SEPTEMBER 2024 VOL. 1

enginitium

The official bulletin of the Research Office, Faculty of Engineering, Universiti Malaya

IN THIS ISSUE

Innovative 3D-Printed Face Guard: A Game Changer for Athlete Recovery

by Hanie Nadia Shasmin, Centre for Applied Biomechanics (CAB)

A collaborative effort between University Malaya (UM) and Selangor FC, together with the university's spin-off company BioApps Sdn Bhd, has led to the development of a 3D-printed face guard for athletes. Led by Prof. Dato' Seri Ir. Dr. Noor Azuan Abu Osman, Mouaz Al-Kouzbary (UM PhD candidate), and Certified Prosthetist and Orthotist Muhammad Hazim Kamaruzaman, this innovative protective gear gained significant recognition when it was used by Malaysia's celebrated Selangor FC footballer, Mohamad Faisal Abdul Halim recently. The custom-made face guard allowed Faisal to continue playing safely while recovering from a facial injury, ensuring both protection and high-level performance.

Faisal Halim's use of the 3D-printed face mask this year has garnered widespread media coverage across various platforms, spotlighting the cutting-edge technology developed at University Malaya. This media attention not only highlighted Faisal's resilience but also significantly promoted the university's research in biomechanics and 3D printing, demonstrating the practical impact of their innovations in real-world sports applications. By combining advanced biomechanics and state-of-the-art 3D printing technology, the face guard was specifically tailored to provide optimal protection, comfort, and agility, enabling athletes to maintain peak performance during recovery.

The face guard was first introduced in 2022, when Selangor FC's Yazan Al-Arab used it following a facial injury. His successful use of the mask demonstrated its effectiveness, paving the way for its application to other athletes, including Faisal Halim in 2024.

This project marks a significant milestone for 3D printing technology in Malaysia's sports industry. The media coverage surrounding Faisal Halim's use of the face guard has helped showcase how University Malaya's research can drive innovation in sports rehabilitation, promoting the university's role as a leader in this emerging field.

For more information on the project, please contact :

Hanie Nadia Shasmin
(hanie_nadia@um.edu.my)

Research Officer
Centre for Applied Biomechanics
Department of Biomedical Engineering

SELANGOR FC with UM and BioApps team

A Word from the Dean

As the Dean of the Faculty of Engineering at Universiti Malaya, it is my distinct pleasure to present the inaugural issue of **Enginitium**, our research bulletin dedicated to showcasing the remarkable achievements of our faculty. In this first edition, we focus on the impactful contributions of our researchers to the wellbeing of the community, highlighting innovations that not only advance engineering but also significantly enhance healthcare outcomes. These projects reflect our faculty's mission to advance engineering knowledge through innovative research that meets societal needs. As we continue to explore new frontiers in engineering, we invite you to engage with our work and support our endeavours in making a meaningful impact on society. We are excited to share these stories and more in Enginitium, and we look forward to your continued support as we strive for excellence in engineering research and education.

Professor Ir. Dr. Nik Nazri Nik Ghazali

Bloodless Dengue Probe

by Mohd Fadzil Jamaludin, AMMP Centre

Dr. Halim Poh's innovative journey to develop a bloodless dengue probe began in 2014 when he witnessed the painful experience his daughter endured while undergoing blood tests for dengue diagnosis. This personal encounter motivated him to explore non-invasive technologies for detecting dengue, starting with his research effort from 2015, under the supervision of Professor Rafiq Mahamd Adikan, and later on under the Prototype Research Grant Scheme (PRGS) awarded by the Ministry of Higher Education Malaysia in 2019.

BETA prototype of the Dengue Probe

The core of Dr. Halim's research involves diffuse reflectance spectroscopy, a technique that utilizes light to illuminate the skin and collect data via a spectrometer. This method allows for the creation of skin profiles from patients diagnosed with dengue and those without, effectively eliminating the need for blood samples. A comprehensive database was established, comprising data from 240 patients, which was essential for developing an algorithm capable of distinguishing between dengue-positive and dengue-negative individuals. To analyze this extensive dataset, Dr. Halim employed discriminant analysis, achieving an accuracy rate of 89% in differentiating patients based on their skin profiles.

Looking forward, several companies have expressed interest in commercializing this technology, although Dr. Halim is still weighing his options regarding potential partnerships and commercialization strategies. Currently he is a visiting researcher at the Centre of Advanced Manufacturing and Material Processing (AMMP Centre), Universiti Malaya.

