

IIUM ENGINEERING CONGRESS 2023 (IEC '23)

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International Conference on
Chemical Engineering &
Sustainability 2023
(ICCHES 2023)



6th International Conference on
Mechanical, Automotive and
Aerospace Engineering
(ICMAAE '23)



9th International Conference on
Computer and Communication
Engineering
(ICGCE 2023)



6th International Conference on
Engineering Professional Ethics
and Education
(ICEPEE '23)

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IIUM ENGINEERING CONGRESS PROCEEDINGS

Volume 1 Issue 1 2023

EDITORS

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EDITORIAL NOTES

Welcome to this issue of our engineering journal, where we celebrate the rich diversity of our field, encompassing chemical, aerospace, mechanical, automotive, computer and communication engineering, and Engineering Professional Ethics and Education.

With each discipline contributing its progress, in this issue, we explore the latest developments and achievements across these diverse engineering domains, highlighting the incredible impact engineers have on our world.

From the precise processes of chemical engineering to the soaring wonders of aerospace, the practical marvels of mechanical engineering, the sustainable strides in automotive engineering, and the digital frontiers of computer and communication engineering, we showcase the breadth of possibilities that engineering offers.

As you dive into the articles within, take a moment to appreciate the collective effort of engineers across these disciplines, and let's continue to celebrate the diversity that makes engineering such a vibrant and dynamic field.

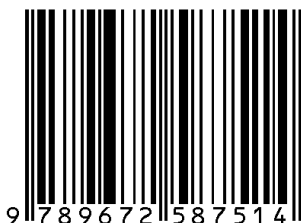
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MESSAGE FROM THE PRESIDENT



YBhg. Tan Sri Samsudin Osman

President

International Islamic University Malaysia

Assalamu'alaikum wrt. wbt.

A very warm welcome to all participants of the IIUM Engineering Congress 2023 (IEC'23).

This event marks a significant milestone in our academic journey, as we come together to celebrate the remarkable achievements and advancements in the field of engineering.

This year the IIUM Engineering congress features four conferences in different fields of Engineering, namely, the 6th International Conference on Mechanical, Automative and Aerospace Engineering (ICMAAE '23), the 9th International Conference on Computer and Communication Engineering (ICCCE 2023), the 6th International Conference on Engineering Professional Ethics and Education (ICEPEE '23), and the International Conference on Chemical Engineering & Sustainability 2023 (ICCHES 2023).

Today, as we gather under the theme "Engineering for a Sustainable Future", we are reminded of the critical role engineers play in shaping our world. The challenges we face as a global community are unprecedented, from climate change and resource scarcity to rapid urbanization and technological disruption. These challenges demand innovative solutions and a concerted effort to create a sustainable future for generations to come.

At IIUM, we have always recognized the importance of engineering in driving societal progress and addressing pressing global issues. Our engineering programs have consistently produced graduates who possess not only technical competence but also a deep understanding of ethical responsibility and the need to contribute positively to society.

As we embark on this congress, I urge all participants to embrace the spirit of collaboration, exchange of ideas, and intellectual curiosity. This platform serves as an opportunity for us to engage in meaningful dialogue, challenge conventional thinking, and push the boundaries of knowledge. Let us seize this occasion to cultivate interdisciplinary partnerships, foster innovation, and explore new frontiers of engineering.

MESSAGE FROM THE PRESIDENT

Together, we can create a better world through our dedication to innovation, sustainability, and ethical engineering practices. I encourage each and every one of you to embrace the challenges that lie ahead, to push the boundaries of what is possible, and to remain committed to the pursuit of knowledge and excellence.

I would like to express my heartfelt gratitude to the organizing committee for their tireless efforts in putting together this exceptional congress IEC'23. Your dedication and commitment to fostering academic excellence and intellectual growth are truly commendable. I would also like to extend my appreciation to the faculty members, industry professionals, and guest speakers for gracing us with their presence and sharing their expertise.

Thank you once again to the organizing committee, the faculty members, the distinguished guests, and all the participants for making this congress a resounding success. May Allah bless our efforts, guide our paths, and grant us success in all our endeavors.

Wassalamualaikum warahmatullahi wabarakatuh.

Tan Sri Samsudin Osman

President of International Islamic University Malaysia

MESSAGE FROM THE RECTOR



Professor Emeritus Tan Sri Dato' Dzulkifli Abdul Razak
Rector
International Islamic University Malaysia

Assalamu'alaikum Warahmatullahi Wabarakatuh

A warm welcome to the IIUM Engineering Congress 2023 keynote speakers and participants.

