering
International Islamic University Malaysia

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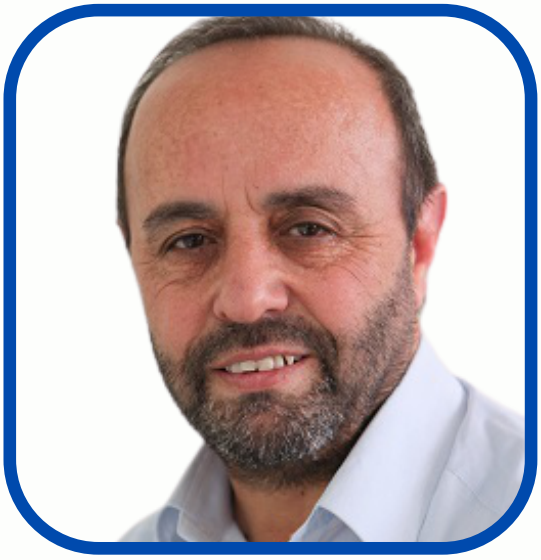
ROBOTICS FOR SUSTAINABLE FUTURE



Keynote Speakers ICOM 2022

Abstract:The robotics technology has evolved over the last decades at a high pace to meet the growing application needs outside of the factory environment. This has allowed the emergence of robotic technologies moving from the traditional industrial manufacturing sector to the service sector covering a wide range of applications in the domestic and public environments. While, in compliance with their safety requirements, traditional robots are restricted to their operating space and may allow only limited interaction with the operator, service robots share the same space with the user and allow close interaction with the user. This poses careful and challenging design and performance metrics to adhere to from perspective of safety requirements, interaction/cooperation for the robot and the user. Additional challenges include the wider societal, application, economic, and environmental considerations, which may lead to significant changes to the landscape of the society from individual to public and societal character.

This presentation will provide an insight into the evolving trend of the robotics technology from the traditional industrial robots to service robots. It will highlight the main characteristic features, safety and performance requirements and challenges through a range of applications. It will also touch upon recent research and development directions in the sector.

Prof. Mohammad Osman Tokhi received the B.Sc. degree in electrical engineering from Kabul University, Afghanistan, in 1978, and the Ph.D. degree from Heriot-Watt University, U.K., in 1988. He is currently a Professor with the School of Engineering, London South Bank University, U.K. His main research interests include active control of noise and vibration, adaptive/intelligent control, assistive robotics, soft computing techniques for modeling and control of dynamic systems, and high-performance real-time computing. He has published extensively and has executed numerous research projects to successful completion in these areas. He is a Chartered Engineer, a Fellow of Institution of Engineering and Technology (IET), and a member of International Institute of Acoustics and Vibration (IIAV) and of Climbing and Walking Robots (CLAWAR) Association. He has worked in various academic positions and in the industry.

FOURTH INDUSTRIAL REVOLUTION AND ITS IMPLEMENTATION IN MALAYSIA

Keynote Speakers ICOM 2022

Dr. Saat Shukri Embong obtained his first degree in Bachelor of Science in Mechanical Engineering from University of Hartford, Hartford, CT, USA on 1994. In 1995, he was awarded with Master of Engineering in Mechatronics and later in 2015, he obtained his Ph.D in Electrical Engineering from Universiti Kebangsaan Malaysia.

He started his career with a research center in the United States after obtaining his Bachelor Degree for two years and then returned to Malaysia to be a part of Motorola Inc. newly formed New Product Introduction center in Seremban, Negeri Sembilan. Since then, he has worked for many multinational companies in Malaysia, where his tasks were mainly responsible for managing and leading the research and development activities in the company. Among the renowned companies that Dr Saat Shukri worked for are STATSChipPAC Inc, Infineon Technologies AG, Texas Instrument Inc, Freescale Semiconductor Inc from 2002 until. 2008.

In 2009, he joined the Malaysian Industry-Government Group for High Technology (MIGHT) as Head of Technology for Technology Evaluation and Transfer activities under Technology Nurturing division. Afterwards, he was assigned to the President and CEO Office and to also spearhead strategic works and initiatives such as the development of National Science, Technology and Innovation (STI) Strategic Plan 2010-2020, conceptualizing Malaysia National Innovation Center that lead to the formation Agensi Inovasi Malaysia (AIM), formulating National Innovation Policy (NIP) as well as gathering STI inputs for Malaysia New Economic Model (NEM). He was the key driver to re-establish and re-position the National Science Advisor Office, an office for Science Advisory to Prime Minister of Malaysia where he was later seconded to be the Operation Director for the Office.

He later joined MIMOS Berhad (2010) as the Director of Research where he was responsible to provide strategic direction and spearhead R&D activities in the areas of Microelectromechanical System (MEMS), Nanoelectromechanical System (NEMS), Photonics, Nanotechnology, Micro Energy, Green Technologies, Electronics Packaging and Process Technology. He also led various collaboration programs with local and international industries, universities and research institutions during his tenure in this position. Later in 2013, he was assigned to lead the Technology and Product Portfolio Development and Management Group where he supervised various aspects of strategic activities such as to provide market intelligence, identify technologies and products to be developed by R&D Group as well as to bring those outputs to market. In 2016, he was tasked to lead MIMOS Strategy Office whereby he is currently providing the overall strategies for the company's way forward related to Fourth Industrial Revolution (4IR) in line with national strategy to position Malaysia in top 20 countries by 2050.
Throughout his tremendous tenure of career, he has successfully developed various new technologies, products and solutions as well as securing various intellectual properties in the field which qualified him to be included in the 16th Edition MARQUIS' Who's Who In The World. He is also acknowledged as an expert in various areas and was invited to sit in various governments, industry and academia related technical advisory committees as consultant and advisor.

ROBOTICS AND AUTOMATION FOR AGRICULTURE

Keynote Speakers ICOM 2022

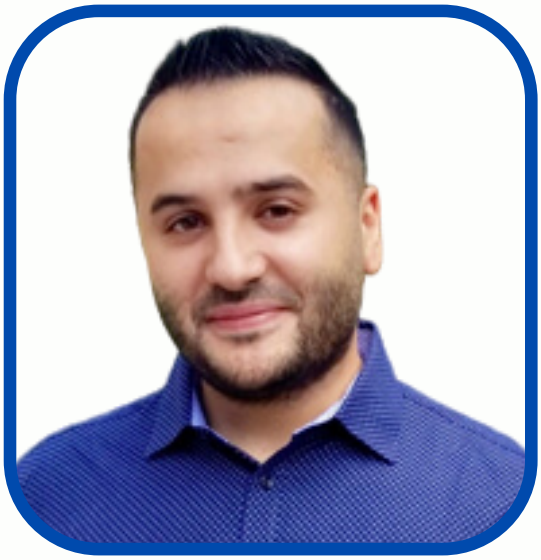
Abstract: Rapid and continuous advancement in robotics and automation technologies has reshaped various sectors including agriculture. Rising demand of food supplies, climate change, increasing labour cost and the shift of consumer preferences are potential driving forces for the need to adopt the technologies to achieve safer and more cost-effective food production. In this talk, various applications of robotics and automation technologies in agriculture, particularly those which are related to two important farming tasks, such as harvesting and weed management will be presented. Enabling technologies, such as artificial intelligence and autonomous vehicles will be discussed in relation to those two tasks. Finally, the talk will explore the skillsets that we can focus on as researchers and/or educators to enhance the positive impacts of robotics and automations applications in agriculture while mitigating any potential negative outcomes

Assoc. Prof. Dr. Rini Akmeliawati is currently an associate professor at the School of Mechanical Engineering, the University of Adelaide. She is a Fellow in Engineers Australia (FIEAust) and Senior Member of IEEE. She is the coordinator of Robotics and Automation Research Group at the University of Adelaide, the Program Coordinator for Mechatronics and Robotics program (a major of Bachelor of Mechanical Engineering (honours) program), and she is co-director of Engagement for the School of Mechanical Engineering.

She has been an academic for more than 20 years. She obtained her PhD in Electrical and Electronic Engineering (major: Control Engineering) from the University of Melbourne in 2002, and Bachelor of Electrical Engineering (honours) from RMIT University in 1997. She was a full Professor in the Department of Mechatronics Engineering at the International Islamic University Malaysia in 2012-2018 and Associate Professor in 2008-2012 in the same department. She was a lecturer at School of Electrical and Computer Systems Engineering, Monash University (2004-2008) and School of Mathematics and Geospatial Sciences, RMIT University (2001-2004).

She was the Vice President of the Malaysian Society of Automatic Control Engineers (MACE) 2016-2018. She was the Chair of IEEE Instrumentation and Measurement Society – Malaysia Chapter 2007-2009, the treasurer of the same society in 2010, and the educational executive committee in 2016 and secretary of IEEE Control Systems Society – Malaysia Chapter in 2010. She was the chair of Intelligent Mechatronics System Research Unit at the International Islamic University Malaysia in 2010-2018. She has been invited to be Keynote speaker and invited speaker on her research outcomes in International and National Conferences/Symposiums/Colloqiums/Seminars. She has published in total more than 200 research papers in journals, conference proceedings and book chapters. Her research interests are on Control Systems Design (Theory and Applications), Space Robotics, Preicision Agriculture, System Modelling and Identification, and Intelligent Mechatronics Systems. She is currently supervising 8 PhD students and more than 15 honours project students.

AUGMENTED AND VIRTUAL REALITY: YESTERDAY AND TODAY



Invited Speaker ICOM 2022

Abstract: For decades, simulated and virtual environments have been used by many for purposes of training, learning, and education. From animated war rooms for military strategists to flight simulators for pilots and astronauts, and from immersive molecular and anatomy lessons to critical and interpersonal skills training; virtual environments have been employed to simulate real-world scenarios without disrupting real-world systems. Such platforms, including augmented and virtual reality, have become increasingly popular in various arenas including maintenance, nursing, music, therapy, behavioral disorders, surgical training, and journalism, among many. In this talk, Dr. Mohammad Obeid provides an overview of the building blocks of Extended Reality (XR) technology and shares strengths and opportunities in the field.

Assoc. Prof. Dr. Mohammad F. Obeid received his BS in Industrial Engineering, German-Jordanian University. He pursued his PhD in Modeling and Simulation Engineering from Old Dominion University. Before that, he obtained MS in Modeling and Simulation Engineering from the same institution.

Dr. Mohammad joined Shenandoah University in Fall 2019. Prior to that, he was a lecturer at Old Dominion University and a co-investigator at ODU's Research Foundation. His research revolves around synthetic environments and medical-oriented simulations. In a general sense, his interests encompass extended reality platforms, interactive and predictive surgical and medical simulation, computer-assisted interventions, and multi-dimensional immersive environments to support decision making. His involvement in various multi-institutional research projects in those areas has led to many publications in the field.

Other areas he is excited to explore include augmented reality in the OR, tele-medicine and its implications with respect to fidelity and latency, haptic-interactive surgical training, and robotic-assisted surgery.

SYNTHESIS OF NB AND ZR ADDED TICN:TIBN COMPOSITE COATINGS WITH CFUBM-HIPIMS TECHNOLOGY AND INVESTIGATION OF MECHANICAL PROPERTIES

Keynote Speakers ICAMME 2022

Abstract: High-power impulse magnetron sputtering (HIPIMS) was introduced in the late 1990s as a unique physical vapor deposition method. In the early 2000s, it started to show itself in R&D studies with the technological developments in electronic power designs for HiPIMS technology. Today, HiPIMS is integrated and successfully used in magnetic field sputtering systems on an industrial scale. HiPIMS technology provides a stable and uniform discharge plasma formation with high current density, especially ensuring that the adhesion bond between the coating film and the base material is strong.

