ISSUE 8 | JUL-DEC 2018

# BULLETIN @ RICE UTeM

Research, Innovation, Commercialisation and Entrepreneurship

## Wild Ideas:
## Developing a New Generation of Researchers

**RESEARCHER'S ACHIEVEMENTS**

### Congratulations! Professor Ts. Dr. Faaizah SEAMEO won the Jasper Research Award

**RESEARCHERS & INNOVATION HIGHLIGHTS**

### Product Personalisation & End-users Adoption of Additive Manufacturing

**INDUSTRY & INTERNATIONAL RESEARCH COLLABORATIONS**

### Design and Development Cone Laying System for Lebuhraya Utara Selatan (PLUS Malaysia Berhad)


**RESEARCHER'S VIEW**

### How Relevant is TVET Education with Research & Innovation in Malaysia?

ISSN 2289-991X
9 772289 991003

# Editorial Board



**Printed & Published in Malaysia**
Penerbit Universiti,
Aras Bawah, Perpustakaan Laman Hikmah,
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya, 76100 Durian Tunggal, Melaka.

# Editor's Note

**Assalammualaikum and Greetings,**

Welcome to the Eighth edition of RICE bulletin. On behalf of the RICE editorial board, I would like to take this opportunity to congratulate our new Deputy Vice Chancellor (Research & Innovation), YBhg. Professor Dr. Zulkifilie Ibrahim and wish him all the best in leading UTeM's research and innovation development to the next level.

In this edition, we share the significant projects, collaborations and achievements of UTeM's researchers throughout the second half of 2018. We also introduce the first journal of ICT from the Faculty of Information and Communication Technology, namely the Journal of Advanced Computing Technology and Application (JACTA).

Last but not least, I hope all of you will enjoy reading and contribute interesting news and articles to be shared with the readers.

*Thank you.*

Assoc. Prof. Dr. Massila Kamalrudin
Chief Editor

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# Wild Ideas:
## Developing a New Generation of Researchers

The fourth industrial revolution (IR 4.0) offers an exciting opportunity to all university's stakeholders, especially researchers who are expected to have significant roles to produce better society. The fourth industrial revolution, which is powered by artificial intelligence, big data and inter-connectivity is going to change the nature of the current practice of doing research and innovation. In this case, the conventional approach of doing research and innovation may no longer be relevant as most of the works will be conducted by machine, such as the analysis of information in the cloud, the dissemination of information using IoT and the connection between human and machine.

Responding to the changes in work practices, the new generation of researchers need to learn and be prepared for the current revolution of doing research. They are not only required to be ready technically but also ready with a new mind-set. They should be open and ready to work collaboratively with other researchers from different fields of expertise. Working in "silo" on specific research area or expertise is no longer relevant and suitable with the new expectations of the industry revolution. These changes somehow need to start from the grass root, where the collaboration should start among the research groups(RGs) and the centres of excellence (CoEs). The purpose of doing research must also evolve, focusing on commercialising the output or product of research rather than just merely on research and development. No more talking about fundamental knowledge only, but emphasis should be given to the need to integrate both fundamental knowledge with technology commercialisation.

The current practice in research mainly focuses on the activities from fundamental research to prototype, while the activities for product commercialisation are conducted separately by different entities. This practice tends to result in similar work being produced by other researchers from different faculty or CoE. Repetitive or 'recycled' innovation does not give any benefits to the university, as it does not have significant commercial values and there is a big possibility for the product to end up in 'the valley of death'.

Hence, I am calling all researchers and the responsible units or departments to start making the right move, if we want the university to grow. The units or departments, such as the Centre for Research and Innovation (CRIM) and the Centre for Commercialisation (UCC) need to play their roles to motivate researchers to start small, while ensuring that their research product has commercial value. For example, the university's grant; Short-term Grant (PJP) should be provided into two categories: 1) fundamental research and 2) innovation. Additionally, UCC should also play their roles to continuously educate researchers on product commercialisation related to Intellectual Properties (IPs) process, identifying potential customers and IP negotiation. There is a necessity to provide better practice and platform to boost the researcher's spirit and enthusiasm to participate actively in research and innovation as well as commercialisation. Emphasising on research and development only is not sufficient as we need to extend the research work for commercialising the product.

In conclusion, I hope all researchers, especially the new generation researchers to start changing their mind-set and start thinking to transform from doing conventional research to integrated research, where the fundamental research is inclusive of commercialisation values.

*All the best!*

YBhg. Professor Dr. Zulkifilie Ibrahim
**Deputy Vice Chancellor (Research and Innovation) UTeM**

# Congratulations!

## Professor Ts. Dr. Faaizah SEAMEO won the Jasper Research Award

**By: Assoc. Prof. Ts. Dr. Sabrina Ahmad, FTMK**


UTeM and SEAMEO members in a photo session after the signing ceremony – 29th Oct 2018

From left: Professor. Ts. Dr. Faaizah Shahbodin, Director of CAES and Dr. Safani Bari, Deputy Director Training & Research upon signing MoA between UTeM and SEAMEO SEN, Melaka – 29th Oct 2018

Professor Ts. Dr. Faaizah Shahbodin, Director of the Center for Academic Excellence and Academic Studies (CAES) has won the SEAMEO - Jasper Research Award 2018/2019 under the theme of Overcoming Barriers to Inclusion.

