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The Official Bulletin of the Faculty of Engineering Research Office, Universiti Malaya



AI and ROBOTICS

The Future is Now



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FOREWORD



VENTURING INTO RESEARCH FACILITIES

Since the year of 2024, the Faculty of Engineering has been allocated a budget for the improving of research facilities, especially related to undergraduate and postgraduate study. The revolution not just at the research facilities but also covered the infrastructure and building improvement. To start with, the very last road plaster was made at the faculty level in the past 20 years ago, and in 2024 the project has been completed for almost 20 acres in the faculty compound. 18 out of 21 building blocks were also painted in 1 color, "grey," for the identity of the faculty since the last exercise was conducted back 20 years ago.

Alhamdulillah, from 2024 until 2026, the Faculty is able to secure a couple of projects within RMK 12, RMK 13, and the Usang Project, including a couple of special projects to improve the facilities. The research facilities include Universal Testing Machine (UTM), Water River System, Robotic Arm, Artificial Intelligence, and several more. This facility is under the coordination of the research center and department of Civil, Biomedical, Chemical, Electrical and Mechanical Engineering.

For the special allocated budget, the Faculty of Engineering is in the process of developing eight Engineering Computing Centres (ECCs). The Engineering Computing Centers are further enhanced with a comprehensive range of specialized software applications designed to support academic instruction, technical training, and research development. These include ANSYS for engineering simulation and analysis, Anaconda and Python for programming and data science applications, MATLAB for numerical computation and modelling, Autodesk Inventor for computer-aided design and product development, IBM SPSS for statistical data analysis, and EndNote for reference management and academic writing. The availability of these software applications enhances students' technical competencies and provides valuable exposure to industry-standard tools relevant to professional engineering practice and research.

The Faculty of Engineering, Universiti Malaya, actively fosters industry-academia collaboration through the establishment of the Engineering@UM – Industrial Innovation Centre (UM-IIC). Building on these initiatives, six companies are currently engaged in active collaboration with the Centre which are Daikin Malaysia Sdn. Bhd, Japan Air Filter Group (JAF Asia), Coway Malaysia, RGS Corporation Sdn. Bhd., and SERVIT Sdn. Bhd. In addition to industry partnerships, the Faculty of Engineering collaborates with the University of Tsukuba Malaysia (UTMy) and the Japan International Cooperation Agency (JICA) in academic and research activities. The collaboration further facilitates joint programmes and research activities, providing opportunities for researchers from the University of Tsukuba and Universiti Malaya to exchange expertise, strengthen research networks, and pursue collaborative research initiatives.



**ASSOC. PROF. IR. DR.
NASRUL ANUAR ABD RAZAK**

**Deputy Dean (Development)
Faculty of Engineering
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Within this Enginitium edition, I hope it is able to inspire you more
bravely in becoming one of the bright in the land of a brave!
Selamat Hari Malaysia.

OCUSCAN: ADVANCING AI-ASSISTED CATARACT SCREENING FOR COMMUNITY-BASED EYE CARE

Dr. Nurul Fauzani Jamaluddin, Universiti Malaya Centre of Innovation & Enterprise

From a clinically identified healthcare need to a student-led biomedical engineering innovation, OcuScan demonstrates how artificial intelligence, mobile health technology and low-cost imaging can be integrated to support more accessible cataract screening and strengthen the pathway from community screening to appropriate eye care.

Addressing the Challenge of Accessible Cataract Screening

Visual impairment can have far-reaching consequences for independence, mobility, quality of life and socioeconomic participation. Cataract remains an important contributor to this burden. Based on the background data used in the OcuScan initiative, cataract accounts for 58.6% of visual impairment and blindness in Malaysia.



Early project discussion supporting the translation of a clinically identified need into the OcuScan community cataract screening concept

The challenge is especially relevant in rural and underserved communities, where access to specialist eye-care services may be limited. Data finds that up to 80% of cases in rural regions are diagnosed late, while referral delays may be three times higher in Sabah, Sarawak and remote areas of Peninsular Malaysia due to limited specialist availability.

Existing outreach initiatives, including the Flying Doctor Service, play an important role in reducing healthcare access gaps between urban and remote populations. However, specialised screening equipment such as eye-imaging systems may not always be readily available during field-based services. Conventional screening also depends on appropriate ophthalmic equipment and trained personnel, limiting opportunities for early detection in settings where these resources are not readily accessible. These emphasize the need to explore complementary approaches that can extend preliminary screening beyond conventional specialist settings while maintaining an appropriate pathway for subsequent clinical assessment.

From Clinical Need to Engineering Innovation

The initial idea for OcuScan originated from Dr Aziz Salowi, Department of Ophthalmology, Hospital Selayang, based on a clinical need for a more accessible approach to cataract screening. The clinical idea was subsequently translated into an engineering solution through the Integrated Design Project (IDP) by students from the Department of Biomedical Engineering, Universiti Malaysia.



Integrated Design Project students from the Department of Biomedical Engineering involved in the development of OcuScan

The project provided an opportunity for students to address a real healthcare challenge by integrating biomedical engineering, smartphone imaging, artificial intelligence and mobile application technologies. Through this process, the students translated the clinical requirement into a functional screening concept comprising a low-cost optical attachment, smartphone-based eye-image acquisition, AI-assisted cataract classification and digital patient documentation. The project illustrates how clinician-engineer interaction and project-based biomedical engineering education can facilitate the translation of healthcare needs into technological solutions.

A Mobile Approach to AI-Assisted Cataract Screening

OcuScan is a mobile-based cataract screening platform designed to facilitate preliminary eye screening at the community level. The system integrates a smartphone with a low-cost optical attachment comprising a 12×–15× macro clip-on lens and an integrated LED light ring, providing a portable approach for acquiring eye images.

The captured eye image is analysed using an AI model developed to classify the image as normal or cataract. The current model reports a classification accuracy of approximately 90%.

The workflow has been designed with accessibility in mind. Healthcare workers, trained volunteers and non-specialist personnel can enter basic patient information into the mobile application before capturing an eye image. The AI model subsequently performs an on-site assessment, providing a preliminary classification that can assist in identifying individuals who may require further professional assessment.

Importantly, the role of AI within OcuScan is intended to support preliminary screening rather than replace ophthalmic examination or clinical diagnosis. Individuals identified through screening would still require appropriate clinical evaluation and confirmation.