Single or multiple coatings of transition metals with C-B-N have many advantages; these are high hardness, adhesion, and wear, while low oxidation and corrosion resistance. Functional properties can be achieved by adding certain amounts of different transition elements (Ti, Zr, Nb etc.) to carbon-boron nitride-based coatings. In this study, mechanical properties were investigated by adding Zr and Nb transition elements to TiCN:TiBN composite-graded coatings using the CFUBMS-HiPIMS hybrid system as a PVD method. Coatings were synthesized on 4140 tool steel and silicon wafer using Taguchi experimental design. While the TiCN:TiBN graded composite structure was synthesized with Cr, Ti, TiB2 targets integrated in the CFUBMS-HiPIMS system, Nb and Zr were used as the fourth target material, respectively. While the mechanical properties (hardness and adhesion) of the coatings synthesized on 4140 steel were investigated, the microstructural properties were analyzed on Si wafer. 100-200 nm thick Cr transition layer was grown as an intermediate layer to increase the adhesion. It was observed that the adhesion changed as a function of the negative voltage applied to the Zr and Nb targets. In the case of Nb addition, it was determined that the highest critical load values (Lc: 90-100N) were reached at -800V, while when Zr was added, it was observed that the adhesion value appeared at lower levels (Lc: 50-60N).

Prof. Dr. Ihsan Efeoglu is a professor at Mechanical Engineering at Atatürk University in Turkey. His work has centered in surface Engineering around plasma-based technologies. His activity is focuses on the development and instructural-mechanical-tribological-chemical characterization of functional coatings. He has 25 years of field experience in Magnetron sputtering-PVD fields, using pulsed-dc and HiPIMS technology with CFUBMS PVD system.

Professor Efeoglu received his PhD in Aero. and Mechanical Engineering from Salford University, UK in 1993. He is head of the Functional Surface Technologies R&D Group, at Surface Technologies R&D Lab, established in 1997 by the Ministry of National Defense-Undersecretariat of Defense Industries of Turkey.

Professor Efeoglu has more than 70 publications in leading journals of the fields and 150 presentations in international scientific meetings. Apparent scientific impact of a scientist h-Index: 22, i10-endex:38, up to day citations 1584.

CHARACTERIZATION OF MULTIFRACTAL FATIGUE CRACK PROPAGATION

Keynote Speakers ICAMME 2022

Abstract: Advanced load-bearing structures such as aircraft spoiler and fuselage, helicopter rotor blade, marine propellers and ship hull operate under fluctuating loads. Damage tolerant design of these structures requires continuous monitoring of existing crack to ensure the structural integrity and safety. For this purpose, the fracture mechanics approach determines the rate of crack propagation and estimates the time for the crack to reach the critical length prior to catastrophic fracture. This requires the determination of the stress intensity factor range, quantified in terms of applied stress range, crack length and crack geometry, to quantify the driving force of the crack tip. The crack geometry factor is available for standard test specimens and structures with relatively simple geometry. However, the stress intensity factor range could also be estimated computationally using the finite element (FE) method. The absence of the much-needed geometry factor of numerous advanced engineering structures renders the fracture mechanics equation inapplicable for calculating the crack-tip driving force. Fortunately, a propagating crack inherits the self-similar and multi-scale fractal features along the length and surfaces of the crack wake. The fractality of the fatigue crack is quantified in terms of their fractal dimensions, and unique relationship is established with the stress intensity factor range. This, in turn, eliminates the need for the crack geometry factor in determining the fatigue crack propagation of the material.
This paper/talk discusses the methodology to quantify the fractality of a fatigue crack of AISI 410 martensitic stainless steel. Fractal analysis of microscopic images along the edge length of the crack is performed using the Box-counting method. Fatigue crack growth tests on C(T) specimen establish the reference crack growth rate response of the alloy. Results show that the crack initially exhibits a Euclidean nature ($dF \approx 1$). The fractal dimension increases steadily with increasing crack length in the Paris crack growth rate region with $1.05 < dF < 1.24$. The corresponding stress intensity factor range varies between $18 \leq \Delta KI \leq 40$ MPa$\sqrt{m}$. The fractal dimension, dF correlates linearly with the normalized stress intensity factor range, within the Paris crack growth region. This enables the multifractal fatigue crack propagation rate of the material to be determined using the fracture mechanics equation, but without requiring the geometry factor of the crack.

Prof. Dr. Mohd Nasir Tamim earned his doctoral degree in Mechanical Engineering and Applied Mechanics from the University of Rhode Island, USA in 1997. He has been with the School of Mechanical Engineering, University Teknologi Malaysia since 1984. Prof. Nasir's research team activities focus on the development of constitutive and damage models for ductile metals and fibrous composite laminates.

He leads his research team on few successful research collaborations with industries including Intel Technology on the development of a validated methodology for reliability prediction of microelectronic BGA packages and through-silicon via (TSV) interconnects, with Kiswire (Korea) for fatigue life improvement of steel wire ropes, and with Airbus and Aerospace Malaysia Innovation Center (AMIC) for damage correlation technique (DIC).

Prof. Nasir has been invited as a visiting researcher at Sophia University, Tokyo (Japan), a visiting professr at the Institut Supérieur de l'Automobile et des Transport, (ISAT), Nevers, France, Dongguk University, Seoul, Korea, and as a visiting research professor at the University of Southampton (Malaysia Campus). He is keen in promoting the university-industry collaboration, and the academic and research collaboration among colleagues across the globe.

CRYPTOGRAPHY - THE HISTORY, SCIENCE AND NATION BUILDING

Keynote Speakers ICMAE 2022

Abstract: This talk revolves around the highly hyped field of cryptography. The terms blockchain / crypto currency are among the most hyped "technology" related to cryptography. In fact, the term "crypto" has been misused to refer to crypto currency, while the fact is "crypto" is the short form for cryptography. I will begin the presentation by putting forward a compressed "historical world-view" of cryptography. The spectrum would be from application of cryptography Before Christ (BC), developments during World War 2 up until "modern" cryptography. This should provide some form of motivation for the audience. I will then discuss current research interest in UPM within my research group. Finally, I will discuss cryptography within in the aspect of Nation Building. Among the "important" aspects is the Malaysian Socio-economic Drivers: Vertical Perspective of 10-10 MySTIE Framework and the Malaysian Cyber Security Strategy (MCSS).

Prof. Dr. Muhammad Rezal bin Kamel Ariffin received his B.S. and M.S. degrees in mathematics from Universiti Putra Malaysia (UPM), Malaysia, in 1999 and 2002, respectively, and his Ph.D degree in mathematics from Universiti Kebangsaan Malaysia (UKM), Malaysia, in 2009. He is currently the Director of the Institute for Mathematical Research, UPM and a Professor with the Department of Mathematics and Statistics, Faculty of Science, UPM. A total of 6 PhD students in the field of Mathematical Cryptography has graduated under his supervision and 7 for the MSc degree also in the same field of study. Currently he has 7 PhD and 1 MSc student undergoing research in Mathematical Cryptography. He has published more than 120 articles in international journals, conferences, and book chapters. In 2007, he pioneered the establishment of the Malaysian Society for Cryptology Research (MSCR). He is currently the President of MSCR beginning December 2020. He is the General Chair for the bi-annual International Cryptology and Information Security Conference (CRYPTOLOGY) series in 2008, 2010, 2012, 2014, 2016, 2018 and 2020. He will also chair for 2022.

He is on the scientific committee for AfricaCrypt for the years 2016, 2017, 2019 and 2020. He has participated with various agencies in Malaysia on issues surrounding cryptography. Three notable deliverables are the Dasar Kriptografi Negara with CyberSecurity Malaysia and National Cyber Security Agency (2010-2013), the Government Public Key Infrastructure Framework with MAMPU in 2016 and the development of the national trusted cryptographic list – Senarai Algoritma Kriptografi Terpecaya Negara (MySEAL) with CyberSecurity Malaysia (2016-2020). His overwhelming research interests is cryptography specifically designing and analysing number theoretic based cryptosystems and post-quantum cryptography. He also has interest in chaos dynamical systems. He, with his dedicated research team, is looking forward to exploring methods towards the development of post quantum cryptography for seamless drop-in replacement and is also hoping to find better methods to reduce the complexity of the RSA problem.

QUADRATIC STOCHASTIC OPERATORS WITH INFINITE STATE SPACE

Keynote Speakers ICMAE 2022

Abstract: Quadratic stochastic operator (in short QSO) was first introduced by Bernstein. The QSO was considered as important source of analysis for the study of dynamical properties and modelling in various fields such as biology, physics, game theory, control system. Such operator frequently arises in many models of mathematical genetics. Regularity, ergodicity and chaotic dynamics of QSO with finite state space were studied in a lot of papers. We will consider QSO with infinite state space. Let (X, F) be a measurable space and S(X, F) be the set of all probability measures on (X, F), where X is a state space and F is σ-algebra of subsets of X. Let $\{P(x, y, A) : x, y \in X, A \in F\}$ be a family of functions on $X \times X \times F$ that satisfy the following conditions: i) $P(x, y, \cdot) \in S(X, F)$, for any fixed $x, y \in X$, that is, $P(x, y, \cdot) : F \to [0, 1]$ is the probability measure on F; ii) P(x, y, A) regarded as a function of two variables x and y with fixed $A \in F$ is measurable function on $(X \times X, F \otimes F)$; iii) P(x, y, A) = P(y, x, A) for any $x, y \in X, A \in F$. We consider a non-linear transformation (QSO) $V : S(X, F) \to S(X, F)$ defined by $(V\lambda)(A) = \int_X \int_X P(x, y, A)d\lambda(x)d\lambda(x)$, where $\lambda \in S(X, F)$ is an arbitrary initial probability measure and $A \in F$ is an arbitrary measurable set. Let $\xi = \{A1, A2, \cdots, Am\}$ be a measurable m−partition of the set X and $\zeta = \{Bij : i, j = 1, 2, \cdots, m\}$ be a corresponding partition of the Cartesian square of $X \times X$, where $Bii = Ai \times Ai$ for $i = 1, 2, \cdots, m$ and $Bij = (Ai \times Aj) \cup (Aj \times Ai)$ if $i \neq j$. We select a family $\{\mu ij : i, j = 1, \cdots, m\}$ of probability measures on (X, F) and define probability measure P(x, y, A) as follows: $P(x, y, A) = \mu ij(A)$ if $(x, y) \in Bij$, $i, j = 1, \cdots, m$ for arbitrary $A \in F$. Then the QSO constructed by this family of functions one can consider as approximation of QSO V by QSO with finite state space. For several years now, joint research has been carried out with colleagues from IIUM to study such operators. The purpose of this presentation is to review the results obtained earlier and to formulate new problems.

Prof. Dr. Nasir Ganikhodjaev is a distinguished professor who made significant contributions in the field of the lattice models of statistical mechanics, dynamical systems and ergodic theory, and stochastic processes. His fundamental results on phase transitions and Gibbs measures theory, on analytic and ergodic theory of quadratic stochastic operators and processes have been recognized worldwide.

Professor Nasir Ganikhodjaev was born on January 18, 1947, in Tashkent, Uzbekistan. He graduated from the high school and Tashkent State University respectively in 1965 and 1971. In 1975, he earned his Ph.D. under the supervision of Professor Vinokurov V. G. He obtained his Doctor of Science degree from Institute for Low Temperature Physics, Kharkov, Ukraine, in 1991. During the period from 1971-1997, he held positions starting from Junior Research Assistant up to Leading Research Fellow at Institute of Mathematics. During the period 1997-2003, he held a position of head of Functional analysis department at National University of Uzbekistan. During the period from June 2003- September 2020, he held a position of professor at the department of Computational & Theoretical Sciences, Faculty of Science, IIUM.

After coming back to Uzbekistan from January 2021, he is working as the Leading Researcher at the laboratory of "Stochastic Analysis" at Institute of Mathematics Academy of Sciences Uzbekistan. Prior joining IIUM Professor Nasir Ganikhodjaev had three (3) D.Sc., ten (10) PhD, and more than the (10) M.Sc. students. During his service at IIUM, he was a PhD supervisor of Assoc. Prof. Dr. Pah Chin Hee, Assoc. Prof. Dr. Nur Zatul Akmar Hamzah, and Asst.Prof. Dr. Mohd Hirzie Mohd Rodzhan. He was also a M.Sc. thesis supervisor of many other students at IIUM including Assoc. Prof. Dr. Fatimah Abdul Razak and Asst. Prof. Dr Siti Fatimah Zakaria.