The main objective of organizing this congress is to provide an international technical forum for engineers, academicians, scientists and researchers to present results of ongoing research in various engineering areas, through the four conferences, namely, the 6th International Conference on Mechanical, Automative and Aerospace Engineering (ICMAAE '23), the 9th International Conference on Computer and Communication Engineering (ICCCE 2023), the 6th International Conference on Engineering Professional Ethics and Education (ICEPEE '23), and the International Conference on Chemical Engineering & Sustainability 2023 (ICCHES 2023). This event serves as a testament to our commitment to academic excellence, innovation, and the pursuit of knowledge in the field of engineering.

The challenges we face as a global society demand innovative solutions, groundbreaking research, and the ability to adapt to a rapidly evolving technological landscape. At IIUM, we take great pride in our engineering programs, which have consistently produced graduates who possess not only technical expertise but also a deep sense of ethical responsibility, social consciousness, and a commitment to serving humanity. Our graduates are equipped with the skills and knowledge needed to address the complex challenges of our time and to contribute meaningfully to the sustainable development of our society.

I would like to express my deepest appreciation to the organizing committee in bringing this congress to fruition. Your hard work has created an exceptional platform for academic discourse, intellectual exchange, and the celebration of engineering achievements.

This congress provides an unparalleled opportunity for students, academics, and industry professionals to come together, collaborate, and share their research findings, innovative ideas, and practical experiences. It is a platform where minds can meet, where new partnerships can be formed, and where interdisciplinary collaborations can flourish.

I encourage all participants to make the most of this congress by actively engaging in discussions, attending the various sessions and workshops, and seizing the chance to learn from the wealth of knowledge and experience present here. This is an opportunity for us to expand our horizons, challenge conventional wisdom, and push the boundaries of what is possible in the field of engineering.

MESSAGE FROM THE RECTOR

As we navigate the complex challenges of our time, we must remember that our actions have far-reaching consequences. Our faith teaches us to be mindful of our responsibilities as stewards of the Earth, to strive for justice and fairness, and to seek solutions that uplift society as a whole. Let us be guided by these principles in our pursuit of engineering excellence and innovation.

In conclusion, I would like to extend my heartfelt gratitude to the organizing committee, the faculty members, the distinguished guests, and all the participants for their contributions to this congress 23. Your presence and active engagement demonstrate the collective commitment we share to advance the frontiers of knowledge and to create a better future for all.

May this congress serve as a catalyst for groundbreaking research, meaningful collaborations, and transformative ideas. May it inspire us to strive for excellence, ethical leadership, and responsible innovation. Together, let us engineer a future that is sustainable, inclusive, and in harmony with the values we hold dear.

I wish everyone a good deliberation and discussion and pray to Allah SWT for His blessing and guidance.

Wassalam,

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

MESSAGE FROM THE CONGRESS CHAIRMAN



Assoc. Prof. Dr. Sany Izan Ihsan
Dean
Kulliyah of Engineering

Bismillahirrahmanirrahim

Assalamualaikum warahmatullahi wabarakatuh

It is my utmost pleasure to welcome all participants to the IIUM Engineering Congress 2023 (IEC'23). This year, in conjunction with the IIUM 40th Anniversary celebration, the IIUM Engineering Congress features four conferences in different fields of Engineering. These are 6th International Conference on Mechanical, Automotive and Aerospace Engineering (ICMAAE '23), the 9th International Conference on Computer and Communication Engineering (ICCCE 2023), the 6th International Conference on Engineering Professional Ethics and Education (ICEPEE '23), and the International Conference on Chemical Engineering & Sustainability 2023 (ICCHES 2023)

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. With our tagline “For Sustainable Future”, the Kulliyah strive to play our role, particularly in engineering field, for the betterment and sustainability of future mankind, society, and the world at large. This congress would be a suitable avenue for us to showcase and share our knowledge and findings, besides providing an opportunity to expand our networking with colleagues for other places. We are proud to have good expertise in many engineering areas from all around the world and look forward to establishing meaningful collaborations for mutual benefits.

Since Covid-19 has become more manageable and online conference tools have been well established due to the pandemic situation, we decided to organize the congress in hybrid mode for the first time this year. We hope that this approach will provide us with both benefit of giving opportunity for participant from abroad to share their knowledge as well as providing the opportunity to have face-to-face discussions and networking opportunities, that has been missing in the past several years. Of course, we anticipate that conducting hybrid session will find new challenges, but we hope that the event will run smoothly to meet its objectives and all participants 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 2023.

