



IT'S MEchanical

'Empowering Engineering, Technology'

THE OFFICIAL BULLETIN OF THE FACULTY OF MECHANICAL AND AUTOMOTIVE ENGINEERING TECHNOLOGY

New Approach In Promoting New Programmes In FTKMA
Page 4

Fiber Bragg Grating Gap Sensor as An Innovative Idea for Critical Flange Monitoring
Page 16

Two FTKMA Lecturers Listed as 2% World's Best Scientists
Page 25



Welcome Note

PAGE 3

1

Academic Activities

PAGE 4

2

Faculty Activities

PAGE 7

3

Focus Group Activities

PAGE 13

4

Research Activities

PAGE 23

5

Creative Corners

PAGE 26

6

Table Of Content



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PATRON WELCOME NOTE

Dear reader,

Happy new year 2022!

It is a great pleasure to welcome all of you to the third edition bulletin of FTKMA. The current edition highlights our activities, news and articles in the second half of 2021. 2021 has been a challenging year for FTKMA, nevertheless it doesn't stop us from organizing activities related to our core subject teaching and learning as well as the research and development including community services.

IT'S MEchanical Bulletin is an academic-led publication of FTKMA to showcase our activities. However, we also open for other staff and students to contribute news or articles to this bulletin. We are thrilled to present for the latest edition of this quarterly publication the news, activities and articles.

I would like to thank FTKMA staff for their efforts and hard work to get the present bulletin published. Despite we are in the times of pandemic-stricken era, the team's perseverance to ensure its successful publication is admirable.

It is our hope that you will be inspired and simultaneously enjoy following the array of activities happening in FTKMA.

Happy reading!

Thank you.

PROFESSOR DR. MAHADZIR ISHAK@MUHAMMAD
Dean
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EDITOR-IN-CHIEF NOTE

The Present edition of our bulletin maintains its reporting compositions as in the past by presenting to the readers all activities around FTKMA over the year of 2021. In addition, we take the opportunity to highlight the appointment of new staff members, rotation positions and also honorary positions for our partners outside UMP. Apart from that, we are also emphasising on research highlights from the seven research groups in FTKMA plus those new articles written by our members. I hope you will enjoy reading and wishing everyone a Happy New Year 2022!

ASSOCIATE PROFESSOR IR. DR. MOHD HAFIZI ZOHARI
Deputy Dean (Research and Postgraduate Studies)
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ACADEMIC ACTIVITIES

New Approach In Promoting New Programmes In FTKMA

Other than the amazing promotional videos developed previously, FTKMA takes a bold move in promoting new programmes in the faculty by launching a free educational comic! The comic, titled 'Misi ke UMP: Jom ke FTKMA!' is developed by the faculty's Publicity and Media Unit in collaborations with Misi and Boneybone Studio team of artists who come up with the professional drawing and excellent storyline. The story centres around two high school students who are interested in pursuing engineering study at UMP. With the help of their uncle and the faculty staff, they manage to get a lot of information regarding the programmes offered in FTKMA. The comic is launched online on 8 August 2021 which can be read and downloaded here: : https://bit.ly/Komik_FTKMA



Strengthening The Industrial Networks and Academic Collaborations

On 14 September 2021, FTKMA organises an online workshop to further refine the Bachelor of Technology (Automotive) (BVA) program alongside relevant industrial representatives. The workshop objective is to ensure that the content of the program is inline with the demands of industry.

The ten industries are:

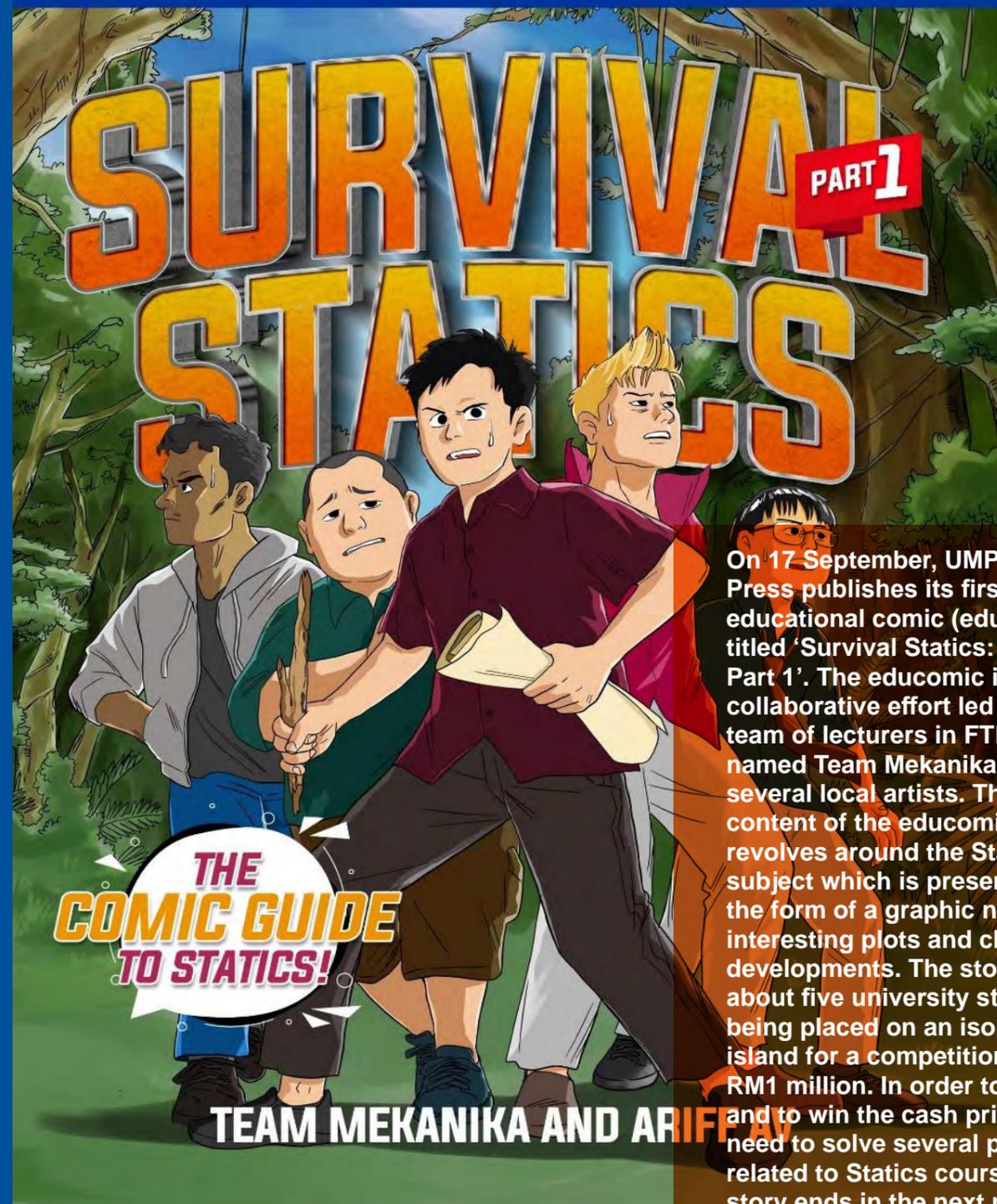
1. MMC Manufacturing Sdn Bhd
2. Techniker Expert Sdn Bhd
3. Nadi Timur Empire
4. DreamEdge Sdn Bhd
5. Move Robotic Sdn Bhd
6. DRB-Hicom Bhd (Paint Shop)
7. Mercedes Benz Malaysia Sdn Bhd
8. Perodua Sales Sdn Bhd
9. MIMOS Bhd
10. Proton Hoi Keen 4S

Feedbacks from the participants of such auspicious events will be used to further enhance BVA



UMP's First Educomic By FTKMA Lecturers

UMP COMIC SERIES PRESENTS



On 17 September, UMP Press publishes its first ever educational comic (educomic) titled 'Survival Statics: Part 1'. The educomic is a collaborative effort led by a team of lecturers in FTKMA named Team Mekanika and several local artists. The content of the educomic revolves around the Statics subject which is presented in the form of a graphic novel with interesting plots and character developments. The story is about five university students being placed on an isolated island for a competition to win RM1 million. In order to survive and to win the cash prize, they need to solve several problems related to Statics course. The story ends in the next part of the educomic.

Malaysian Board Of Technologists (MBOT) Awareness Talk By Ts. Dr. Nor Aznan

On 19 March 2021, Volkswagen Group Malaysia Sdn. Bhd. generously donated three cars and one car body to FTKMA for teaching and learning as well as research purposes. The donated vehicle models are Vento, Passat and Tiguan. It is hoped that the donation would give a better understanding to the students in terms of technology, design, manufacturing processes and electrical works used in automotive industries in recent years, giving them the edge over other learning centre students.