Professor Nasir Ganikhodjaev is the author of more than 150 journal articles published in most prestigious journals and five (5) books, a member of the Editorial Board of number of journals, attended numerous international conferences and workshops. He also gives particular attention to middle and high school mathematics. Many years (1997-2002, 2021-2022) he led Uzbekistan's team during International Mathematics Olympiads. He is the founder of "IIUM Mathematics Competitions (IMC)" for high school students organized by the department of Computational & Theoretical Sciences, Faculty of Science, IIUM since 2005.

REENGINEERING THE PANDEMIC WISELY

Keynote Speakers ICEPEE 2022

Abstract: The prevailing coronavirus pandemic has laid bare much of the existing ecosystems that we tend to take for granted. Foremost, is the education ecosystem affecting most disciplines, including engineering. More gaps are being exposed as we contemplate the futures of the world as engineers. The presentation will elucidate some of the gaps and suggest how best to professionally and wisely navigate through the (post)-pandemic era.

Tan Sri Dato' Dzulkifli Abdul Razak (or for short, Dzul) is currently the Rector of the International Islamic University Malaysia. He was the Vice Chancellor of Universiti Sains Malaysia (USM) from 2000-2011. He is the immediate past president of the International Association of Universities (IAU), a UNESCO-affiliated organisation, based in Paris. He was the Convenor of the Regional Centre for Expertise on Education for Sustainable Development based in USM, one of seven pioneering centres worldwide, beginning 2005. Dzul was awarded the prestigious 2017 Gilbert Medal by Universitas 21 in recognition of "his long term commitment to a sustainable approach to international higher education." He is a Fellow of the Academy of Sciences Malaysia (FASc), the World Academy of Art and Science (FWAAS) and the World Academy of Islamic Management (FWAIM).Recently, on 28th May 2022, he was selected as a Senior Fellow of Academy of Sciences Malaysia.

Dzul was an Honorary Professor at the University of Nottingham from 2014 until August 2020, He is a member of the Advisory Board of the Right Livelihood College Steering Committee based at University of Bonn and an Advisory Board Member, Institute of Sustainable Development and Learning at Leuphana University of Luneburg. He was an invited speaker at the 2015 Nobel Dialogue in Sweden. In October 2020, he was appointed as a member of Qatar Foundation Higher Education Strategy Advisory Panel. Besides, Dzul is also a member of the UN Academic Network for Development Dialogue (ANDD), World Islamic Economic Forum (WIEF) and National Digital Economy & Fourth Industrial Revolution Council. In February 2021, he was invited to serve as an Expert for the Futures of Higher Education Project at UNESCO's Institute for Higher Education (IESALC) based in Caracas.

Dzul was awarded the 2017 Tokoh Akademik Negara (National Academic Laureate) and recipient of number of Honorary Doctorates from various international universities. Locally, in October 2018, he was conferred Professor Emeritus by USM, whilst in November 2019, Universiti Sains Islam Malaysia (USIM) conferred him an Honorary Doctorate of Dakwah and Islamic Management in recognition of his efforts in widening the dimensions of dakwah through various research and leadership while serving at the University. In addition, the Government of Japan, in recognition of his contribution to the academic collaboration and exchanges between the two nations has conferred him "The Order of the Rising Sun, Gold Rays with Neck Ribbon" in September 2019. In mid-December 2021 he was conferred an Honorary Doctorate of Leadership Education by the University of Cyberjaya.

Since 1995 Dzul writes weekly Op-Ed columns for Malaysia's dailies especially, The New Straits Times.

EMBEDDING ENTREPRENEURSHIP IN ENGINEERING EDUCATION: WAY FORWARD FOR POST PANDEMIC

Keynote Speakers ICEPEE 2022

Abstract: Entrepreneurship is increasingly important for business globally. The prospects of entrepreneurial activities are still underutilized due to uncovered ground of its scope. The stakeholders involved in designing the curriculum for entrepreneurial course of engineering programmes need to take into account the attributes of different types of entrepreneurs. Subsequently this will result in a clear direction for entrepreneurship in engineering education.

Prof. Dr. Luqman Abdullah is a professor at Department of Chemical and Environmental Engineering, Faculty of Engineering, Universiti Putra Malaysia. He received his Bachelor of Science in Chemical Engineering from Universiti Teknologi Malaysia in 1994 followed by his Ph.D in Chemical Engineering fron University of Birmigham, United Kingdom in 2000. He was a Deputy Dean of International and Industrial Relationship Unit, School of Graduate Studies, UPM from 2012 to 2014. Prior to that he served as the Head of Laboratory of Biopolymers and Derivatives at the Institute of Tropical Forestry and Forest Products (INTROP) from 2006 to 2011. To date, he has published about 300 papers.

CHALLENGES IN DESIGNING CURRICULUM WITH HUMAN VALUES

Keynote Speakers ICEPEE 2022

Abstract: Engineering curricula have traditionally been heavily focused on science, mathematics, and technology-based courses, without any connection to human values. While there are efforts to include social science and humanities electives to educate more well-rounded engineering graduates, the chasm between the electives and the technical courses often lead to students viewing them as a chore and waste of time. Nevertheless, the mission of engineers to "make the world a better place", is very much grounded in service to humanity. With the fast-evolving technology and the challenges in sustainable development, remaining true to the mission requires engineering courses throughout the curricula to be infused with human values, rather than separated as electives without any connection to the core courses. So how can we infuse these values in the curricula? This presentation will discuss several possible approaches, and the challenges in implementing a whole curricula approach that infuse human values.

Prof. Dr. Khairiah Mohd Yusof is the President for the Society of Engineering Education Malaysia and a Board Member of the Academy of Professor Malaysia. She is a professor in the Faculty of Engineering as well as the founding Director and fellow of Universiti Teknologi Malaysia Centre for Engineering Education. She had held positions as Vice President of the Federation of Engineering Education Societies (2012 – 2018) and Board Member representing Asia of the Research in Engineering Education Network (2012 – 2017). A practitioner, trainer, and researcher in scholarly engineering education practices, she has been invited to share her work locally and globally in Asia, Australia, Africa, Europe and North and South America.

FACILITATING THE STANDARDISATION OF LIFECYCLE CARBON ASSESSMENT FOR RAIL INFRASTRUCTURE THROUGH DIGITAL KNOWLEDGE MODELS

Keynote Speakers ICCE 2022

Abstract: Meeting climate emergencies are now a key priority for the government, business, and sustainability stakeholders, and decision-makers. The UK's construction industry contributes 47% of the nation's greenhouse emissions. Thus, significant efforts have been focused on reducing this significant carbon impact. Evidence from previous studies in the literature suggests that calculating carbon footprint for buildings and infrastructure projects suffers from a variety of well-known problems such as inconsistency in assessments, use of disparate solutions, and high subjectivity in approaches. Yet, there is limited empirical qualitative research based on the perspectives of UK carbon specialists to advance knowledge in the field. For example, there is still no consensus on an appropriate technique for assessing railway infrastructure footprint within the UK LCA community. Building Information Modelling (BIM) and related approaches offer a potential solution to accurately modelling, analysing, and simulating energy efficiency alternatives that can aid the reduction of carbon hotspots in proposed building designs. However, while existing BIM-based tools have facilitated the development of energy and carbon assessment models, they suffer from two main weaknesses. Firstly, the lack of integration between the BIM model and life cycle assessment methodologies is well documented in the literature. Secondly, existing BIM-based solutions for the assessment of the carbon impact of building assets are not well integrated with the asset management data requirements; this, in essence, limits their value as true BIM models and thus their effectiveness in informing whole life carbon-based decisions. In this study, we explore the use of parametric modelling supported by application programming interfaces (APIs) in developing an integrated carbon assessment interface. Our proof-of-concept is a proposed net-zero energy buildings and infrastructure projects. Our solution further supports cloud-based collaborative low-carbon optioneering and the integrated management of carbon asset information. Findings of the research suggest the need to integrate BIM solutions with the building's whole life cycle using intelligence supported by integrated web technologies.

Prof. Dr. Nashwan Dawood is a member of the senior management team (Associate Dean for Research & Innovation, AD for R&I) at the School Computing, Engineering and Digital Technologies (SCEDT). This school was formed in 1st Oct 2019 following a restructuring at Teesside University to create 'super schools' and reduce the number of school at university. Previously he was Associate Dean for Research & Innovation at School of Science, Engineering & Design (SSED). As the AD for R&I, his main responsibilities are: creating a vibrant research culture; leading and growing research and innovation; contribute to the University's research strategic vision and mission; develop international collaboration; maintain a high quality of research impact, respond to local and national grand challenges (in particular decarbonisation of industrial sector, Digital City and Biologics). He is responsible for REF2021 submission of three big UoAs, Engineering, Design and Computing with 100 staff expecting to be returned. Prof. Dawood developed and operationalised school research strategy focusing on increase capacity and capabilities to deliver research projects and outputs. He developed 'Industry Facing' strategy within the school to enable research teams to develop solutions for industrial challenges: Decarbonisation, Digital Health, Smart Energy Systems and Transforming Construction. Operationalisation of the strategy was accomplished through alignment of the research base to local and national industry strategies to deliver applied research, research consultancy and knowledge transfer.

METHODS AND TECHNIQUES OF DIELECTRIC MODELS FOR GROUND-BASED SOIL MOISTURE MEASUREMENT

Keynote Speakers ICCE 2022

Abstract: A vital natural ecosystem balance including seed sprouting, plant nutrition and growth, water infiltration, plant transpiration, redistribution, evaporation, and percolation relies on paramount property of soil moisture. Soil moisture measurement and its pattern understanding are crucial for various important fields such as Meteorology, Hydrology, Agriculture, Weather and Climate studies. In recent decades, a significant number of experimental methods have been developed to measure the soil moisture. The available common techniques for measuring soil moisture are divided in gravimetric, volumetric and potentiometric either in direct or indirect method. Electromagnetic methods categorized as volumetric method have been widely used in the measurement of the water content of the soil. These methods utilise the permittivity as electrical properties of the soil, to determine the moisture content of the soil. Since the measurements are carried out indirectly, a calibration between permittivity and the water content of the soil is needed. Generally, the calibration method generated by using an empirical and mixing model. This study presents a method of calibration by using a normalisation approach to calibrate the value of the permittivity of the water content of the soil. Secondary data was used to compare new calibration with other methods from previous studies. This calibration provides satisfactory results when compared to other methods. The model then was applied using electrical capacitance volume tomography (ECVT) to image soil water content during infiltration of water in a soil column. The result showed that the model for measuring moisture water content can be seen in each layer during soil water infiltration in the soil column.

Prof. Dr. Ir. Muhammad Mukhlisin is a is a Professor in the Department of Civil Engineering, Politeknik Negeri Semarang, Indonesia. He received the Bachelor of Engineering degree in civil engineering from Diponegoro University, Semarang, Central Java, Indonesia in 1992 and the Master of Engineering in Hydro Engineering from Gadjah Mada University, Yogyakarta, Indonesia in 1999. He obtained PhD degree from Kyoto University in 2005 under JICA (Japan International Cooperation Agency) scholarship program. From 2008 to 2014, he was a visiting lecturer in Department of Civil and Structural Engineering, Faculty Engineering and Built Environment, Universiti Kebangsaan Malaysia (UKM) Malaysia and Department of Civil Engineering, Faculty of Engineering, King Mongkut's University of Technology Thonburi (KMUTT) Thailand on February 2020. Since February 2018 He has been appointed as the Head of International Office of Politeknik Negeri Semarang. He has published more than 180 papers on journals and conferences related to water resources, environmental and natural disaster issues including a number of keynote speakers and special lectures.

