RISALAH

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
الجامعة الإسلامية العالمية ماليزيا
يونيۏرسيتي إسلام انتارابڠسا مليسيا
Garden of Knowledge and Virtue

LEADING THE WAY
KHALĪFAH • AMĀNAH • IQRA' • RAHMATAN LIL-ĀLAMĪN

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RISALAH

LETTER FROM EDITOR

In This Issue

RISALAH ©
Mechatronics Engineering Dept., IIUM
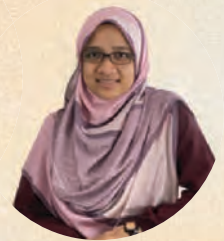**https://engine.iium.edu.my/mechatronics/**

EDITORIAL BOARD:

Dr. Azhar   Dr. Diyana   Dr. Azni

The Mechatronics Engineering (MCT) Department of International Islamic University Malaysia is proud to present our bi-yearly newsletter, and this is our first ever issue!

RISALAH in Arabic literally means 'information' or 'message', and that is what we are presenting to the readers. The newsletter will feature various events, announcement and information regarding the department including key events, research projects, student activities and success stories in Mechatronics Engineering Department, IIUM.

We hope to be able to reach out to the stakeholders; alumni, employers, students, future students, and the community as a whole, not only to tell our stories but to hear from you also! Feel free to contact us for any inquiry or suggestion: mct_info@iium.edu.my

FOREWORD FROM THE DEAN

Assalamu'alaikum wa rahmatullahi wa barakatuh,

I would like to take this opportunity to congratulate our colleagues in the Mechatronics Department for the great effort and initiative to produce their department newsletter. This would provide a great opportunity to share and showcase various research and student activities at the department and to create a bridge to connect to our alumni as well as industries. With this I hope, it will open up to various collaboration and cooperation in the future to benefit not only the department and industries, but to our students, the future engineers.

The programme has started since the inception of the Kulliyyah, more than 25 years ago. They produced thousands of graduates at various level as well as many relevant research findings and activities. Therefore, with this newsletter, our alumni can regularly be updated on various information including key events, research projects and student activities at the department to keep feeling connected with your alma mater.

Lastly, I wish continuous success to the team and looking forward for future editions. Thank you wassalam.

Assoc. Prof. Dr. Sany Izan Ihsan
Dean

MESSAGE FROM THE HEAD OF DEPARMENT

Assalamu'alaikum wa rahmatullahi wa barakatuh,

Dear students, staff members, alumni, the big family of the Mechatronics Department of IIUM,

In the midst of this very challenging pandemic, with the gratitude to Allah the Most Merciful, we would like to welcome and introduce the first edition of MCT newsletter. It is our hope that the department will continue to grow from strength to strength benefitting more and more all of its stakeholders, including the students, the alumni, the staff members – like you and me –, the nation and the ummah. And the birth of this newsletter is just a part of the journey. It should serve as an effective medium for sharing useful knowledge and constructive advice. Published 2 times a year, it will keep us and the public updated with the latest success stories, achievements and other happenings, both in our beloved department and the exciting world of mechatronics engineering.

You are all welcome to send your suggestions and also to send your news and updates to the editorial team so we can share them through this newsletter.

Last but not least, while the pandemic is at one of its peaks currently in Malaysia and some other parts of the world, let's pray to Allah SWT that He will keep protecting us and remove this pandemic soon. Let each and every one of us do our part responsibly to contribute to the speedy eradication of Covid-19 from our planet. In getting to that stage, unavoidably, we have to go through the remote teaching and learning (RTL) phase. It has been tough for everyone in the last one and a half years. But with perseverance, patience and strong determination from each of us, insha Allah we will go through this painful and challenging experience happening both inside and outside the classroom safely and successfully. With every hardship comes ease.

Happy reading and thank you!