Among the various research works related to assistance and supports for disabilities received by SEAMEO SEN from all over Southeast Asia, her research work entitled the "Development of Autism Cognitive Level Identification Assessment Kits using Serious Games Technique for SEAMEO SEN" has been selected to receive the prestigious award. The Vice-Chancellor of UTeM, Professor Datuk Ts. Dr. Shahrin Sahib expressed his gratitude and excitement for this significant achievement. He commented that "the success has become a catalyst for other UTeM's academicians to further expand the range of research results that directly assist the community and the handicapped".

SEAMEO - Jasper Research Award is one of the initiatives of the SEAMEO Secretariat and the Government of Canada to recognise research from Southeast Asia as well as to facilitate research network from the country. It was established in 1990 with the ultimate aim of promoting young intellectuals to continue research on themes related to social development in Southeast Asia and to facilitate continuous interaction and sharing of knowledge among Southeast Asian and Canadian researchers.

The award ceremony is expected to be held in March 2019 and to be completed by the Ministry of Education Malaysia together with the President of SEAMEO Council 2019/2021.

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# Design and Development Cone Laying System for Lebuhraya Utara Selatan (PLUS Malaysia Berhad)


**By: Ts. Dr. Mohd Azli Salim, CARe, FKM**

Connecting the northern and southern states of Malaysia, the North-South Expressway is the first highway, developed by the government. Stretching from Bukit Kayu Hitam, Kedah to Johor Bahru, Johor, this expressway connects a total of eight states in Malaysia. It is the country's longest highway, covering approximately 847.7 kilometers. The main purpose of constructing this highway was to catalyze the development of the country's economic sector as it serves as the driver of the land transport industry, especially in the West Coast of the Peninsular Malaysia region. Due to its huge impact and benefits for the majority of people in the country, the government has allocated a huge amount of resources to realize this dream with the hope that this highway complies with a set of high standard, ensuring its safety for public usage.

In this case, maintenance works need to be conducted regularly to ensure the safe condition of the highway. When conducting the highway maintenance, PLUS, as the concession company that maintains the highway, usually needs to close the affected areas of the highways. This method is one of the standards to prevent the occurrence of any incidents and accidents during the maintenance period.

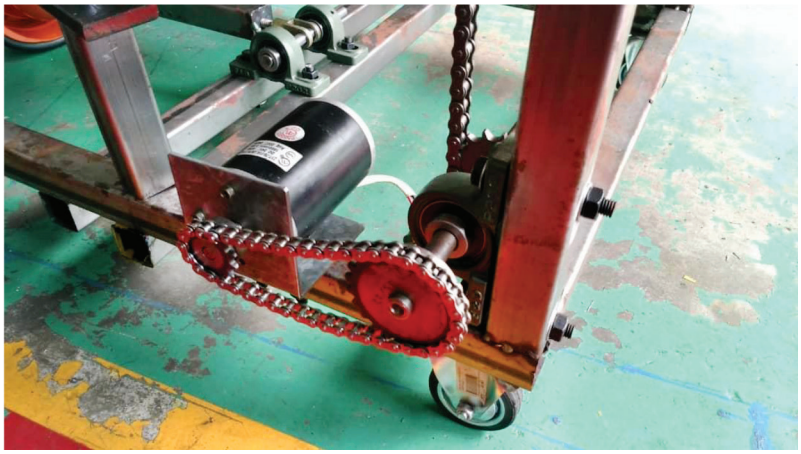
The partial closure of the highway during the maintenance process usually involves the use of "shadow vehicles". This method is expected to reduce the speed of vehicles on the highways to prevent and avoid unexpected events, such as accidents involving workers or maintenance personnel as well as highway users.

During the maintenance, the "shadow vehicles" enter each lane on a highway starting from the left side to the right side of the highway. They, then, slow down their speed,

causing the vehicles following behind them to slow down. Typically, a minimum speed of up to 10 km/h is used, and often these vehicles are required to stop for the preparation of the maintenance works to be carried out.

Such a situation will take up to 20 minutes. During this period, the workers and maintenance personnel who are in front of the "shadow vehicles" will place the cone along the highway where the desired area is going to be maintained. Although the 20-minute period is considered very short for the workers and highway officials, it is perceived differently by the highway users. The 20-minute period is considered very long for highway users during the standstill traffic. They also feel that the waiting time defeats the purpose of paying the toll for convenience and uninterrupted travelling time.

To address this issue, PLUS has conducted a joint study with researchers from the Universiti Teknikal Malaysia Melaka (UTeM). Based on the initial discussion, both parties agreed that the procedure of "shadow vehicle" is needed to ensure the safety environment for highway workers; hence, its operation cannot be abolished. However, both parties agreed that the laying and picking up the cones throughout the maintenance area need to be done quickly and efficiently, thus the closure time of the highway can be reduced.