BED DEFORMATION ANALYSIS OF BED MATERIAL LOAD AND ITS APPLICATION

Keynote Speakers ICCE 2022

Abstract: A flood flow contains not only water but also a large amount of sediment. These sediments change the shapes of the channel and the bed topographies. These changes in rivers is accompanied by bank erosion, which results in the loss of houses and farmland on the floodplain. Local scouring along banks and around bridge piers can cause bank and pier collapse, making it very important to predict the channel and bed configurations to suppress flood disasters. In addition, many plants and animals inhabit and grow in rivers, and channel and bed deformations have a strong influence on the change of physical environment of plant and animal habitats. Therefore, the prediction of river geometry and grain size of bed materials is important for the conservation and creation of ecological systems in rivers. In this talk, a boundary-fitting two-dimensional model of bed deformation analysis using the basic equations written in the general coordinate system will be introduced. The two- dimensional model can reproduce the horizontal distributions of the water level, the bed level, and the bed material size. Additionally, a free soft ware of river flow and bed deformation analysis iRIC that can be used for perform horizontal two-dimensional bed deformation analysis will be introduced during the talk.

Assoc. Prof. Hiroshi Takebayashi is Associate Professor, Disaster Prevention Research Institute (DPRI), Kyoto University in Japan, has rich experience in water and sediment hazard research. He started his career as Assistant Professor, Faculty of Engineering, Tokushima University in 2000, and has studied on various research topics such as numerical analysis on debris/mud flows, effect of sediment size distribution on formative mechanism on bed and channel geometries, numerical analysis of bed and channel geometries with vegetation growth, development of bed and channel deformation software. He is a chairperson of iRIC Research Association and a developer of iRIC which is a free river analysis software and has been developed by Japanese and USA researchers. He introduces two models into iRIC. One of them is two-dimensional bed and channel deformation analysis model which treats bed material loads and can simulate sand bars, braided channels and so on. The other is two-dimensional debris and mud flow model which and can simulate development process of debris/mud flow from surface landslides and deposition process of debris/mud flow on alluvial fan. At this current position at Disaster Prevention Research Institute (DPRI), Kyoto University, he works on sediment related disaster and river ecosystem conservation research such as debris/mud flow, bank erosion, formation process of riparian habitat and so on. He also teaches at Undergraduate School of Global Engineering, Faculty of Engineering, Kyoto University, Department of Civil and Earth Resources Engineering, Kyoto University Graduate School of Engineering.

CHALLENGES AND OPPORTUNITES TOWARD WATER SECTOR TRANSFORMATION

Keynote Speakers ICCE 2022

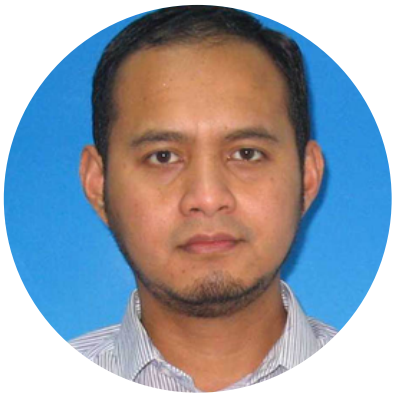
Abstract: There are five basic issues facing the water sector in Malaysia. They are the lack effective water governance, lack of ownership on water, unintegrated and insufficient quality of water data and RDIC, financial constraints and inadequate infrastructure and technology innovation. The government is committed to transform the water sector from an economic enabler into a dynamic economic sector. Academy of Science Malaysia has recently completed Water Sector Transformation 2040 (WST 2040) study awarded by the Economic Planning Unit (EPU). The Study has the twin objectives; (a) water security and sustainability and (b) water as an economic opportunity. The Study involves the preparation of a Roadmap to transform the Water Sector by 2040, that is, to become a dynamic sector that is able to contribute significantly to the GDP of the country as well as provide good quality affordable water to all. This dynamic sector will not only create new jobs but also facilitates the development of science, technology, innovation, and commercialization in the water sector. The WST 2040 Study addresses 8 additional sub-sectors deemed vital and strategic to empower people in accelerating the implementation ofIntegrated Water Resource Management (IWRM) Plan; to leverage on the advancements made in STI to enhance capability in data-driven decision making; to ensure sustainable financing; and to develop sustainable infrastructure with cost-effective Technology. The WST2040 agenda will be implemented over 20 years and has set strategic directions to be undertaken over 4 Malaysian Plans, beginning with the 12th Malaysia Plan. A vibrant water sector must recognise both the Wawasan Kemakmuran Bersatu (WKB) 2030 and the Sustainable Development Goals (SDG) 2030 to achieve social well-being, environmental sustainability and economic prosperity, leaving no one behind and ensuring water security for all. The water sector will also be regarded as a source for growth of the national economy which will generate income through value-added products and services in the sector. Under the Twelfth Plan, besides continuing some of the existing strategies from the Eleventh Plan, focus will be given on building the foundations for the water sector transformation through acceleration of the IWRM framework. In short, the WST2040 Study had included the WST2040 and Composite Roadmaps, as major outputs of the Study, and proposed a total of 106 Immediately Implementable Projects (12MP) for the consideration and implementation of the Government. In addition, the Study had proposed a total of 87 Strategies (each with the proposed Targets and KPIs set) over the 4 Phases until 2040.

Dr. Zulkifli Yusop (Adjunct Professor) was a Senior Professor of Environmental Hydrology at Universiti Teknologi Malaysia. He was the Dean of Research (water and resource sustainability), and Director of Institute of Environmental and Water Resource Management (IPASA). He is a Fellow of Malaysia Academy of Science, Fellow of Malaysia Academy of Professor and recipient of Eco-Frontier Fellowship Awards from the Ministry of Environment, Japan (2004-2006). Currently he is the Chair of Academy of Science Water Committee and Board Member of Lembaga Urus Air Selangor (LUAS). In 2019, he received the Malaysia Outstanding Water Award for Research. He was one of the editors of Water Science and Technology (IF=1.9) from 2013-2020, and issue editor of Hydrology Research (IF=2.2). He has written about 400 articles, book and book chapters, and about 200 of them are Scopus indexed. In 2012 and 2018 his team won UTM's best consultancy awards. He was involved in groundwater study at the Nabawi Mosque, flood risk study in Madinah Al Munawarah, headed research on safe rural water supply in Cambodia (2012-2016), program leader for flood disaster studies (RM 20 mill.) and head of research domain (Cultural and Natural Heritage) for research grants under the Ministry of Higher Education. Now he is working on RM 7.8 mil. research grant from the UKRI on water security.

8th International Conference Mechatronics Engineering (ICOM'22)

MESSAGE FROM THE CHAIRMAN

ICOM 2022



Assoc. Prof. Dr. Ali Sophian
Chairman
8th International Conference Mechatronics Engineering
(ICOM 2022)

Assalamualaikum warahmatullahi wabarakatuh, warm greetings to all,

On behalf of the Committee, I would like to extend to the keynote speakers, invited speakers and participants the warmest welcome to the 8 th International Conference on Mechatronics Engineering (ICOM'22). The conference is organized biennially by the Department of Mechatronics Engineering of the International Islamic University Malaysia (IIUM). For the first time ICOM is being held online. Although, we are transitioning out of the pandemic, preparation for the conference started in the middle of the Covid-19 pandemic last year, when we predicted that the movement restriction would still be upheld. Despite the challenges and the virtual form the conference is taking, we believe that it will still function as an effective platform for researchers and academicians to share and exchange ideas and the latest achievements in the sphere of mechatronics engineering. Mechatronics engineering with its fascinating assorted disciplines has played an important role in the betterment of humankind. And, this is especially true with the rise of the fourth industrial revolution that brings transformation in the manufacturing industry built upon technological pillars, many of which coincide with the scope and elements of mechatronics engineering. This opens vast opportunities for us to deliver our duties as engineers to offer sustainable solutions that will serve and enhance both the society and industry, not only for this generation, but for many generations to come.

Finally, allow me to express utmost appreciation to all members the organizing committee, the international advisory board, and the IIUM Engineering Congress 2022 Committee for all the hard work, contribution, and support given to ICOM'22.

Wassalaamualaikum warahmatullahi wabarakatuh

Assoc. Prof. Dr. Ali Sophian
Head of Mechatronics Engineering Department
Kulliyyah of Engineering
Chairman of ICOM 2022

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TECHNICAL SESSION ICOM 2022

Details at ICOM 2022

Day 1: 9th August 2022			
8:00am - 9:00am	Online attendance to the Congress IEC 2022 - Zoom Room (ICOM)		
9:00am - 10:00am	Opening Ceremony of the IIUM Engineering Congress 2022 Welcoming Remarks by The Dean, The Rector and The President		
10:00am - 10:15am	Online attendance to ICOM 2022 - Zoom Room (ICOM)		
10:15am - 11:00am	ICOM Keynote Speech #1 Speaker: Dr. Saat Shukri Embong Title: "Fourth Industrial Revolution and its implementation in Malaysia" Chairperson: Dr. Muhammad Afif Husman		
11:00am-11:15am	Break & Networking		
	PARALLEL SESSION #1a	PARALLEL SESSION #1b	PARALLEL SESSION #1c
11:15am-11:35am	149	126	122
11:35am-11:55am	142	127	138
11:55am-12:15pm	102	139	108
12:15pm-12:35pm	146	114	137
12:35pm-12:55pm	-	162	159
12:55pm-2:00pm	LUNCH		
2:00pm-2:45pm	ICOM Keynote Speech #2 Speaker: Prof. Osman Tokhi Title: "Robotics for Sustainable Future" Chairperson: Assoc. Prof. Dr. Ali Sophian		
2:45pm-3:00pm	Break & Networking		
	PARALLEL SESSION #2a	PARALLEL SESSION #2b	PARALLEL SESSION #2c
3:00pm-3:20pm	118	134	133
3:20pm-3:40pm	119	144	117
3:40pm-4:00pm	107	141	129
4:00pm-4:20pm	151	131	104
END OF DAY ONE			

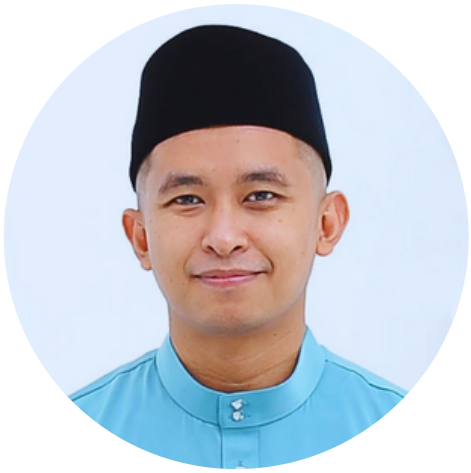
TECHNICAL SESSION ICOM 2022

Details at ICOM 2022

Day 2: 10th August 2022			
9:00am - 9:45am	ICOM Keynote Speech #3 Speaker: Assoc. Prof. Dr. Rini Akmeliawati Title: "Robotics and Automation for Agriculture" Chairperson: Dr Hasmawati Antong		
9:45am - 10:30am	ICOM Keynote Speech #4 Speaker: Dr. Iskandar Thani Title: "Robotics in Oil and Gas Application" Chairperson: Assoc. Prof. Dr. Tanveer Saleh		
10:30am-10:40am	Break & Networking		
10:40am - 11:10am	ICOM Invited Speaker Speaker: Dr. Mohammad F. Obeid Title: Augmented and Virtual Reality: Yesterday and Today Chair: Assoc. Prof. Ir. Dr. Siti Fauziah Toha		
	PARALLEL SESSION #3a	PARALLEL SESSION #3b	PARALLEL SESSION #3c
11:15am-11:35am	116	145	123
11:35am-11:55am	120	124	152
11:55am-12:15pm	135	136	154
12:15pm-12:35pm	150	113	130
12:35pm-2:00pm	LUNCH		
	PARALLEL SESSION #2a	PARALLEL SESSION #2b	PARALLEL SESSION #2c
2:00pm-2:20pm	125	109	143
2:20pm-2:40pm	103	111	148
2:40pm-3:00pm	105	128	106
3:00pm-3:20pm	115	121	112
3:20pm-3:40pm	156	157	161
3:20pm-3:35pm	Break & Networking		
3:35pm-4:00pm	CLOSING & BEST PAPER/PRESENTATION AWARDS		

5th International Conference on Advances Manufacturing and Materials Engineering (ICAMME '22)

MESSAGE FROM THE CHAIRMAN ICAMME 2022



Dr. Ahmad Zahirani Ahmad Azhar
Chairman
5th International Conference on Advances Manufacturing and Materials Engineering (ICAMME 2022)

Assalamualaikum warahmatullahi wabarakatuh,

On behalf of the organizing committees, I would like to extend a warm welcome and greeting to all participants attending ICAMME 2022. This conference is organized as a part of KOE IIUM Congress 2022 together with the 8th International Conference on Mechatronics Engineering (ICOM'22), 6th International Conference on Mathematical Application in Engineering (ICMAE'22), 5th International Conference on Engineering Professional Ethics and Education (ICEPEE'22) and 1st International Conference on Civil Engineering (ICCE'22).