Wassalaam,
Assoc. Prof. Dr Ali Sophian
Head, Mechatronics Engineering Department, IIUM

INTRODUCING MCT DEPARTMENT ACADEMIC ADMIN POST LINE-UP

https://engine.iium.edu.my/mechatronics/?p=356

MEDIBOT: ROBOT TO SUPPORT COVID-19 PATIENT CARE

BY DR. MUHAMMAD AFIF BIN HUSMAN
Centre for Unmanned Technologies (CUTe)

Medibot is a multi-purpose medical robot which inception was inspired by the ongoing COVID-19 Pandemic. As early as February 2020, a group of researchers from International Islamic University Malaysia comprising academic staff and students from Kulliyyah of Engineering, Kulliyyah of Information and Communication Technology working with the Centre for Unmanned Technologies (CUTe) came out with a vision of robot that can perform remote doctor-patient interaction. The functional robot aims to minimize the exposure of COVID-19 virus towards the frontliners in the hospital setting. The effort was also coordinated with the medical staff from the IIUM Health and Wellness Centre.

Medibot is teleoperated mobile robot which consist of a telepresence module, allowing doctors to interact with the patients from a distance. The screen onboard Medibot will project the doctor's visual and audio to the built-in audio input module allows two-way conversation with the patients. The robot can be navigated around the hospital settings from within the doctor's console which consist of a visual interface and a joystick. In addition, Medibot is envisioned to be equipped with multiple sensors to allow acquiring basic vital signs information, for example the temperature and patient's SpO2 (oxygen saturation). The effort to develop Medibot is also supported by an industrial partner, Prostrain Technologies Sdn. Bhd., which contributed to the mechanical, fabrication and electrical design of the newer version of the Medibot. As of now, Medibot has gone through a series of design iterations, with the current version of the robot is the fourth revision or known as Medibot V4. Two preliminary field tests were conducted to test the functionality of Medibot. The first one was carried out at the IIUM Health and Wellness Centre, Gombak on March 2020 (using Medibot V1) to evaluate the initial conceptual design.

'Medibot' invented to do rounds on Covid-19 wards

KUALA LUMPUR (AFP): Scientists here have created a barrel-shaped robot on wheels that they hope will make the rounds on hospital wards to check on Covid-19 patients, reducing health workers' risk of infection.

The Star / Apr 13, 2020

MEDIBOT featured in "The Star"

The second field test was carried out to evaluate the Medibot's telepresence, navigation and communication protocol (using Medibot V3) at the Sultan Ahmad Shah Medical Centre, Kuantan on September 2020. Feedback from both field tests were incorporated to produce Medibot V4. Medibot V4 is still currently in active development, with an important milestone of obtaining the IEC 60601-1-2:2014 certification by December this year.

It is envisioned that Medibot will become part of an important automation integration in the hospital settings, especially in quarantine environment such as posed by the COVID-19 pandemic.

MEDIBOT design evolution

Congratulations!

Mohd Rasfan / AFP

MEDIBOT

THE CENTRE OF UNMANNED TECHNOLOGIES (CUTE)

PROJECT LEADER:
ASSOC. PROF. DR. ZULKIFLI ZAINAL ABIDIN

SIGNIFICANT CONTRIBUTION AWARD
(IIUM TAKRIM DAY)

The department would like to congratulate those who are involved in this project.

We are incredibly proud by the achievement, accomplishment and commitment shown

by all team members.

SNAKE ROBOT: A MODULAR RECONFIGURABLE ROBOT FOR VERSATILE APPLICATIONS

BY PROF. DR. MD RAISUDDIN KHAN

Robots are mainly intended to handle dexterous tasks that are either difficult to handle by humans or by traditional automation systems. There are various types of robots that are undergoing research on how to mimic different animals like Cheetah by DARPA, ASIMO by Honda and so on. Biomimicking the spider, dragonfly, beetle, snake etc. is also under extensive research. The target of biomimicking robots is to imitate the capabilities of the respective animal counterpart.

Snakes have a wide range of capabilities both on the ground and underwater, only the basic versions of snake robots with maneuverability on the land and underwater has been successful so far. Before delving on snake robots, let us have a look on the capabilities of a natural snake. A snake can execute four types of motion namely serpentine, rectilinear, sidewinding and concertina. Snakes can maneuver over wide range of terrains by executing different motion gaits depending upon the nature of the terrain.