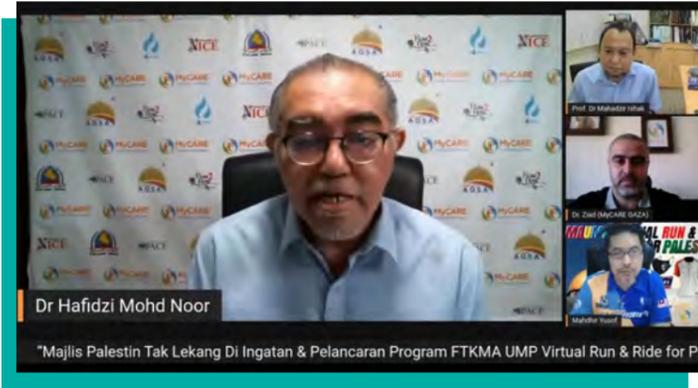
Industrial Talk: Automotive Industrial Design By MIMOS Representatives

FTKMA facilitates another interesting industrial talk on 19 November 2021 on Automotive Industrial Design by Mr Saharudin Busri and Mr Nizam Najmuddin from MIMOS Berhad. Both speakers are highly experienced in the field and their talk is centred on the Industrial Design Development Process. At the end of the event, the students are able to watch a live demo of the Virtual Reality (VR) technology using a special headset.



COMMUNITY SERVICES

FTKMA UMP Virtual Run & Ride for Palestine 2021



FTKMA UMP takes the initiative to raise funds for Palestine through the FTKMA UMP Virtual Run & Ride for Palestine 2021. In addition, the goal is also to encourage a healthy living culture during the pandemic crisis. The inaugural program receives attention and cooperation from NGOs, namely Humanitarian Care Malaysia (MyCARE) and Malaysia Runners. An event occurs on 11 October 2021 to share the latest situation in Palestine by Prof. Madya Dr. Hafidzi Mohd Noor, Chairman of MyCARE, and Dr. Ziad M.M. Shehada, MyCARE Manager in Gaza. Subsequently, the program is officiated by the Dean of FTKMA, Professor Dr. Mahadzir Ishak @ Muhammad. A total of 153 entries are registered with three optional categories (running/cycling/contribution). The challenge begins on 15 October 2021 and ends on 15 November 2021. The fund set up by this program is finally channelled to MyCARE.

Volunteers To Help Flood Victims

The unusually bad weather has hit the country recently causing massive flooding in some areas. Therefore, the aid activity to clean several FTKMA staff houses in Kuantan and Pekan affected by the recent floods is carried out from 21 to 23 December 2021. Altogether, the team of volunteers consisting of FTKMA staff manage to clean five houses. Thank you to the FTKMA Flood Volunteer Team.



Food Distribution To Students In The Quarantine Block

29 May 2021

After the long stay at home, students returning to UMP must undergo ten days of quarantine in a specific dorm in UMP Pekan Student Residential College. During this quarantine period, Professor Dr. Mahadzir Ishak @ Muhammad (Dean of FTKMA) together with Hazmin Aris (Chief Operating Officer of UMP), Dr. Mohd Adnin Hamidi, and Dr. Mohd Hilmi Jalil have joined the volunteer program to deliver food to these students. The activities adhere to strict SOPs to ensure minimum contact with quarantined students. This program is coordinated by Mahdhir Yusof, a fellow at the UMP Pekan Student Residential College cum Assistant Vocational Training Officer at FTKMA.



FTKMA Volunteers At Pusat Pemberian Vaksin (PPV) Integrasi@UMP

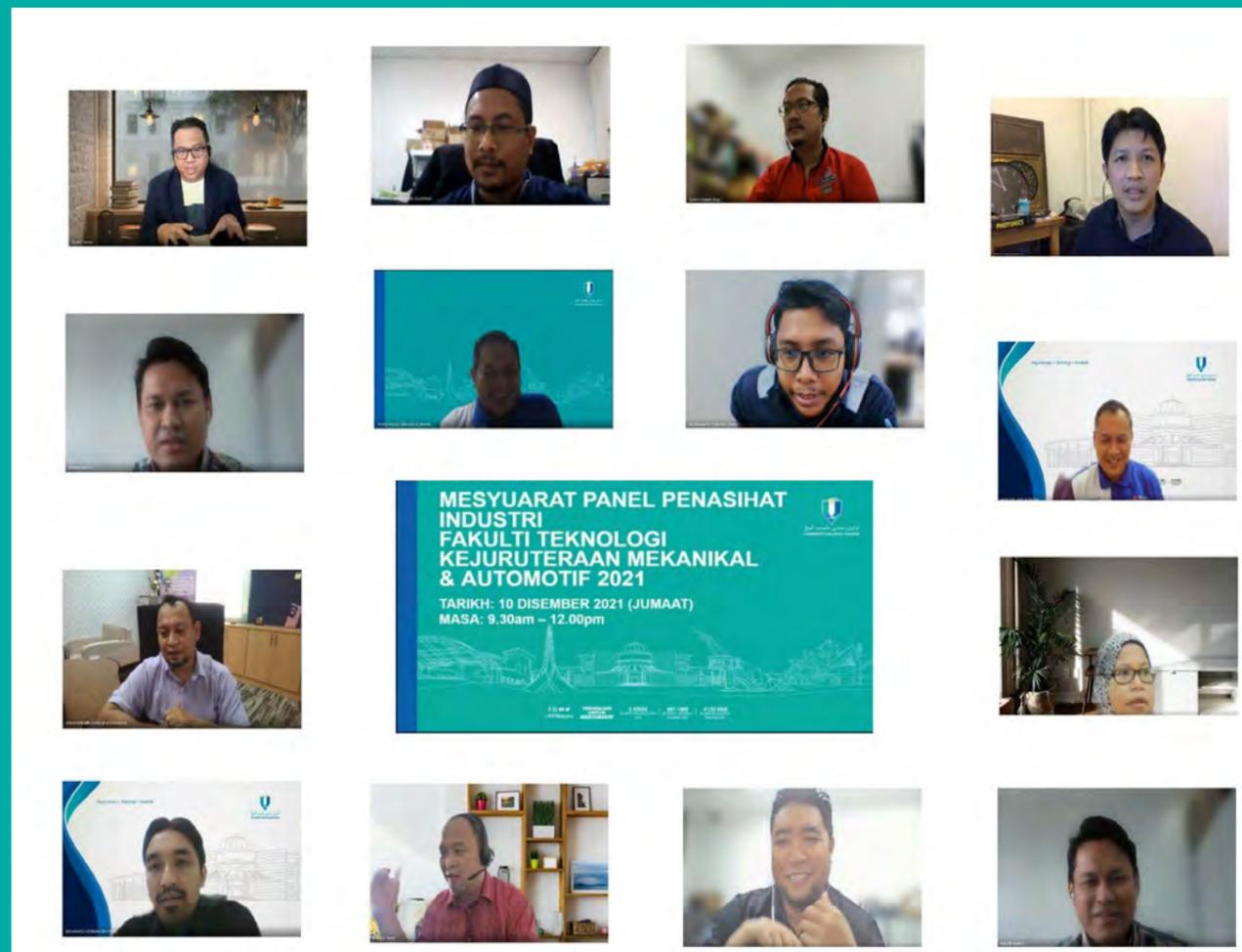
Universiti Malaysia Pahang (UMP) is one of the Vaccination Administration Centres (PPV) Integration through the National COVID-19 Immunization Program (PICK). It is a collaboration with COVID-19 Immunisation Task Force (CITF) Pahang, Pahang State Health Department (JKNP) and Pahang District Health Office. The goal is to increase and accelerate vaccination among residents in Pekan and Kuantan. The operation starts from 8 August, 16 to 17 August, 29 August, and 8 to 10 September 2021. Dr. Nasrul Hadi Johari and Mohammad Ilzam Jamat represents FTKMA as the volunteers at the centre