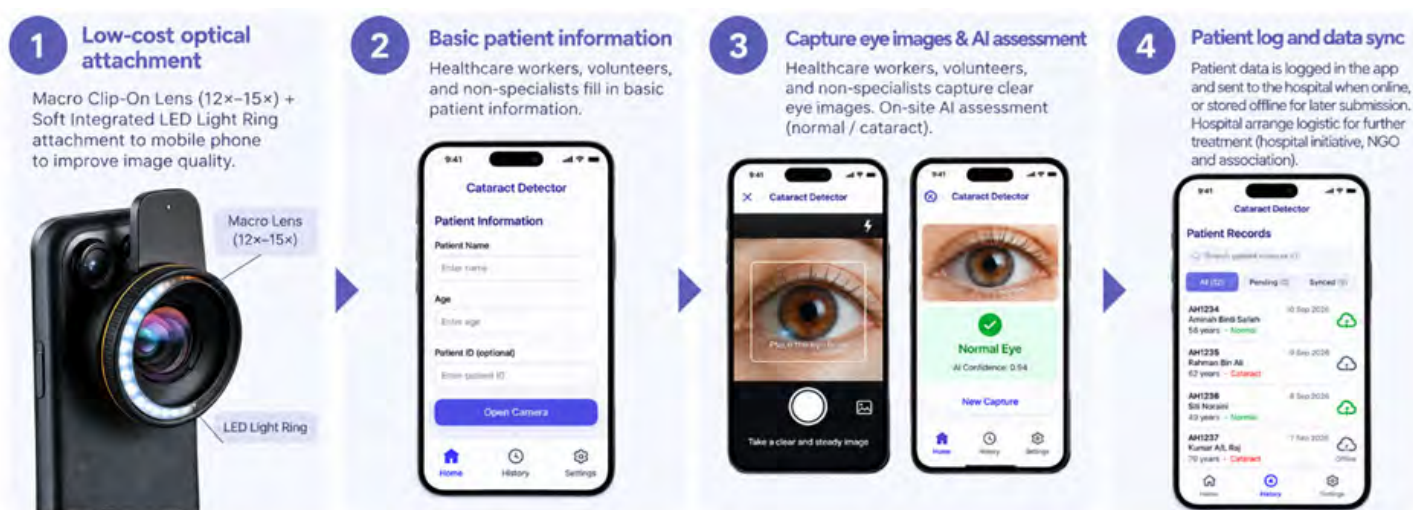
Beyond AI: Connecting Screening to Care

An important component of OcuScan is the integration of AI-assisted screening with digital patient documentation. Patient information and screening outcomes can be stored within the mobile application, creating a digital patient log that extends the function of the system beyond image classification.

When internet connectivity is available, screening information can be transmitted for subsequent action. In locations with limited connectivity, the data can be stored offline and submitted later. This feature is particularly relevant for rural and outreach environments where continuous internet connectivity cannot always be assumed.

The broader concept therefore encompasses a pathway from community screening and AI-assisted detection to data sharing, clinical verification and referral support. Screening could potentially be conducted in villages, community halls, Klinik Desa, and other outreach locations. Individuals requiring further assessment could subsequently be connected to appropriate clinical services for confirmation and further management.

In this context, the value of OcuScan lies not only in its ability to classify an eye image, but also in its potential to provide continuity between screening, documentation and referral.



OcuScan mobile screening workflow integrating a low-cost optical attachment, patient registration, eye-image acquisition, AI-assisted cataract classification and digital patient logging.

Earlier Detection and Its Potential Economic Impact

Beyond clinical outcomes, progressive visual impairment may affect an individual's independence, ability to work and participation in everyday activities. It may also increase dependence on family members and caregivers, creating wider social and economic burdens. By extending preliminary screening to the community level, OcuScan has the potential to facilitate earlier identification and more timely referral, particularly in areas where access to specialist screening is limited. Earlier detection may contribute to preserving independence and productivity while reducing the indirect burden associated with advanced visual impairment.

The project estimates that every cataract detected early could help avoid up to RM33,000 in economic loss, with potential benefits to individuals, families, healthcare systems and national productivity. The anticipated impact includes preserving independence, reducing caregiver burden and avoiding more complex late-stage intervention.

From a health-system perspective, the use of a portable, smartphone-based platform may also provide a scalable approach for extending preliminary screening without requiring specialised eye-imaging infrastructure at every community location. Further implementation and health-economic studies would nevertheless be required to quantify these potential benefits under real-world conditions.

The broader objective is therefore to connect screening access, early detection and timely referral with preventive care, community empowerment and greater equity in access to eye-health services.

From Student Project to Recognised Innovation

OcuScan has progressed beyond its initial development as an Integrated Design Project. The mobile application has been copyrighted as "Mobile Apps for Community Cataract Screening Tools" (LY2025W11896), representing an important milestone in protecting the intellectual property generated through the project.

The innovation subsequently received 2nd Place in the Professional/Public Category at the IdeaVault Competition during the Putrajaya Festival of Ideas 2025. This recognition represents another step in the project's progression from a student engineering project towards a potentially translatable healthcare innovation.

The progression from clinical need → student engineering project → functional prototype → intellectual property → innovation recognition demonstrates how university-based multidisciplinary projects can provide an important platform for developing and translating healthcare technologies.



OcuScan received 2nd Place in the Professional/Public Category at the IdeaVault Competition, Putrajaya Festival of Ideas 2025

Towards Translation and Community Implementation

OcuScan demonstrates how AI can be integrated with relatively accessible technologies to address a practical healthcare challenge. Its significance extends beyond the performance of an AI algorithm; the wider objective is to establish an accessible screening pathway that connects technological capability with real-world healthcare delivery.

Further work will be important to evaluate the system across broader and more diverse populations, assess its usability and performance in actual community screening environments, and establish appropriate pathways for clinical validation, regulatory requirements and implementation. The longer-term vision is a transition from hospital-centric towards community-driven screening, from specialist-dependent initial screening towards appropriately supported local screening, and from delayed diagnosis towards earlier intervention.

Ultimately, OcuScan provides an example of how a clinically identified problem, biomedical engineering education and AI-enabled innovation can converge within a translational pathway. By integrating portable image acquisition, AI-assisted classification, digital patient records and referral connectivity, the project aims to contribute towards a future in which early eye screening is more accessible—particularly for communities where distance and limited specialist resources remain barriers to timely care.

ROBOTS AT WORK: HOW UNIVERSITI MALAYA IS DESIGNING AND BUILDING THE NEXT GENERATION OF MANUFACTURING

Dr. Mohd. Fadzil Bin Jamaludin

Walk into a modern car plant in Tanjung Malim, an electronics facility in Penang, or a precision engineering factory in Klang, and you are likely to find robots working alongside people. Industrial robots, which are programmable, multi-axis machines that can weld, paint, assemble, inspect and handle materials, have gone from being expensive novelties to everyday production tools. Their appeal is simple. A robot performs the thousandth cycle with the same accuracy as the first, tolerates heat, noise and hazards, and frees skilled workers for tasks that need judgement rather than endurance.

The global figures show how fast this shift has happened. The International Federation of Robotics (IFR) reports that about 542,000 industrial robots were installed worldwide in 2024, more than twice the number a decade earlier, with annual installations above half a million for four consecutive years (IFR, 2025). Asia is the centre of this growth, accounting for 74% of new deployments in 2024. In total, some 4.66 million industrial robots were in operation in 2024, up 9% from the year before.

For Malaysia, robotics is tied directly to national productivity. The National Robotics Roadmap (NRR) 2021–2030 targets a robot density of 195 units per 10,000 employees by 2030, compared with 55 units in 2019 (MOSTI, 2021). The New Industrial Master Plan 2030 (NIMP 2030) identifies welding, assembly, defect inspection and packaging as key tasks for robotics and advanced automation (MITI, 2023). A London School of Economics study cited in the national roadmap found that each one-unit increase in robot density is associated with roughly a 0.36% rise in labour productivity. Robotics also answers a structural workforce challenge, as the 13th Malaysia Plan aims to reduce the share of foreign workers from 15% to 10% of the total workforce (Ministry of Economy, 2025).

Yet robots do not arrive ready-made for every task. Someone has to design the grippers, jigs and tools, plan the robot's path, integrate cameras and sensors, and prove that the process delivers quality parts.