At present, the processes of laying and lifting cones are performed manually. Further, it requires at least three people to accomplish each process and the weight of each cone can reach up to 6 kilograms. Therefore, this whole procedure consumes certain period of time to be fully completed. Thus, PLUS and UTeM are in consensus that the operations of laying and lifting the cones should be reviewed, and ultimately the two parties agreed to develop an automated system that can facilitate these processes.

UTeM and PLUS have agreed to actively cooperate in this project, in which UTeM researchers, led by Ts. Dr. Mohd Azli Salim are responsible for the research and development work, while PLUS headed by Dr. Norbazlan Mohd Yusof are responsible for the fieldwork. The expenditure and development costs of the project are shared by both parties - through a matching research grant. Responding to UTeM researchers' commitment and direction towards university-industry and "demand-driven" objectives, PLUS has also agreed to contribute more than 1:1 of a matching grant value of this project. The initial stage of the project is expected to be completed in May 2019.

The UTeM researchers involved in this project are: Professor Dr. Ghazali Omar (University-Industrial Adviser), Mr. Faizil Wasbari, Dr. Norazmmi Masripan, Dr. Nurfaizey Abd Hamid, Mr. Adzni Md. Saad, Dr. Muhd Ridzuan Mansor, Professor Dr. Noreffendy Tamaldin, Dr. Norfariza Ab. Wahab, Ir. Dr-Ing. Azrul Azwan Abdul Rahman, Dr. Nadlene Razali, Mrs. Suhada Syaza Safiee, Mrs. Anita Akmar Kamarolzaman, Dr. Siti Hajar Sheikh Md. Fadzullah, Dr. Mohd Zaid Akop, Dr. Mizah Ramli and Dr. Mohd Nor Azmi Nordin.

# Participation of UTeM's Researchers in a Prestigious International Research Project

**By: Assoc. Prof. Ir. Dr. Gan Chin Kim, CeRIA, FKE**

The international consortium of the University of Manchester (UK, project lead), Newcastle University (UK), the Universiti Teknikal Malaysia Melaka (Malaysia), and the Xiamen University (China) have been awarded a research project entitled "TERSE: Techno-Economic Framework for Resilient and Sustainable Electrification" (Ref: EP/R030294/1). The project was awarded by the Engineering and Physical Sciences Research Council (EPSRC) through the "Resilient and Sustainable Energy Networks for Developing Countries" Global Challenges Research Fund call. The duration of this project is three (3) years, starting from 1st May 2018 to 30th April 2021 with the total approved project value of £1,024,786: UTeM will receive £137,605 for this project. It is also important to highlight that UTeM has significantly contributed to the success of the highly competitive proposal.


Courtesy visit to UTeM Vice Chancellor's Office on 21st November 2018, fifth from the right is TERSE project leader, Professor Pierluigi Mancarella from The University of Manchester.


Project meeting with the industry stakeholders at MIGHT's office on the 22nd November 2018. Third from the right is the Manager (Research and Development) of Sarawak Energy Berhad, Mr. Christopher Wesley Ajan while fifth from the right is the Senior Vice President of MIGHT, Dr. Raslan Ahmad.

The project aims to address one of the national agendas of Malaysia i.e. to improve the welfare and economic status of the remote villagers, especially those in Sarawak and Sabah. The project team strongly believes that successful implementation of the international collaborative project will improve energy resilience and provide significant benefits for developing countries, such as Malaysia.

The Malaysian Industry-Government Group for High Technology (MIGHT), Sarawak Energy Berhad (SEB) and the Sustainable Energy Development Authority (SEDA) Malaysia are the supporting partners in Malaysia, and the project team will rely on their strategic support to the research consortium in terms of policy advice, facilitation of knowledge transfer, provision of case studies, and realization of a platform to leverage project impacts.

The team of researchers from Malaysia is led by Associate Professor Ir. Dr. Gan Chin Kim.

# Collaboration Research for Underwater Technology Research Group

**By: Assoc. Prof. Dr. Mohd Shahrieel Mohd Aras, CeRIA, FKE**

The Universiti Teknikal Malaysia Melaka (UTeM) has signed the Memorandum of Understanding (MoU) with Nakhoda Maritime Sdn. Bhd. on the 8th October 2018. After the MoU signing, the Managing Director of Nakhoda Maritime Sdn. Bhd., Mr. Hisham Ahmad paid a visit to the Underwater Technology Research Group (UTeRG), under the Center for Robotics and Industrial Automation (CeRIA), UTeM. The UTeRG is led by Associate Professor Dr. Mohd Shahrieel Mohd Aras. In relation to this, the Nakhoda Maritime invited the UTeRG Team for a technical visit to Trone Solutions and Technology Sdn. Bhd., at Subang Jaya, Selangor on 4th December 2018. The visit was participated by representatives from UTeRG, namely Associate Professor Dr. Mohd Shahrieel Mohd Aras, Dr. Ahmad Anas Yusof, Dr. Mohd Khairi Mohamed Nor, Ir. Mohamad Afif Kasno and Mr. Muhamad Khairi Aripin. The purpose of the technical visit to Trone Solutions & Technology was to discuss research and collaboration between the UTeRG, Nakhoda Maritime and Trone Solutions and Technology Sdn. Bhd. Based on the discussion, Trone Solutions and Technology Sdn. Bhd. suggested for a collaboration in research and development of underwater Remotely Operated Vehicle (ROV) technologies.