As the body of almost all snakes is very near to a long cylinder with flexibility along the length of the body, the centre of gravity of the snake remains very close to the ground unless the snake raises it head too much above the ground, thus overturning due to instability is very rare. Many snakes can climb trees and can even jump from one tree to another tree. A snake can wind up its tail end of the body around a support while it can extend its head like a cantilever beam to reach objects in 3D space.

The first snake robot ACM III was built in 1972 by Professor Shigeo Hirose of Japan. His investigation on natural snake gait discovered a curve known as serpenoid curve, a sine wave with variable amplitude along the length of the snake. The serpenoid curve was implemented in the ACM III for its motion.

A snake robot mainly consists of a number of links connected in series. Generally electrical motors are used as actuators at each joint. Then gait algorithms are programmed into the controller for driving the robot. If few of the links are made as modules using different sensors and actuators, a snake robot could become reconfigurable with extended capabilities over the natural snakes.

Snake robot research is still limited to few universities and has not been successfully commercialized yet. One landmark application of snake robot was the joint operation conducted by the search-and-rescue workers and two snake robots made by roboticist Howie Choset's research group at Carnegie Mellon University in Pittsburgh, Pennsylvania after the deadly 19 September, 2017 earthquake in Mexico.

There lies a great potential of collaborative snake robots. Being very flexible, it would be possible to develop collaborative snake robot systems for collaborative actuation and collaborative search and rescue mission, for example a concept of handling heavy load by a bunch of snake robots. Unlike the other robots, there lies many challenges in the case of snake robot. Snake robot dynamics and gaits are still under research.
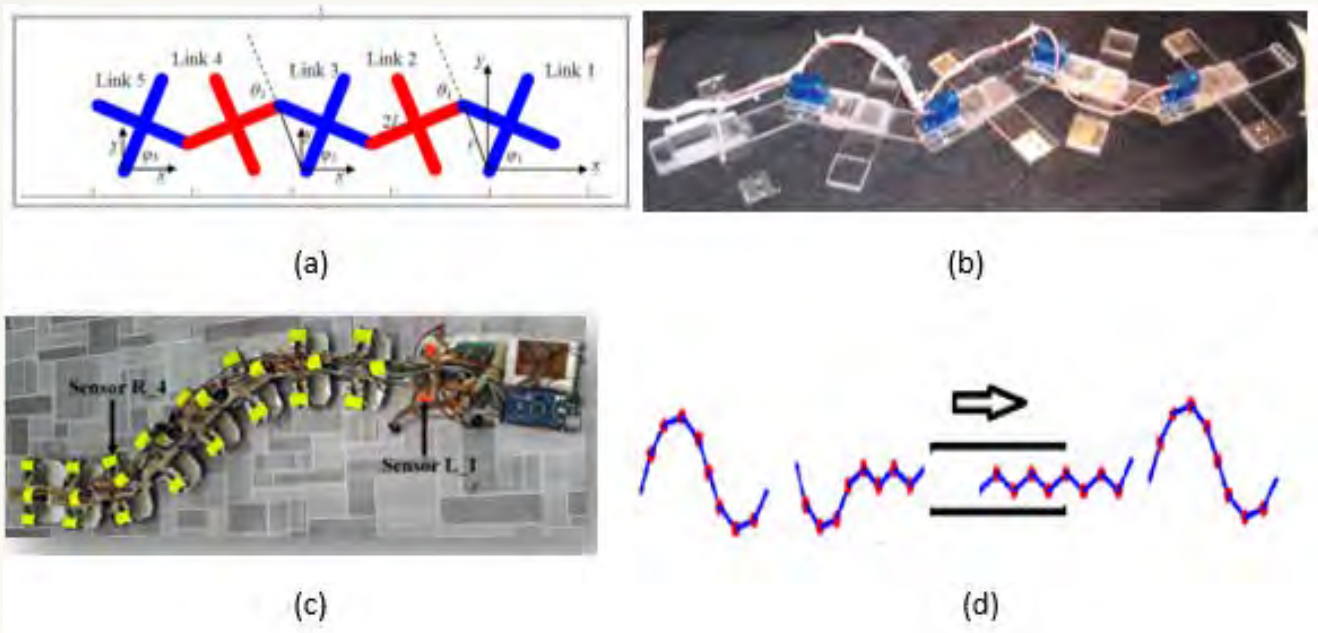
Prototypes of IIUM snake robot with wriggler gait

In the case of collaboration, collision detection between the snake robots as well as collision avoidance, not much studies have been conducted. For this, snake robots collaborative mapping avoiding collision among the robots requires intensive research. Shape of snake robots are variable, as such traditional collision avoidance of fixed shaped robots are not applicable.

