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Robotics Technology: Driving Innovation, Transforming Future

**ReNeU's 1st
Anniversary**
Galvanising Research Excellence

**UiTM's Global Effort
in Training Young Aspiring
Neuroscientists**



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ADMINISTRATION

Prof. Ts. Dr Mohd Nazip Suratman

Deputy Vice-Chancellor (Research & Innovation)
Office of Deputy Vice-Chancellor (Research & Innovation)
nazip@uitm.edu.my
603-5544 2004

Dr Mohd Muzamir Mahat

Head of Research Communication & Visibility Unit (UKPV)
Research Communication & Visibility Unit (UKPV)
mmuzamir@uitm.edu.my
603-5544 3097

Miss Nur Syazwani Ahamad Azahari

Senior Statistician
Strategic Information Unit
wawa@uitm.edu.my
603-5544 3295

ABOUT THE MAGAZINE

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research & Innovation) with the aim of highlighting the research and innovation on of experts from multidisciplinary fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and strive to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that should be embraced by everyone.

ABOUT UiTM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. Office of the Deputy Vice-Chancellor (Research & Innovation) or known as TNCPI (*Timbalan Naib Canselor (Penyelidikan & Inovasi)*) serves a *Pusat Tanggungjawab (PTJ)* that navigates the research and innovation of university in achieving UiTM agenda. TNCPI office strives to mobilise the faculties, and campuses to move together and promotes cooperation among researchers in bringin UiTM as a leading global university of science, technology, and innovation by 2025.



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Dr Mohd Muzamir Mahat
Head of Research Communication & Visibility Unit

Editors

Nur Syazwani Ahamad Azahari – (Statistics & Information)
Nazarul Wirda Baharuddin – (Content)
Ts. Dr Judith Gisip – Guest Editor

Designers

Muhammad Ammar Khaizuan
Mohd Aizuddin Borhan Shah

FOREWORD

VICE-CHANCELLOR



To excel globally, research must be weighed in as a key factor to navigate the university's direction in making an impact. This is especially when focusing on translational research where society can benefit greatly from its findings.

Congratulations to the Office of the Deputy Vice-Chancellor (Research and Innovation) on the publication of this magazine, aptly called RISE. I am pleased to see that the COVID-19 pandemic has not dampened UiTM researchers' pursuit of their dreams. The contents of these pages allow active research and innovation activities be shared with our stakeholders, local and international collaborators.

As UiTM aspires to be a world-renowned university by 2025, I believe that our current research practises are on track. For example, the featured article in the magazine highlights the key success of robotic technology ventured by our researcher, Associate Professor Dr Hanafiah Yussof, who formed a start-up company to advance robotic technology in Malaysia. His contribution to the robotics industry, the Robot Rehabilitation System for Autism Therapy, is an example of innovation that can transform the future.

In our pursuit of changing the future, we at UiTM are cognisant of the current and future direction of research to facilitate research from different disciplines. We have researchers using drones for pineapple plantations, exploring hybrid rockets with Equatorial Space System (ESS), and researching sanitation, collection, and sewage/wastewater treatment systems with Indah Water Konsortium (IWK) Sdn Bhd, to name a few of the work we have been actively involved in.

Hence, we will continue to contribute and make progress associated with processes and knowledge pivotal for impactful research, especially in developing knowledge-based technology that benefit society.

Ultimately, I am confident that the publication of this magazine will further strengthen the visibility of UiTM research and innovation.

Thank you.

PROFESSOR Ts. DR HAJAH ROZIAH MOHD JANOR

Vice-Chancellor

Universiti Teknologi MARA

FOREWORD

DEPUTY VICE-CHANCELLOR (RESEARCH & INNOVATION)



I would like to congratulate the editorial team on the release of RISE, a research magazine highlighting our research and innovation efforts and accomplishments. The magazine exemplifies our office's synergistic and collaborative efforts, as well as those of our researchers and article contributors, to advance the visibility agenda.

As the office in charge of research and innovation, we are constantly hoping that every research result and invention will benefit the community through translational research. Assoc. Prof. Dr Hanafiah Yussof's Robot Rehabilitation System for Autism Therapy, for example, has aided the autism community in improving communication. Even more proud that this endeavour resulted in the formation of a start-up company.