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Part of ICSITech 2018 participants

# ICSITech 2018

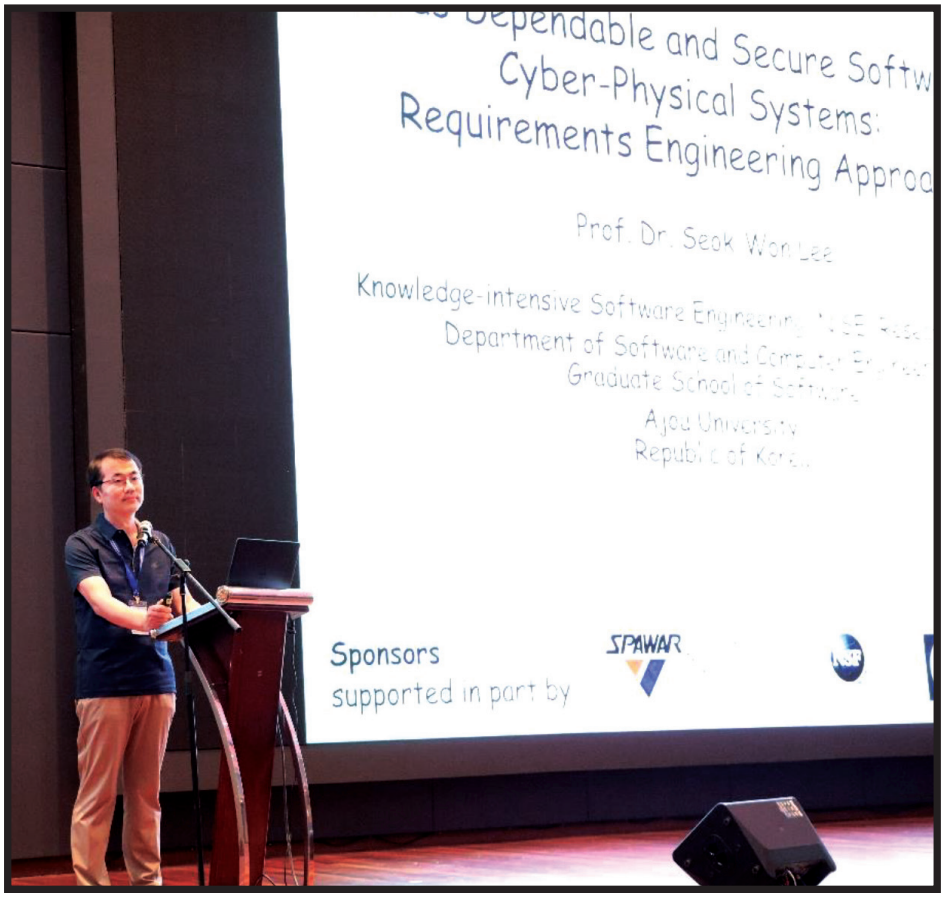
## FTMK Upholds Science and Information Technology along with Industrial Revolution 4.0

**By: Ts. Dr. Ummi Rabaah Hashim, FTMK**

UTeM continues to drive excellence through world-class information and communication technology in line with the changes and progress of the IR 4.0. Recently, the Faculty of Information and Communication Technology (FTMK), Universiti Teknikal Malaysia Melaka (UTeM) has organized the 4th International Conference on Science in Information Technology (ICSITech 2018). The conference was held in one of the hotels in Melaka, the Swiss Garden Hotel from 30th – 31st October 2018.

With the theme "Embracing Industry 4.0: Towards Innovation in Cyber Physical System", this conference provided a platform for researchers and academics to discuss and present the latest research and work in the field of Science and Information Technology. The conference received participation from both local and international researchers, academics

Audience listening to one of the keynote speech




Keynote speech by Professor Dr. Seok-Won Lee
from Ajou University of South Korea

and scholars, besides spurring research among UTeM scientists in line with the changes and progress of the Industrial Revolution 4.0 (IR 4.0).

The ICSITech 2018 conference has succeeded in accumulating over 70 researchers and experts in the field of Science and Information Technology. The main areas covered in this conference include Artificial Intelligence, Big Data and Data Mining, Biomedical Informatics, The Internet of Things, Cloud & Grid Computing, Soft Computing, Green Computing and others. All papers presented in this conference will be published in selected journals indexed within SCOPUS.

Among those who delivered the keynote address at this conference were Professor Datuk Ir. Dr. Mohd Jailani Mohd Nor from Albukhary International University Malaysia and Professor Dr. Seok-Won Lee from Ajou University of South Korea.