The aim of this conference is to provide a platform for knowledge sharing and interchange among researchers, academicians and industrial expertise in terms of current research and development especially in the advancement of knowledge in Manufacturing Engineering and Materials Engineering.

I believe that this conference will lead to a broad discussion, generate new ideas scientifically and at the same time will create a strong 'ukhuwwah' among the participants.

I would like to express my deepest gratitude to our sponsors; Buildtest Laboratory Sdn Bhd and Deer Hills Publication for their generous contribution.

Last but not least, I would like to extend my special appreciation to all committee members who had worked so hard in making this conference a success. I do hope everyone will enjoy the conference, I believe this will be a fruitful experience and a rewarding opportunity.

Thank you.

Dr. Ahmad Zahirani Ahmad Azhar
Head of Manufacturing and Materials Engineering Department
Kulliyyah of Engineering
Chairman of ICAMME 2022

ORGANIZING COMMITTEES OF ICAMME 2022

CHAIRMAN:	Dr. Ahmad Zahirani bin Ahmad Azhar
CO-CHAIRMAN:	Assoc. Prof. Dr. Mohamed Abd Rahman
	Prof. Ir. Dr. Zuraida Ahmad
INTERNATIONAL ADVISORY PANEL:	Prof. Md. Abdul Maleque
SECRETARY:	Dr. Alya Naili Rozhan
	Dr. Nur Ayuni Jamal
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	Dr. Afifah Mohd Ali
	Dr. Adibah Amir
	Dr. Natasha A. Raof
	Dr. Syazwani Mohd Zaki
	Dr. Nor Farah Huda Abd Halim
	Dr. Norshahida Sarifuddin
	Dr. Sharifah Imihezri Syed Shaharuddin
	Dr. Nor Khairusshima Muhamad Khairussaleh
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	Prof. Ir. Dr. Md. Yusof Ismail
	Assoc. Prof. Dr. Mohd Hanafi Ani
	Zahir Hussain
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	Dr. Assayidatul Laila Binti Nor Hairin
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	Assoc. Prof. Dr. Noor Azlina Hassan
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	Dr. Norita Hassan
	Dr. Aishah Najiah Dahnel
	Dr. Nur Idayu Ayob
SOUVENIR COMMITTEE:	Dr. Siti Haryani Tomadi
KEYNOTE SPEAKER INVITATION COMMITTEE:	Assoc. Prof. Dr. Norhashimah Shaffiar (Head)
	Assoc. Prof. Dr. Noorasikin Samat
	Dr. Norhuda Hidayah Nordin
WEBSITE:	Dr. Shafie Kamaruddin
	Ir. Dr. Yang Chuan Choong
PROMOTION:	Dr. 'Atiah Abdullah Sidek
	Dr. Hafizah Hanim Mohd Zaki
LOGISTIC COMMITTEE:	Dr. Farah Diana Mohd Daud (Head)
	Dr. Suazlan Mt Aznam
	Dr. Muhammad Mukhtar Noor Awalludin
	Dr. Zakaria Mohd Zain
	Dr. Abd. Malek Abdul Hamid

ORGANIZING COMMITTEES OF ICAMME 2022

INTERNATIONAL ADVISORY BOARD:

Prof. Ir. Dr. Mohammad Yeakub Ali, Universiti Teknologi Brunei
Prof. Ir. Dr. Ramesh Singh Kuldip Singh, Universiti Teknologi Brunei
Prof Islam Shyha, Edinburgh Napier University, UK
Prof. T. M. Indra Mahlia, University of Technology, Australia
Dr. İhsan Efeoğlu, Ataturk University, Turkey
Dr Oyetunji Akinlabi, Federal University of Technology, Nigeria
Professor I.M. Mujtaba, University of Bradford, UK
Prof. Ong Soh Khim, National University of Singapore, Singapore
Dr. Muammer Kaya, Eskisehir, Osmangazi University, Turkey
Dr. Mohd Hasbullah Idris, Universiti Teknologi Malaysia, Malaysia
Dr. A S M A Haseeb, University of Malaya, Malaysia
Dr. Md Moniruzzaman, Bangladesh University of Engineering and Technology, Bangladesh
Dr. Muataz Al Hazza, American University of Ras Al Khaimah (AURAK), UAE

TECHNICAL SESSION ICAMME 2022

Details at ICAMME 2022

Day 1: 9th August 2022				
8:00am - 9:00am	Online attendance to the Congress IEC 2022 - Zoom Room (ICAMME '22)			
9:00am - 10:00am	Opening Ceremony of the IIUM Engineering Congress 2022 Welcoming Remarks by The Dean, The Rector and The President			
10.00am - 10.15am	Welcoming Remarks by 5th ICAMME 2022 Chairman - Zoom Room (ICAMME '22)			
10:15am - 11:15am	ICAMME '22 Keynote Speaker Session - Zoom Room (ICAMME '22) Prof. Dr. Ihsan Efeoglu Synthesis of Nb and Zr Added TiCN: TiBN Composite Coatings with CFUBM - HiPIMS Technology and Investigation of Mechanical Properties Chairman: Prof. Dr. Maleque			
11:15am - 12:15pm	ICAMME '22 Keynote Speaker Session - Zoom Room (ICAMME '22) Prof. Dr. Mohd Nasir Tamin Characterization of Multifractal Fatigue Crack Propagation Chairman: Assoc. Prof. Dr. Norhashimah Shaffiar			
12:15pm - 2:00pm	Noon Break			
Time	Room 1	Room 2	Room 3	Room 4
2:00pm - 2:20pm	5	10	11	66
2:20pm - 2:40pm	16	18	19	71
2:40pm - 3:00pm	53	26	25	76
3:00pm - 3:20pm	55	50	31	77
3:20pm - 3:40pm	63	51	33	83
3:40pm - 4:00pm	68	57	36	87
4:00pm - 4:20pm	80	69	48	95
4:20pm - 4:40pm	109	75	62	96

TECHNICAL SESSION ICAMME 2022

Details at ICAMME 2022

Day 2: 10th August 2022				
Time	**Room 1**	**Room 2**	**Room 3**	**Room 4**
9:00am - 9:20am	29	4	7	72
9:20am - 9:40am	13	12	22	74
9:40am - 10:00am	14	21	30	78
10:00am - 10:20am	15	38	34	89
10:00am - 10:20am	17	40	41	90
10:40am - 11:00am	Break			
11:00am - 11:20am	9	44	43	65
11:20am - 11:40am	20	46	54	67
11:40am - 12:00pm	24	47	58	103
12:00pm - 12:20pm	27	49	59	104
12:20pm - 12:40pm	28	52	60	105
12:40pm - 1:00pm	32	56	61	110
1:00pm - 2:00pm	Break			
2:00pm - 2:20pm	35	64	81	93
2:20pm - 2:40pm	37	70	85	106
2:40pm - 3:00pm	79	82	88	111
3:00pm - 3:20pm	-	86	108	-
3:30pm - 4:00pm	Closing Ceremony			

6th International Conference On Mathematical Applications in Engineering (ICMAE '22)

MESSAGE FROM THE CHAIRMAN

ICMAE 2022

Assoc. Prof. Dr. Mohd Lukman Inche Ibrahim

Chairman
6th International Conference on Mathematical Application in Engineering
(ICMAE 2022)

Assalamualaikum warahmatullahi wabarakatuh,

Mathematics is essential in advancing many fields, from engineering to social science. Mathematics provides the methodology and framework of rigorous thoughts not just in understanding various phenomena in this world, but also in applying the knowledge that we obtain to solve real world problems and improve our lives. It is astonishing to think that the enormous advancement in our lives today, compared with a few centuries ago, would not be possible without mathematics.

The Department of Science in Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), in collaboration with the Department of Computational and Theoretical Sciences, Kulliyyah of Science, IIUM, and Institut Penyelidikan Matematik (INSPEM), Universiti Putra Malaysia are therefore proud to present the 6th International Conference on Mathematical Applications in Engineering 2022 (ICMAE'22). We envision ICMAE'22 to be a platform for academicians and researchers to meet, exchange ideas and present the latest innovations and findings involving mathematical applications in various field of studies. We sincerely hope that all participants would gain as much as possible from the intellectual discourses planned throughout the event.

I would like to express my utmost appreciation to all steering and working committees for making this event a success. The publication of full-length research articles of this conference would not be possible without the critical assessments and feedback from the appointed reviewers. I hereby wish to convey my sincere gratitude to all of them. The financial support from Persatuan Sains Matematik Malaysia (PERSAMA), with the intention to further advance the field of mathematical sciences particularly in Malaysia, is deeply appreciated. Finally, thank you to all participants for your support and it is hoped that we meet again in the 7th edition of ICMAE, insha'Allah.

Thank you.

Assoc. Prof. Dr. Mohd Lukman Inche Ibrahim
Head of Science in Engineering Department
Kulliyyah of Engineering
Chairman of ICMAE 2022

ORGANIZING COMMITTEES OF ICMAE 2022

CHAIRMAN:	Assoc. Prof. Dr. Lukman Inche Ibrahim
CO-CHAIRMAN:	Assoc. Prof. Dr. Mimi Hafizah Abdullah
TECHNICAL:	Prof. Dr. Abdumalik Rakhimov
	Assoc. Prof. Dr. Jamal I. Daoud
	Assoc. Prof. Dr. Pah Chin Hee
	Dr. Nor Amirah Mohd Busul Aklan
	Dr. Siti Fatimah Zakaria
	Dr. Wan Nur Fairuz Alwani bt Wan Rozali
	Dr. Nur Zatul Akmar Hamzah
	Dr. Nurul Farahain Mohammad
	Dr. Hafizah Bt Bahaludin
	Dr. Zulmaryan binti Embong
	Dr. Norfaieqah Ahmad
WEBSITE, PUBLICITY & PAPER SUBMISSION:	Dr. Mohd Saiful Riza Bashri
	Dr. Maziati Akmal Mohd Hatta
	Dr. Noraini Mohamed Noor
	Assoc. Prof. Dr. Raihan Othman
	Dr. Nur Zatul Akmar Hamzah
PUBLICATION:	Assoc. Prof. Dr. Mohd Lukman Inche Ibrahim
	Prof. Dr. Abdumalik Rakhimov
PROGRAMME:	Dr. Kartini Ahmad
	Assoc. Prof. Dr. Abdurrahim Okhunov
PAYMENT & REGISTRATION (TREASURER):	Dr. Kartini Ahmad
	Dr. Abdul Aziz
SOUVENIR & CERTIFICATES:	Dr. Hanisah Mansor
	Dr. Norhanis Aida Mohd Nor
TECHNICAL (EQUIPMENT & ONLINE PLATFORMS AND LOGISTICS:	Dr. Mohd Saiful Riza Bashri
	Dr. Abdul Aziz
SPONSORSHIP:	Assoc. Prof. Dr. Jamal I. Daoud
	Assoc. Prof. Dr. Zaharah Wahid

ORGANIZING COMMITTEES OF ICMAE 2022

INTERNATIONAL ADVISORY BOARD:

Dr. Faiz Elfaki, Qatar University, Qatar

Dr. Fawaz Hjouj, Khalifa University, UAE

Dr. Mustofa Usman, Universitas Lampung, Indonesia

TECHNICAL SESSION ICMAE 2022

Details at ICMAE 2022

ICMAE Zoom Room Link (click here)