Dr Abdul Halim demonstrating the Dengue Probe on Prof. Ir. Dr. Kaharudin Dimyati, Deputy Vice Chancellor of UM (Research & Innovation) at the Invention, Innovation & Technology Exhibition (ITEX) 2024

Related Publications

1. Poh, Abdul Halim, Faisal Rafiq Mahamd Adikan, Mahmoud Moghavvemi, Sharifah Faridah Syed Omar, Khadijah Poh, Mohamad Badrol Hisyam Mahyuddin, Grace Yan, Mohammad Aizuddin Azizah Ariffin, and Sulaiman Wadi Harun. (2020). Precursors to non-invasive clinical dengue screening: Multivariate signature analysis of in-vivo diffuse skin reflectance spectroscopy on febrile patients in Malaysia. *Plos One* .15, no. 4, e0228923.
2. Poh, Abdul Halim, Mohd Fadzil Jamaludin, Iman Aris Fadzallah, Nik Muhd Jazli Nik Ibrahim, Farazila Yusof, Faisal Rafiq Mahamd Adikan, and Mahmoud Moghavvemi. (2019). Diffuse reflectance spectroscopic analysis of barium sulfate as a reflection standard within 173–2500 nm: From pure to sintered form." *Journal of Near Infrared Spectroscopy*, 27, no. 6, 393-401.

Awards

1. Silver Award, Dengue Probe, 35th International Invention, Innovation, Technology Competition & Exhibition 2024 (ITEX'24), Kuala Lumpur, Malaysia

Project Funding

1. Skin Morphology Probe: A Completely Non-invasive Optical Skin Reflectance Signature Analyzer For Clinical-based Dengue/tropical Disease Screening And Monitoring (2019-2022) - PRGS Grant

For more information please contact:

Dr Abdul Halim Poh
(abdulhalimpoh@vortex.my)

Visiting Researcher
Centre of Advanced Manufacturing and Material Processing (AMMP Centre)

Precision MMT using Automated Methadone Dispenser

by Associate Professor Ir. Dr Mohd Sayuti Ab Karim

In Malaysia, drug addiction is recognized as a chronic national issue that requires long-term treatment and support. Despite significant government investment, including over a million ringgit, the problem persists. In 2005, Malaysia initiated a Methadone Maintenance Treatment (MMT) program aimed at helping patients with opioid dependence. This program utilizes methadone syrup, a controlled medication dispensed only by authorized health practitioners to prevent misuse.

Demonstration to General Practitioners (GPs) involved in MMT program

The program has expanded to include various agencies, such as prisons and the National Anti-Drug Agency (NADA), and is implemented in Cure & Care centers and rehabilitation facilities. The MMT program has successfully reduced drug retention rates among opioid-dependent patients, improving their quality of life by decreasing heroin use, HIV risk behaviors, and criminal activities. However, challenges remain, particularly in the dispensing process, where manual methods using syringes have led to physical strain on health practitioners and a risk of errors. Each patient requires a different methadone dosage based on their history, resulting in inefficiencies and inaccuracies in dispensing. To address these issues, a locally designed automated methadone dispensing machine was developed by the team from the Faculty of Engineering, Universiti Malaya, to enhance pharmacist productivity, minimize the risk of injuries like carpal tunnel syndrome, and improve overall treatment procedures. The machine allows for easy operation via a laptop, enabling precise dispensing of methadone. Evaluations have shown that the machine is both efficient and accurate, with the potential to significantly reduce relapse rates and enhance the quality of life for patients in the program.

Public Showcasing of the Seven Station Methadone Dispenser

The automated methadone dispenser is being introduced as part of a larger initiative led by the University Malaya's Centre of Addition Science (UMCAS). This program, situated at the Glami Lemi Biotechnology Research Centre in Jelebu, Negeri Sembilan, seeks to facilitate the reintegration of former drug addicts into society by empowering them through agricultural economic acitivities. Additionally, a new portable automated methadone dispenser with two stations is currently in development for potential deployment in remote locations.