FACULTY ACTIVITIES

Industrial Expert Panel Meeting 2021

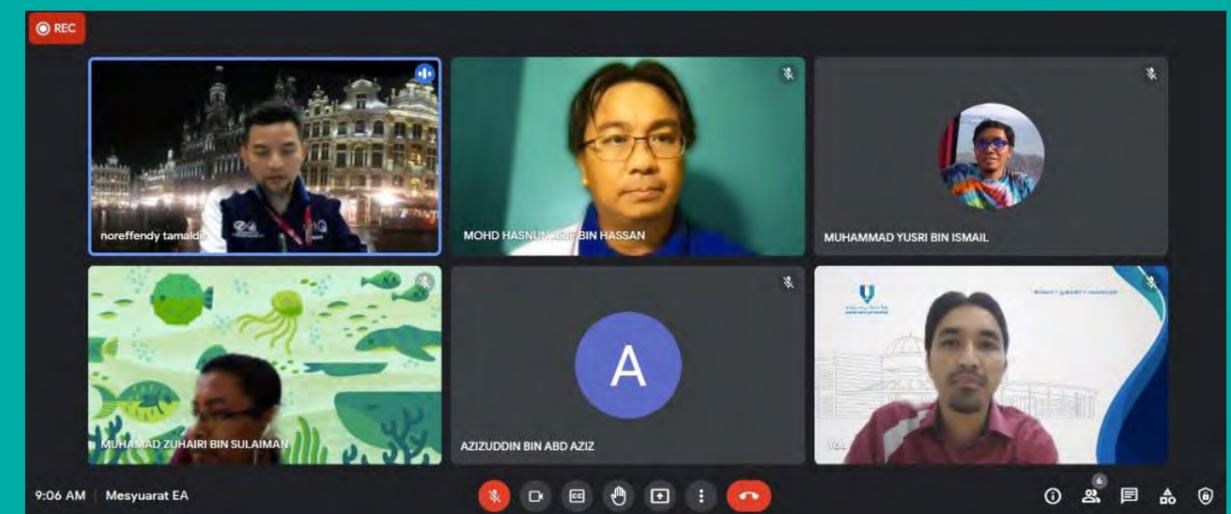
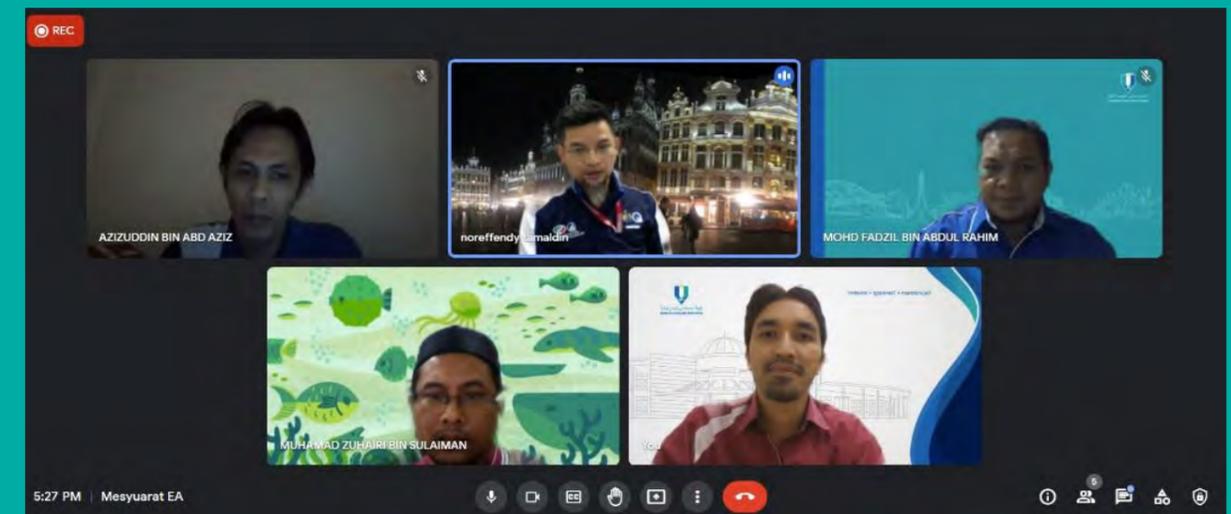
The Industrial Advisory Panel (IAP) meeting is held on 10 December 2021. In the event, the faculty obtain feedbacks and views from IAP members regarding the academic programs in terms of content suitability, teaching plan evaluation, course structure and placement of students and staff for training / industrial attachment. The meeting is divided into three groups to look at the respective programs of Bachelor of Automotive Engineering with Honours (BHA), Bachelor of Technology in Automotive with Honours (BVA), and Diploma in Mechanical Engineering (DMM). Mohd Ruslin Mohd Tamsir from MQ Finique Sdn Bhd and Mohd Ruhaidi Abdul Rashid from BMW Motorsport have been appointed as the IAP for BHA Program. Syahril Azeem Ong from CENDANA Auto, Mohd Nazri Kasuan from HICOM Automotive Manufacturing and Wan Mohd Fairuz Wan Mamat from PROTON have been appointed as an AIP for the BVA Program. Mohd Yusrizal Mohd Yusof from Mercedes-Benz Malaysia and Khazirul Izwan Mohamad Mangin from PROTON have been appointed as the IAP for the DMM Program.



External Assessor (EA) Meeting for Bachelor of Technology in Automotive with Honours (BVA)

16 December 2021

FTKMA has appointed Professor Ts. Dr. Noreffendy Tamaldin from Universiti Teknikal Malaysia Melaka (UTeM) as the External Assessor (EA) for Bachelor of Technology in Automotive with Honours (BVA). The objectives of the appointment are to get expert and professional views from the EA in terms of handling and quality of the evaluation process, suitability of the program following the regulation of relevant accreditation bodies, student learning outcomes, and provide suggestions on facilities, amenities and learning materials for the students. Packs are distributed among the faculty members along with some homemade scrumptious raya cookies. The event takes place on 5 May 2021 at FTKMA's ground floor foyer.



PEOPLE

New Appointment of Adjunct Professor at FTKMA

Congratulations to Professor Ir. Ts. Dr. Khairil Anwar Abu Kassim, Director General of MIROS for being appointed as Adjunct Professor at FTKMA from 21 September 2021 to 20 September 2022.



Professor Ir. Ts. Dr. Khairil Anwar Abu Kassim



Professor Dr.-Ing. Nik Abdullah Nik Mohamed

Reappointment to the Post of Visiting Professor at FTKMA

Congratulations to Professor Dr.-Ing. Nik Abdullah Nik Mohamed for being reappointed as a Visiting Professor at FTKMA starting from 10 November 2021 until 9 November 2022.

New Appointment to the Post of Administrative Position

Congratulations on the new appointments.

1. Dr. Nasrul Hadi Johari has is appointed as the Director of Technology Center for Humans in the Department of Research & Innovation starting from 1 September 2021 to 31 August 2023.
2. Dr. Daing Mohamad Nafiz Daing Idris is appointed as the Head of Program (Master of Mechanical Engineering) FTKMA starting from 15 August 2021 to 14 August 2023.
3. Dr. Norhaida Ab. Razak is appointed as the Head of Diploma Program at FTKMA starting from 15 August 2021 to 14 August 2023.



Dr. Nasrul Hadi Johari



Dr. Daing Mohamad Nafiz Daing Idris



Dr. Norhaida Ab. Razak

Acknowledgment and Appreciation

Thank you for the service.

1. Dr. Mohd Adnin Hamidi for diligently carrying out his duties as the Head of Diploma Program at FTKMA from 15 August 2019 to 14 August 2021.
2. Dr. Daing Mohamad Nafiz Daing Idris for diligently carrying out his duties as the Head of Masters of Automotive Engineering Program at FTKMA from 15 August 2019 to 14 August 2021.



Dr. Mohd Adnin Hamidi



Dr. Daing Mohamad Nafiz Daing Idris

Reappointment to Various Administrative Positions

Congratulations to:

1. Professor Dr. Mahadzir Ishak @ Muhammad is reappointed as the Dean of Faculty of Mechanical & Automotive Engineering Technology from 1 August 2021 to 31 July 2023.
2. Associate Professor Ts. Dr. Mohd Ruzaimi Mat Rejab is reappointed as the Director of the German Center for Academic Cooperation, JHEAA from 1 August 2021 to 31 July 2023. August 2019 to 14 August 2021.
3. Dr. Mohd Hasnun Arif Hassan is reappointed as the Deputy Dean (Academic & Student Affairs) of Faculty of Mechanical & Automotive Engineering Technology from 15 August 2021 to 14 August 2023.
4. Associate Professor Ir. Dr. Mohd Hafizi Zohari is reappointed as the Deputy Dean (Research and Graduate Studies) of Faculty of Mechanical & Automotive Engineering Technology from 15 August 2021 to 14 August 2023.
5. Ir. Dr. Mohd Rashidi Maarof is reappointed as the Head of Technical at Faculty of Mechanical & Automotive Engineering Technology from 15 August 2021 to 14 August 2023.
6. Dr. Mohamad Heerwan Peeie is appointed as the Head of Program (Automotive Technology) Faculty of Mechanical & Automotive Engineering Technology from 15 August 2021 to 14 August 2023.



Professor Dr. Mahadzir Ishak @ Muhammad



Associate Professor Ts. Dr. Mohd Ruzaimi Mat Rejab



Dr. Mohd Hasnun Arif Hassan



Assoc. Prof. Ir. Dr. Mohd Hafizi Zohari



Ir. Dr. Mohd Rashidi Maarof



Dr. Mohamad Heerwan Peeie

Appointment of New FTKMA Staff

Congratulations and welcome to our new members joining FTKMA big family!