Day 1: 9th August 2022	
8:00am - 9:00am	Online attendance to the Congress IEC 2022
9:00am - 10:00am	Opening Ceremony of the IIUM Engineering Congress 2022 Welcoming Remarks by The Dean, The Rector and The President
10.00am - 10.10am	Welcoming Remarks by the Chairman of ICMAE 2022
10:10am - 11:10am	ICMAE '22 Keynote Speaker Session Prof. Dr. Muhammad Rezal bin Kamel Ariffin Cryptography - The history, science and nation building Chairman: Assoc. Prof. Dr. Raihan Othman
11:10am - 12:10pm	ICMAE '22 Keynote Speaker Session Prof. Dr. Nasir Ganikhodjaev Quadratic Stochastic operators with infinite state space Chairman: Prof. Dr. Abdulmalik Rakhimov
12:10pm - 2:00pm	Break
Time	Technical Session 1 (Topic: Analytical and numerical methods) Chairperson: Dr. Kartini Ahmad
2:00pm - 2:20pm	ID 1: On the exponential Radon transform Presenter: Fawaz Hjouj, Khalifa University, UAE
2:20pm - 2:40pm	ID 18: A numerical algorithm for solving fractional pharmacokinetics model Presenter: Nursyazwani Mohamad Noor, Universiti Sains Malaysia, Malaysia
2:40pm - 3:00pm	ID 29: Application of shortest path problem in the university campus using Dijkstra's algorithm Presenter: Norfaieqah Ahmad, International Islamic University Malaysia, Malaysia

TECHNICAL SESSION ICMAE 2022

Details at ICMAE 2022

Day 1: 9th August 2022	
Time	**Technical Session 2 (Topic: Algebra and anlysis)** **Chairperson: Dr. Nur Zatul Akmar Hamzah**
3:00pm - 3:20pm	**ID 13: Complete classification of two-dimensional algebras over any basic field** **Presenter: Ural Bakbaev, Turin Polytechnic University in Tashkent, Uzbekistan**
3:20pm - 3:40pm	**ID 14: On *n*-power-associative two-dimensional algebras** **Presenter: Ural Bakbaev, Turin Polytechnic University in Tashkent, Uzbekistan**
3:40pm - 4:00pm	**ID 9: Some constructions of factorizations of symmetric group** **Presenter: Chen Huey Voon, Universiti Tuanku Abdul Rahman, Malaysia**
4:00pm - 4:20pm	**ID 19: The idempotency in the genetic algebras generated by QSO on infinite state space** **Presenter: Khaled Ftameh, International Islamic University Malaysia, Malaysia**
4:20pm - 4:40pm	**ID 33: The fixed point of two-dimensional b-bistochastic quadratic stochastic operators and its application in dynamical system** **Presenter: Ahmad Fadillah Embong, Universiti Teknologi Malaysia, Malaysia**

TECHNICAL SESSION ICMAE 2022

Details at ICMAE 2022

Day 2: 10th August 2022	
Time	**Technical Session 3** **(Topic: Cryptography; mathematical physics and differential equations)** **Chairperson: Assoc. Prof. Pah Chin Hee**
9:00am - 9:20am	**ID 17: The tropical version of El-Gamal encryption** **Presenter: Any Muanalifah, UIN Walisongo Semarang, Indonesia**
9:20am - 9:40am	**ID 28: Wigner distribution function of the zero-order Bessel beam and superimposed zero-order Bessel beams** **Presenter: Franulfo L. dela Cruz, Ateneo de Manila University, Philippines**
9:40am - 10:00am	**ID 30: Convergence of the Fourier Laplace series in the spaces with the mixed norm** **Presenter: Abdumalik Rakhimov, International Islamic University Malaysia, MAlaysia**
Time	**Technical Session 4** **(Topic: Probability and mathematical statistics)** **Chairperson: Assoc. Prof. Jamal I. Daoud**
10:00am - 10:20am	**ID 15: The effect of different distance measurements on goodness-of-fit test for multinomial logistic regression** **Presenter: Hamzah Abdul Hamid, Universiti Malaysia Perlis, Malaysia**
10:20am - 10:40am	**ID 20: Statistical analysis of cutting forces and surface roughness using I-kaz3D method in the milling process** **Presenter: Razali Samin, Universiti Putra Malaysia, Malaysia**
10:40am - 11:00am	**ID 22: Predicting the optimum spinning viscosity based on temperature of wood pulp cellulose dope** **Presenter: Chen Yuan-Tsung, National Yunlin University of Science & Technology, Taiwan**
11:00am - 11:20am	**Break**

TECHNICAL SESSION ICMAE 2022

Details at ICMAE 2022

Day 2: 10th August 2022	
11:20am - 11:40am	ID 23: Relationship analysis between meteorological factors and air pollutants Presenter: Noratiqah Mohd Ariff, Universiti Kebangsaan Malaysia, Malaysia
11:40am - 12:00pm	ID 24: Prediction of PM10 time series data in Malaysia using support vector regression (SVR) model Presenter: Mohd Aftar Abu Bakar, Universiti Kebangsaan Malaysia, Malaysia
12:00pm - 12:20pm	ID 26: An investigating into simulation breast cancer using Cox model Presenter: Faiz Elfaki, Qatar University, Qatar
12:20pm - 12:40pm	ID 27: Survival models for Middle East respiratory syndrome corona virus MERS-CoV Presenter: Faiz Elfaki, Qatar University, Qatar
12:40pm - 1:00pm	ID 12: Strong consistency of estimates density function from stationary sequences of strongly linearly positive quadrant dependent random variables Presenter: Abdurahman Muhamedov, University of Uzbekistan, Uzbekistan
1:00pm - 2:20pm	Break

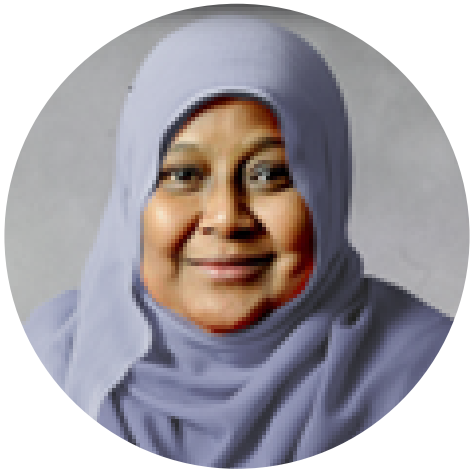
TECHNICAL SESSION ICMAE 2022

Details at ICMAE 2022

Day 2: 10th August 2022 (continuation)	
Time	**Technical Session 5** **(Topic: Mathematical modelling and simulation)** **Chairperson: Dr. Nurul Farahain Mohammad**
2:20pm - 2:40pm	**ID 5: Algebraic reconstruction approach for the circular Radon transform** **Presenter: Mohammad Hjouj, Al Quds University, Palestine**
2:40pm - 3:00pm	**ID 7: Reconstruction from limited-angle projections based on transformation** **Presenter: Mohammad Hjouj, Al Quds University, Palestine**
3:00pm - 3:20pm	**ID 8: Gradient descent approach for the Hausdorff problem** **Presenter: Fawwaz Hjouj, Khalifa University, UAE**
3:20pm - 3:40pm	**ID 11: Review and improvement of the linear transformation of images** **Presenter: Mohammad Hjouj, Al Quds University, Palestine**
3:40pm - 4:00pm	**ID 31: Modeling organic light emitting diodes: A comparison between the conventional and a new carrier recombination models** **Presenter: Mohd Lukman Inche Ibrahim, International Islamic University Malaysia, Malaysia**
4:00pm - 4:30pm	**Closing ceremony and awards**

5th International Conference On Engineering Professional Ethics and Education (ICEPEE '22)

MESSAGE FROM THE CHAIRMAN ICEPEE 2022



Prof. Dr. Aisha Hassan Abdalla Hashim
Chairman
5th International Conference on Engineering Professional Ethics and Education (ICEPEE 2022)

Assalamualaikum warahmatullahi wabarakatuh,

All praises be to ALLAH, the Almighty who has made it possible for the Kulliyyah of Engineering to organize the 5 th ICEPEE 22 after the success of the 4 th ICEPEE in 2021. The conference will be held from 9-10 August 2022 with the theme entitled "Humanizing Engineering Education for Sustainable Future".

The theme of the conference is of utmost importance as the world is desperately looking for measures to sustain after the pandemic covid 19 has left a detrimental impact in the world at large.

As the International Islamic University aims at providing a value-and-ethics based education to all the students, the ICEPEE serves as a platform to discuss how Engineering Education can be reformed to meet the current challenges. Many of those challenges are closely connected with Engineering Education in some ways. Professionalism and ethics, humanising Engineering Education, social responsibility in Engineering, Engineering Education policies and practices, are a few examples, amongst others.

I would like to take this opportunity to thank the Conference Committee who have put tremendous efforts to ensure the success and smooth running of the conference. I would also like to extend my sincere gratitude to our distinguished keynote speakers, to all presenters and participants. Finally, on behalf of the Organizing Committee, I welcome you all and wish you an enjoyable and fruitful virtual conference. May ALLAH subhanahu wata'ala guide us all in our work for the betterment of our society.

Best Regards;

Prof. Dr. Aisha Hassan Abdalla Hashim
Chairman of ICEPEE 2022

ORGANIZING COMMITTEES OF ICEPEE 2022

CHAIRMAN:	Prof. Dr. Aisha Hassan Abdalla Hashim
CO-CHAIRMAN:	Dr. Ani Liza Bt. Asnawi
SECRETARY:	Assoc. Prof. Dr. Nurul Fariza Binti Zulkurnain
REGISTRATION:	Dr. Nurul Arfah Binti Che Mustapha
TECHNICAL COMMITTEE:	Assoc. Prof. Dr. Suriza Ahmad Zabidi
	Assoc. Prof. Dr. Siti Noorjannah Bt. Ibrahim
	Dr 'Atiah Bt. Abdullah Sidek
PUBLICATION COMMITTEE:	Dr. Ahmad Zamani Bin Jusoh
	Dr. Noor Hazrin Hany Bt Mohamad Hanif
PUBLICATION COMMITTEE:	Prof. Dr. Ma'an Fahmi Rashid Al-Khatib
PROGRAM BOOK & CERTIFICATES:	Assoc. Prof. Dr. Nor Fadhillah Bt. Mohamed Azmin
MULTIMEDIA:	Dr 'Atiah Bt. Abdullah Sidek
KEYNOTE SPEAKERS:	Dr. Suhaily Binti Mokhtar
	Prof. Dr. Ir. Zuraida Bt. Ahmad
WEBSITE:	Assoc. Prof. Dr. Ali Sophian
	Assoc. Prof. Dr. Muhammad Mahbubur Rashid
SPONSORSHIP:	Dr. Nur Shahida Binti Midi

ORGANIZING COMMITTEES OF ICEPEE 2022

INTERNATIONAL ADVISORY BOARD:

Prof. Dr Buan Anshari, Universitas Mataram, Indonesia
Prof. Dr. Ikhwana Elfitri, Universitas Andalas, Indonesia
Assoc. Prof. Dr. Asma Yasen Hamo, University of Mosul, Iraq
Dr. Tyseer Alabid Elsiddig, University of Khartoum, Sudan
Dr. Mustafa Ali Abuzaraid, Misurata University, Libya
Dr. Yousef Fazea, Marshall University, USA
Dr. Bernardi Pranggono, University of Sheffield Hallam, UK
Dr. Fathey Mohammed Abdualrakeb Mohammed, Universiti Utara Malaysia, Malaysia