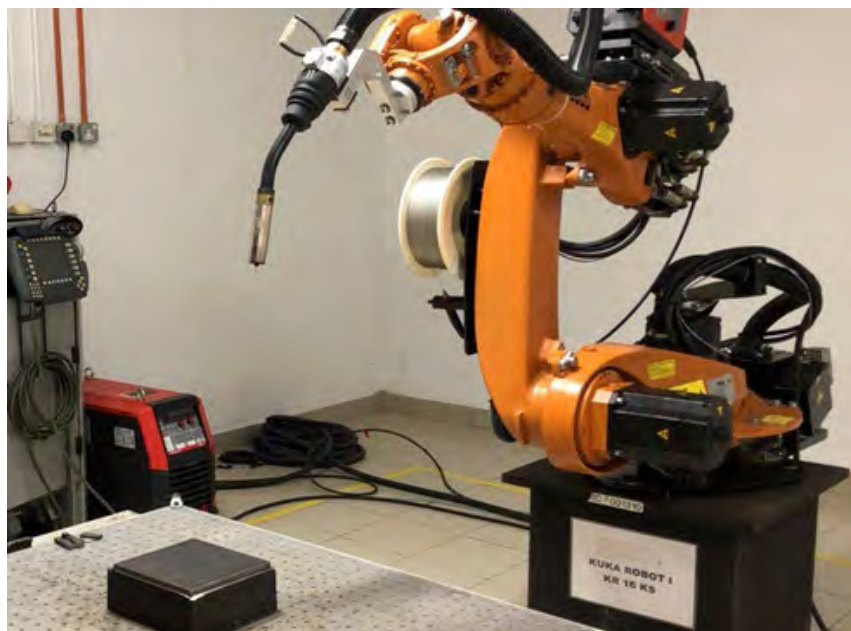
This is where university research makes a difference. This article highlights robotics research at the Faculty of Engineering, Universiti Malaya (UM), where each effort is rooted in design and manufacturing and closely connected to the industry.

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PRINTING METAL WITH ROBOTS THROUGH WIRE ARC ADDITIVE MANUFACTURING (WAAM)



One of the most exciting uses of robots is not to assemble products but to build them, layer by layer. Wire Arc Additive Manufacturing (WAAM) is a metal 3D printing process in which a robotic arm guides a welding torch, melting metal wire and depositing it bead upon bead until a three-dimensional part emerges. Because it uses standard welding equipment and wire feedstock instead of costly metal powders, WAAM is well suited to large components such as marine fittings, pipe sections, moulds and structural parts, and to the repair of worn components.

Robotic WAAM Cell

At UM, WAAM is a key research focus of Prof. Ir. Dr. Farazila Yusof and her team at AMMP Centre. WAAM can produce large metal parts at high deposition rates and low cost, but consistent quality remains a challenge. The team has examined these research challenges together with quality control and monitoring strategies for WAAM (Zahidin et al., 2023). Their work showed that WAAM part quality depends on carefully selecting and controlling the bead deposition strategy, wire material, heat source, wire feed speed and shielding gas (Mohd Mansor et al., 2024). This is where the robot becomes central, because only a precisely programmed robotic path can lay down hundreds of consistent layers while keeping heat input under control.

The team's current work moves from process to material. Duplex stainless steel is a corrosion-resistant alloy valued in the oil and gas and marine sectors, but WAAM builds of this alloy often form coarse, column-like grains that can limit their strength and toughness. To overcome this, the team is exploring inoculation, in which fine particles such as titanium nitride (TiN) are added to the melt pool to refine the grain structure of the printed metal. Finer grains generally mean better mechanical properties, bringing printed parts closer to the performance of conventionally manufactured ones. Experimental trials are being carried out on a robotic WAAM facility through a collaboration with partner institutions.

Prototype Flange produced by WAAM



i. WAAM Deposition



ii. Machined by lathe



iii. Secondary process by CNC



iv. Finished product

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A ROBOTIC HAND FOR THE PALM OIL PLANTATION

Manufacturing robotics is not limited to the factory floor. Malaysia's palm oil industry is one of the country's most important economic sectors. It has long depended on manual labour to harvest and collect heavy fresh fruit bunches (FFB), and shortages of foreign workers have made mechanisation a pressing need.



Automated Hydraulic Robotic Grabber for harvesting

Researchers led by Associate Prof Dr Raja Ariffin Raja Ghazilla from the Centre for Sustainable and Smart Manufacturing (CSSM), Department of Mechanical Engineering, working with Sime Darby Plantation, have developed a prototype automated hydraulic grabber for collecting palm fruit. The system, shown in Figure 2, automatically detects fresh fruit bunches, picks them up and deposits them into a collection bin with minimal operator intervention. The engineering challenge is considerable. The grabber must handle bunches that vary in size, weight and orientation, operate on uneven plantation terrain, and combine the raw force of hydraulics with the "intelligence" of machine vision.

By mechanising and automating this field operation, the project aims to raise harvesting efficiency and productivity while reducing the heavy physical workload on plantation workers. It shows how the principles of industrial robotics, namely sensing, gripping, path control and automation, can be carried from the factory into agriculture.



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ROBOTS FOR THE AEROSPACE INDUSTRY

Aerospace manufacturing demands extreme precision, traceability and safety, making it an ideal proving ground for advanced robotics. Prof. Ir. Dr. Yap Hwa Jen of the Department of Mechanical Engineering has built a portfolio of robotics and AI projects for the aerospace sector, many in collaboration with the Aerospace Malaysia Innovation Centre (AMIC) and major aerostructure manufacturers such as Spirit AeroSystems Malaysia.

One early project, the Automated Painter Demonstration and Optimisation (AGP), mounted a robotic spray painter onto an automated guided vehicle (AGV) for greater mobility and reach. The system recognises a scanned panel and loads the matching painting programme, and the work received a Good Design Award in 2018. A related IoT-enabled collaborative robot spray painter was implemented at Spirit AeroSystems Malaysia.

Automated Robotic Painter for aircraft body panels



Programming industrial robots is traditionally slow and requires production to stop. Prof. Yap's Online Robot and Machine Planning in Virtual Environment (OnBot) project tackles this by letting operators programme robots such as KUKA industrial arms through virtual reality. Robot programming can then be done offline or online in near real time, with zero downtime. Building on this, the ongoing Augmented Reality Assisted Seven-Axis Robot In-Situ Simulation and Programming (Robo7AR) project combines offline path simulation for a seven-axis robotic cell with optimisation algorithms that find the shortest, fastest and safest robot path for aerospace-grade drilling on actual aircraft parts.

Programming Industrial Robots



Onbot system



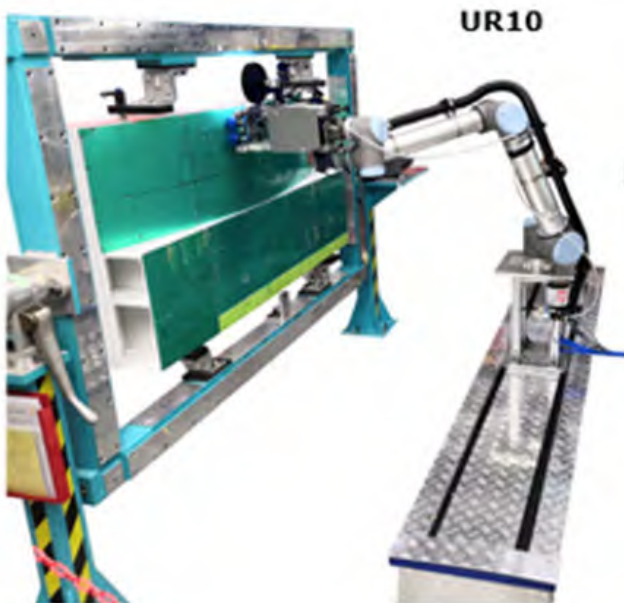
Robo7AR implementation

Drilling is a recurring theme. The Collaborative Robot Driller (COILER) developed with Spirit AeroSystems and IDS Integrated Solutions, mounts a collaborative robot arm on a linear track to create a seven-axis drilling system (Figure 5a). It features a lightweight drill end-effector, image processing to compensate for pilot-hole tolerance, and safety features that allow the robot to share the workspace with human technicians.