Related Publications:

1. Mohd Mazlan, M. F., Salleh, S. Z., Ab Karim, M. S., & Abd Razak, N. A. (2022). Design and development of automated dispensing machine as medical device-based application: A review. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, 236(18), 10033-10050.
2. Mohd Mazlan, M.F., Salleh, S.Z., Ab Karim, M.S., Mohd Amran, N.A., Abd Rashid, R., Abd Razak, N.A., Kadri, N.A. and Zahari, Z. (2022). Development and performance evaluation of automated methadone dispenser for drug addiction therapy. *Journal of Testing and Evaluation*, 50(3), pp.1299-1312.
3. Mohd Amran, N. A., Ab Karim, M. S., Abd Rashid, R., Tuan Zahari, T. Z., & Latif Ishak, A. (2019). Improvement of Methadone Maintenance Treatment (MMT) process through development and implementation of methadone dispenser. Journal of Testing and Evaluation, 47(5), 3563-3575.

Awards:

1. Gold Award; Malaysia technology Expo 2022 (MTE2022), The International Expo on Innovation and Technology, Automated Methadone Dispenser.
2. Gold Medal; 33rd International Invention, Innovation & Technology Exhibition, Malaysia (ITEX 2022) - Automated Methadone Dispenser for Drug Addiction Therapy.
3. Best Paper Award, Development and Performance Evaluation of Methadone dispenser for Drug Addiction theraphy; Universiti Malaya Academia-Community Engagement (UMACE) 2021 International Conference
4. Gold Award at International Conference and Exhibitions on Inventions by Institutions of Higher Learning (PECIPTA 2017) for Automated Methadone Dispenser for Drug Addiction Treatment Program, Institutions of Higher Learning, Malaysia, 2017

Project Funding:

1. Breaking Barriers and Building Futures :Malaysia Madani (2023-2025) - RU Grant
2. Installation And Training On Handling The Methadone Dispenser For Replacement Therapy Treatment (RTG) Program Using Methadone (2019-2022) - MRUN Grant
3. Prototype Scale Up Of A Low-cost Methadone Dispensing System With Integrated Secure Database For Individualised Methadone Maintenance Treatment (MMT) - PRGS Grant

Mr Leo Funke, an exchange student from Hochschule Düsseldorf, University of Applied Sciences, Germany, assisting in the development of a new 2-station portable Automated Methadone Dispenser

For more information please contact:

Associate Professor Ir. Dr Mohd Sayuti Ab Karim
(mdsayuti@um.edu.my)

Achievements : World's Top 2% Scientist 2024

Congratulations to our faculty members for the recognition in the World's Top 2% Scientists 2024 ranking! This prestigious list, compiled by Stanford University in collaboration with Elsevier, honours the top researchers globally based on their significant contributions to science. The ranking evaluates scientists across various fields and subfields, utilizing metrics such as citation counts and H-index values to determine their impact and influence within the scientific community.

Research Grants Awarded (July - Sept 2024)

We are pleased to announce that seven of our academicians have successfully secured the Fundamental Research Grant Scheme (FRGS) from the Ministry of Higher Education.

The Fundamental Research Grant Scheme (FRGS) is an initiative established by the Ministry of Higher Education (MOHE) aimed at supporting basic research across various disciplines. It is designed to promote fundamental research for the generation of knowledge that can contribute to the improvement of intellectual levels, the creation of new technologies and dynamic cultural enrichment in line with national aspirations.

TOTAL FRGS GRANT AWARDED : RM 1,032,327.00

Congratulations!

We are also pleased to announce that several academicians from the Faculty of Engineering, Universiti Malaya (UM) have successfully secured significant research grants from various agencies and industries. This achievement not only highlights their dedication and expertise but also contributes to the advancement of engineering research and innovation in Malaysia.

Conference News

Global Collaboration in Healthcare: Insights from BioMed-APOSM 2024

by Dr. Nurul Fauzani Jamaluddin, CIME

The 7th Kuala Lumpur International Conference on Biomedical Engineering and the 8th Asian Prosthetic and Orthotic Scientific Meeting (BioMed-APOSM 2024) were successfully held from August 21st to August 24th, 2024, at the Wyndham Grand Bangsar Kuala Lumpur. This event was organized by the Department of Biomedical Engineering, Faculty of Engineering, Universiti Malaya, and chaired by Associate Prof. Ir. Dr. Nasrul Anuar Abd Razak. BioMed-APOSM 2024 brought together professionals, researchers, and industry experts from around the world to discuss the latest advancements in biomedical engineering, prosthetics, and orthotics.

The conference attracted over 300 delegates from various countries, representing a diverse range of fields within biomedical engineering and prosthetics and orthotics sciences. Participants included academic researchers, healthcare professionals, engineers, and industry leaders, creating a rich environment for networking, knowledge exchange, and collaboration on cutting-edge solutions for improving patient care and rehabilitation. The conference featured keynote speeches, panel discussions, and technical sessions that focused on advancements in biomedical technology, smart prosthetics, orthotic innovations, and rehabilitation engineering. A wide variety of topics were covered throughout the event.