TECHNICAL SESSION ICEPEE 2022

Details at ICEPEE 2022

Day 1: 9th August 2022 [morning]	
8:00am - 9:00am	**Online attendance to the Congress IEC 2022 - Zoom Room (ICEPEE '22)**
9:00am - 10:00am	**Opening Ceremony of the IIUM Engineering Congress 2022** **Zoom Room (ICEPEE '22)** **Welcoming Remarks** **by** **The Dean, The Rector and The President**
10:00am - 10:15am	**Online Attendance to ICEPEE 2022**
10:15am - 11:15am	**ICEPEE '22 Keynote Speaker Session - Zoom Room (ICEPEE '22)** **Prof. Emeritus Tan Sr. Dato' Dzulkifli Abdul Razak** **Reengineering The Pandemic Wisely** **Chairman: Assoc. Prof. Dr. Suriza Ahmad Zabidi**
11:15am - 11:45am	**ICEPEE '22 Keynote Speaker Session - Zoom Room (ICEPEE '22)** **Prof. Dr. Luqman Chuah Abdullah** **Embedding Entrepreneurship In Engineering Education:** **Way Forward for Post Pandemic** **Chairman: Assoc. Prof. Dr. Nor Fadhillah Mohamed Azmin**
11:50am - 12:30pm	**Session 1 - Zoom Room (ICEPEE '22)** ***Chair: Dr. Ani Liza Asnawi*** ***Co-chair: Dr. Ahmad Zamani Jusoh*** ***Sustainability in Engineering Education and Research*** **11:50 AM** **[ID#8]** Mapping Integration of Sustainable Development Goals for Engineering Programme at International Islamic University Malaysia (IIUM) *Presenter: Amin Akramin Shafie* **12:10 PM** **[ID#11]** Ethics and Values Towards Environmental Sustainability During Covid'19 Presenter: Nassereldeen Ahmed Kabbashi
12:30pm - 2:00pm	**LUNCH BREAK**
2:00pm - 5:00pm	**Session 2 - Zoom Room (ICEPEE '22)** ***Chair: Assoc. Prof. Dr. Nurul Fariza Binti Zulkurnain*** ***Co-chair: Dr. Nur Shahida Binti Midi*** ***Enhancing Innovation in Research and Education*** **2:00 PM** **[ID#6]** Developing an Internet of Things Module for Final Year Engineering Student Presenter: Bernardi Pranggono

TECHNICAL SESSION ICEPEE 2022

*Details at **ICEPEE 2022***

Day 1: 9th August 2022 [afternoon]	
2:00pm - 5:00pm	**2:20 PM** **[ID#7]** Challenges in Quality of Education in Higher Education Institutions (HEIs) of Pakistan Presenter: Zohaib Hassan Sain **2:40 PM** **[ID#13]** Instrument Development and Validation using Rasch Model to Measure Students' Communication Skills Career Readiness Presenter: Izzeldin Ibrahim Mohamed **3:00 PM** **[ID#19]** Enhancing Innovation in Research Based on Chicken-Feed Formulation for Sustainable Production, Estimation and Commercialization Presenter: Zaharadeen Ahmed ***Entrepreneurship in Engineering Education*** **3:20 PM** **[ID#5]** A Study on Online Reservation Behaviour of Hotel Catering Industry Presenter: Kun-Shan Zhang ***Professionalism and Ethics in Engineering and Engineering Education*** **3:40 PM** **[ID#12]** Digital Hacking and Cyber-Attacks: Cyber Security from Islamic Perspective Presenter: Zainab Attar Bashi **4:00 PM** **[ID#17]** Epistemological Integration Between Modern Engineering Education and Islamic Science Presenter: Zaharadeen Ahmed

TECHNICAL SESSION ICEPEE 2022

Details at ICEPEE 2022

Day 2: 10th August 2022	
9:00am - 10:00am	**ICEPEE '22 Keynote Speaker Session - Zoom Room (ICEPEE '22)** **Prof. Dr. Khairiah Bte Mohd Yusof** **Challenges In Designing Curriculum with Human Values** **Chairman: Prof. Dr. Ir. Zuraida Bt Ahmad**
10:00am - 12:00pm	**Session 3 - Zoom Room (ICEPEE '22)** **Chair: Assoc. Prof. Dr. Muhammad Mahbubur Rashid** **Co-chair: Dr. Nurul Arfah Binti Che Mustapha** ***Engineering and Environment*** **10:00 PM** **[ID#9]** Stress Problems during Emergency Remote Teaching Learning (ERTL): Students' Perspective. Presenter: Nur Aishah Zainal ***Humanising Engineering Education & Related Topics*** **10:20 AM** **[ID#15]** Islamic Counselling from the Perspective of Professor Malik Badri Presenter: Afaf Husein Osman **10:40 AM** **[ID#14]** Realizing Humanizing Engineering Education in IIUM: A preliminary outcomes Presenter: Zuraida Ahmad **11:00 AM** **[ID#10]** A Real-time Brain Computer Interface (BCI) Framework for Sleep Stimulation Using a Deep Learning Technique: A Proposal Presenter: Zainab Attar Bashi **11:20 AM** **[ID#16]** Implementing Critical Thinking Methods in Engineering Curriculum Presenter: Ali Sophian

1st International Conference On Civil Engineering (ICCE '22)

MESSAGE FROM THE CHAIRMAN

ICCE 2022

Dr. Saerahany Legori Ibrahim

Chairman
1st International Conference on Civil Engineering
(ICCE 2022)

Assalamualaikum warahmatullahi wabarakatuh,

Alhamdulillah, all praise be to Allah SWT, the 1st International Conference on Civil Engineering 2021 (ICCE '22) has been successfully organized by the Department of Civil Engineering, Kulliyyah of Engineering, International Islamic University Malaysia held from 9 th to 10 th August 2022 with the theme "Integrating Innovation and Sustainability in Civil Engineering". The International Conference on Civil Engineering will be held every two years and it serves as an international platform to bring together international and local academics, scientists, researchers and scholars to exchange and share their experiences and research findings on all aspects of civil engineering. The conference was realised with smooth and efficient co-organisation from our esteemed collaborators that include Universiti Teknologi Brunei (UTB), Malaysian Institute of Road Safety Research (MIROS) and also the Institute of Oceanography & Maritime Studies (INOCEM).

With 4 keynote speakers from the ranks of reputable scholars, as well as more than 30 papers contributed by participants from various institutions and countries, the success of the conference can be attributed foremost to the quality and scope of the technical research in the relevant civil engineering fields. Papers with in-depth and intriguing topics were presented along 3 distinctive tracks covering the unique disciplines of civil engineering, namely material and structure, geotechnical, highway and transportation and also water and environment. ICCE '22, which is held virtually, conformed to strict protocols of rigorous reviews through a blind review process by at least two experts comprising of non-members and members of the organizing committee for all submissions.

Many members of the organizing team worked very hard to turn our initial visions for this conference into reality. I would like to express my sincere gratitude to the members of the organizing committee for their hard work and continuous support; plus, my sincere appreciation to all participants, members of the local and international advisory committee, keynote speakers and sponsors that have contributed to making this conference a successful one. I am also greatly humbled by the support and assistance given to us by the IIUM International Engineering Congress (IEC) 2022 chairman and committee members.

Thank you.

Dr. Saerahany Legori Ibrahim
Head of Civil Engineering Department
Kulliyyah of Engineering
Chairman of ICCE 2022

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TECHNICAL SESSION ICCE 2022

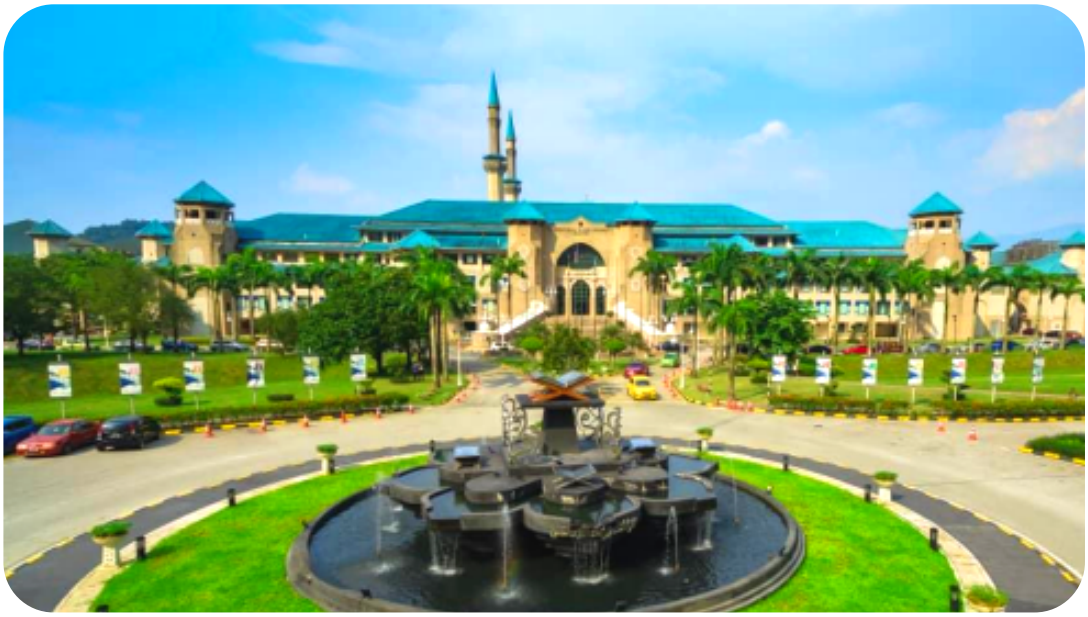
Details at ICCE 2022

<table>
<tr><th colspan="4">Day 1: 9th August 2022</th></tr>
<tr><td>8:00am - 9:00am</td><td colspan="3">Online attendance to the Congress IEC 2022 - Zoom Room (ICCE'22)</td></tr>
<tr><td>9:00am - 10:00am</td><td colspan="3">Opening Ceremony of the IIUM Engineering Congress 2022
Welcoming Remarks
by
The Dean, The Rector and The President</td></tr>
<tr><td>10:00am - 10:15am</td><td colspan="3">Welcoming Remarks by 1st ICCE '22 Chairman</td></tr>
<tr><td>10:15am - 11:15am</td><td colspan="3">Keynote Address 1
Professor Nashwan Dawood - Zoom Room (ICCE'22)
Chairperson: Prof. Ir Dr. Marlinda Binti Abdul Malek</td></tr>
<tr><td>11:15am - 12:15pm</td><td colspan="3">Keynote Address 2
Professor Dr. Ir. Muhammad Mukhlisin - Zoom Room (ICCE'22)
Moderator: Prof. Ir Dr. Marlinda Binti Abdul Malek</td></tr>
<tr><td>1:00pm - 2.30pm</td><td colspan="3">Noon Break</td></tr>
<tr><td rowspan="2">2:30pm -5:30pm</td><td>Moderator:
Dr. Nadiah Md Husain
Time Keeper:
Nor Rimie Zakerya</td><td>Moderator:
Dr. Muhammad Zahir Bin Ramli
Time Keeper:
Mohd Zairul Muiz Abd Razak</td><td>Moderator:
Ts. Ir. Dr. Norhidayu Kasim
Time Keeper:
Mohd Hanafi Agus Salim</td></tr>
<tr><td>Room Link:
Structure, Construction & Materials</td><td>Room Link:
Water & Environment</td><td>Room Link:
Geotechnical & Transportation</td></tr>
<tr><td>5.30pm</td><td colspan="3">Disperse</td></tr>
</table>