Assoc. Prof. Dr. Sany Izan Ihsan
Chairman
IIUM Engineering Congress 2023

CONGRESS ORGANIZING COMMITTEE

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KEYNOTE 1

HARMONIZING COMPUTER TECHNOLOGY, AI, AND ETHICAL ENGINEERING FOR A SUSTAINABLE FUTURES

Abstract: This keynote speech explores the intersection of computer technology, AI, and ethical engineering, emphasizing the need to address the ethical considerations that arise alongside technological advancements. It highlights the potential risks and benefits of these technologies and emphasizes the importance of ethical decision-making in their design and implementation. The speech emphasizes key principles of ethical engineering, interdisciplinary collaboration, and the role of education in nurturing a culture of ethical engineering. By harmonizing computer technology, AI, and ethical engineering, we can shape a sustainable future that aligns with our shared values and respects fundamental human rights.



Rafeek Ibrahim is a distinguished professional known for his remarkable contributions to the fields of engineering and management. With a diverse educational background and extensive experience in various leadership roles, he has made a significant impact on the global stage.

Rafeek's journey began with a solid academic foundation. He completed his undergraduate studies in Engineering, specializing in solid state physics. Driven by his passion for knowledge, he pursued a master's degree in the same field, delving deeper into the intricacies of solid state physics. However, he didn't limit himself to technical expertise alone. Recognizing the importance of business acumen in today's fast-paced world, Rafeek enrolled in an executive education program at Harvard Business School, focusing on data analytics, a crucial skill in the digital age.

Rafeek's professional career commenced in the field of IP Validation Engineering, where he honed his skills in ensuring the integrity and functionality of intellectual property. His expertise soon expanded to encompass Power Management, an area vital for optimizing energy usage and efficiency. With his extensive knowledge and experience in Power and Performance, Rafeek emerged as a subject matter expert in these domains.

Demonstrating his adaptability and leadership prowess, Rafeek held leadership positions in large engineering organizations across different countries. His expertise was sought after in the United States, Singapore, and Malaysia, where he led diverse teams of engineers and researchers. Through his strategic vision and effective management, Rafeek successfully steered these organizations towards groundbreaking achievements in research and development, as well as operational excellence.

As a testament to his contributions to the scientific community, Rafeek has published technical papers in prestigious journals such as IEEE and Springer. His research and findings have been shared and recognized in international conferences, further solidifying his reputation as an authority in his field. Moreover, Rafeek's commitment to innovation has resulted in the granting of two patents in the United States, highlighting his inventiveness and ability to translate ideas into tangible solutions.

Rafeek's dedication to fostering growth and knowledge extends beyond his own accomplishments. He actively participates as a mentor in the Intel Global Mentor Circle mentorship program, where he imparts his wisdom and guidance to senior leaders. Recognizing the importance of diversity and inclusion, Rafeek represents Malaysia in a global forum aimed at advocating for these values. As a member of the Intel Disability Leadership Council, he strives to create an inclusive environment that celebrates the unique contributions of individuals with disabilities.

In addition to his impressive professional achievements, Rafeek also serves as a consultant to the government, providing expertise on the Nation Robotics Roadmap. His valuable insights contribute to shaping policies and strategies in the field of robotics, furthering the nation's technological advancements. Moreover, Rafeek holds an advisory role at the Economic Planning Unit, where he helps shape R&D policies that drive innovation and economic growth.

Recognized for his expertise and leadership, Rafeek sits on the University Advisory Board for multiple universities globally. His involvement in these esteemed institutions allows him to contribute to educational and research initiatives, providing guidance and insight to shape the future workforce in engineering and technology.

Throughout his career, Rafeek Ibrahim has seamlessly blended his technical expertise with his management skills, making him a trailblazer who bridges the gap between engineering and business. His commitment to research and development, combined with his strategic leadership, has paved the way for innovation and growth in the organizations he has led.

KEYNOTE 2

THE TREND AND IMPACT OF COMPUTER TECHNOLOGIES TO TELECOMMUNICATION

Abstract: With the advancement of computer technologies, we see the increasing capabilities of telecommunication to connect, serve and impact lives of individuals and businesses. We will take a quick look on how we got here, and what impact has it made. Also looking forward, what we would be expecting computer technologies to have impact on how we deliver and use telecommunication.