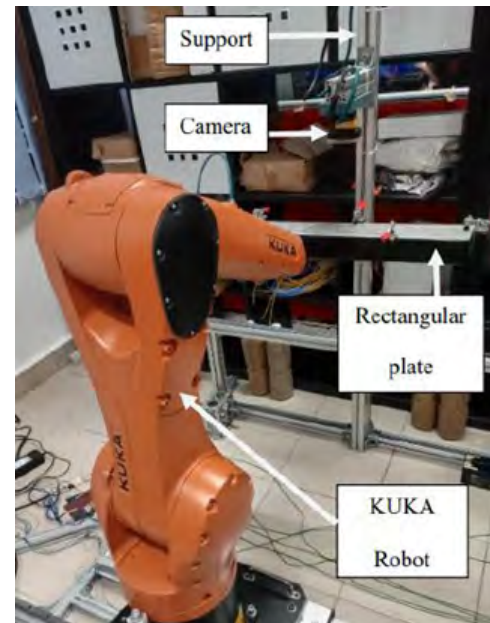
The Closed-loop Automated Positioner for Drivmatic Drilling and Countersinking (AUTODICE) addresses a different bottleneck (Figure 5b). Large aircraft parts for Airbus and Boeing programmes are still positioned manually under the drilling machine, a slow and tiring task that relies on the technician's eyesight. AUTODICE uses a robot positioner guided by a vision sensor to correct hole alignment automatically. Its proof-of-concept is designed to scale to a full-size robot with a 3.7 m reach and a 300 kg payload.

Most recently, Prof. Yap's team developed a robotic inspection system for aircraft nose cones (radomes), which house the radar systems vital for navigation and communication. In a case study on Airbus A320 radomes at a Malaysian maintenance, repair and overhaul (MRO) company in Sepang, a Universal Robots UR10 cobot fitted with an automatic tap-testing tool replaced the manual process of an inspector tapping across the radome surface. The robot's path was planned and optimised offline in simulation, while an augmented reality system recorded "OK" and defective points as a 3D point cloud stored in the part's digital twin. The work demonstrates how digital twins, robot programming and automated jigs can combine to deliver faster, more precise and safer aircraft inspection.

Intelligent Drilling Robots



COILER system



AUTODICE prototype

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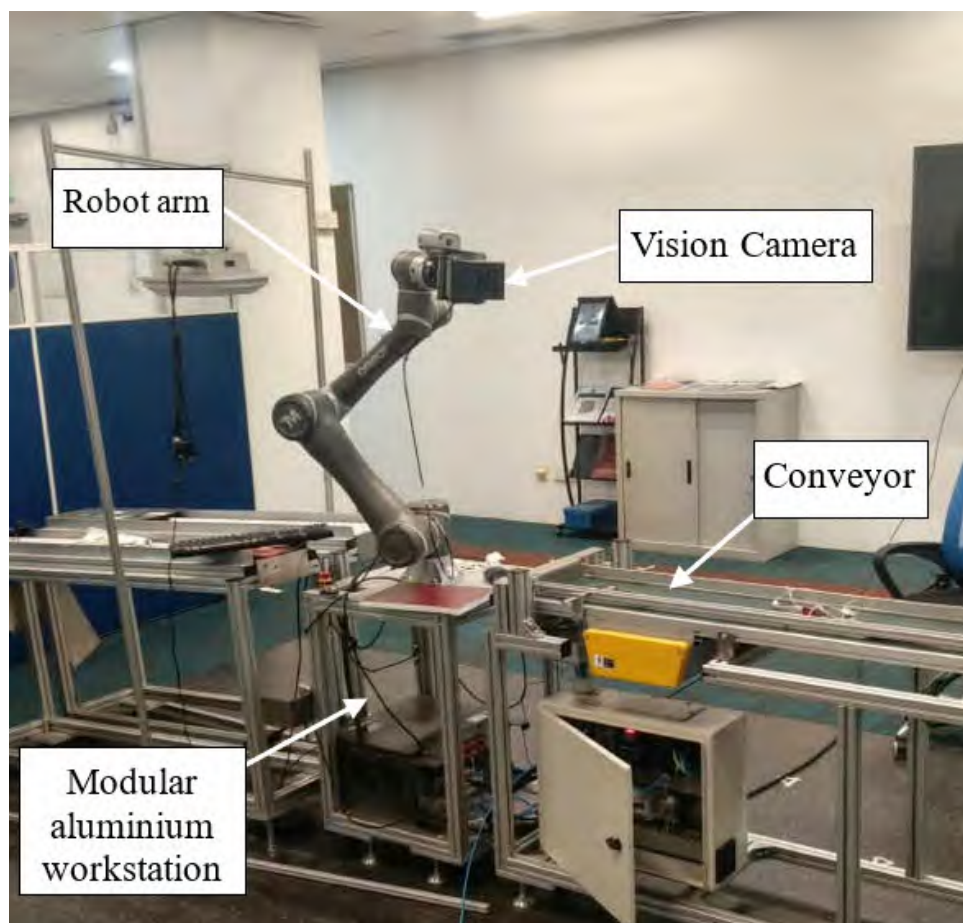


THE SMART PRODUCTION LAB

Individual robots deliver value, but the real promise of Industry 4.0 lies in connecting robots, machines, sensors and data into one production system. This is the mission of UM's Centre for Research in Industry 4.0 (CRI4.0), led by Assoc. Prof. Ir. Dr. Mohd Ridha Muhamad. The centre works closely with industry to help organisations adopt Industry 4.0 technologies, and it actively guides small and medium enterprises (SMEs) through practical implementation.

One of CRI4.0's ongoing projects is the Smart Production Lab Integration. The lab brings together a collaborative robot with a vision camera, modular aluminium-profile workstations, a conveyor line and dedicated control panels to form a reconfigurable miniature production line.

Researchers and students can design, programme and test the full chain of a smart factory, from robotic pick-and-place and vision inspection to material flow and machine-to-machine communication, before these solutions are scaled up in industry. SMEs that cannot afford to experiment on their own production lines gain a low-risk space to see Industry 4.0 in action and train their workforce.



Smart Production Lab Integration set-up at CRI 4.0



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MORE ROBOTICS ACROSS THE FACULTY

Robotics research at UM's Faculty of Engineering extends beyond fixed robot arms on the factory floor. Exoskeletons, wearable robots that support or amplify the body's movements, are being designed for the workplace. At the Centre for Sustainable and Smart Manufacturing (CSSM), Department of Mechanical Engineering, Mr. Norhafizan Ahmad and his colleagues develop exoskeletons for workers in physically demanding jobs. During prolonged walking, repetitive squatting and heavy lifting, these devices aim to reduce strain by augmenting strength, increasing endurance and minimising high muscle activation.

The team designed a wearable lower-body exoskeleton to assist squatting and walking in manual handling work and developed its control system (Sado et al., 2019). More recently they tested a hip- and knee-actuated exoskeleton suit for repetitive lifting and carrying, in which fifteen volunteers lifted and carried a 9.5 kg box with and without the suit (Figure 7) (Sado et al., 2025). The group has also explored brain-computer interfaces as a way to control exoskeletons. For manufacturers, such devices could complement industrial robots. Robots would take over the most repetitive tasks, while exoskeletons would protect workers who still handle loads by hand.