1. Dr. Mohd Hanafi Muhammad Sidik, University Lecturer Grade DS51-A (1 September 2021)
2. Muhammad Zulhilmi Immerus, Assistant Vocational Training Officer Grade DV29-A (1 December 2021)



Dr. Mohd Hanafi Muhammad Sidik



Mr. Muhammad Zulhilmi Immerus

FOCUS GROUP ACTIVITIES

Automotive Engineering Research Group (AERG) Trained The Industrial Engineer and Trained By Industrial Experts

Automotive Engineering Research Group (AERG) members have undertaken several upskilling trainings relevant to automotive such as:

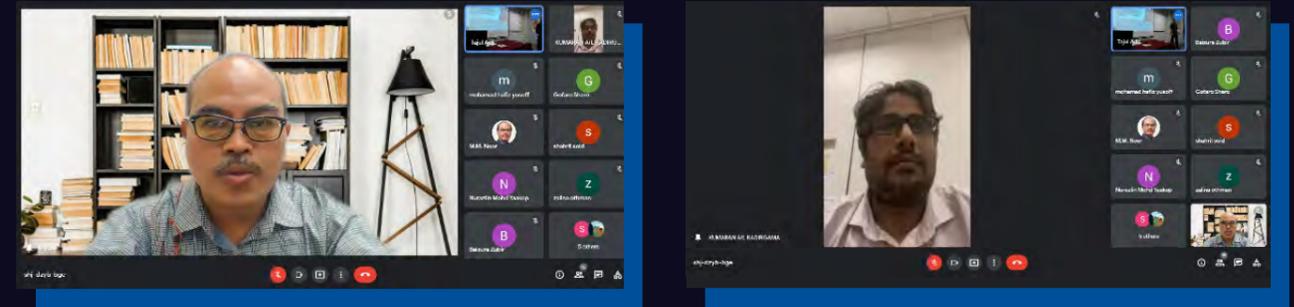
- Vehicle Fault and Diagnosis (8-11 November 2021)
- Gearbox and Air Conditioning Training (15-17 November 2021)
- ECU Tuning and Remapping (18-19 November 2021)
- Engine Overhaul (23-24 November 2021)
- Crash Testing Workshop with Malaysian Institute of Road Safety Research (MIROS) (16-18 December 2021)
- Hybrid and EV Servicing by Institute of The Motor Industry (IMI) (6-12 December 2021)

As for contribution to the industry committee, AERG member Dr. Muhamad Mat Noor, has conducted Six Sigma and Failure Mode & Effect Analysis (FMEA) training for a group of engineers from Malaysia Automotive Robotics and IoT Institute (MARII), Malaysia. Dr. Mohd Heerwan Peeie has contributed to the Vehicle Dynamics and Control training for staff member from the Centre for Instructor and Advanced Skills Training (CIAST).



The Conference of Frontier Automotive System & Technology University (FASTER) 2022

On 12 January, five researchers from Automotive Engineering Research Group (AERG) of FTKMA participated in the annual event of Frontier Automotive System and Technology University Consortium (FASTER) 2022 by presenting significant findings from their research work. FASTER is a joint consortium comprises three universities, Universiti Malaysia Pahang (UMP), Universiti Malaysia Perlis (UniMAP) & Universiti Kuala Lumpur (UniKL). The consortium aims to further expand the sphere of automotive research expertise from the accumulated work of each of its members. Such endeavour emphasises the strategic research collaboration encompassing the broad technical capabilities which serves to reinforce a symbiotic work between academia and industry in preparation for the national target on Industrial Revolution 4.0 (IR 4.0).



Automotive Engineering Research Group (AERG) Research News and Updates

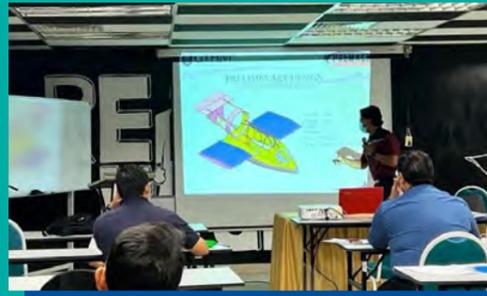
Current worldwide pandemic doesn't hinder the progress of AERG's research and development task. A total of 28 Web of Science (WoS) and Scopus journals are published throughout the 2021. A cumulative of 1459 Scopus citations have been recorded for the same period of time. 2021 also sees the group members publish two books as well as two chapters in books. There are 15 active postgraduate students currently active under the AERG. Four students are at the final stage of the study after passing the viva-voce and now submitting the final thesis. Associate Professor Ts. Ir. Dr. Kumaran Kadirgama and Dr. Muhamad Mat Noor are awarded with 2 gold medals during the International Invention, Innovation & Technology Exhibition (ITEX) 2021 in Kuala Lumpur.





Advanced Fluid Focus Group (AFFG): Workshop for National Coastal Defense

In Malaysia's first Defence White Paper (DWP) published in 2020, a few key policy initiatives are laid out aimed for complete accomplishment over the next 10-year period (2020-2030). One of the initiatives is to support the development of amphibious capabilities and the utilisation of artificial intelligence derived from latest technology for Malaysia's defence strategy particularly for the nation's coastal defence. Associate Professor Dr. Saiful Anwar Che Ghani together with several other researchers from Universiti Pertahanan Nasional Malaysia (UPNM), Universiti Tun Hussein Onn Malaysia (UTHM) and Science & Technology Research Institute for Defence (STRIDE) in a collaboration effort, organises a workshop at Institut Kemahiran Tinggi Belia Negara (IKTBN) Dusun Tua to develop a prototype of the Hover Wing-in-Ground-effect (HWIG) vehicle which is to be designed with mission profile of a mobility warfare platform capable of sustaining flight over a level surface by making use of the ground effect technology with intelligent control specialising for operation around the vicinity of coastal area.



A Technical Visit to Turbines Power Plant in Pasir Gudang

A visit by Dr. Muhamad Zuhairi Sulaiman and two postgraduate students to Southern Power Generation (SPG) to evaluate the technical and operation of a newly installed 1440 MW General Electric combined cycle gas turbine (CCGT) power plant in Pasir Gudang, Johor which takes place on 11 April 2021. The plant is just approximately a year into its commercial operation after being commissioned in 2020. During the visit, the delegation is briefed on several aspects concerning the plant operation protocols as well as technical challenges it's facing. The visit also aids the entourage to understand the role of SPG in producing and supplying the ever-increasing energy demand across the national power grids. SPG is represented by Ir. Amir Hasdi.



Fiber Bragg Grating Gap Sensor as An Innovative Idea for Critical Flange Monitoring

By Assoc. Prof. Ir. Dr. Mohd Hafizi Zohari

Bolted joint integrity is a critical parameter to preserve for safe and efficient operation of the pipeline system, mainly in the flange gap monitoring exercise. Failure to precisely monitor any early signs of components gapping may result in a sudden failure or even injuries to personnel (Figure 1). Conventional monitoring method is primarily attained by embedding an electrical strain gauge sensor into the body of the bolt, to make it a "smart bolt". The two major drawbacks of the sensor are the need for an extensive cabling network which in return, yields a significant signal power loss over the long-range data transmission. In addition, a strain gauge-based sensor can only perform a monitoring job for mere several metres before the transmitted electrical signal get attenuated severely, compromising the diagnostics accuracy and reliability.

On the other hand, the proposed method in utilising the fibre Bragg grating (FBG) sensor comes with an impressive capability to perform the long-range monitoring (e.g. 1000 m) without experiencing significant loss in signal transmission. Unlike conventional strain gauges, FBG will not cause electrical spark that may potentially lead to an explosion, making it a credible candidate for the application in harsh environments or underwater. In addition, FBG sensor features high data accuracy and resolution as well as being highly immune to disturbances from electrical spark and electromagnetic interference (EMI). Furthermore, FBG materials are also capable of withstanding temperatures of up to 600°C without having its reliability compromised or physically degraded.

The innovative gap sensor (Figure 2) is completely passive and offers inherently insensitivity to the effects from environmental induced drift. This detachable gap sensor renders the design to be commercially appealing for a non-destructive gapping evaluation. Equipped with a solid and metallic protective cover, it makes the FBG the ideal choice for installation in any harsh working environments. The FBG technique is now filed for product patent under a title "A Gap Monitoring Device for Two Connected Flanges" with application number PI2021007060. The invention is awarded with a Gold Medal award (Figure 2) in the 2021's International Invention, Innovation & Technology Exhibition (ITEX).