Tan Cheng Peng, the Acting Chief Technology Strategy Officer, Maxis, is accountable for our technology strategy roadmap to ensure technology and network leadership in anticipation of industry trends and direction, with the right and optimum technologies, network features, capabilities, architecture to meet our current and future needs. He leads a team of technologists to develop technology strategy and long range network plan along the vectors of innovation, service quality, business objectives and customer experience by ensuring right technology & investment at the right time and right place with the view to increase network efficiency and performance while minimise cost, rework and single point of failure.

KEYNOTE SPEAKERS ICCCE 2023

KEYNOTE 3

MALAYSIA RENEWABLE ENERGY ROADMAP

Abstract: Moving forward, Malaysia aims to achieve a higher RE growth, from the existing 23% or 8.45 GW RE in its power installed capacity. Malaysia Renewable Energy Roadmap (MyRER) projected to increase the share of RE to 31% or 12.9 GW in 2025, and 40% or 18.0 GW in 2035. The RE Initiatives under this roadmap are expected to support Malaysia's commitment to greenhouse gas (GHG) emission reduction under the Paris Agreement led by the United Nations Framework Convention on Climate Change (UNFCCC). Malaysia's global climate commitment is to reduce its economy-wide carbon intensity (against GDP) of 45% in 2030 compared to 2005 level. Realization of the Government's vision is crucial in supporting the nation to achieve its Nationally Determined Contributions (NDC) targets. This talk will describe the identified resource potential, strategies, key actions, opportunities, current and future scenarios.



Mr. Saiful Hakim bin Abdul Rahman, has been in the utility and energy related business for over 28 years. He started his career with Distribution TNB scholar and served the distribution division for 17 years which provides him with vast experience in Distribution Network business. He then moved to United Kingdom and worked with Scottish and Southern Energy (SSE), one of the big 6 utilities in the UK based in Glasgow. Whilst in SSE, he was involved in Business Planning, Regulatory Reporting and Compliance, Asset Management and supporting the grid connections for Renewable Energy under the Transmission business. He worked closely with OFGEM, the Regulator for the UK utilities during that period in developing the Regulatory Reporting for the RIIO-T1 Regulatory Period. He developed his interest and enthusiasm on Renewable Energy whilst working there. Later he joined Landis+Gys AG, a Swiss based energy management company developing business on energy management solution such as smart metering and smart grid. Mr. Saiful Hakim obtained his Bachelor of Engineering in Electrical & Electronic Engineering from University of Brighton, United Kingdom in 1993 and MBA (Strategic Management) from Aston University, United Kingdom in 2011. During his MBA time he also attended Audencia Business School, Nantes in France for lectures.

KEYNOTE SPEAKERS ICCHES 2023

DECARBONIZATION TECHNOLOGIES FOR THE NATURAL GAS PROCESSES AS THE TRANSITION ENERGY SOURCE

Abstract: Gas to Liquid (GTL) conversion of natural gas to synthetic fuels (Syncrude) expands the value-chain of natural gas utilization where plants like the Bintulu and the Pearl GTL plants are typical cases. However, the CO₂ emissions from GTL processes, estimated at 314 kgCO₂/bbl. Syncrude, negatively impact the carbon footprint of the ultra-clean fuels produced from the GTL plant. Natural gas reforming is the first-step in the GTL plant and emits up to 60% of the CO₂ emission of the entire process. Therefore, decarbonization of the reforming process is imminent to reduce the CO₂ footprint of the GTL products. CARGEN-based reformer unit demonstrated a 40% reduction in CO₂ footprint compared to the benchmark reforming processes and is therefore considered an attractive candidate for decarbonizing the GTL and other chemical process plants. CARGEN-based reformer comprises two integrated reactors that sequentially convert natural gas and CO₂ to multi-walled carbon nanotubes (MWCNTs) and downstream compatible syngas. The co-production of MWCNTs presents significant economic incentives unmatched by the benchmark reforming processes while bringing CO₂ sustainability. In this work, we present a retrofitting case study of state-of-the-art Autothermal Reformer (ATR)-based GTL plant that produces 50,000 bbl./day of Syncrude using CARGEN-based technology. We demonstrate that the implementation of the CARGEN technology results in a net CO₂ emission of 84 kg CO₂/bbl. Syncrude, which is a 73% reduction compared to the 314 kg CO₂/bbl. emission of the ATR-based GTL plant. CARGEN implementation also requires a 79% less oxygen than the ATR-based GTL plant. Also, the additional functionality of CO₂ abatement results in the co-production of 243 kg MWCNTs/bbl., however, at a 61% higher methane requirement. Nevertheless, our comprehensive economics assessment entails the opportunity for 1.2 M USD/day additional revenue generation upon CARGEN implementation. Ultimately, the outcome of this study encourages CARGEN-based chemicals and refinery plants that co-produces syngas, hydrogen, and MWCNTs from CO₂ and natural gas as an integrated decarbonization solution.