Wearable lower body Exoskeleton

Mobile robots are another growing area. Dr. Mohammed Abdo Hashem Ali of the Department of Mechanical Engineering researches autonomous mobile robot navigation, robot path planning, simultaneous localisation and mapping (SLAM), industrial robotics and mobile manipulators. His recent work with UM colleagues includes a wave water simulator for path planning of autonomous robots in constrained environments (Chen et al., 2026). This research is increasingly relevant as factories adopt autonomous mobile robots to carry materials between workstations.



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Conclusion

These projects span metal printing, plantations, aircraft, smart factories and wearable exoskeletons, but they share a common foundation. Each depends on design, whether of grippers, drill end-effectors, jigs, positioners, wearable frames or robotic cells. Each also depends on manufacturing knowledge, such as welding metallurgy, drilling tolerances, painting quality, production flow or the ergonomics of manual work. Increasingly, each relies on digital tools such as offline simulation, virtual and augmented reality, machine vision and digital twins. Robots are only as good as the processes they carry out, which is why mechanical and manufacturing engineers remain at the heart of the robotics revolution.

Looking ahead, the next generation of manufacturing robots will be smarter and more aware of their surroundings, and collaborative robots are making automation affordable for SMEs that cannot justify large, fenced-off robotic cells. For the public, the message is reassuring as well as exciting. Robots are not simply replacing workers. They are reshaping work and creating demand for technicians, programmers, designers and materials scientists. Malaysia has strong national policy direction, and Universiti Malaya's research community works hand in hand with industry partners. The country is well placed to move from being a user of robotic technology to a creator of it.

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ARTIFICIAL INTELLIGENCE MODELLING FOR HUMAN MOVEMENT AMONG CEREBRAL PALSY CHILDREN

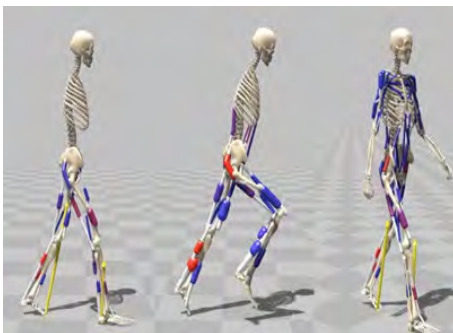
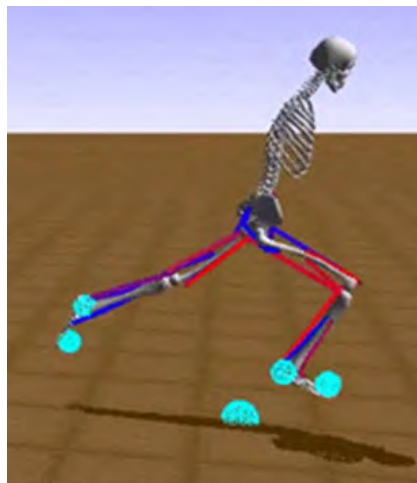
Dr. Chan Chow Khuen and Xing Wan

Cerebral palsy (CP) is a non-progressive neuromuscular disorder caused by early brain developmental anomalies. CP significantly limits mobility and independence from an early age, necessitating long-term therapeutic management. Hence, early treatment is required to provide a better quality of life for both the CP children, parents and caretakers.

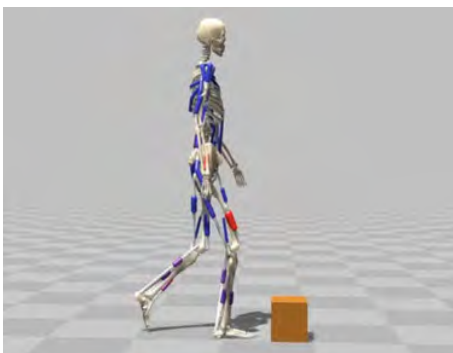


Current clinical interventions including botulinum toxin and orthopedic surgery rely on observational walking biomechanics analysis. Nevertheless, this analysis is lacking in quantification of internal biomechanical loads. Hence, our research group initiates the use of neuromusculoskeletal (NSMK) modelling in estimating the hidden parameters such as spastic muscle contribution and muscle forces. Existing inverse dynamics, however, still encounter difficulty in simulating CP-specific neural-musculoskeletal coupling or tissue adaptations.

Our research study focuses in developing a computational framework by integrating: (1) neurologically modified forward dynamic muscle models, (2) patient-specific musculoskeletal geometry simulation from motion data, and (3) optimal control-derived movement strategies based on reinforcement learning. The methodology of research is composed of data collection, NMSK model scaling, application of reinforcement learning (RL) for artificial intelligence modelling, and validation. By conducting a comprehensive evaluation, the framework can help provide another approach to accomplish forward simulation for surgery prediction and rehabilitation for CP patient. RL, which requires sequential decision-making domains, utilizes the trend of conventional, static optimization to prediction, and physics-based neuromechanical simulations. RL controls musculoskeletal modelling without depending on standard motion capture dataset.



Our research studies together with RL and personalized NMSK modelling, it is hopeful in attaining a forward dynamic simulation for CP children. Through this simulation, medical practitioners, therapists, and caregivers are able to decide on the proper and optimal treatment such as rehabilitation regime, surgical or even orthotic prediction.



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MEET DR. NURUL JANNAH ZAMBERI

Dr. Nurul Jannah Zamberi is a biomedical engineering researcher whose work explores how engineering and computational approaches can help us better understand the heart. Her research focuses on cardiovascular modelling, cardiac mechanics, and finite element analysis, with a particular interest in developing more comprehensive representations of cardiac function.

She is currently a Fellow under the Skim Latihan Akademik IPTA (SLAI) at the Department of Biomedical Engineering, Faculty of Engineering, Universiti Malaya, where she is involved in research, undergraduate teaching, and student supervision.

Her academic journey took her from Foothill College in Los Altos, California, to Rutgers, The State University of New Jersey, where she completed her Bachelor of Science in Biomedical Engineering in 2019. She graduated Summa Cum Laude and ranked first among 110 students in her major. Her achievements were recognised with the Samuel Welkowitz Award, Rutgers' highest honour for excellence in Biomedical Engineering, and induction into the Matthew Leydt Society, which represents the top 2% of the Rutgers–New Brunswick graduating class.

She later completed a Joint PhD in Biomedical Engineering from Universiti Malaya (UM) and the University of New South Wales (UNSW Sydney). Her doctoral research focused on developing a more comprehensive computational representation of the heart by incorporating the length- and velocity-dependent behaviour of cardiac muscle. This enabled her to investigate the heart's mechanical response and gain mechanistic insights into cardiac function under different cardiovascular loading conditions, progressing from idealised to patient-specific models of left ventricular hypertrophy.

Her broader research interests include cardiovascular biomechanics, computational physiology, and patient-specific modelling, including emerging cardiac digital twin approaches. She is interested in using computational models to complement experimental and clinical research by providing a window into the underlying mechanics and physiological processes of the heart that can be difficult to observe directly.

Beyond research, Dr. Nurul Jannah is passionate about teaching and mentoring future biomedical engineers. At Universiti Malaya, she encourages students to explore how engineering principles and computational tools can be applied to complex healthcare challenges.

Looking ahead, she hopes to build collaborations across engineering, medicine, academia, and industry, advancing computational approaches that deepen our understanding of cardiovascular health and contribute to more personalised approaches to cardiac research and care.