In conjunction with the conference, a Prosthetics and Orthotics Expo was also organized, featuring more than 22 sponsors showcasing the latest technologies, products, and services. This exhibition allowed participants to explore cutting-edge devices, materials, and software that are shaping the future of prosthetics and orthotics. It also provided an opportunity for companies to interact with potential clients, researchers, and healthcare professionals.

BioMed-APOSM 2024 provided a dynamic platform for the exchange of ideas and technological advancements in the fields of biomedical engineering, prosthetics, and orthotics. With participants from diverse backgrounds and regions, the conference fostered interdisciplinary collaborations aimed at improving patient care and rehabilitation outcomes.

Synergies in Biomedical Engineering: Highlights from ICIBEL 2024

by Dr. Nurul Fauzani Jamaluddin, CIME

The 5th International Conference on Innovation in Biomedical Engineering and Life Science (ICIBEL 2024) was successfully held from September 22nd to 23rd, 2024, in Yogyakarta, Indonesia, under the theme "Synergies in Biomedical Innovations: Revolutionizing Collaborative Research for Future Healthcare Solutions." The conference gathered around 100 participants, including speakers and delegates from various countries, showcasing diverse expertise in biomedical engineering and life sciences.

Organized by the Centre for Innovation in Medical Engineering (CIME) at University Malaya, chaired by Prof Ir Dr Fatimah Ibrahim, ICIBEL 2024 was co-organized with the Malaysian Society of Medical and Biological Engineering (MSMBE) and Universitas Gadjah Mada (UGM). It received support from the International Federation for Medical and Biological Engineering (IFMBE) and IEEE Women in Engineering (WIE) chapters from Malaysia and Indonesia. The conference aimed to promote research on integrating engineering technology into medical and life sciences. It facilitated collaboration among experts dedicated to transforming healthcare through innovative solutions, emphasizing biomedical innovations and interdisciplinary synergies.

Distinguished guests included Prof. Ratko Magjarević, President of IFMBE, who highlighted the importance of collaborative research in addressing global healthcare challenges. Dr. Muralitharan Paramasua, Chief Executive of the Medical Device Authority, shared insights on medical device regulation, while Roy Himawan, Director for Pharmaceutical and Medical Devices Sovereignty in Indonesia, discussed advancing local industries. ICIBEL 2024 underscored the importance of cross-disciplinary collaboration to tackle healthcare challenges. With participation from global experts and support from key organizations, the conference fostered knowledge sharing and networking, serving as a catalyst for advancements in biomedical innovations that could revolutionize healthcare practices.