Prof. Nimir Elbashir

Texas A&M University, Qatar



Professor Elbashir holds a joint appointment as a professor in the Chemical Engineering Program and the Petroleum Engineering Program at Texas A&M University at Qatar. He is the director of Texas A&M's Engineering Experiment Station Gas and Fuels Research Center (GFRC), a major research center involving 30 faculty members from the College Station and Qatar campuses of Texas A&M University (<http://gfrc.tamu.edu/>). He has extensive research and teaching experience from four countries worldwide, including his previous position as a researcher at BASF R&D Catalysts Center in Iselin, New Jersey. His research activities focus on designing advanced reactors, catalysts, and conversion processes for natural gas, coal, and CO₂ to ultraclean fuels and value-added chemicals. He has established several unique global research collaboration models between academia and industry, with research funds exceeding thirteen million dollars during the past eight years. He holds several U.S. and European patents and many scientific publications in peer-reviewed journals, conference papers, technical industry reports, and invited talks and conference presentations. The scholarship of his research activities has been recognized by awards from the Qatar Foundation, BASF Corp., Texas A&M University Engineering Experiment Station, Texas A&M University Qatar, the American Institute of Chemical Engineers, Shell, ORYX GTL Co., and others. Professor Elbashir has been elected as a member of the Sudanese National Academy of Sciences (SNAS) since 2022.

KEYNOTE 1

INNOVATING IN MALAYSIAN INDUSTRIAL ECOSYSTEMS

Abstract:

Innovating in Malaysian industrial ecosystems involves a combination of government support, industry-academia collaboration, technology adoption, sustainable practices, industry clustering, startup ecosystem, and skills development. These elements work together to enhance competitiveness, promote sustainable growth, and ensure the country's industrial sectors remain at the forefront of innovation.



Mr. Naguib Mohd Nor

BEng. Aerospace Engineering - UMIST, MSc. Aerospace Vehicle Design – Cranfield.

Naguib is CEO of Strand Aerospace Malaysia and President of Malaysia Aerospace Industry Association (MAIA). Naguib holds a BEng. Aerospace Engineering from UMIST and a MSc. Aerospace Vehicle Design from Cranfield. He began his career growing a UK aerospace start-up, and then returned to Malaysia to build Strand Aerospace Malaysia into an organisation leading the design and analysis engineering services industry in Malaysia. Naguib has been active as an engineer, technologist and business developer in the global aerospace supply chain since 2000. He speaks frequently on aerospace and other technology subjects at global events. His deep understanding of technology comes through his 20 years' experience as an aerospace engineer supporting the design and development of commercial aircraft and aerospace companies.

KEYNOTE 2

RESEARCH TRENDS IN SUSTAINABLE MOBILITIES

Abstract:

Air pollution and climate change are significantly affected by the increase of greenhouse gases produced by burning fossil fuels. The transportation or mobility sector is considered the primary source of these emissions. Policymakers have imposed stricter legislation to reduce greenhouse gas emissions and implement new energy mobilities such as battery electric vehicles, fuel cell vehicles, and hydrogen internal combustion engine vehicles. For example, the European Parliament has agreed to ban new fossil fuel sales beyond 2030. The demand for cleaner and sustainable mobility has driven a drastic change in the way how mobilities are functioning today. However, the new energy mobilities pose several challenges such as range anxiety, lack of charging infrastructure, vehicle costs, and charging time, that are interrelated to each other. Many automotive manufacturers and researchers have developed more innovative system designs and solutions. In this topic, the trends in future mobilities will be covered to understand the research opportunities that can help to achieve the net zero emissions target.



Dr. Raja Mazuir Shah

Associate Dean, College of Engineering, University of Doha for Science and Technology, Qatar.

Dr. Raja Mazuir Shah is an Associate Dean at the College of Engineering, University of Doha for Science and Technology, Qatar. Dr. Mazuir has been working in academia and industry research settings in Automotive Engineering for more than 27 years, for example, Warwick University UK, Coventry University UK, Sakarya University Turkiye, Lotus Engineering UK, Arrival Limited UK. Dr. Mazuir has also collaborated with external stakeholders such as Jaguar Land Rover UK, Aston Martin Lagonda UK, and Bladon Jets UK to develop innovative solutions for propulsions and energy management systems. Dr. Mazuir is currently working on several research clean mobility projects to develop a sustainable and renewable green hydrogen EV charging infrastructure, a novel lithium-ion battery thermal management system for energy and thermal optimisation, a sustainable mobility system, and advanced sustainable mobility design and testing facilities. Dr. Mazuir was a visiting academic at Cranfield University, UK and Universiti Teknologi Petronas, Malaysia. Dr. Mazuir has published his works in high-impact journals and conferences.