A new kind of snake robot with a new gait called wriggler gait, which was first developed in IIUM in 2009, is shown in the figure (b) above. The skeleton diagram of the snake robot is shown in (a). This robot uses artificial snake-scale on the ventral side of each link. The wriggler gait helps the robot to move along a straight line with minimum lateral displacement. Thus, this gait is suitable for negotiating narrow passages.

After several modifications, the second prototype with larger number of links for executing serpenoid and wriggler gait was developed, as shown in figure (c). An example of application for serpenoid–wriggler gait in negotiating narrow passage is illustrated in (d).

Successful research and development on snake robot would be able to solve many problems faced by humans, specifically search and rescue operations in cluttered environment, inspection and maintenance of machine components located deep inside narrow passages or underwater structures.

"SNAKES HAVE A WIDE RANGE OF CAPABILITIES BOTH ON THE GROUND AND UNDERWATER, ONLY THE BASIC VERSIONS OF SNAKE ROBOTS WITH MANEUVERABILITY ON THE LAND AND UNDERWATER HAS BEEN SUCCESSFUL SO FAR."

WHEN DEEP LEARNING...

...MEETS OIL AND GAS

BY MOHAMMAD NAJIB ABDUL RAHIM AND DR. HASAN FIRDAUS MOHD ZAKI

Digital transformation in oil and gas industry is the new norm and no longer a future outlook. The previously slow-to-adapt industry is now at the forefront of many frontier technologies. The need had become more pressing than ever with year 2020 double jeopardy on another oil price plunge combined with the pandemic Covid-19. Deep Learning (DL), a subset of machine learning and artificial intelligence (AI), despite being in existence since 2006 after rebranded from neural network, has become an overnight sensation when in 2016, Google's AI program had defeated human grandmaster Lee Sedol in AlphaGo.

DL has aggressively penetrated various applications in oil and gas industry. Gartner, a market research firm had predicted that through 2022, more than 75% of organizations will use Deep Neural Network (DNN) which is one of Deep Learning (DL) technique. DL is intertwined with the growing interest in Internet-of-Things (IoT), Edge Computing, and Digital Twin. In oil and gas industry, DL is mainly used for equipment fault detection and diagnostic, leak detection, production optimization, environmental emission detection, structural and equipment inspection, and work optimization.

Equipment Fault Detection and Diagnostic

The most apparent application of DL in oil and gas is the equipment fault detection and diagnostic. This application is generally structured into two main components which are the DL algorithm to predict the equipment or system parameter or behaviour and fault diagnosis algorithm to detect and classify the deviation as fault condition. It is also known as anomaly detection and certain systems are integrated with Remaining Useful Life (RUL) prediction.

Equipment vibration are widely monitored under this application in which the DL algorithm performs prediction and fault diagnosis using vibration data in the form of time and frequency domain of displacement, velocity, or acceleration.

"IN OIL AND GAS INDUSTRY, DL IS MAINLY USED FOR EQUIPMENT FAULT DETECTION AND DIAGNOSTIC, LEAK DETECTION, PRODUCTION OPTIMIZATION, ENVIRONMENTAL EMISSION DETECTION, STRUCTURAL AND EQUIPMENT INSPECTION, AND WORK OPTIMIZATION."