Figure 1. Effect of the gap in bolted flange failure



Figure 2. Product image & Gold Medal in ITEX2021

ASIVR: The Leak Locator, Rig to Real (LLRR)

A group of researchers from Advanced Structural Integrity and Vibration Research Group (ASIVR) of FTKMA, carried out a Leak Locator, Rig to Real (LLRR) research to overcome the problem with underground pipe leaks. The project is led by Associate Professor Ir. Dr. Mohd Fairusham Ghazali stems from the need to populate available locations of water pipe leaks to reduce the rate of non-revenue water (NRW). The Leak Locator, Rig to Real (LLRR) is a mobile system developed to analyse the areas where pipe leaks may present without having to get to the laboratory to verify the leakage. It is easy to use which also makes it attractive for general use compared to existing detection techniques where a skill operator is needed. The system can be kept to be improved further incorporating the 4.0 industry revolution, wireless technology and the Internet of Things (IoT). The team organise the site meeting on 8-9 December 2021, this team had a site meeting with MOZ Sdn Bhd which is one of the contractors for Syarikat Bekalan Air Selangor (SYABAS).



ASIVR Benchmarking Visit from UniKL Researchers

On 17 December 2021, the Advanced Structural Integrity and Vibration Research Group (ASIVR) laboratory hosts a benchmarking visit from the Malaysian Institute of Marine Engineering Technology UniKL (UniKL MIMET) as its research partner. The party from UniKL MIMET is led by Dr. Zulzamri Salleh. The main purpose of the visit is to explore into the developmental work around the application of the optical fiber technology in structural integrity monitoring and the potential to expand the application to fit a continuous monitoring requirement of marine structures.



HUMEN: WREHAB - Advancement of Rehabilitation Device to Help Disable Patients

Rapid advancement in technology is expected to exponentially boost the rehabilitation treatment programmes in managing patients with various chronic conditions related to neurological and orthopedics maladies. Rehabilitation is a process, post-traumatic event, to restore the body function and allow the patient to regain their life independence in the safest and most effective way. According to Global Market Insights, Inc., the rehabilitation equipment market size is projected to surpass USD 31.2 billion by 2026. The Human Engineering Group (HUMEN) has been joining the race of producing advanced rehabilitation products involving different segments of physical injuries. One of the products already developed is the automatic control of wrist rehabilitation therapy (WREHAB). WREHAB is a device that helps patients with wrist stiffness due to any traumatic brain injury, such as stroke. The device is also very useful to assist physiotherapists in conducting the physiotherapy sessions for the patients. WREHAB project is led by Idris Mat Sahat who is awarded a research fund by the Malaysian Technology Development Corporation (MTDC).



HUMEN: Phymill The Rehabilitation Product for Paediatric Patients

Physio-Treadmill (PhyMill) is a dedicated rehabilitation product to train walking movements for paediatric patients struggling with a disability to control their position and activation, owing to the compromised intellectual development of the brain, commonly known as cerebral palsy. The automatic exercise product can assist therapists during physiotherapy sessions especially involving the movement in the lower extremities or the lower body limbs. The product is equipped with several function modes to cater different patient needs and physiotherapy requirements and has been tested in local physiotherapy centres. PhyMill is developed with the help of several government fundings and is expected to be in the market in near future. In terms of achievement, PhyMill project which is led by Ts. Mohd Azrul Hisham Mohd Adib has been awarded with the Outstanding Research Award and Gold Medal at MTE2021.



Phywalk As an Appliance for Human Rehabilitation Technology

Physio-Walker (PhyWalk) is another development of rehabilitation technology that aids therapists to help the patient rehabilitation during physiotherapy sessions particularly for lower limb movement or lower body components. The function of this product is to control the patient movements during walking with pace adjustment control. A display screen to keep the kid entertained while undergoing rehabilitation sessions is also available. PhyWalk can be utilized by Cerebral Palsy (CP) patients with spastic diplegia and suitable for GMFCS II to III patients aged as early as 4–7 years old. PhyWalk is the first walker equipment specialised for paediatrics CP patients in Malaysia. Caregivers will find it useful in their work and so does physiotherapists during a treatment. The patient is able to practice walking at their own pace to maximise motor control and to reduce spasticity. In terms of achievement, the PhyWalk project which is led by Ts. Mohd Azrul Hisham Mohd Adib and is awarded with a gold medal award in ITEX2021.



UMP Seals Memorandum of Understanding (MoU) With Institut Sukan Negara (ISN) On Sports Technology

UMP embraces the race for innovations in sports. Research and development on sports technology have been actively carried out since 2013 through the Human Engineering Group (HUMEN) of FTKMA and Innovative Manufacturing, Mechatronics & Sports Laboratory (IMAMs) of FTKPM. Very recently, UMP has commemorated a strategic collaboration and partnership with Institut Sukan Negara (ISN) for innovations in sports technology. Present in the MoU signing ceremony event are Assoc. Prof. Dr. Abdul Adam Abdullah, the Dean of Industry Innovation (UMP) and Mr. Ahmad Faedzal Md Ramli, the Chief Executive Officer (CEO) of ISN. The event is witnessed by the Minister of Youth and Sports Datuk Seri Ahmad Faizal Azumu. The close collaboration of the two agencies will positively benefit both parties encompassing a broad reach of staff and students in research, consultation, industrial training and sponsorship.



HUMEN: Professional Certificate for Entrepreneurship Educators (ProCEEEd) 2021

Ts. Dr. Ummu Kulthum Jamaludin participates in a 5-day programme of ProCEEEd via an online platform under the Ministry of Higher Education. This programme is dedicated to train educators in higher learning institutions for one of the Twelve Malaysia Plan (RMK12) agenda in producing young entrepreneurs among the students. The programme consists of three main series modules namely Start – Up Equation, Education Hackathon and Demo-Day. At the end of this programme, participants are certified by the Ministry of Higher Education as professional educators who could teach, coach and mentor students in any entrepreneurship courses, programmes and trainings.



HUMEN & HUSM research collaboration

A short collaborative for research discussion with Hospital Universiti Sains Malaysia (HUSM) Kubang Kerian, Kelantan takes place on 21 November 2021. This visit is led by Dr. Nasrul Hadi Johari and other HUMEN team members as well as the group's postgraduate students. Discussion between both organisations reinforces the joint collaboration between UMP via FTKMA specifically and USM Medical Sciences in the research of biomedical engineering discipline. The delegation are taken on a tour of to visit several laboratories amassed with advanced medical equipment.

MyPace's Series of Entrepreneurship Webinar

FTKMA via a joint-force of its SUPREME and MFG research group members organises a global seminar on 4 May 2021 under the MyPace's Series of Entrepreneurship Webinar coordinated by MOHE's Industry and Community Collaboration Division (BKIM). The seminar is aimed for UMP senior engineering students, especially for those who undertakes Mechanical Design course with an objective to expose future engineers on the interdependency between industrial standard stipulations and its calculation protocols. The talk on design considerations of bolted joint performance across the range of mechanical process systems under elevated pressure-temperature operating conditions. A practical session at the end of the seminar is carried out on how the torque load applied to the bolted assembly would be affecting the joint performance as well as integrity of both fastener and the members it clamps.



fatigue design2021

9th edition
of the International conference on fatigue design
PARTNER COUNTRY: GERMANY

17 & 18
November 2021
Senlis - France

fatiguedesign.org

9th Fatigue Design Conference

The 9th Fatigue Design Conference takes place on 17-18 November 2021 at Senlis, France and participated virtually by the members of SUPREME Focus Group. The conference aims to present the most innovative approaches and scientific progress in the design methodologies, and strategies for tools and equipment with a longer life span, focusing on industrial applications. The topics that SUPREME members are keenly following encompass work related to experimental and numerical design and validation methods, damage tolerance and fatigue life. These disciplines are further extended to include the reliability-based approaches and probabilistic methods, fatigue under severe service conditions, non-linear behaviours and cumulative damage.

6th Symposium of Damage Mechanism in Materials and Structures

SDMMS 2022
The 6th Symposium on Damage Mechanisms in Materials and Structures (SDMMS 2022)

UNIVERSITI MALAYSIA PAHANG

16th - 17th August 2022
Swiss-Garden Beach Resort Kuantan, Malaysia

This symposium covers in the field of research and industrial applications, i.e. **MECHANICAL & CIVIL ENGINEERING**. Topics of interest for submission include, but are not limited to:

- Fatigue Damage
- Fatigue Crack Initiation & Propagation
- Life Prediction Techniques
- Failure Mechanisms & Assessment
- Non-Destructive Test (NDT)
- Failure Assessment
- Failure on soil structures
- Structural Durability & Reliability
- Structural Health Monitoring
- Construction Damage Recovery
- Other Relevant Topics Related to Failure Analysis

SUPREME Focus Group (UMP) and Universiti Kebangsaan Malaysia (UKM) jointly organise the 6th Symposium of Damage Mechanism in Materials and Structures (SDMMS) 2022. This symposium covers the work in the field of Mechanical and Civil Engineering. The 6th edition takes place in Kuantan, Pahang from 16-17 August 2022. This symposium offers a conducive platform for research networking, learning, discussions, as well as publication opportunities. Historically, the symposium is recognised to always successfully attract researchers and industry players alike to bring to the event some new insights towards perfecting the mechanics of damage mechanism.