KEYNOTE 1

ENGINEERING EDUCATION AND ETHICS TOWARDS SUSTAINABLE SOCIETY

Prof. Emeritus Tan Sri Dato' Dzulkifli Abdul Razak

Rector, International Islamic University Malaysia, Malaysia



Abstract: Education for Sustainable Development has been adopted globally as the overarching framework to transform education holistically in shaping the society of the future. It integrates the 3Ps of People, Planet and Prosperity in a balanced and harmonious way. In short, the same applies to the discipline of engineering. Taking into account transdisciplinary, inclusive as well as indigenous approaches to realise a sustainable society. The presentation will explain on how this could be systematically achieved.

KEYNOTE 2

PREPARING STUDENTS FOR INDUSTRY: BRIDGING THE GAP BETWEEN ACADEMIA AND THE REAL WORLD

Prof. Dr. Abdel Magid Hamouda

Professor, College of Engineering, Qatar University



Abstract: In an ever-evolving technological landscape, the dynamic role of engineering education in preparing industry-ready graduates has gained paramount importance. The journey to bridge the gap between academia and the real world, aligning graduate attributes and skills with industrial needs, is influenced by various challenges and barriers. The involvement of industry professionals in curriculum design infuses programs with pertinent skills, technologies, and practices. Experiential learning, internships, and collaborative activities reveal profound insights to student about industries.

Industries are undergoing rapid transformations driven by technological breakthroughs and market dynamics. Automation, artificial intelligence, renewable energy, sustainable practices, and digitalization are reshaping the landscape of various sectors. By aligning with industry needs, universities ensure their engineering programs reflect these changes, enabling students to acquire the latest technical skills and knowledge. Graduates with up-to-date expertise become more relevant and valuable to employers, positioning themselves for career success.

Introducing the concept of innovation in engineering education as a bridge between academia and industry is crucial. The presentation will highlight methodologies such as project-based learning, problem-based learning, flipped classrooms, and experiential learning. Examples showcasing how these approaches engage students in practical, real-world scenarios, fostering critical thinking, collaboration, and problem-solving will be presented and discussed. The design of innovative classrooms that include space design (hubs) for experiential and hands-on learning mirroring industry landscapes is essential for foster critical thinking.

The presentation is also delves into the pivotal role of soft skills in graduate employability, such as communication, adaptability, and leadership. Integrating these skills into the curriculum empowers graduates to manage not just the details of their technical subjects, but also the complexities of different work environments. It will also illustrate the benefits of incorporating real-world projects within the curriculum, showcasing a successful projects that effectively embed and nurture the skills and attributes needed for students to excel in the real world.

The presentation will explore how fostering an entrepreneurial mindset can encourage innovation and adaptability among engineering graduates, and how to foster an entrepreneurial and innovative ecosystems within universities.

The presentation delves into the significant influence that accreditation holds on the employment prospects of university engineering graduates. The presentation will present and discuss how university ranking often hold a reputation for offering quality education and producing skilled graduates.

Employers may prioritize graduates from top-ranked universities due to their perceived higher competence.

Finally, looking toward the future, universities act as navigators. Their curricula must serve as a map, equipping graduates with the skills required to navigate this AI-driven job market.

KEYNOTE 3

RESEARCH IN ENGINEERING EDUCATION FOR TEACHING EXCELLENCE CAREER PATHWAY

Prof. Dr. Fatin Aliah Phang Abdullah

Professor, Universiti Teknologi Malaysia, Malaysia



Abstract: When the Ministry of Higher Education launched the Malaysia Education Blueprint 2015-2025 (Higher Education), one of the shifts is to achieve Talent Excellence. To support this shift, MOHE published the Orange Playbook to introduce the Differentiated Career Pathways for the promotion of academics. This opens up a few niches for academics to focus in developing their academic careers such as Teaching & Learning, Research, Professional Services and Leadership. Engineering educators at higher education institutes are given the opportunities to venture further into teaching, curriculum development, research in engineering education and engineering education related conferences and awards as a new pathway towards career promotion. This keynote will introduce the teaching excellence framework by the Royal Academy of Engineering as a foundation for engineering educators in planning their career towards the teaching & learning pathway. The keynote will also cover various levels of engineering educators ranging from good practices in teaching to conduct rigorous research in engineering education.