Leak Detection

Implementation of DL in leak detection application is leading the automation of real-time leak identification using IoT cameras. Some of the specific applications are for pipeline leak detection and Optical Gas Imaging (OGI) for hazardous gases such as methane. Most commonly used leak detection techniques are based on optical and acoustic signals. This is where DL techniques give the 'brain' to the leak detection system to automatically identify the leak and trigger relevant notification for further action by plant operators. For this application, variations of Convolutional Neural Network (CNN) are widely used such as Single Shot Detection model and GasNet.

Production Optimization

In terms of production optimization, DL implementation mainly focuses on well, reservoir, and seismic data for oil and gas production prediction, well performance monitoring, and seismic diagnosis. DL mainly contributes to critical decision making during exploration and production stage of the oil and gas value chain. Significant expenditures on seismic survey, well test, shut-ins, and interventions can be reduced and optimized.

Environmental Emission Detection

Being a hydrocarbon-based industry, oil and gas has been facing great challenge in striking a balance between production output and environmental care. DL is applied to improve the environmental emission control and monitoring in oil and gas hydrocarbon processing plants offshore and onshore. Natural gas methane emissions detection using Convolutional Neural Network (CNN) technique enables real-time control and monitoring to oil and gas operators.

Structural and Equipment Inspection

DL implementation in structural and equipment inspection significantly simplifies procedures and minimizes costs of the traditional inspection strategy. As an example, to resolve a machine-to-structure vibration related issue traditionally requires Operating Deflection Shape (ODS) study and it requires high man-hours on site and engineering study.

By using DL approach combining Deep Convolutional Neural Network (DCNN) and temporal bandpass filter, the structural vibration mode shape can be obtained simply by pointing a Motion Amplification camera to the equipment or structure. This advancement had significantly simplified the procedures and reduces cost.

Conclusion

It is evident that DL applications in oil and gas industry has been positively improving at all areas in the business value chain. However, there are more areas of improvements than can be benefited by DL implementation. To significantly accelerate DL adoption, it is recommended for oil and gas players to emulate and innovate DL solutions from the early adopters such as software publishers, hardware manufacturing, computer systems design, finance, and insurance. However, oil and gas players need to be vigilant in striking a balance between technology adoption and business values. Theoretically all DL adoptions will improve efficiency of the associated systems. However, not all will bring real value to the business balance sheet. Proper and thorough assessment is required to consider the short, medium, and long terms potential value creation through DL adoption.

AUTISM SPECTRUM DISORDER:

What lies behind the skin and amygdala?

BY DR. SHAHRUL NA'IM SIDEK AND DR. AIMI SHAZWANI GHAZALI

The latest data from the Centers of Disease Control and Prevention (CDC) under the Autism and Developmental Disabilities Monitoring (ADDM) Network based in the United States has estimated that 1 in 59 children aged 8 years old to be identified with autism spectrum disorder (ASD). In Malaysia, it is estimated that a staggering 9,000 children will be born with ASD every year. A valid information on this issue is scarce and only a small-scale study has been done by the Malaysia Ministry of Health on children between the age of 18 to 26 months, which inscribed a ratio of 1.6 in 1000 children to be affected by the disorder. Many cases remain undetected, and practitioners both in medical and education fields reported an increase in the number of ASD cases which they have to address at the children's pediatric and training centers by years. It is likely that the true prevalence rate of autism in Malaysia is higher. Although ASD can be a lifelong disorder, treatments can improve the person's symptoms and ability to function. However, the availability of such support facilities to render the treatment is far-fetched especially in the areas distant from the city centers.

Emotional regulation refers to the range of cognitive, physiological, and behavioral abilities which allow children to monitor and modulate the occurrence, valence, intensity, and expression of their emotions and arousal. Based on the existing literature, a child is able to regulate his emotions successfully when he can recognize his own emotional states according to age-appropriate levels, possess strategies to self-soothe or relax when experiencing a negative emotion or strong levels of excitement or arousal, and maintain progress in current activities with the risk of potentially interfering emotions.

On the contrary, a child with high levels of emotion dysregulation may have difficulties in modulating their emotional intensity since their emotions frequently interfere with goal-directed and interpersonal activities. Children with ASD have poor emotion regulation, however, changes in emotional state can always be identified through behavioral reaction meanwhile facial expression and speech are the resulting therein.