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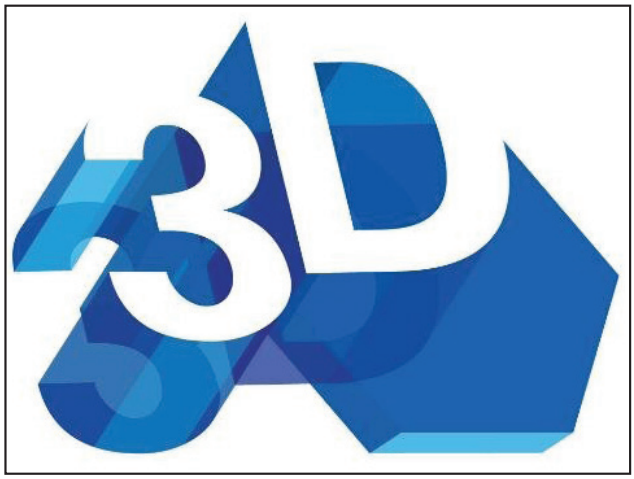
# Product Personalisation and End-users Adoption of Additive Manufacturing

**By: Ts. Dr. Syahibudil Ikhwan Abdul Kudus, JTKP, FTKMP**




Additive Manufacturing (AM) technology has received much attention and increasingly gained acceptance from both professional and non-professional users due to its advancement towards manufacturing beyond prototyping. This movement has paved the way for 'do-it-yourself' designers, and, subsequently, has created new ways to design and manufacture products through personal 3D printers. The emergence of such technology presents a new opportunity for product realisation; the personalisation of products tailored to individual preferences. Under these circumstances, the growth of product personalisation will increase the use of AM for production of end-use components.

Through customer-centric personalised production, AM allows end-users to produce a series of simple product components for their own use. In addition, AM technology enables conventional manufacturers to create new niche markets by creating many different versions of products aimed at different target users through product personalisation. It can replace long production runs of mass-produced parts with batch production, where the batch size can be as small as one. In this way, AM can contribute towards product differentiation and new market creation.

The adoption of fabrication tools such as 3D printers and easy-to-use design toolkits may lower the barriers for transforming an idea into a physical representation. Recent development has seen a significant number of companies beginning to market entry-level 3D printers sold at affordable prices. These machines have been priced so that they can be purchased by individuals and can produce objects from a range of plastics.

A personal 3D printer can produce relatively complex objects with minimal user intervention, making it possible for users to build physical objects at home. These low-cost printers are more suitable and affordable for early technology adopters and "make-it-yourself" beginners. By using such printers, personalised designs can be fabricated in a short time, and this makes it economical to create highly unique products that meet the growing need for personalisation. A study found that 45.6% of 3D printing users were from non-professional backgrounds and considered themselves as 'beginners' or early technology adopters who did not have a formal design education. Based on the trends, the number of people wanting to get involved in 3D printing technology is growing.

Regarding the motivation for end-users personalising their own products using AM, some evidence shows the key reason to be that end-users were interested in using the technology because they were motivated by the 'do-it-yourself' (DIY) movement to replicate existing items, to make household objects, repair broken parts, and create custom objects as a way to express themselves through the product they produced. Thus, 'playing' with the technology become fun and pleasurable. Studies revealed that end-users used 3D printing to produce decorative items, functional models, spare parts for devices, end-use products, and for educational purposes.

In the matter of realising a design idea, individuals may experience difficulty because they lack the skills to design and fabricate their personalised design. Moreover, it is hard for non-expert users to quickly design and print something, as it requires some degree of learning 3D design skills. It is necessary for end-users to learn how to use sophisticated design tool, material and fabrication process, and make a necessary investment on the printing machine.

Researchers suggest that manufacturer creates a user-friendly virtual environment in which consumers can easily sculpt virtual objects, the manufacturer could make sure that these virtual objects are produced as real 3D objects. 3D printing machines and design software should be simple, have easy-to-use functions and user interfaces, and enable non-expert users to control the digital design process.

Supported by AM-enabled design tools, end-users can readily design and manufacture their personalised products using suitable AM systems, such as personal desktop 3D printers. Additionally, by using AM-enabled design tools, end-users can 'play' and create complex patterns and shapes. Existing free design toolkits such as 123D Design (www.123dapp.com/design), Tinkercad (www.tinkercad.com), and Project Shapeshifter (shapeshifter.io) offers easy-to-use design interfaces for non-expert users to produce their personalised designs with AM. Instead of owning a personal 3D printer, individuals may also turn to online retailers such as Thingiverse and Shapeways. These online retailers offer a wide variety of product categories such as high-tech components (e.g. cases, drone parts, etc.), jewellery (e.g. earrings, pendants, etc.) and household goods (e.g. dining implements, lighting, etc.). Figure 1 shows some examples of personalised products produced using 3D printing.