Despite the COVID-19 pandemic, UiTM researchers continued to conduct relevant research activities despite the uncertainty. The scale of the events varies from a small effort to install solar panels at a rural school and organise virtual conferences to the use of drones and precision agriculture technology on pineapple plantations. Notably, a Bioextreem solution capable of inhibiting 99.99 percent of bacteria and viruses was also developed.

With these accomplishments, we will continue to support research efforts, particularly those aimed at developing knowledge-based technology with a social benefit in mind.

Finally, I believe that this magazine can serve as a platform for the visibility agenda by incorporating a wide range of science and research perspective, fostering more potential collaboration between UiTM researchers and local and international institutions and industries.

Thank you.

PROFESSOR Ts. DR MOHD NAZIP SURATMAN

Deputy Vice-Chancellor (Research & Innovation)

Universiti Teknologi MARA

MESSAGE

FROM THE CHIEF EDITOR



Alhamdulillah.

It gives me great pleasure to see this issue published. We received a massive and impactful submission to feature our UiTM community's research stories. Despite the difficult circumstances, UiTM researchers are proactive in carrying out research activities and events within their respective capacities.

Allow me to express my heartfelt gratitude to all of the authors of the articles in this magazine. The publication of this issue would have been far more difficult to achieve without their contributions. Here, we feature Assoc. Prof. Dr Hanafiah Yussof of the College of Engineering's beautiful journey into robotic technology. I believe that robotics has always been on the national agenda for its true mission in helping people. We chose to focus on robotics to honour a UiTM researcher who has dedicated his academic

career to assisting society through technological advancements. To all researchers out there, we hope that his inspiring journey will rekindle our enthusiasm for research.

The inaugural issue of the RISE magazine also features research achievements and the multidisciplinary research areas in UiTM which support national priorities. Research Nexus UiTM (ReNeU) celebrates its first anniversary in 2021, marking a major milestone in its journey. Faculty of Pharmacy is making a global impact towards producing young aspiring neuroscientists. The exploration of Lembah Benua has highlighted the wonderful forest as a potential research station. The potential of fine art logistic industry is also of utmost importance towards making Malaysia as a top art market hub. These are some of the exciting research stories and I invite you to discover more in this issue.

We sincerely hope to bring you more research news from the UiTM family in the coming issues. Have fun reading!

DR MOHD MUZAMIR MAHAT

Head of Research Communication & Visibility Unit (UKPV)
Office of Deputy Vice-Chancellor (Research & Innovation)
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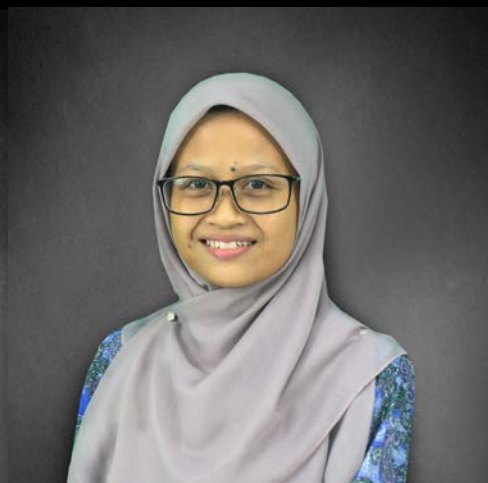
Nazarul Wirda Baharuddin (Content)

Ts. Dr Judith Gisip (Guest Editor)

Designers

Muhammad Ammar Khaizuan

Mohd Aizuddin Borhan Shah



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Collaboration between NEXTGREEN Global and UiTM will strengthen UiTM cooperation with public listed company in zero waste technology and renewable energy for sustainable development



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Hutan Simpan Lembah Benum Exploration 2021

**1ST
MALAYSIAN
HUMANOID
ROBOT**

ADAM

**ADVANCED DEVELOPMENT
AUTONOMOUS MACHINE**

Robotics Technology: Driving Innovation, Transforming Future

An inspirational journey of Associate Professor Dr Hanafiah Yussof
on his pioneering work in robotics

by Ts. Dr Judith Gisip (Faculty of Applied Sciences, UiTM Shah Alam)



The COVID-19 pandemic has disrupted our livelihoods since the beginning of 2020. It has also created both challenges and opportunities. The coronavirus crisis has not only affected the global economy but also accelerated creativity and innovation. With the “innovation” theme in mind, the Office of Deputy Vice-Chancellor (Research & Innovation), Universiti Teknologi MARA (UiTM) is proud to feature an esteemed expert, Associate Professor Dr Hanafiah Yussof, in its magazine’s inaugural issue.