MESSAGE FROM THE CHAIRMAN OF ICCCE 2023



Prof. Dr. Md Rafiqul Islam

Assalamualaikum warahmatullahi wabarakatuh,

I would like to extend my warmest welcome to the participants of the 9th International Conference on Computer and Communication Engineering 2023 (ICCCE 2023) organized by the Department of Electrical and Computer Engineering (ECE), Faculty of Engineering, International Islamic University Malaysia (IIUM). The Department and the Faculty have been encouraged to organize bi-yearly ICCCE conferences by the enthusiasm and participation in the previous conferences which drawn from around the world. Our aim in establishing ICCCE series of IEEE supported and Scopus indexed conferences is to make it a landmark in the field of Computer and Communication Engineering, which provides a healthy atmosphere for intellectual exchange of thoughts and sharing of research findings among fellow colleagues, researchers, policy makers and students. The theme of the present conference is "Engineering Research for a Sustainable World".

The past ICCCE conferences, as well as the current one, has followed a strict regime of IEEE guidelines of blind-review process seconded by the experienced technical committee scrutiny to update the papers based on reviewers' comments and to comply with the template guidelines. The ICCCE2023 conference has achieved acceptance rates of around 71% out of 110 full paper submissions through EDAS from around 20 countries.

I would like to express my sincere gratitude to the organizing committee and everybody who has worked very hard to make this conference a reality and a success. I would like to express my deepest gratitude to the distinguished keynote speakers, International Advisory Board members and sponsors. I am also grateful to all the reviewers, as without their effort the high-quality standard for the conference could not have been maintained.

I wish all of you a pleasant hybrid experience and we hope that ICCCE 2023 will be a successful and enjoyable event for all participants. I would like to express my gratitude to the participants, members of the organizing committee, secretarial staff, and everyone who have worked hard to make this conference into reality. Finally, I hope that ICCCE 2023 will be successful and enjoyable to all participants.

Wassalam,

Prof. Dr. Md Rafiqul Islam
Electrical and Computer Engineering Department
Kulliyah of Engineering
Chairman of ICCCE 2023

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MESSAGE FROM THE CHAIRMAN OF ICCHES 2023



Prof. Ir. Dr. Mohammed Saedi Jami

Chairman

**International Conference on Chemical Engineering & Sustainability 2023
(ICCHES 2023)**

Assalamualaikum warahmatullahi wabarakatuh,

The International Conference on Chemical Engineering & Sustainability 2023 (ICCHES 2023) (Previously known as ICBioE) is being organized by the Department of Chemical Engineering and Sustainability at the Faculty of Engineering, International Islamic University Malaysia. The conference will take place on August 15th – 16th, 2023, and its theme is "Nurturing Innovation for Sustainable and Green Future". The conference will serve as an international platform for researchers to share their ideas, experiences, and latest research findings and innovations in various fields of chemical engineering, including bioenergy, materials, bio-chemical engineering, environmental engineering, and bioprocess engineering. The submissions will undergo a rigorous review process by at least two experts, including members and non-members of the organizing committee. The organizer eagerly looks forward to see you there as the members of the organizing committee, participants, members of the advisory committee, keynote speakers, and sponsors and be a part of this impactful pool of ideas and knowledge sharing.

To summarize, we would like to extend a warm invitation to you to join us at our upcoming conference. We have an exciting line-up of speakers and topics that we believe will be of great interest to you and your colleagues. We hope you will take advantage of this opportunity to network, learn, and engage with other professionals in your specific field. We look forward to seeing you at the conference and hope that you will find it to be a valuable and enlightening experience. Thank you for the impactful work that you do and we hope to see you soon.

Wassalam,

Prof. Ir. Dr. Mohammed Saedi Jami
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MESSAGE FROM THE CHAIRMAN OF ICMAAE '23



Fadly Jashi Darsivan

Chairman

6th International Conference on Mechanical, Automotive and Aerospace Engineering 2023 (ICMAAE '23)

Assalamualaikum warahmatullahi wabarakatuh,

Welcome to the International Conference on Mechanical, Automotive, and Aerospace 2023, ICMAAE '23. We gather here to celebrate the brilliance of engineering and technology, uniting researchers, professionals, and experts from across the globe.