ADVANCING MALAYSIA'S AI IN HEALTHCARE AGENDA THROUGH CROSS-MINISTERIAL COLLABORATION

Associate Prof. Ir. Dr. Wong Wei Ru

Universiti Malaya (UM), on behalf of the Ministry of Higher Education (MOHE) and in close collaboration with the Malaysian Research Accelerator for Technology & Innovation (MRANTI), convened a three-day Ministry and Agency Engagement Session for AI Nation 2030: Strategy and Action Plan for Healthcare (AIH) from 23 to 25 June 2026 in Putrajaya.



Facilitating stakeholder discussions to gather strategic inputs for the AIH Action Plan.

The session brought together representatives from ministries, government agencies and key stakeholders to discuss how Malaysia can strengthen the development, adoption and responsible implementation of Artificial Intelligence (AI) across the healthcare ecosystem. Rather than focusing solely on technology development, the engagement placed emphasis on coordination, implementation and alignment across government, recognising that the successful adoption of AI in healthcare requires contributions from multiple sectors.

Moving from technology development to national coordination

Healthcare AI cuts across traditional institutional and sectoral boundaries. Its development and adoption involve not only healthcare providers and technology developers, but also agencies responsible for education and talent, research and innovation, digital infrastructure, data, regulation, investment, financing, industry development and public service delivery.

The three-day session therefore provided a platform for ministries and agencies to examine their respective roles and identify how existing policies, programmes and initiatives could be better aligned with the emerging AIH direction.

Each day focused on one of the three strategic pillars of AIH:

Pillar 1 – Globally Competitive Talent & Workforce Readiness

The first day examined the talent and workforce requirements needed to support an AI-enabled healthcare ecosystem. Discussions included the development of relevant skills, workforce readiness and the need to prepare healthcare professionals, technical specialists, researchers and other stakeholders for the changing demands created by AI.

Pillar 2 – Research, Innovation & Adoption Ecosystems

The second day focused on strengthening the pathway from research and innovation towards real-world adoption. Discussions explored how Malaysia can better connect researchers, healthcare institutions, private and government agencies, while addressing issues like validation, funding, technology transfer, commercialisation and adoption.

Pillar 3 – Service Delivery & Society Well-being

The final day considered how AI can contribute to better healthcare services and societal well-being. The discussion extended beyond individual AI solutions to consider implementation within healthcare systems, including the need for appropriate governance, infrastructure, data, trust and accountability.

A whole-of-government approach to AI in healthcare

A key feature of the session was the participation of stakeholders beyond the traditional healthcare and technology sectors. The discussions highlighted that the national AI-in-healthcare agenda cannot be implemented by a single ministry or organisation. For example, the development of AI talent requires coordination between education, healthcare and industry stakeholders. Similarly, moving an AI solution from research into clinical or operational use requires collaboration across research institutions, healthcare providers, regulators, technology developers and funding bodies. The engagement also highlighted the importance of creating appropriate mechanisms to support industry participation, sustainable financing, public-private collaboration and procurement, particularly as Malaysia moves from pilot projects towards wider adoption. Data and digital infrastructure were another important consideration. Effective AI deployment requires access to high-quality and appropriately governed data, interoperable digital systems, cybersecurity safeguards and clear accountability arrangements.

These requirements reinforce the need for coordination between healthcare, digital, regulatory and other relevant government agencies. The inputs gathered through the engagement session will help translate the strategic direction of AIH into practical actions and implementation priorities. The engagement also supported alignment of the proposed actions with existing national policies and initiatives, while clarifying the roles and implementation considerations of key stakeholders.



Participants and representatives from ministries and agencies at the Ministry and Agency Engagement Session for AI Nation 2030: Strategy and Action Plan for Healthcare (AIH).



Representatives from ministries and agencies at the Ministry and Agency Engagement Session for AI Nation 2030: Strategy and Action Plan for Healthcare (AIH).

Engineering as a bridge between innovation and implementation

The initiative reflects the increasingly important role of engineering in healthcare transformation. AI-enabled healthcare requires interdisciplinary capabilities spanning artificial intelligence, data engineering, biomedical engineering, electrical and electronic engineering, software systems, cybersecurity and human-centred design, alongside clinical and policy expertise.

For the Faculty of Engineering, this national engagement provides an opportunity to strengthen the connection between engineering research, healthcare needs and national policy priorities. Technologies developed in universities can create significant value only when they are translated into solutions that are technically robust, clinically relevant, safe, scalable and implementable within real healthcare environments. The AIH initiative provides a platform for these different dimensions to come together, connecting technical innovation with the institutional and policy conditions required for adoption.

As Malaysia moves towards 2030, the challenge is no longer simply to demonstrate what AI can do in healthcare. The greater challenge is to create the people, infrastructure, governance, financing, innovation and delivery ecosystem needed to ensure that promising AI technologies can be developed and adopted responsibly and sustainably.

Associate Prof. Ir. Dr. Wong Wei Ru

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6TH INTERNATIONAL CONFERENCE FOR INNOVATION IN BIOMEDICAL ENGINEERING AND LIFE SCIENCES (ICIBEL 2026)

Prof. Datin Wira Ir. Dr. Fatimah Ibrahim and Nor Syafrah Zambry

27–28 August 2026 | Kuala Lumpur — The Centre for Innovation in Medical Engineering (CIME), Department of Biomedical Engineering, Faculty of Engineering, Universiti Malaya, successfully organised the 6th International Conference for Innovation in Biomedical Engineering and Life Sciences (ICIBEL 2026) at the Kuala Lumpur Convention Centre, in conjunction with the International Medical Devices Exhibition and Conference (IMDEC) 2026.

Co-organised with the Malaysian Society of Medical and Biological Engineering (MSMBE), the Medical Device Authority (MDA), AI in Medicine and Universitas Gadjah Mada (UGM), Indonesia, and endorsed by the International Federation for Medical and Biological Engineering (IFMBE), the conference carried the theme “From Innovation to Adoption: Regulation, Health Technology Assessment, Clinical Engineering & Talent



MSMBE–JSMBE signing ceremony

for Sustainable Healthcare Systems.” It brought together researchers, clinicians, engineers, regulators, industry professionals, and emerging talents to explore how promising research can become safe, effective, and sustainable solutions ready for real-world adoption.



*Official opening address by
YBhg. Prof. Dato' Seri Ir. Dr. Noor Azuan Abu Osman,
Vice-Chancellor of Universiti Malaya*

The conference was chaired by YBhg. Prof. Datin Wira Ir. Dr. Fatimah Ibrahim, with Prof. Dr. Ika Dewi Ana (UGM) as Co-Chair. Following the Chair's welcome remarks, ICIBEL 2026 was officially opened by YBhg. Prof. Dato' Seri Ir. Dr. Noor Azuan Abu Osman, Vice-Chancellor of Universiti Malaya, joined by YBhg. Datuk Ts. Dr. Muralitharan Paramasua, Chief Executive of MDA. The opening also witnessed the signing of a Memorandum of Understanding between MSMBE and the Japanese Society for Medical and Biological Engineering (JSMBE).



Clinical Engineering & HTA Forum



Dengue Forum



MBEC Journal Workshop



Hands-on VR demonstration

ICIBEL 2026 featured 28 accepted papers from Malaysia, Indonesia, India, Japan and Iraq, covering topics such as artificial intelligence in medical device regulation, exosome-based biosensors for oral cancer detection, smart CPR training, portable ventilator commercialisation, biomass-derived bioproducts and nanotechnology in vaccine development.