CPD points from: MBOT

All authors are invited to submit their **TWO PAGES EXTENDED** abstracts through Easy Chair by downloading the template from <https://sdmms2022.ump.edu.my>. All accepted extended abstracts will be included in the SDMMS2022 proceeding with an ISBN. High quality papers to be considered in respective indexed journals (ISI/ESCI) subjected to thorough reviewing and acceptance by the publisher.

IMPORTANT DATES

- Extended Abstract Deadline: 31 January 2022
- Notification of Acceptance : 31 March 2022
- Submission of Full Paper : 31 May 2022

FEES

	Local	International
Presenter & Publication*	RM650 + Publication Fees*	USD250 + Publication Fees*
Non Presenting Participant	RM450	USD120

Note:

- Invoice for presenter will be given upon the acceptance of extended abstract
- Invoice for presenter with publication will be given upon the acceptance from the publisher

KEYNOTE SPEAKERS
Will be announced later!

CONTACT US

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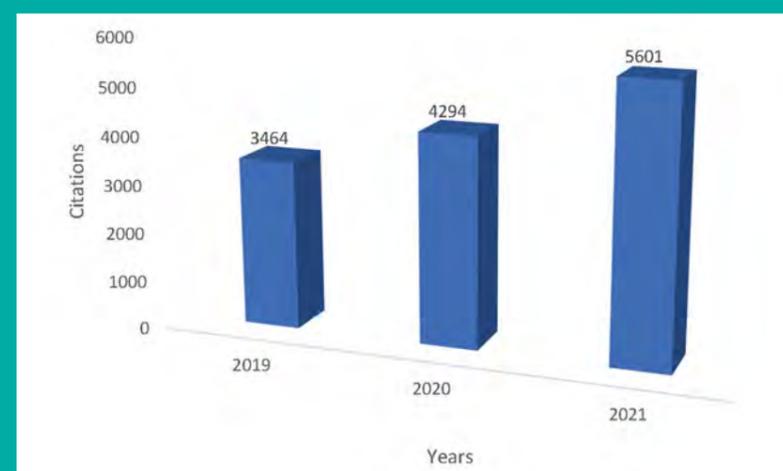
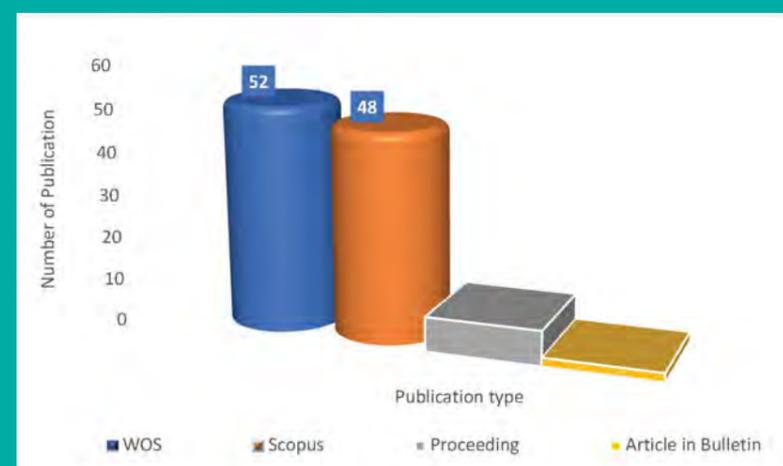
Organised by:

In collaboration with:

Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang

RESEARCH ACTIVITIES

In 2021, FTKMA researchers have been collectively awarded by a myriad of agencies with research funding totalling to RM 6.15 million. In terms of individual research group, Advanced Fluids Focus Group (AFFG) gets the biggest fraction of the grant money worth RM1.64 million. This is followed by Manufacturing Technology Group (MTG) with RM1.22 Million. The fund awarding bodies and schemes include those from Fundamental Research Grant Scheme (FRGS), Lab 2 Market, UMP internal grant, international grant, and prototype research grant scheme (PRGS).



Publishing journals and proceeding articles is the bread and butter of FTKMA ecosystem. A total of 52 journals as cited in Web of Science (WOS) are published, and 48 are published in Scopus indexed journals in 2021, respectively. The citation trend for FTKMA is steadily on the rising trajectory in the span between 2019 to 2021 and for 2021 alone, the increment percentage is as high as 1.3 times the year prior. These data reflects the significance of work by FTKMA members and further imposes these impacts have for the benefit of the entire world.

Patent Information

A Joint Patent has been granted to researchers from UMP-Malaysia and India.

Patent title:

A Solar biomass-based hybrid dryer for agro-products",

Inventors:

S., Dhanushkodi; Wilson, Vincent Herald; **Sudhakar, K.**; Khan, M. Abdul Ghani and V., Jayaseelan, Australian Patent No.: 2021105456 (Australia Patent, 2021)

Abstract of the invention:

A hybrid solar biomass dryer uses two energy sources to produce hot air for drying agricultural products: sunlight as a primary energy source and biomass as a secondary energy source. The dryer system is ideal for continuously drying fruits, spices, herbs, and vegetables. An indirect solar air heater, a biomass heating unit, a drying unit with trays, a blower to circulate air, and a chimney are used in the hybrid solar dryer setup. In the absence of solar radiation, a biomass burner provides hot air for drying by burning dried biomass such as pellets, wood chips, charcoal, etc. In cloudy conditions, hot air from the combined solar and biomass unit is drying. Through an air diffuser, hot air from both the solar and biomass units enters the drying chamber. A baffle plate is incorporated into the design of the drying chamber to achieve precise air distribution. A chimney structure is located at the top of the drying compartment to remove moist air. The developed dryer is capable of drying at temperatures ranging from 50oC to 90oC.



Two FTKMA Lecturers Listed as 2% World's Best Scientists

Two FTKMA lecturers are listed among the world's best two percent scientists in their research disciplines. They are Dr. Sudhakar Kumarasamy and Associate Professor Ir. Ts. Dr. Kumaran Kadirgama. The accomplishment is in line with UMP's Strategic Plan 2016-2020 to achieve research excellence at both national and global levels. Such a 2% Scientists database for 2021 is published on 19 October 2021 and pioneered by experts from Stanford University. The study considers scientists from among the top 190,063 across all fields comprising 149 countries worldwide.



Dr. Sudhakar Kumarasamy



Associate Professor Ir. Ts. Dr. Kumaran Kadirgama



Two FTKMA researchers win the gold medal in the 33rd International Invention, Innovation & Technology Exhibition, Malaysia 2021 (ITEX 2021). Associate Professor Ir. Dr. Mohd Hafizi Zohari wins the medal for a pipe flange gap critical monitoring technique using the Fiber Bragg Grating Gap Sensor for Critical Flange Monitoring while Assoc. Prof. Ir. Dr. Kumaran Kadirgama's award is based from the work Superpower Coolant for Energy Storage System.

The 6th ICMER2021 is the continuity of the NCMER2010. The year of 2010 represented a significant milestone in the history of the Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang (UMP), Malaysia, with the organization of the first and second national level conferences (1st and 2nd NCMER) at UMP on May 26-27 and Dec 3-4 2010. Since then the Faculty has changed the name from National Conference on Mechanical Engineering Research (NCMER) to International Conference on Mechanical Engineering Research (ICMER). The year 2021 is our 6th ICMER. The conference theme is "Technological Advancement in Embracing The New Norm." It is co-organized by Ningxia University, Malaysia-Japan International Institute of Technology (MJIT), UCSI University and University of Mindanao. There are 137 papers presented at the conference, and all papers are accepted in various scopus indexed journals. Participants come from various countries such as China, India, the Philippines, Indonesia and Germany. Four distinguished speakers are invited as keynote speakers, Prof. Datuk Ir. Ts. Dr. Siti Hamisah Tapsir, Chairman of MBOT Malaysia, Dr.-Ing. Olaf Weckner, Senior Lead Engineer of Structural Analysis Engineering, Boeing Company, Dr. Rezal Khairi Ahmad, Chief Executive Officer of NanoMalaysia and Associate Professor Dr. Antonio Garcia Martinez, Universitat Politècnica de Valencia, Spain. The conference receive an overwhelming response worldwide with 137 participants presenting their papers online. The conference has successfully connected FTKMA with international researchers in the field of engineering technology.