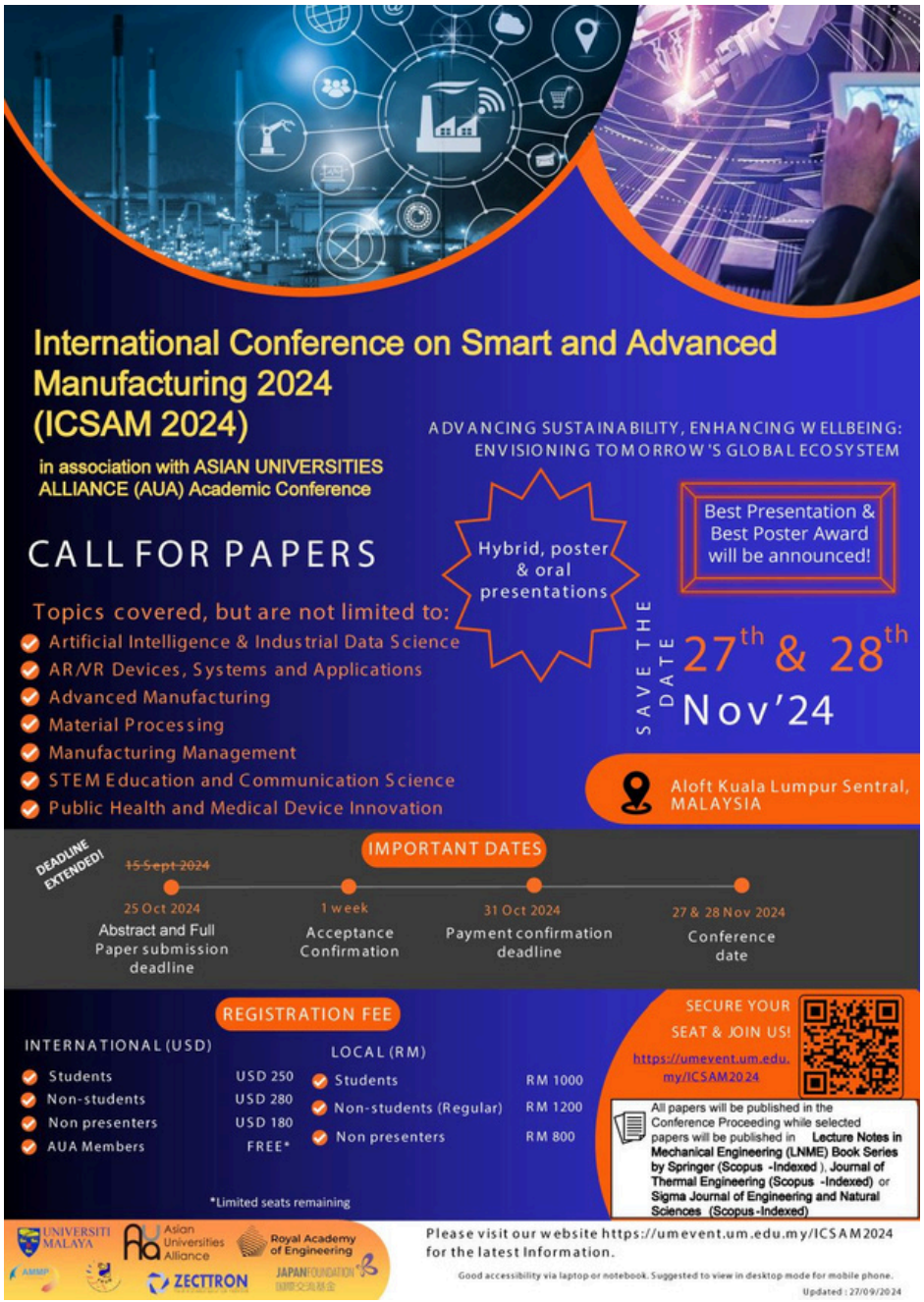
Upcoming Conference

Join Us at ICSAM 2024: A Premier Event in Smart and Advanced Manufacturing

We are excited to invite you to the International Conference on Smart and Advanced Manufacturing 2024 (ICSAM 2024), taking place on November 27-28, 2024, in Kuala Lumpur, Malaysia. Organized by the Centre of Advanced Manufacturing and Material Processing (AMMP Centre) at Universiti Malaya, in collaboration with the Asian Universities Alliance (AUA), this event promises to be an impactful platform for academia and industry to converge and share the latest advancements in smart and advanced manufacturing.

Publication Opportunities: All submitted and reviewed articles will be published, with excellent technical work considered for publication in peer-reviewed indexed publications.

For more information, please visit ICSAM 2024 Website (https://umevent.um.edu.my/ICSAM2024).
We look forward to welcoming you to this exciting event and fostering meaningful connections that will drive innovation in the field of smart and advanced manufacturing.



Distinguished Keynote Speakers

YBhg. Dato' Ts. V Valluvan A/L Veloo
Director, Manufacturing Industry, Science and Technology Section Division, Ministry of Economy Malaysia

Professor Andrew YC Nee
Emeritus Professor at the National University of Singapore

Mr Naguib Mohd Nor
President of Malaysia Aerospace Industry Association (MAIA) and a Board Member of Malaysian Investment Development Authority (MIDA)

Meet our researcher : Dr. Meor Mohd Faisal Mohd Zulkifli

Email: meor@um.edu.my
Researcher ID: X-4047-2019

Meor Faisal Zulkifli earned his Bachelor's degree in Mechanical Engineering from the University of Surrey, UK, and his Ph.D. in Engineering from Imperial College London. He is currently a Senior Lecturer in the Department of Mechanical Engineering at Universiti Malaya, specializing in power generation and machine learning applications. Dr Meor has extensive industry experience as a Principal Researcher at TNB Research, where he led several projects aimed at enhancing the efficiency of gas turbine and coal-fired power plants through advanced technologies. Throughout his career, he has successfully managed five major projects totaling over RM 10 million. His research interests encompass fuels and combustion, clean energy, power plant operations, and the integration of artificial intelligence (AI) in engineering practices.