The programme included four keynote sessions delivered by Prof. Dr. Kang Ping Lin (President, IFMBE), Ir. Dr. Sasikala Thangavelu (MdDev Sdn. Bhd.), YBhg. Datuk Ts. Dr. Muralitharan Paramasua (MDA) and Emeritus Prof. Dr. Ng Kwan Hoong (Universiti Malaya), complemented by invited speakers from Japan, Indonesia and Malaysia. Delegates also took part in three forum sessions: the Clinical Engineering and Health Technology Assessment (HTA) Forum; the Medical & Biological Engineering & Computing (MBEC) Journal Workshop; and the forum on Advancing Dengue Diagnostics Through Clinical Needs and Engineering Innovation.



Speakers and organising committee ICIBEL 2026

These sessions strongly emphasized capacity building, professional development, and knowledge translation. The MBEC workshop, led by Prof. Dr. Shanbao Tong, Editor-in-Chief (Springer), guided researchers and postgraduate students in producing high-quality, impactful publications.

Supported by Gold Sponsor Solid Intellectual Sdn. Bhd. (SISB) and industry partners, ICIBEL 2026 reaffirmed Universiti Malaya's leadership in connecting research, regulation and industry to move healthcare innovations closer to real-world adoption.

Prof. Datin Wira Ir. Dr. Fatimah Ibrahim

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UNIVERSITI MALAYA SHOWCASES RESEARCH EXCELLENCE AT REONS 2026

Universiti Malaya returned to the Research Officers National Symposium in Penang with a strong presence spanning plenary leadership, scientific presentations, session chairing and national recognition for the achievements of its research officers.



Speakers and organising committee ReONS 2026

Research officers, science officers and postgraduate researchers from institutions across Malaysia gathered in Pulau Pinang on 12–13 August 2026 for the 3rd Research Officers National Symposium (ReONS 2026). Hosted by Universiti Sains Malaysia (USM), the two-day symposium carried the theme “Frontiers of Research: Connecting Minds, Creating Impact”, reflecting its emphasis on interdisciplinary exchange, professional networking and translating research into broader impact. For the first time, ReONS also formally opened participation to science officers and postgraduate researchers from Malaysian Research Universities.

For Universiti Malaya (UM), ReONS 2026 represented a continuation of an event in which the university has already played an important role. The symposium series began at Universiti Putra Malaysia in 2022, before UM hosted the second ReONS in 2024. This year, UM moved from host to active contributor, with its research officers taking part at several levels of the scientific programme.

One of UM's most prominent contributions came from Dr Mohd Fadzil Jamaludin, Research Officer at the Centre of Advanced Manufacturing and Material Processing (AMMP Centre), Faculty of Engineering, who was selected as a plenary speaker. His session, "Printing the Future: A Cross-Disciplinary Tour of Additive Manufacturing," was delivered on the first day of the symposium. Dr. Mohd Fadzil's research expertise includes additive manufacturing, precision joining and product design.

The plenary placed additive manufacturing — commonly associated with 3D printing — within a much wider research and industrial context. Rather than presenting the technology simply as a rapid-prototyping tool, the session explored the principal additive-manufacturing process families and how researchers from different disciplines can identify realistic applications within their own work.



Drawing on ongoing work at the AMMP Centre, including wire-arc additive manufacturing (WAAM) of stainless steel and FDM-based soft tooling, the presentation connected laboratory research with practical questions of material qualification, standards, cost and technical capability. It also situated additive manufacturing within Malaysia's evolving industrial landscape, including applications in manufacturing, medical devices, tooling and other emerging areas.

The plenary paper was authored by Mohd Fadzil Jamaludin, Farazila Yusof and Yupiter HP Manurung, demonstrating the collaborative research underpinning the presentation.

UM's presence at ReONS 2026 was further marked by the 1st Malaysian University Research Officer Society (MROS) Award 2026, held alongside the symposium on 12 August. The awards recognised the achievements and contributions of research officers across areas including research, publication, grants, intellectual property, commercialisation, professional service and research leadership. A total of 39 awards were presented nationally.

Of those, 15 awards were secured by Universiti Malaya research officers, giving UM a particularly substantial representation among the recipients.

Among those recognised were Dr Mohd Fadzil Jamaludin for an award for commercialisation and Madam Hanie Nadia Shasmin, from Centre for Applied Biomechanics, who received recognition under the Publication Excellence Award, specifically the Book/Book Chapter Author Excellence Award.



Award recipients from Faculty of Engineering

Across the two days in Penang, UM's contribution to ReONS 2026 extended from engineering and advanced manufacturing to physics, proteomics, biomedical engineering and research management. More importantly, its participation illustrated the increasingly multidimensional role of research officers within a modern research university.

They conduct and publish research, manage specialised facilities and projects, support interdisciplinary teams, build external networks, supervise and train researchers, and help translate technical expertise into institutional and societal outcomes. That breadth closely matched the purpose of ReONS itself. Organised as a national platform for Malaysia's research-officer community, the symposium aims to strengthen professional networks while enabling researchers from different disciplines and institutions to exchange knowledge, showcase their work and develop new collaborations.



University Malaya wins 15 awards out of 39 in the 1st MROS Award 2026

Having hosted ReONS in 2024, Universiti Malaya's return in 2026 as plenary contributor, scientific presenter, session facilitator and award recipient demonstrated continuity rather than simply attendance. From sharing advances in additive manufacturing to guiding multidisciplinary sessions and receiving national professional recognition, the UM team contributed to the central idea behind ReONS 2026: connecting research expertise with the people and partnerships needed to turn it into impact.

Editorial Team

MEKANIKUM 2026 BRINGS RESEARCH, INDUSTRY AND INNOVATION TOGETHER

Dr. Cheah Mei Yee, and Dr. Chanthiriga Ramasindarum

KUALA LUMPUR, 3 September 2026 – The Department of Mechanical Engineering, Faculty of Engineering, Universiti Malaya, hosted MEKANIKUM 2026: International Conference on Mechanical Engineering Advances from 2 to 3 September 2026 at the Connexion Conference & Event Centre, Bangsar South, Kuala Lumpur.

Held under the theme “Sustainability in Mechanical Engineering”, the inaugural MEKANIKUM brought together researchers, academics, students and industry professionals to exchange knowledge and discuss emerging developments in mechanical engineering and related fields. The conference was organised in conjunction with the 2nd International Conference on Smart and Advanced Manufacturing (ICSAM 2026), the International Conference on Next Generation Materials (NEXMAT 2026) and the Smart and Sustainable Industrial Ecosystem Conference (SSIEC 2026).



Commemorative group photograph at MEKANIKUM 2026.

The conference opened with welcoming remarks by Associate Professor Dr. Raja Ariffin Raja Ghazilla, Chairman of MEKANIKUM 2026, followed by an officiating speech by Professor Ir. Dr. Nik Nazri Nik Ghazali, Dean of the Faculty of Engineering, Universiti Malaya. The opening ceremony also featured an industry sponsor recognition segment and a group photo session.



Prof. Benny E. Tjahjono, Coventry University delivering his keynote, “Is There Life After EV? The Second Life of EV Batteries and Future Research Opportunities.”

A major highlight of the two-day programme was its keynote series, which brought international perspectives on technological development, sustainability and advanced manufacturing. Professor Kamal Youcef-Toumi of the Massachusetts Institute of Technology (MIT), USA, opened the keynote programme with “Research that Moves the Nation”, highlighting the importance of developing technological capabilities through research, learning and innovation.