CREATIVE CORNERS

Hybrid Solar-Heat Pump Dryer for Marine Products

By: Ts Dr. Amir Abdul Razak
Senior Lecturer, FTKMA

The primary economic activity around Kuala Pahang in Pekan focuses on fisheries and processed marine-based products, mainly the dried salted fish and seafood. As such, the region hub can potentially become a processed marine product in Pahang due to its strategic location and continuous supply of fresh raw seafood materials. A market study conducted by Research and Markets for the Asia-Pacific shows the industry has vast potential to expand. The region's dried fish and seafood market registered a positive annual growth with the sales value amounting to USD 8,604.39 million in 2017 alone. Thus far, the dried marine products have been mainly produced using the conventional open drying method. The disadvantages of such a method are that of unhygienic conditions (exposure to dust, animals, and foreign objects) as well the excessive, unregulated solar radiation exposure (ultraviolet and longwave infrared), which leads to the destruction of almost the entire products' nutrients. As such, the technique significantly reduces the market value of the products.

To counter these drawbacks, especially for Kuala Pahang dried-product industry, a hybrid solar-heat pump dryer for marine produces is developed by Ts Dr. Amir Abdul Razak from the Energy Sustainability Focus Group (ESFG), of FTKMA for industries around Kuala Pahang. The specialised air-based thermal dryer can be utilized

to dry marine products. It can be operated under two working modes: solar mode and heat pump mode. The dryer system uses an indirect solar drying principle in an enclosed space, capable of drying products in a more hygienic environment, while retaining maximum nutrient contents, its natural colour; and higher product yield value as it can operate during any solar irradiance level including at night time. The dryer employs a cross-matrix absorber solar air collector for the solar mode and a 1 kW integrated heat pump for heat pump mode when operating under low solar irradiance conditions. It has a fully enclosed food-grade stainless steel drying chamber with a drying capacity of up to 50 kg of marine produce at one time. The drying of preprocessed dried fish using the system can achieve up to 20 % of total moisture in 2 days, under fully solar mode drying during intermittent weather conditions, while working in the heat pump mode, in nearly 15 to 20 hours to achieve a similar moisture level. With this hybrid solar-heat pump dryer system, the community around could potentially increase the quality and yield of their dried marine products which translates into the betterment of their bioeconomic status.

Acknowledgement: The project is supported by the Malaysia Research University Network (MRUN), Universiti Kebangsaan Malaysia under a project grant number MRUN-RAKAN RU-2019-001/3.



Figure 3. Hybrid solar-heat pump dryer developed at UMP

Roofed-Motorcycle: How Relevant is the Concept for Malaysia's Climate?

Prepared By: Hoh Rui Bin and Dr. Nasrul Azuan Alang
SUPREME Focus Group, FTKMA, UMP.

By the end of the first quarter of 2020, almost every nation across the globe is shocked by the transmission of COVID 19 virus. The uncertainty around the mutation of new variants in the ensuing months has affected both the economy and general health of the public. Despite the scare and negative economic effects, demand for food delivery has emerged to be a preferred method for the people to continue with "eating out experience" whilst minimising human interaction. In Malaysia, the most common mode of food transportation is by using motorcycles, as it's the most economical and efficient means. However, as the number of motorists increases it is reported that more than half of the total number of road accidents are associated with motoriders. Both riding attitudes and uncertain weather conditions contribute to the factors attributing the statistics. Nevertheless, to fulfil customer satisfaction and maintain the hygiene of the ordered food, the riders usually continue delivering regardless of the weather.

Nowadays, some automotive industries are attempting to challenge the issue by creating a motorcycle with a roof. However, in Malaysia, the use of roofs is unacceptable, possibly due to a lack of attractiveness, instability, unavailability in the market, and unaffordable cost, although it could benefit both the customer and riders by reducing the time taken to deliver food during bad weather. As a result, an effort has been initiated by the SUPREME research group of FTKMA to explore the possibility of developing roofed motorcycles.

A feasibility survey is conducted around Pekan and

Kuantan districts encompassing a total of 98 respondents, including riders and customers. Based on the study, 52% of the total riders stated that bad weather, such as hot and rain conditions affect the food delivery effectiveness. About 59.6% of riders get summoned during bad weather. At the same time, approximately 53.8% of riders were looking for shelter while raining. Thus, installing a roof shelter on a motorcycle could resolve the issue. According to the survey's findings, 78.6 % of riders lack confidence in the available commercial roof products. They claimed that there are many disadvantages, including less stability, minor convertible, and the potential of consuming more fuel. To regain confidence among riders, the roof design must be rigid, stable, and user-friendly. The other important factor is that the plan has no significant effect on overall fuel consumption. In that case, Computational Fluid Dynamics (CFD) which is a typical technique for investigating aerodynamics performances has been performed by the SUPREME focus group to investigate the aerodynamics performance of motorcycles with a roof that could be explicitly related to the fuel consumption. Three cases, motorcycle, motorcycle with a rider, and motorcycle with a roof (see Figure 1), have been modelled and analysed. It is discovered that with proper roof design, better aerodynamics performance can be achieved compared to the original motorcycle with the rider. In conclusion, a bike equipped with a roof can facilitate the food delivery process during hot and rainy weather, particularly in countries like Malaysia.

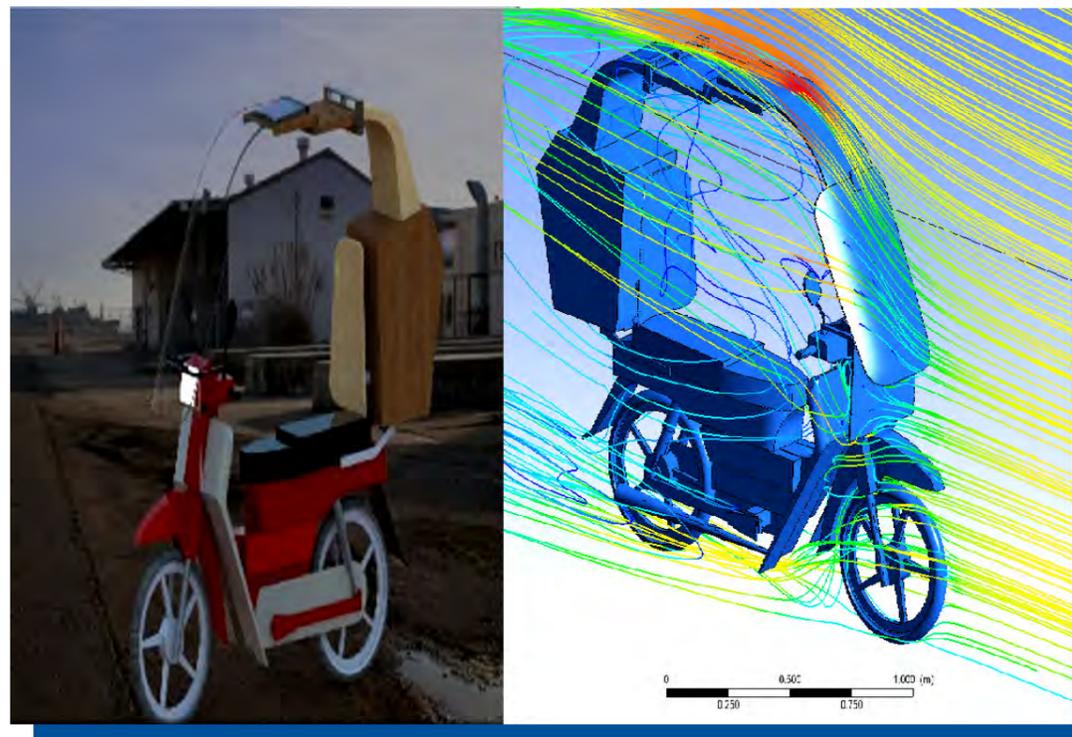


Figure 4. Air-flow pattern on motorcycle with roof

UMP Excels in The Research Area of "PV Module Cooling"

By: Dr. Sudhakar Kumarasamy
Senior Lecturer, FTKMA, UMP.

A UMP research team led by Dr. Sudhakar Kumarasamy in collaboration with Russian and Indian researchers have been working on cooling solutions for photovoltaic modules over the past few years.

In one of their recent research projects, a holographic film is used to prevent PV modules from overheating. Holographic films are extremely thin, flexible plastic films that can be laminated to various surfaces. They can direct the generated energy toward the solar cells by diffracting usable frequencies from the sunlight. They function correctly with prismatic concentrators known as "prismacons," which are made of a transparent material with very small holographic lenses. The holographic film, by simply being laminated onto the panel surface, prevents the module from overheating by reflecting infrared rays from its metallised top layer. The researchers also created a thermal model to evaluate the novel heat-protective film's performance. Its core is made up of a layer consisting of tiny beads.