However, recognition from reactions such as facial expression and speech are contended for children with ASD as they are claimed to have inappropriate social responses. In order to assess the emotional state, it is common for the practitioners to base the reading on the generated physiological signals, facial expressions, and speech and body gestures. It is however a challenge to assess ASD children using similar modalities due to the inherent characteristics.

There are two biological mechanisms that enable thermal observation of emotional nature and these mechanisms change the volume of blood within vessels under the skin, namely through vasodilation and vasoconstriction processes, thus enables the classification of the subdivisions for the Autonomous Nervous System (ANS) to identify the emotional states. As such, the ability to measure the activity in the vascular system noninvasively for instance by using a thermal camera would be exciting so as to investigate the correlation between the generated thermal images to the emotional states of the ASD children.

Another characteristic of ASD children is their abnormal sensory sensitivity towards human senses including sound, smell, taste touch, balance, and proprioception. This abnormal sensitivity leads to difficulties for this individual to do their daily routines, socialize and regulate their emotions. When ASD children are exposed to even mild sensory stimulation, their brain will overly react causing sensory overload, thus affecting their emotional state.

The hypersensitivity towards sound in particular and the relationship with emotion is substantiated by the evidence that the auditory system is linked to the limbic system at the amygdala. The connectivity of the auditory system with the limbic system indirectly indicates that sound and auditory system could influence individual emotional state, thus open up another window of investigation that could leverage on a different spectrum of sound sources as a therapeutic regimen in regulating the emotions among ASD children.

HEALTHCARE ENGINEERING & REHABILITATION RESEARCH GROUP

Healthcare Engineering & Rehabilitation Research Group (HERR) was founded in 2019. The research group is established with a mission to foster collaboration between researchers, industries, healthcare providers and communities towards enhancing the quality of life for the special needs group. Its vision is to propel towards an integrated multidisciplinary assistive technology research group for the special needs group.

Under HERR establishment, there are five research labs with specialized expertise namely Rehabilitation Lab, Ergonomic Lab, Mental-wellbeing Lab, Wearable and Assistive Device Lab and STEM Lab.

REHABILITATION LAB
The goal of this lab is to develop technological solutions and devices to assist individuals with disabilities in regaining their original limb functions that were lost due to disease or injury. Among their specializations are upper and lower limb rehabilitation systems (mechanism, control system, automatic detection).

ERGONOMIC LAB
The main target of this division is to develop smart ergonomics systems that are suitable for both normal and disabled people in various settings of activities. Their long-term goal is to develop smart ergonomics systems that are suitable for both normal and disabled people in various settings of activities such as dental treatment, driving posture etc.


Ergonomic analysis for wheelchair users

A subject undergoing long distance driving experiment

Automatic feeder for the disabled

Automatic finger extensor for hand rehabilitation

*Robotic exoskeleton with assist-as-needed control*

MENTAL WELLBEING LAB

Here, the researchers are passionate to create changes in people's lives, communities and workplaces through research and education. They focus on using biosensors to detect the presence of stress and mental illness
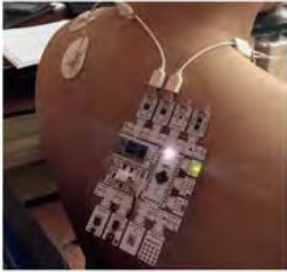
Stress detection based on human physiological signals

Speech-based and text-based automatic depression detection
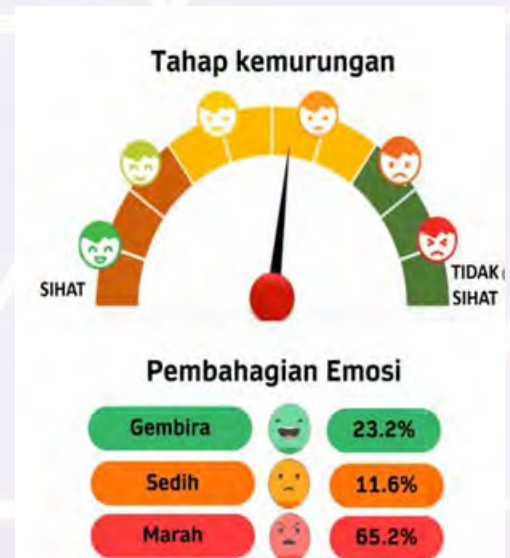
WEARABLE & ASSISTIVE DEVICES LAB