Research Interests

- Power generation
- Power plant engineering
- Fuels and combustion
- Clean Energy
- AI and machine learning
- Laser diagnostics

Selected Publications

1. Zhenzhen Wang, Wangzheng Zhou, Meor Faisal Zulkifli (2020). Application of 2D temperature measurement to a coal-fired furnace using CT-TDLAS. Meas. Sci. Technol. 31 035203
2. Akma Mohd Noor, Hasril Hasini, Haziq Mohd Samsuri, Meor Faisal Zulkifli (2020). CFD Analysis on the effects of different coal on combustion characteristics in coal-fired boiler, CFD Letters, vol 12, Pages 128-138
3. Cheng Tung Chong, Jo-Han Ng, Meor Faisal Zulkifli (2019). Impact of gas composition variations on flame blowout and spectroscopic characteristics of lean premixed swirl flames. Process Safety and Environmental Protection, vol 128, pp 1-13.

Publications

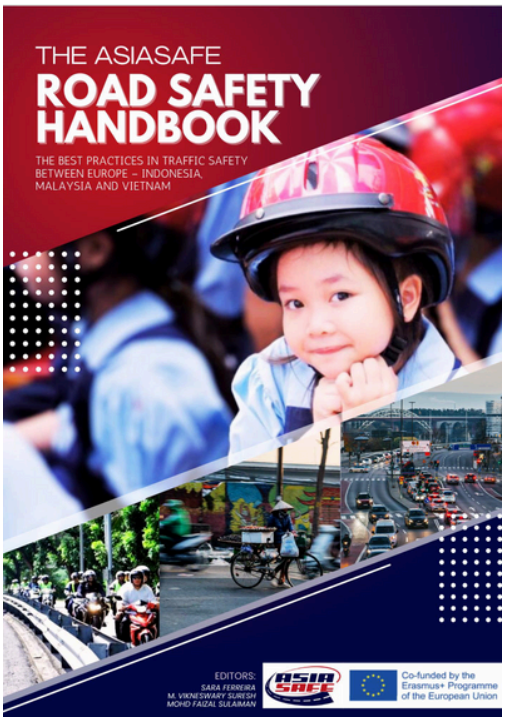
AsiaSafe Road Safety Handbook

The AsiaSafe Road Safety Handbook was launched by the Honourable Datuk Haji Hasbi bin Haji Habibollah, Deputy Minister of Transport Malaysia at Sidang Karyawan, Faculty of Built Environment, Universiti Malaya.

The handbook served as a significant milestone in our collective efforts to address the global challenge of road safety and to support the Malaysia Road Safety Plan 2022-2030 developed by Ministry of Transport.

From Left:
Dr. Suhana Koting, Dr. Onn Chiu Chuen, Ir. Ts. Dr. Yuen Choon Wah and Madam Nik Ibtishamiah Ibrahim

Project Team members from Faculty of Engineering, Universiti Malaya



ISBN: 978-972-752-320-7

Research Achievement Statistics - Faculty of Engineering

1 January 2024 - 30 September 2024

Total number of Publications indexed in WoS	: 517
Percentage of Publication in WoS Q1 & Q2	: 81.8% (423/517)
No of publication per staff	: 3.38
New Research Grant approved	: RM 9,757,633.85
R&D Consultation activities	: 23
Intellectual Property Rights (IPR)	: 7

Editorial Team

Deputy Dean of Research Office
Level 4, Block L
Faculty of Engineering
Universiti Malaya, 50603
Kuala Lumpur, Malaysia

PUBLISHED BY:
FAKULTI KEJURUTERAAN
UNIVERSITI MALAYA

About ENGINITIUM

Enginitium is the quarterly bulletin published by the Research Office at the Faculty of Engineering, Universiti Malaya. Its mission is to celebrate the achievements of our faculty members, particularly focusing on their research initiatives and contributions to knowledge and society. This publication seeks to foster a vibrant culture of knowledge sharing and collaboration within our academic community. Through Enginitium, we aspire to inspire and inform, showcasing the impactful work being conducted at the Faculty of Engineering, Universiti Malaya.

Call for Submissions

We invite all members of the Faculty of Engineering, UM to contribute to Enginitium. Whether you have a research article, thoughts on recent developments in engineering, or updates about activities within your research team, we would love to feature your work. Your contributions will not only enrich our bulletin but also inspire and inform fellow researchers and practitioners. Please submit your articles and updates via email to: **fk_tdr@um.edu.my**. We look forward to your valuable contributions!