Dr Hanafiah is from the College of Engineering, UiTM Shah Alam, Selangor, and has more than 18 years of experience in robotics research and development. He is also the Founder and Group CEO of Robopreneur Sdn Bhd and serves as the Chair of the IEEE Robotics & Automation Society (IEEE-RAS) Malaysia Chapter.

Beyond his outstanding academic and research achievements, Dr Hanafiah is a visionary technopreneur who has won many accolades for his pioneering work in service robotics technology including being the finalist of the Ernst & Young Entrepreneur of the Year Award 2021 and the ASEAN Start-up Award 2021. Under his leadership, Robopreneur has become a fast-growing company of exceptional values with recognition from the Malaysian Investment Development Authority (MIDA) as a pioneer in Service Robotics. Among the awards received by the company include SME100 Fast Moving Companies Awards 2020, Sustainable Brand Award 2020 and SUPERBRANDS Award 2021. Robopreneur is also the winner of Khazanah Impact Innovation Challenge 2021 through their product, Robotic Wheelchair Arm System.

A virtual interview was conducted on 2 August 2021 to gain his valuable insights on his innovations in robotics and how robotics technology is transforming our future.

Japan, where it all began

Dr Hanafiah’s involvement in robotics is closely related to his educational background in Japan. He graduated with a Degree in Mechanical Engineering from Iwate University in 1998, under the Special Preparatory Programme to Japan through the Malaysia’s Look East Policy. In 2003, as a recipient of the prestigious Monbusho Scholarship, he began his journey in the field of robotics during his postgraduate studies in Mechanical System Engineering at Yamagata University. He was exposed to the early development of the first humanoid robot in the world and gained in-depth knowledge and understanding in the areas of hardware, design and control.

After he completed his master’s degree in 2005, he joined UiTM in 2006 as a tutor, while also pursuing his doctoral degree in Information Science at Nagoya University, under the same Manbusho Scholarship from the Japanese Government. He expanded his knowledge in tactile sensors and precision technology for use in humanoid robot hand. Dr Hanafiah successfully earned his PhD in 2008. He was awarded the best PhD student and represented his batch to receive the graduation certificate from the university’s chairman, who was also the founder of Toyota. His quest for knowledge never ends.

Photo credit : <https://www.robopreneur.com/>





In 2010, he had a two-year stint at Nagoya University as a postdoctoral researcher, under the Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowships for Research in Japan.

Acquiring the right working skills is crucial. Dr Hanafiah honed his skills in problem solving and project management from his working experience at Japanese companies in Malaysia after finishing his bachelor's degree. He worked as a research and development engineer at Sharp Electronics (M) Sdn Bhd in Shah Alam for three years, and two years as a product engineer at Autoliv Hirotako Safety Sdn Bhd. Dr Hanafiah acquired the work culture and ethics of typical Japanese companies, which emphasise on punctuality, accuracy and appreciation of the spirit of work. These are the values which have prepared him for what he has achieved and aspired to be.

Innovation journey and the inception of Robopreneur Sdn Bhd

Dr Hanafiah is not your typical university lecturer. He is strongly driven to develop and grow in academic research. Upon returning to UiTM after completing his postdoctoral fellowship, it was a real challenge for him to implement his advanced research in Malaysia. Equipped with his solid background, he found his calling to apply robotics in autism research. The idea was triggered after seeing a car sticker on autism as he was driving from Bangi to UiTM Shah Alam. It was indeed a drive destined for greatness. His curiosity on the subject led him to discover that Malaysia has a huge community with autism that requires support. Dr Hanafiah saw this as an opportunity to contribute to society with his expertise. He established a research team that focussed on autism therapy and

secured several grants totalling more than RM6 million including the Niche Research Grant Scheme of the Ministry of Education (NRGS-KPM) worth RM5 million. Dr Hanafiah and his team experimented with real autism children and successfully patented the Robot Rehabilitation System for Autism Therapy in 2017.

With the aim of fostering an innovative culture and further exploring his invention potential, Dr Hanafiah boldly took the risk as he ventured into entrepreneurship and founded Robopreneur Sdn Bhd in 2015. The start-up company was the first initiative by an academic that had charted the path for commercialisation of inventions in UiTM. With the support from UiTM, Malaysian Technology Development Corporation (MTDC) and Research Innovation Business Unit (RIBU), Robopreneur was able to commercialise the invention through a patent



Photo credit : <https://www.robopreneur.com/>

license agreement. Dr Hanafiah and his team overcame the hurdles and obstacles in business through hard work and determination. Based in Cyberjaya, the company focuses on four main pillars, which include service robotics, software and artificial intelligence, additive manufacturing (3D printing) and medical technology.