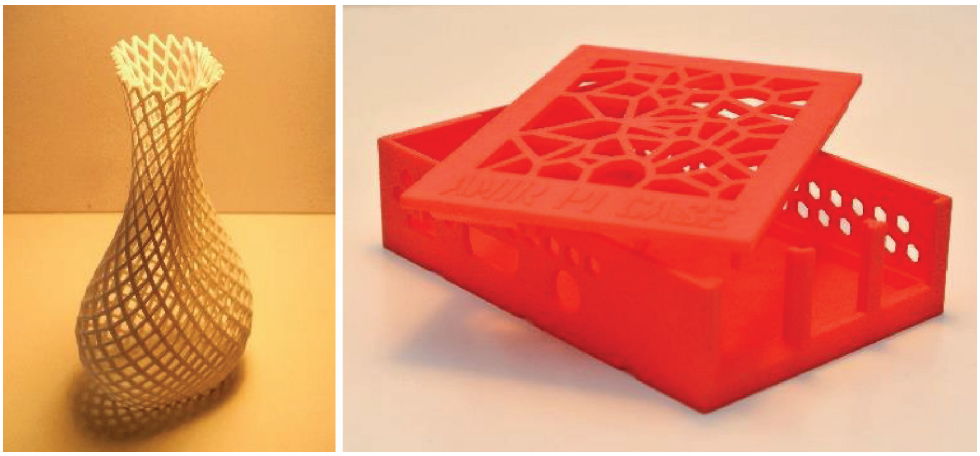


Figure 1: Examples of 3D printed personalised products.

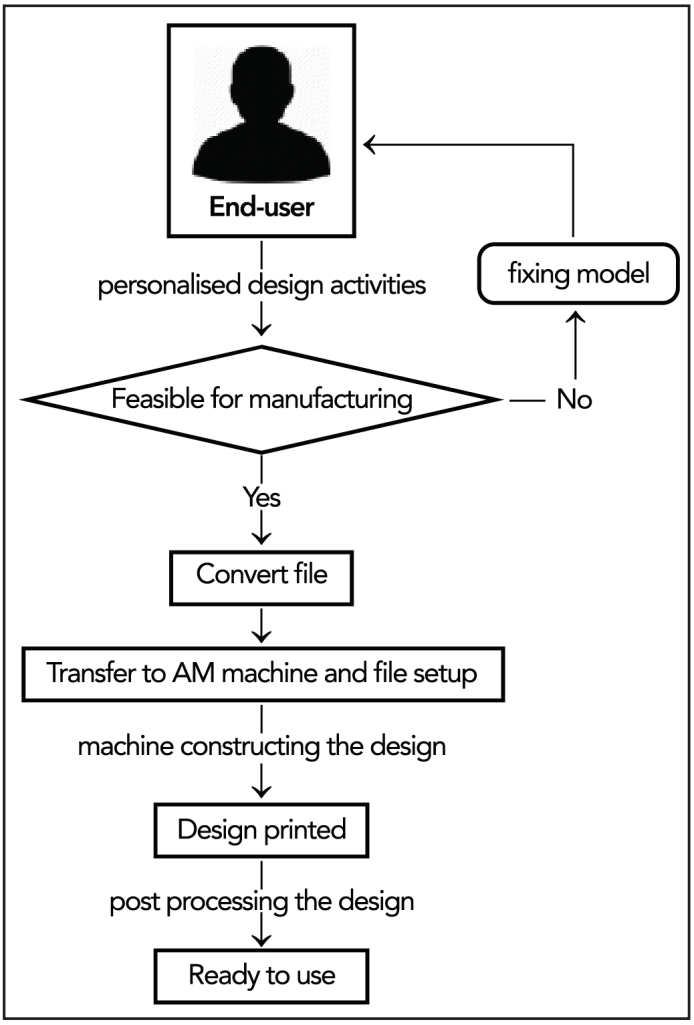



Figure 2: The design process for product personalisation through the use of AM.

The design process for product personalisation through the use of AM is illustrated in Figure 2. Based on Figure 2, end-users participate in the design process by completing a product's individual elements and finalising the design using an AM-enabled design toolkit. End-users are allowed to change and manipulate certain physical design features of the 3D CAD file using design toolkits. They can alter shapes, sizes, textures, patterns or add particular design features; either to enhance the product's functionality or appearance. However, the essential performance of the product (for example, performance, reliability, safety, etc.) will be protected. After the design has been finalised, end-users can convert the 3D CAD file to the STL format and transfer it to an AM machine. End-users need to setup an AM machine with appropriate settings before it can construct the part. Alternatively, they could send the file to a bureau service for printing.

# Conclusion

The demand for product personalisation using AM is expected to grow in coming years. AM is vital for design firms, manufacturers and consumers because one of the core drivers for AM is to increase geometric freedom, and this approach could offer added value to personalised products fabricated through AM technology. The emergence of responsive and flexible manufacturing systems such as AM, in addition to the existence of AM-enabled supporting tools, there would be an opportunity for product personalisation to become a new paradigm for product realisation.

Nevertheless, to allow end-users to enjoy the benefits and take advantage of the advancement of AM, they need to have a deep understanding about the value they can acquire from personalising products through AM. Also, designers could facilitate ways for end-users to personalise the products according to the features they want, thus enabling them to actively participate in personalisation process.