TECHNICAL SESSION ICCE 2022

Details at ICCE 2022

<table>
<tr><th colspan="4">Day 2: 10th August 2022</th></tr>
<tr><td>9:00am - 10:00am</td><td colspan="3">Keynote Address 3
Assoc. Prof. Hiroshi Takebayashi - Zoom Room (ICCE'22)
Chairperson: Prof. Dr. Abdullah Al-Mamun</td></tr>
<tr><td>10:00am - 11:00am</td><td colspan="3">Keynote Address 4
Prof. Dr. Zulkifli Yusop - Zoom Room (ICCE'22)
Chairperson: Prof. Dr. Abdullah Al-Mamun</td></tr>
<tr><td>11:00am - 11:20am</td><td colspan="3">Break for 20mins</td></tr>
<tr><td rowspan="2">11:20am -1:00pm</td><td>Moderator:
Dr. Wan Nur Firdaus Wan Hasan
Time Keeper:
Nor Rimie Zakerya</td><td>Moderator:
Dr. Dani Irwan Misbah
Time Keeper:
Mohd Azar Amirul</td><td>Moderator:
Ts. Dr. Wan Nur Aifa Binti Wan Azahar
Time Keeper:
Mohd Hanafi Agus Salim</td></tr>
<tr><td>Room Link:
Structure, Construction & Materials</td><td>Room Link:
Water & Environment</td><td>Room Link:
Geotechnical & Transportation</td></tr>
<tr><td>1:00pm - 2:30pm</td><td colspan="3">Noon Break</td></tr>
<tr><td rowspan="2">2:30pm - 4:30pm</td><td>Moderator:
Assoc. Prof. Dr. Motiar Rahman
Time Keeper:
Nor Rimie Zakerya</td><td>Moderator:
Dr. Muhammad Zahir Bin Ramli
Time Keeper:
Mohd Azar Amirul</td><td>Moderator:
Dr. Nur Khairiyah Binti Basri
Time Keeper:
Mohd Hanafi Agus Salim</td></tr>
<tr><td>Room Link:
Structure, Construction & Materials</td><td>Room Link:
Water & Environment</td><td>Room Link:
Geotechnical & Transportation</td></tr>
<tr><td>4:30pm -5:00pm</td><td colspan="3">Closing</td></tr>
</table>



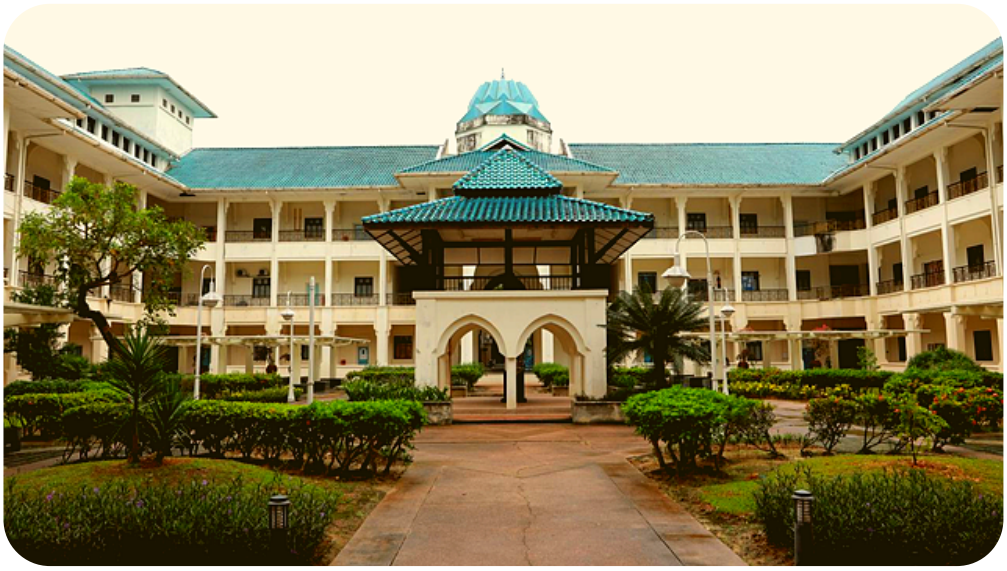
IIUM was established in 1983 to fulfill one of the major aspirations of the contemporary global Muslim community. This yearning of the Ummah is a key element in IIUM's vision statement: "To become a leading international center of educational excellence which seeks to restore the dynamic and progressive role of the Muslim Ummah in all branches of knowledge and intellectual discourse."

IIUM operates under the direction of a Board of Governors with representatives from the eight sponsoring governments and the Organization of Islamic Conference (OIC). Currently, IIUM is home to over 24,000 students (18,000 undergraduates and 6,000 Postgraduates) students including students from more than 117 countries and 3,000 teaching and administrative staff members.

The university's current physical facilities are located at five sprawling campuses in Gombak, Kuala Lumpur, Kuantan, Gambang and Pagoh. This was a far cry from its humble beginnings in 1983 when it operated from temporary quarters with 153 students and a handful of lecturers and administrators.

IIUM offers a wide range of academic programs through its faculties of Science, Laws, Medicine, Engineering, Islamic Revealed Knowledge and Human Sciences, Economics and Management, Nursing and Allied Health Sciences and Architecture and Environmental Design. These are geared towards both skill-building and scholastic attainments and designed by IIUM"s philosophy, which is built upon the belief that knowledge must be pursued and propagated in the spirit of tawhid, as an act of worship, in full recognition that it is a trust which Allah has placed upon mankind. Malaysian graduates of IIUM have performed well in both the public and private sectors. Since 1987 IIUM has been producing about 3,000 graduates annually.

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA (IIUM)



KULLIYYAH OF ENGINEERING, (IIUM)

The mission of the Faculty of Engineering is to provide quality engineering education, with sufficient scope to include fundamental and specialized knowledge and practice in engineering and a broad base in management, ethics, and humanities. This will enable our graduates to be ready to serve the current and emerging needs of the society.

Besides being professionally qualified and competent, the graduates will acquire spiritual, intellectual, moral and ethical characteristics towards the development of an integral and harmonious relationship with Allah (the Creator), fellow human beings and with the natural environment. The interdisciplinary approach to engineering education not only allows the graduates to solve industrial and human problems; it will also enable them to bring about and manage changes in conformity with the worldview based on the principles of Islam.

Currently, there are nine programs being offered: Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical and Electronics Engineering, Manufacturing Engineering, Materials Engineering, Mechanical Engineering and Mechatronics Engineering. The faculty is also offering postgraduate engineering programs leading to MSc. and Ph.D. degrees. At the moment the student population at the undergraduate level stands around 2200 and more than 200 at the postgraduate level.

Research and development are one of the primary activities in the Kulliyyah of Engineering which is harnessed by excellent facilities, qualified and competent academic staff, and holistic 'Garden of Knowledge and Virtue' ecosystem that elevate active participations in research activities in multi-disciplinary engineering areas. To foster research collaboration amongst faculty members, research units and research groups have been established towards broader Quintuple-Helix interactions for problem solving and solutions.

Presently, there are three research units and fifteen research groups spanning over various areas of engineering, encompassing both conventional and emerging fields. There are also well equipped Advanced Laboratories to support research and development activities and postgraduate studies.

The Faculty of Engineering offers a wide range opportunity of postgraduate studies with Ph.D. and Masters degree programmes. With the Kulliyyah's philosophy that is based on systems approach, the engineering programmes offer an integrated and comprehensive education that transcends the boundaries of various disciplines. The Ph.D. programme is by research whereas the Master degree program is conducted in three different modes, namely, research only, mixed mode (equal number of credits for both taught courses and research element), and coursework mode.

The Mixed-mode and Coursework mode programmes are offered in the following nine (9) programmes respectively: Automotive Engineering, Biotechnology Engineering, Communication Engineering, Computer and Information Engineering, Electronic Engineering, Manufacturing Engineering, Material Engineering, Mechanical Engineering and Mechatronics Engineering.

In addition to its teaching role, the Kulliyyah has the responsibility to conduct strong research programmes that contribute to the advancement of knowledge. Fourteen (14) cutting edge specializations are offered under the MSc in Engineering (Full Research) programme, that are Automotive Engineering, Biochemical Engineering, Biotechnology Engineering, Communication Engineering, Computer and Information Engineering, Chemical Engineering, Civil Engineering, Electronics Engineering, Engineering Mathematics, Engineering Science, Manufacturing Engineering, Material Engineering, Mechanical Engineering and Mechatronics Engineering.

ACKNOWLEDGEMENT AND SPONSORSHIPS

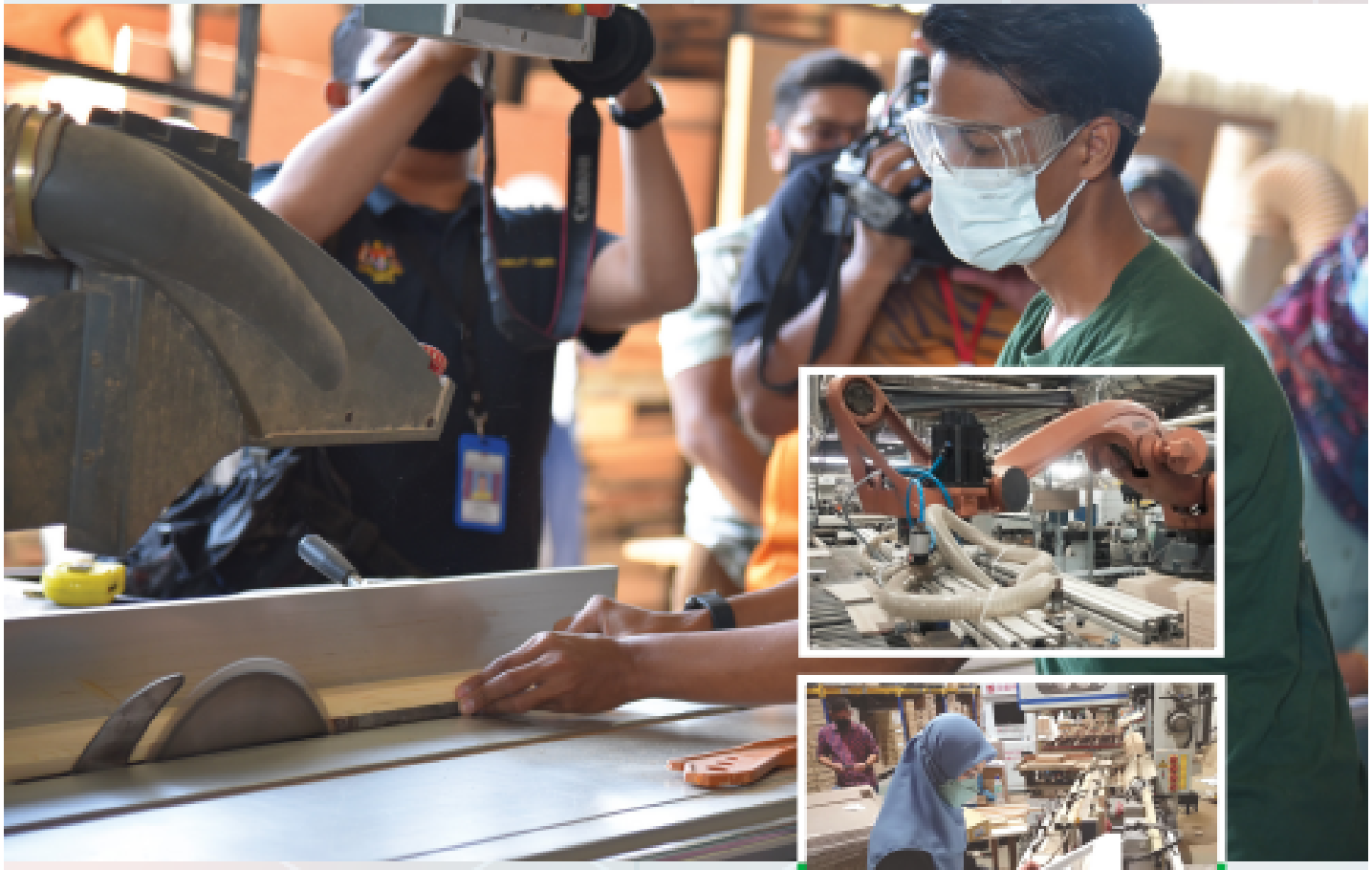
The organizing committee acknowledges the efforts of all those who have contributed their valuable time and efforts as reviewers in ensuring high-quality technical papers for the IIUM Engineering Congress 2022.

Deepest appreciation to all faculty members of the Kulliyyah of Engineering, International University Malaysia (IIUM) for their sincere cooperation in making the conference successful. Appreciation also goes to all parties who have contributed to the success of the IIU Engineering Congress 2022.

Finally, the organizing committee would like to express their thanks to the following companies for sponsoring this congress.

PROGRAM PENEMPATAN JURUTERA DAN LATIHAN PRASISWAZAH

ENGINEER PLACEMENT AND INTERNSHIP PROGRAMME



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