This research lab is currently looking into providing solutions for independent learning and living of visually impaired person. At the same time, they are also working on self-powered wearable devices based on energy harvesting technology by optimizing methods to harvest energy from low frequency vibration (such as human motion).
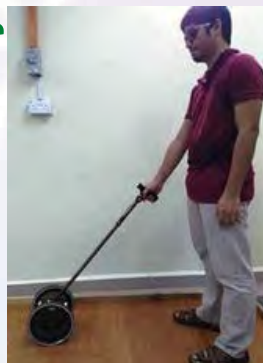
Assisitive device to help visually impaired people
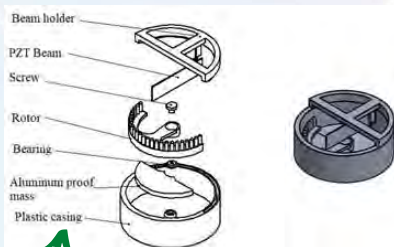
Wearable device powered by vibration energy harvesting

Various workshops participated by HERR STEM Lab members with primary and secondary school children

HERR STEM LAB

In this lab, it is believed that the most effective ways to promote and inspire careers related to science, engineering and mathematics among our future generations is through fun and hands-on activities and to start them young. In HERR-STEM lab, the aim is to increase STEM literacy among primary and secondary school students by initiating STEM programs, seeking grants related to STEM and taking part in STEM-related activities.

Who's in the team?

ADVISOR: Prof. Dr. Amir Akramin Shafie
CHAIRMAN: Assoc. Prof. Ir. Dr. Siti Fauziah Toha

MEMBERS:
Dr. Syamsul Bahrin Abdul Hamid
Dr. Muhammad Afif Husman
Dr. Nadzril Sulaiman
Prof. Dr. Teddy Surya Gunawan
Dr. Aimi Shazwani Ghazali
Dr. Hasmawati Antong
Dr. Norsinnira Zainul Azlan
Dr. Nor Hidayati Diyana Nordin
Dr. Nur Liyana Azmi

Dr. Nik Nur Wahidah Nik Hashim
Dr. Hazlina Md Yusof
Dr. Azni Nabela Wahid
Dr. Farahiyah Jasni
Dr. Noor Hazrin Hany Mohamad Hanif
Dr. Aliza Aini Md Ralib
Dr. Fatimah Dzaharudin

Tell us about yourself.

I was born on the 9th of January 1973 and I received my: First School Leaving Certificate from Local Government Primary School, Mushin Lagos, Nigeria; Secondary School Leaving Certificate from Euba Boys' Secondary School, Mushin, Lagos, Nigeria; National Diploma award from The Polytechnic, Ibadan, Nigeria; B.Sc. degree from Obafemi Awolowo University (OAU), Ile–Ife, Nigeria; M.Sc. degree from Blekinge Institute of Technology (BTH), Sweden and Doctoral degree from International Islamic University Malaysia, (IIUM), Malaysia. I was in IIUM from 2006 to 2012. First as a PhD candidate under the supervision of Prof. Dr. Momoh Jimoh Eyiomika Salami from 2006 to 2010 and as an Assistant Professor from 2010 to 2012 at Department of Mechatronics Engineering, IIUM.

I am a highly–motivated career driven achiever and Acadopreneur (Academic + Entrepreneurship) with over Eighteen (18) years working experience in the fields of: Mechatronics Engineering, Telecommunication Engineering, Spectrum Management, Industrial Automation, Teaching, Research and Project Management. I have been actively involved in teaching, supervision, mentoring and research activities at various universities in Nigeria and Malaysia. I joined the services of Federal University of Technology (FUT), Minna in 2012 and I am presently a Professor of Mechatronics Engineering at the Department of Mechatronics Engineering, FUT, Minna, Nigeria.