# Aerial Dengue Monitoring System (ADMS)

**By: Assoc. Prof. Gs. Dr. Asmala Ahmad & Mohd Yazid Abu Sari,**
**Centre for Advanced Computing Technology (C-ACT), FTMK**

In Malaysia, a total of 82,840 dengue cases were recorded in 2017, leading to the death of 171 people. Various measures for preventing dengue cases have been carried out by authorised parties, but there have been no promising outcomes. To overcome these issues, we developed a novel system known as the Aerial Dengue Monitoring System or ADMS. ADMS consists of a drone and a laptop. The drone system's main payload is a high resolution camera. The close up of the system is presented in Figure 1. ADMS can be operated by one person, from anywhere and at any time. It is able to navigate autonomously and can be tracked in real-time. The operational concept of ADMS is shown in Figure 2. In dengue monitoring, ADMS can be used to create accurate current topography maps with elevation contour lines, and detailed 3D maps that can provide information on mosquito breeding sites that attract aedes mosquito, i.e. the type of mosquito that causes dengue. Figure 3 shows an example of high resolution 3D maps produced by ADMS. From the map, 150 m radius around the place reported for a dengue case will be considered as the most potential breeding sites for aedes. Within this area, the structures that tend to provide a suitable breeding site for aedes will be further analysed. Figure 4 shows structures on the roofs highly potential to be aedes breeding sites.

Figure 1: A close-up of ADMS.

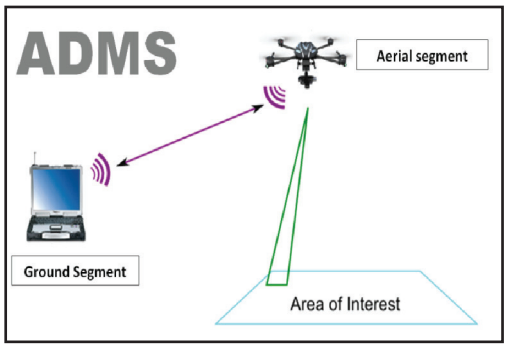
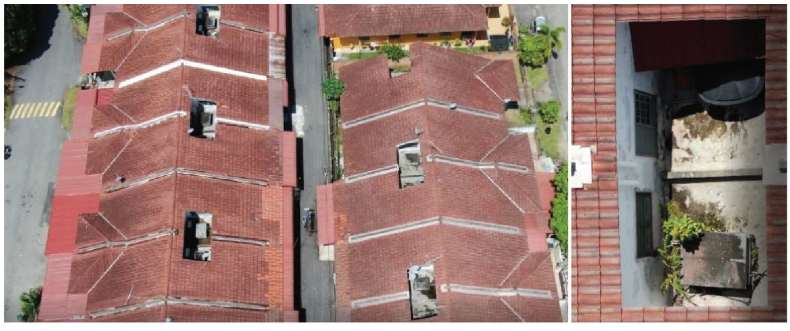



Figure 2: ADMS operational concept.


Figure 3: An example of 3D maps produced by ADMS.



(a) (b)

Figure 4: (a) Highly potential roof structures to be aedes breeding sites and (b) a close-up of one of the structures.

# How Relevant is TVET Education with Research & Innovation in Malaysia?

**By: Dr. Shamsul Anuar Shamsudin, CARe, FKM**

Technical and Vocational Education and Training (TVET) has for a long time been designed for students who are technically-inclined but do not meet the admission requirement for the ordinary science and engineering courses. Although vocational education is for youngsters in schooling age, this type of trainings is also given to older people like retrenched workers, pre-release prisoners, and armed-forces personnel returning to civilian life. Malaysia also has had vocational schools and training centres for a long time. The implementation of TVET is becoming a mainstream now with a lot of investments by the Government. However, the question now is can TVET contribute to research and innovation in Malaysia?

The number of private colleges in Malaysia saw a spike increase in the 1990s. Many colleges offer collaborative programs with established public universities like the Universiti Teknologi Malaysia (UTM). Many of these diploma programs are in the fields of engineering and engineering technology. Additionally, the Malaysian Government has set up technical university-colleges in 2000 and eventually upgraded them into university status by 2006. The emphasis of education in these new universities has always been on technical and practical solutions in the industries. In 2016, the Government drafted a plan to build more vocational colleges that would produce more skilful workforce for the nation to alleviate the problems of poverty.

However, even though TVET is for more practice-based learning, research work and innovation must be conducted to help the growth of the nation. Hence, whether our students are in TVET or engineering, relevant type of research and innovation efforts are still important to really give an impact to our national development. It is expected that more research and development (R&D) engineers are needed in the future.

Malaysia has been depending on foreign investments, resulting in many factories being set up in the country. However, most of the real R&D work is still carried out overseas. The R&D sections here are usually for small changes in design. As mentioned by many colleagues who once worked in various industries, this scenario is considered as a common practice in the industry.