Another key programme was the industrial forum, "Can Malaysia Engineer the Next Industrial Revolution: Bridging Research, Semiconductor, Innovation, Digital Transformation and Sustainable Manufacturing." Moderated by Professor Dato' Ir. Dr. Mohd Hamdi Abd Shukor, the forum brought together perspectives from semiconductor, aerospace and academic communities through contributions from Dr. Eu Poh Leng of NXP Semiconductors, Mr. Ahmad Fuzli Fuad of National Aerospace & Defence Industries Sdn. Bhd. (NADI), and Professor Ir. Dr. Ghazali Omar of Universiti Teknikal Malaysia Melaka (UTeM).

The technical programme formed a central part of MEKANIKUM 2026, with five parallel sessions featuring 60 scheduled oral research presentations across ICSAM, NEXMAT and SSIEC. The presentations covered a broad range of topics, including advanced manufacturing, additive manufacturing, advanced materials, artificial intelligence, robotics, renewable energy, electric vehicle batteries, sustainable industrial systems and digital transformation.



Prof. Kamal Youcef-Toumi of the Massachusetts Institute of Technology delivering his keynote, "Research that Moves the Nation."



Panellists and participants exchanging insights during the MEKANIKUM 2026 Industrial Forum.



Research presentations in progress during parallel sessions.

The parallel sessions provided a platform particularly valuable to postgraduate students and early-career researchers, allowing them to present their work to academic and professional audiences, receive feedback and engage with researchers working in related fields. The diversity of presentations also highlighted the increasingly interdisciplinary nature of engineering research, where materials, manufacturing, computing, sustainability and industrial applications intersect.



Participants exploring industry showcases and engaging with exhibitors during the booth visitation activity.

Beyond the formal sessions, the conference also created opportunities for participants to engage with industry through sponsor booths and informal discussions. These interactions allowed students and researchers to learn more about current industrial technologies and challenges, while giving companies opportunities to connect with the academic community. MEKANIKUM 2026 gratefully acknowledges the valuable support and contributions of its co-organizer and Silver Sponsor, IEEE Electronics Packaging Society, together with its sponsors: CADVision Systems (Platinum Sponsor), LMS Scientific Solution Sdn. Bhd. (Bronze Sponsor), IKA Works (Asia) Sdn. Bhd. (Bronze Sponsor), Li-Zainal Consulting Engineers (Bronze Sponsor), and KL Analytical Sdn. Bhd. (Bronze Sponsor).

The organizing committee sincerely appreciates their generous support and contributions towards the success of MEKANIKUM 2026. The conference concluded with closing remarks by Dr. Goh Yingxin, followed by the Best Presenter Awards and a lucky draw. Divassgar P. Manimutthu (NEXMAT-002), Nurhasyimah Binti Abd Aziz (SSIEC22), and Roselyn Gubal (ICSAM-008) were recognised as the Best Presenters for NEXMAT, SSIEC and ICSAM, respectively.



The organising committee of MEKANIKUM 2026.

MEKANIKUM 2026 demonstrated the value of bringing different areas of engineering research into a shared platform. By connecting students and researchers with academic and industry communities, the conference provided opportunities for knowledge exchange, professional networking and discussion of how engineering research can contribute to technological advancement and sustainable industrial development. With the next edition scheduled for 2028, MEKANIKUM 2026 provides a strong foundation for further collaboration and continued engagement across the engineering community.

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FUTURE MOBILITY SOLUTIONS INFOGRAPHIC POSTER DESIGN COMPETITION 2026

26 September 2026, Faculty of Engineering, Universiti Malaya

Nik Ibtishamiah Hj Ibrahim



The competition encouraged students to think beyond conventional transportation systems and present creative solutions addressing contemporary mobility challenges such as road safety, sustainable transportation, public transport, active mobility, smart mobility, accessibility and emerging transport technologies.

Through infographic poster design, participants were given the opportunity to combine creativity, knowledge and problem-solving skills while developing their understanding of how future mobility can contribute towards safer, more sustainable and inclusive communities.

The journey towards future mobility starts today—with the ideas of our young generation.

The competition was open to secondary school students across Malaysia, with two categories: Group A (Form 1–2) and Group B (Form 3–4). Each team consisted of two students. Participants designed an A1 infographic poster in Bahasa Melayu or English, focusing on urban traffic issues and proposing their own creative solutions. AI-generated content was not allowed.

The competition culminated in the Final Presentation and Judging Session held on 26 September 2026 at The Cube, Level 2, Faculty of Engineering, Universiti Malaya.

The programme also provided an engaging platform for students to gain exposure to transportation-related issues and appreciate the important role of innovation, technology and human-centred solutions in shaping future mobility.





The presentations showcased the enthusiasm, originality and potential of young innovators, reflecting the importance of involving the younger generation in conversations about the future of transportation. Their ideas demonstrated that meaningful mobility solutions can begin with a simple question: "How can we make the way we move better for everyone?"

Selected finalists presented their innovative ideas to a panel of judges and fellow participants, demonstrating the enthusiasm and creativity of the younger generation in addressing future transportation challenges.

Congratulations to all winners!

Organised by:

Centre for Transportation Research, UM
Dept. of Civil Engineering, UM
UM Smart Mobility CoE
Civil and Environmental Engineering Club (CEEC)
China State Construction

Nik Ibtishamiah Hj Ibrahim

Centre for Transportation Research (CTR)
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PATH TO EXCELLENCE: GRANTS

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(Jabatan Kejuruteraan Mekanik)

penerimaan geran
Geran Penyelidikan Eksploratori dan Transformatif (GET)
Fasa 1 Tahun 2026

tejuk
Electrified-Tribological Behavior Analysis of Fe-based Amorphous Metal Coating for EV Components

jumlah
RM 173,150.00

ikhtisar daripada
Fakulti Kejuruteraan
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(Jabatan Kejuruteraan Awam)

kerjasama penyelidik bersama
Institut Penyelidikan Air Kebangsaan Malaysia (NAHRIM)

nama projek
Pengukuran Aliran Dan Aras Air Untuk Kajian Kebolehlaksanaan Dan Reka Bentuk Konsep Bagi Projek Perintis Penaiktarafan Kolam Takungan Banjir (KTB) Batu Kepala Sistem Dwifungsi

jumlah
RM 350,000

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PROFESOR IR. DR. HAZLIE MOKHLIS
(Jabatan Kejuruteraan Elektrik)

penerimaan geran
Geran Penyelidikan Eksploratori dan Transformatif (GET)
Fasa 1 Tahun 2026

tejuk
Lightning Strikes Detection and Classification Strategies for Back Flashover and Shielding Failure Overvoltage in Power System Networks

jumlah
RM 106,700.00

ikhtisar daripada
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DR. ZULHELMI BIN AMIR
(Jabatan Kejuruteraan Kimia)

penerimaan geran
Geran Penyelidikan Eksploratori Dan Transformatif (GET)
Fasa 1 Tahun 2026

tejuk
Investigation of Reaction Mechanism and Kinetics for the Degradation of 3 Monochloropropane-1,2-diol in Palm Oil Using Reactive Oxidative Species

jumlah
RM 91,500.00

ikhtisar daripada
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Universiti Malaysia

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- Abdellatif, A., Abdellatef, H., Abujarad, M., Nizamani, B., Samion, M. Z., & Mokhlis, H. (2026). Physics-informed FiLM surrogate modelling and SSFM-verified Pareto analysis of mode-locked fiber lasers. *Physica Scripta*, 101(32). <https://doi.org/10.1088/1402-4896/ae94f7>
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