Robopreneur thrives in its role to empower humanity through developing and distributing commercial robots which contribute to the advancement of the robotics industry in Malaysia.

Staying true to its mission, Dr Hanafiah led his team in securing a RM22 million worth of funding from the Ministry of Finance in 2018. They are joining forces with Futurise Sdn Bhd to develop Malaysia's first advanced humanoid robot, ADAM, the acronym for Advanced Development Autonomous Machine. The first phase of

the project worth RM4.2 million was completed within one year and the prototype version of ADAM was successfully launched in 2019.

The five-year project supports Malaysia's vision in embracing Industrial Revolution 4.0 through the adoption of innovative technologies.

Challenges, opportunities and way forward

In navigating through the coronavirus crisis, Dr Hanafiah solves business and innovation challenges through exemplary leadership. The company is exploring the application of robotics for elderly healthcare including the use of robotic wheelchairs. The new norms have also opened doors for Robopreneur's original products such as the Smart Thermal & Attendance Recognition Scanner (STARS). As we enter the

post-pandemic development phase, Dr Hanafiah and his team are seeking for opportunities to showcase how robotics can solve airport problems as part of the recovery from the pandemic. There are also plans to explore robotics roles in automating the restaurant industry.



Going forward, Dr Hanafiah believes that the COVID-19 pandemic has accelerated the adoption of automation in Malaysia. Companies especially in the service as well as the food and beverage industries should realise the full potentials of adopting digital transformation in their business to remain competitive. Dr Hanafiah is also involved in the development of the National Robotics Roadmap led by the Ministry of Science, Technology and Innovation (MOSTI) which will pave the way for implementing strategies in the Malaysia robotics agenda.

As for the question, “Will robots ever replace humans?” Dr Hanafiah shared a key finding from a survey by McKinsey Global Institute that 55% of jobs in Malaysia are repetitive, which can be replaced through robotics and automation. The future most definitely will see a lifestyle that is moving into a human to system dependency, such as autonomous vehicle technology and the use of avatars in teaching. On the positive side, robots collaborate with humans to transition the workforce effectively via innovation. Humans should invest in reskilling and upskilling to remain relevant in the age of automation.



PRENEUR POWERING INNOVATION

ROBOTICS

OT

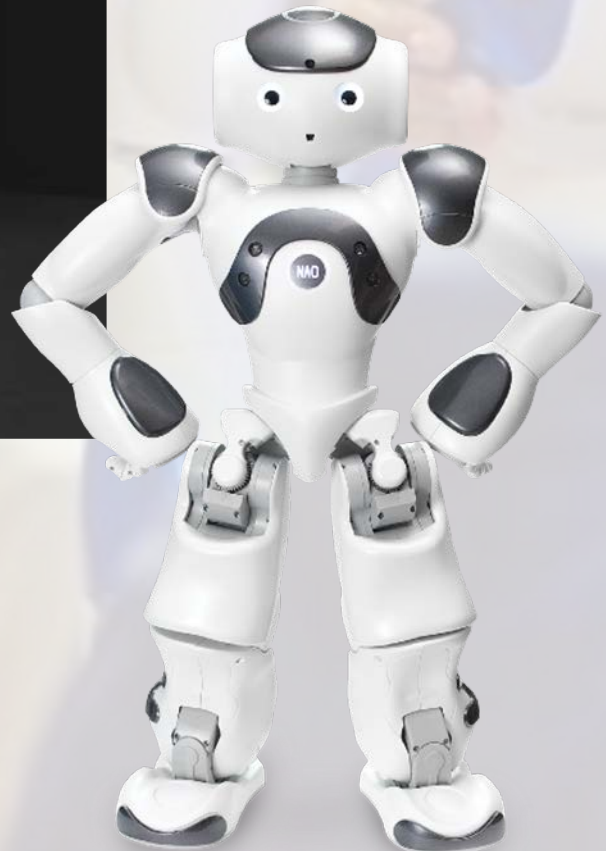


DELIBOT

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In conclusion, it takes a revolution in mindset and action to create transformational changes. Dr Hanafiah is a person who never stays in a comfort zone and always challenges himself to go beyond the norm. He holds the belief that as an academic, one should strive to create a long-lasting impact on the community. A famous quote by Alan Kay is a great way to sum up Dr Hanafiah's great life achievements, "The best way to predict the future is to invent it". His contribution in the robotics industry is the epitome of innovation that transforms the future.