Within these pages of the program book, a realm of knowledge awaits you—a testament to human ingenuity, innovation, and collaboration. From mechanics to automotive engineering, and aerospace exploration, we showcase the incredible achievements that have shaped our world.

As we delve into plenary sessions and technical presentations let us remember the power of collective wisdom. Together, we can overcome challenges and unlock opportunities that lie ahead. This conference not only heralds progress but also reminds us of our responsibility. Sustainable development and ethical practices must underpin every advancement we make. Let us steer our innovations toward a brighter and more inclusive future.

ICMAAE '23 is more than just an academic event; it embodies the spirit of community. Let us cherish the bonds formed here and leverage mentorship to nurture the next generation of visionaries. In conclusion, my gratitude goes to all whose dedication made ICMAAE '23 a reality. This program book serves as a beacon, inspiring us to explore new frontiers, guided by the principles of responsible innovation.

Thank you and enjoy the enriching experience of ICMAAE '23. Together, we shape a world of endless possibilities.

Wassalam,

Assoc. Prof. Dr. Fadly Jashi Darsivan
Chairman of ICMAAE '23

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MESSAGE FROM THE CHAIRMAN OF ICEPPE 2023



Assoc Prof. Dr. Ani Liza Asnawi

Chairman of 6th International Conference on Engineering Professional Ethics and Education 2023 (ICEPEE' 23)

Assalamualaikum waramatullahi wabarakuh

A warm welcome to the 6th International Conference on Engineering Professional Ethics and Education (ICEPEE'23), organized by the INTEGRATES (Integrative Engineering Education and Ethics for Sustainability) research group, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM). We proudly present our conference theme this year, which focus on the “*Engineering Education and Ethics towards Sustainable Society*”.

Globalization has led the whole world to be closely connected and interdependent economically, socially, and politically. This has led to increasing apprehension globally that many engineering advancements and scientific research lead to contentious breakthroughs and outcomes that are ethically unacceptable. In the era marked by rapid technological advancements and global challenges, the intersections of sustainability, ethics and engineering education have never been significant. Today, as engineers and educators, we carry profound responsibility not only to develop innovative solutions but also to perform it with a conscious understanding of their impact on our society, generations, and our ecosystem as well.

The ICEPEE'23 with its significant theme serves as a platform to bring the gaps between theory and practice, to share insights that inspired ethical considerations in engineering, and to foster a commitment to sustainability that echoes through our institutions, curriculum, and research. As we embark on this transformative journey over the coming days, it is important for us to take every opportunity to engage, learn and collaborate. The objective of this conference is to gather all related parties to exchange relevant ideas and findings to enrich their knowledge and views on the significance of the engineering education, and ethics in shaping our future generation.

I would like to take this opportunity to extend my heartfelt gratitude to our keynote speakers, authors, and presenters, who have dedicated their commitment to the accomplishment of this conference. Surely the insights and all the sharing will undoubtedly serve as beacons of inspiration for us to continue the journey in shaping our engineers and society. This conference also will not be possible without the tireless effort of our organizing committee particularly. For the organizing committee, thank you for your hard work and support that have turned this conference into a reality and success. May Allah grant the efforts tremendously.

Finally, on behalf of the organizing committee, I welcome all participants to the ICEPEE'23, may this platform bring a meaningful change and inspire us for shaping our engineering education and ethics towards a sustainable society. Thank you and let us embrace the challenges and opportunities that lie ahead.

Best Regard,

Assoc Prof. Dr. Ani Liza Asnawi
Chairman, ICEPEE'23

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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.

KULLIYAH OF ENGINEERING, IUM



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 Kulliyah 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 Kulliyah'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.

KULLIYAH OF ENGINEERING, IIUM

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 specialisations 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

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 2023.

Deepest appreciation to all faculty members of the Kulliyyah of Engineering, International Islamic 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 IIUM Engineering Congress 2023.

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



and secondary level of schooling, 2) Project on the new outlook of the engineering programmes and 3) Contribution of engineering on sustainability of the society through capacity building.

ICESCO Chair in Sustainable Engineering (ICESCO CiSE) is a programme initiated by the Islamic World Educational, Scientific and Cultural Organization (ICESCO), for promoting capacities of the institutions of higher education by facilitating access to knowledge and taking parts in its activities e.g., motivation, training and research activities, academic exchange etc.

ICESCO CiSE is based at the Kulliyyah of Engineering, and focuses on youth training and capacity building and its sustainability. Our vision and action strategy dwell on three main domains : 1) Capacity building project for youth in national STEM Education at the primary

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