Natural plants and coir pitch are proposed for cooling the PV modules in a previous study conducted by the team. When compared to an uncooled PV module, the placement of plants around the modules or coir pith underneath provide improved performance in terms of temperature reduction and power yield. Coir cooling produces the most significant increase in module power yield of 11.34 %, while plant cooling produces the second-best result with a 7.34 % increase in output power. The team further reviews the various PV cooling strategies including those of fluid-based natural cooling, forced convection air/ water cooling, liquid immersion cooling, nano-fluid based cooling, phase change materials-based cooling, heat pipes, heat sink or fins, micro-, microchannel heat exchangers, radiative sky cooling, thermoelectric cooling, evaporative cooling, and spectrum filter cooling. Findings from the research work is now published as a case study article in the reputed Elsevier's Journal, Case studies in Thermal Engineering (IF 4.724).

The work contributes critical insights and knowledge to the solar PV cooling research. PV Magazine, a well-known publication among the international photovoltaics (PV) community, is fully aware of the ongoing research efforts and development concerning the study of Solar PV cooling.

Commercial Diving: A Career Path Worths a Consideration

By: Ts. Dr. Siti Rabiattul Aisha Idris
Senior Lecturer, FTKMA, UMP.

Commercial diving is categorised under a professional diving practice where it enables divers who are involved with any underwater jobs such as construction, engineering, industrial, repair, and maintenance, being carried out offshore and on land. It's common for most of us to think that this type of career is only relevant to work offshore whereas the reality is that commercial diving may also be found to be carried out on shore. As commonly encountered during the bridge inspection, wastewater treatment repair, building repair. Regardless of the nature of the various types of commercial diving to be specialised in, one who wants to pursue their career in association with commercial diving should first consider and understand a variety of trades and skills needed to master posed by the hostile environments they are going to be working in. Commercial divers must be able to undertake a broad range of duties and in far more demanding circumstances than other tradesmen. Where a division between life and death is after-. If we think that welding is difficult to be performed on shore, then the underwater welding would be several folds more arduous and challenging, especially when it involves the cold and dark working condition, 400 feet underneath the surface.

Nonetheless, before jumping into such an industry, we might first wish to experience a little deeper on what constitutes commercial diving, how it works as well as what are the essential and desirable skills expected. For such initial exposure, FTKMA in collaboration with Akademi Adab hopes to open up avenues for students to delve deeper into the world of commercial diving by promoting its potential at the university's level.



Figure 5. : Onland construction site

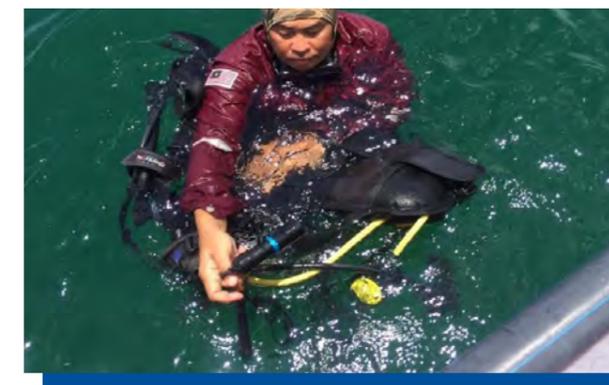


Figure 6. : Offshore construction site

Processing of Customized Automotive and Oil and Gas Components – Nickel Aluminium Bronze and Aluminium Silicon Material by Using Metal Casting Techniques

By: Ir. Dr. Mohd Rashidi bin Maarof
Senior Lecturer, FTKMA

The academic year of 2011/2022 which begins in October 2021 where students continue to undertake their face-to-face lecture or laboratory sessions as restrictions imposed by the MCO are gradually being eased up. As such for Foundry Lab of FTKMA, several laboratories sessions are slotted to expose students to the manufacturing process by means of metal casting technique. For 20 BVA students enrolling into the BVA 1064 Automotive Component Fabrication course, they are exposed to the casting steps in manufacturing metallic-based automotive components. Several examples are used such as the rotor propeller and pipe fitting part as described by Figure 7 and Figure 8, respectively. Each part is unique as it's developed by its pattern, assembled in a moulding flask before finally being set to metal pouring session. The alloy used is an aluminium silicon alloy which is melted up to 660°C, tapped for pouring into the cavity, and allowed to solidify to room temperature.

For the seven students undertaking the final year project, they are tasked to fabricate two components, namely the archery holder component and pump casing connector for oil and gas component assembly. In a similar process with previous automotive components, both components are developed by its pattern, assembled in moulding flask, and set to metal pouring session. The alloy material used is aluminium silicon alloy (LM3) which is heated to its molten temperature of 680°C, tapped to pour into the cavity, and allowed to solidify at room temperature, as shown in Figure 9. The final components are shown in Figures 10 and 11 respectively.



Figure 7. Rotor propeller



Figure 8. Pipe fitting part



Figure 9. Molten metal pouring process

After each pouring is allowed to fully cured and solidified, all the components gating and risering system will be removed for physical inspection to the product. The part will then be sectioned, and the cross-section to be visually examined. Later it's the phase to extract a small piece from the finished component as specimen, ground, and polished to further observe its microstructural characteristics for process improvement and optimisation.

For another session involving postgraduate students, the alloy investigated is nickel aluminium bronze (NAB), which is intended for use under a corrosive environment. This time, the alloy can be produced by alloying the mixture up to 1100°C. However, upon sectioning and further inspection on the microstructure behaviours reveals commonly encountered issues in casting process - porosity, warranting that going forward, further work in the processing improvement for NAB material is deemed necessary.

References

- [1] Manufacturing Engineering & Technology, Serope Kalpajian, 7th Edition (2014) Pearson
- [2] ASM Handbook: Volume 15: Casting, D.M Stefanescu, 9th Edition, 2008 ASM International



Figure 10. Example of archery holder component



Figure 11. Example of pump casing connector

Renewable Energy, A Tube Solar Collector using Nanofluids

By: Ts Dr. M.M.Noor
Senior Lecturer, FTKMA

In both power generation and other energy sectors, renewable energy is gradually becoming an alternative to fossil fuels. From an economic sense, the cost of renewable energy is the least expensive for every unit of energy harvested. Solar energy is one of the best alternatives to fossil fuels, and research on solar collectors is gaining significant attention in energy producing where, by harnessing the power of the sun, we may minimise our heavy reliance on fossil fuels. The performance of parallel-type (PT) Evacuated Tube Solar Collectors (ETSC) using aluminium oxide (Al₂O₃) nanofluid is investigated experimentally. The solar collector is used during both peak and off-peak hours. As a result, the ETSC's efficiency is determined by incorporating various amounts of Al₂O₃ nanoparticles into the base fluid. The working fluid circulation is set to be at 0.035 kg/s and 0.065 kg/s. The solar collector's highest efficiency is 61.8%, 65.4%, and 69.5% at a flow rate of 0.035 kg/s with nanofluids concentrations of 0.15%, 0.2%, and 0.3 vol% of Al₂O₃ nanofluid, respectively. When compared to the flow rate of 0.065 kg/sec, efficiency improvement of 6.7%, 7%, and 7.7% are attained. When compared to different percentages of nanofluid and water, the most optimal concentration of 0.3 vol% Al₂O₃ nanofluid showed improvement in thermal efficiency. Introduction of Al₂O₃ nanoparticles into the base fluid improved the efficiency of the evacuated tube solar collector. The temperature of the entrance and exit fluids, solar radiation, ambient temperature, energy generation, and collector efficiency will also be investigated. The research also sought to determine the efficacy of PT-ETSC under various environmental conditions. Finally, based on the findings of the experiments, the current research might be useful for the application sector in agriculture, notably in the drying of vegetables.



Figure 12. Pure water and nanofluids (Sasikumar, M.M.Noor et. al, 2020)

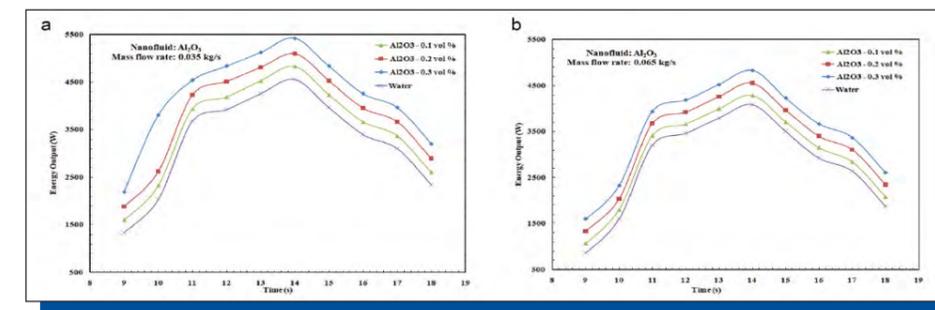


Figure 13. (a) Time vs energy output of PT-ETC at MFR of 0.035 kg/s. (b) Time vs energy output of PT-ETC at MFR of 0.065 kg/s (Sasikumar, M.M.Noor et. al, 2020).



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