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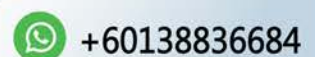
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		05		Smart Sensors	05		Non-Communicable Disease	
Logistics and Transportation	01	Transportation	Energy & Environment	01	Water Security		Social Creativity & Innovation	01
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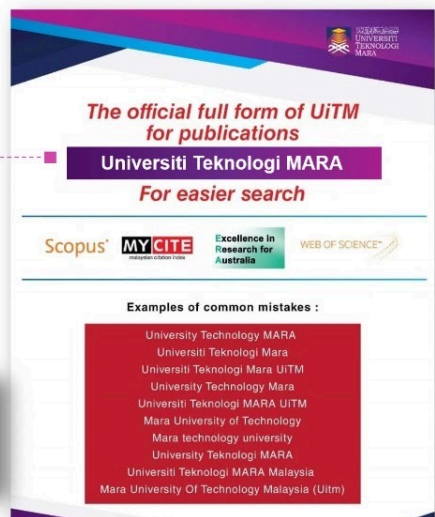
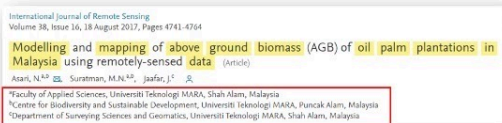
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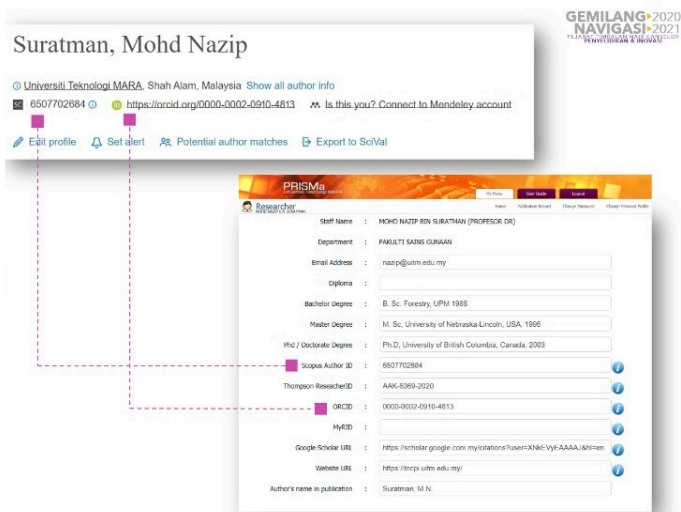
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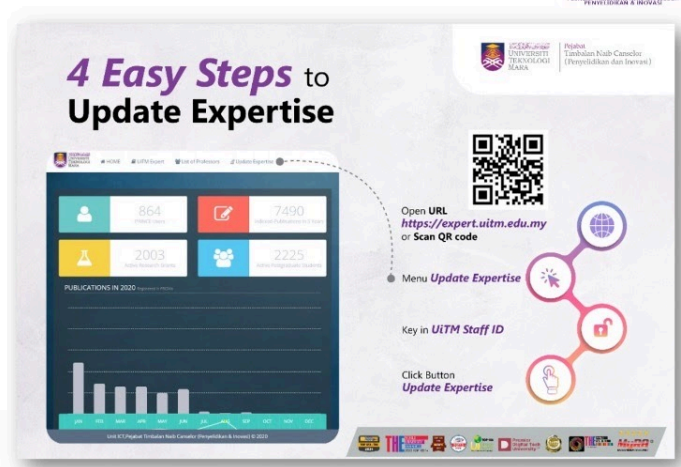
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Dr Mohd Muzamir Mahat

Research Communication & Visibility Unit (UKPV)
Hutan Simpan Lembah Benum Exploration

Dr Muhammad Asraf Hairuddin

School of Electrical Engineering, College of Engineering UiTM,
Campus Pasir Gudang, Johor
Drone and Precision Agriculture Technology for Pineapple Plantation

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Faculty of Computer & Mathematical Sciences, UiTM Shah Alam
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Strategic Information Unit, Office of the Vice-Chancellor (Research and Innovation), UiTM

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