Some large corporations like the car maker PROTON secured a Government grant up to RM1.1 billion for R&D, in the hope to turnaround their losses [6]. It is in R&D sections where many engineers graduated from engineering programs could flourish and use their talents and ingenuity to the fullest. TVET graduates, on the other hand, can offer many contributions to corporations and the nation. Many productions and operations sectors would benefit more from the practice-based skills that TVET graduates should possess. In short, there is a place for everyone.

Unfortunately, it has been reported that the youth unemployment is as high as 10.8%. That could be among the highest percentage for ASEAN countries. As a result, TVET could also focus more on entrepreneurship so that youth can be self-employed or venture into business and create more jobs. Many genuine efforts must be garnered to ensure

this effort can be realized. This should include a lot of practical R&D work even in universities and colleges. It cannot be mere political gimmicks or rhetoric any more.

Among the aspects that can be ventured is the way TVET is delivered. Blended-learning through various medium and applications for TVET learning can be applied. Other than that, product designs that produce household solutions or even quick-fix for operations in industries can also be our strong points. If we can deliver this sort of R&D in shorter period of time through TVET, investors – local and foreign – will see this as an incentive to setup their businesses here. When this happens, our growth will have a brighter future.

In summary, the contribution of TVET in the national growth must be recognized accordingly. Many people, especially the youths can be trained through TVET to be skilful workers in order to build this nation. More appropriate research and innovation products can be expected from TVET graduates because this is what mostly needed in the current situations in Malaysia.

# Postgraduate Experience in UTeM

**By: Dr. Syahril Anuar Idris (PhD in Manufacturing Engineering from FKP)**

They say every Doctorate, has his/her own PhD journey. As for me, my journey started at the Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka (UTeM). Under the guidance of Dr. Fairul Azni Jafar, alhamdulillah I managed to complete my PhD within four years, conducting a research work entitled the *'Development of Pipeline Corrosion Inspection System Using Machine Vision'*. I received my graduation scroll on the 20th November 2017 during the 13th convocation ceremony.

Before starting my PhD, my background experience is on manufacturing engineering. However, my PhD research field was multidisciplinary in nature, thus requiring me to explore other fields. Here, in UTeM, I was fortunate to have the opportunity to inquire and get consultation from experts in other departments and faculties. Along the way, I managed to publish five journals and four articles, in which four of them are indexed by Scopus, and one chapter in a book. I had also won a few medals in innovation competitions along the way.


The environment in UTeM also plays a significant role in the process of completing my PhD journey. Despite doing a PhD which is supposed to be very stressful, I really had an enjoyable time and I think this is because of the support I that I received from the supervisory team who facilitated my PhD. Other postgraduate students had also given a great help in providing tips and trick to publish, updated news and information and supportive rival to encourage me during my gloomy days. In addition to that, even after graduating from UTeM, I am still in contact with my lecturers who support me in many ways, such as sharing and helping me with my career development as a technology consultant at PSI Global.

JACTA
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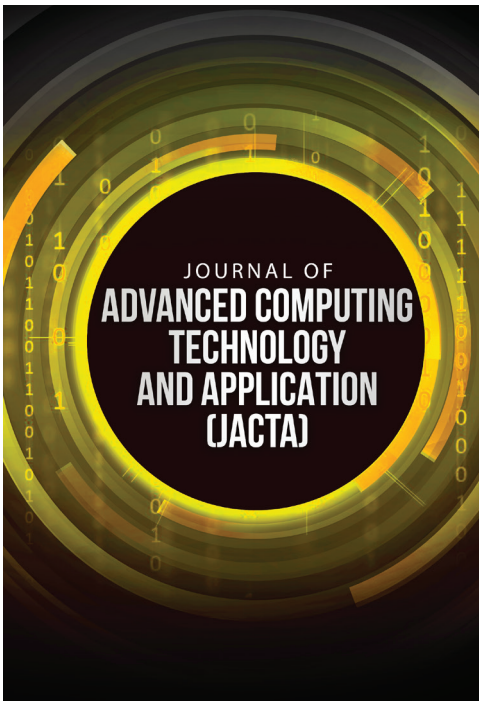


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## 4. Immersive Multimedia and Games Technology

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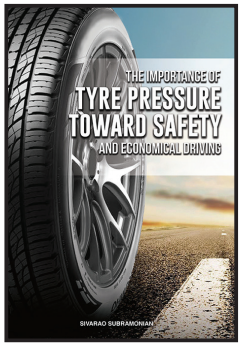


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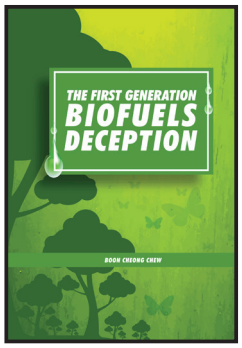


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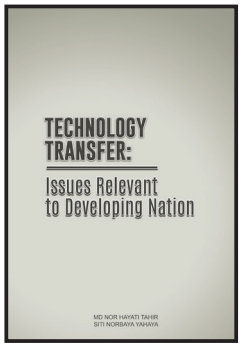


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