I have participated and won several academics and research awards at various international and national exhibitions. I was among the recipients of the following awards: Deans Honors Award, Faculty of Technology, Obafemi Awolowo University Ile–Ife, Osun State, Nigeria in 1997; Lagos State Honors Award for deserving National Youth Service Corps (NYSC) in 2003; Best Graduating PhD Student (Engineering) Award, 26th Convocation, International Islamic University Malaysia in 2010; 53rd Anniversary, Nigerian Air Force Research and Development Award in 2017. Let me also add that, I was also nominated for 2012 promising researcher award and best teacher award at IIUM, Malaysia. I am presently, the Head of Department, Mechatronics Engineering Department, FUT Minna, Nigeria; Director, Center for Open Distance and e–Learning (CODeL), FUT Minna, Nigeria; the pioneer and coordinator of Advanced Engineering Innovation Research Group, FUT Minna, Nigeria; and a senior consultant at Ph.D. Clinic, FUT Minna, Nigeria.

PROF. DR. ABIODUN MUSA AIBINU

IIUM PHD ALUMNI (2006–2010)

ASSISTANT PROF. IN IIUM (2010-2012)

"My principle in life is to be in love and peace with all, both living and non-living things. With love, you have it all. You conquer all hearts. You can open all doors. You can smile at others and open their hearts."

What was your most memorable experience at IIUM?
Everything about IIUM you can think about are memorable to me. Think about, the people, the culture, the food, the environment, just everything you can think are too memorable to forget.

How does MCT/KOE/IIUM have an impact on your career?
Learning a lot from MCT/KOE/IIUM has really laid the foundation for my career as an acadopreneur. I could remember my involvement in the Dinar and Dirham movement while in MCT/KOE/IIUM. That singular experience has been the turning point in my life couple with diverse nature of MCT/KOE/IIUM. That is meeting people from all over the world.

Would you recommend IIUM as a place to study, why/why not?
Capital YES. YES. YES. Very simple, the place is Garden of knowledge and virtues. You acquire knowledge and you are virtues.

You are very enthusiastic, what motivates you to keep moving forward?
Yes, I know people says this a lot about me. Moving forward has not been easy but I have continuously been drawing my strength from Quran, my love ones, my mentors and Muhammed Ali, the Greatest Boxer of All Time (GOAT). He is an inspiration to all, master of strategy, an audacious mentor.

IS MECHATRONICS ENGINEERING A GOOD CHOICE?

BY DR. AZHAR MOHD IBRAHIM AND INTIAZ MOHAMMAD ABIR

Mechatronics engineering integrates specific areas of mechanical, electrical, computer and software engineering. After doing Mechatronics Engineering courses, the graduates will be able to identify and solve problems along with installing, maintaining and servicing mechatronic systems. They will be knowledgeable enough to be able to assist in building a project or to rebuild a project. Among the vast learning objectives of Mechatronics Engineering courses; designing a mechatronic system, learning industrial automation, instrumentation, controlling, robotic system, artificial intelligence and machine vision are mentionable.
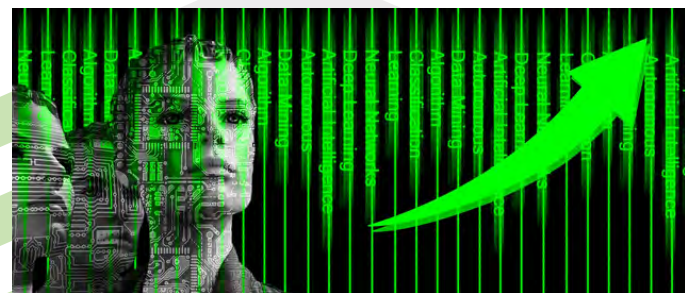
> **"MECHATRONICS IS THE BASIS FOR THE FOURTH INDUSTRIAL REVOLUTION (4IR / INDUSTRY 4.0) WHICH REFERS TO INTELLIGENT NETWORKING MACHINES AND PROCESS CONTROL WITH THE AID OF INFORMATION TECHNOLOGY AND ARTIFICIAL INTELLIGENCE."**
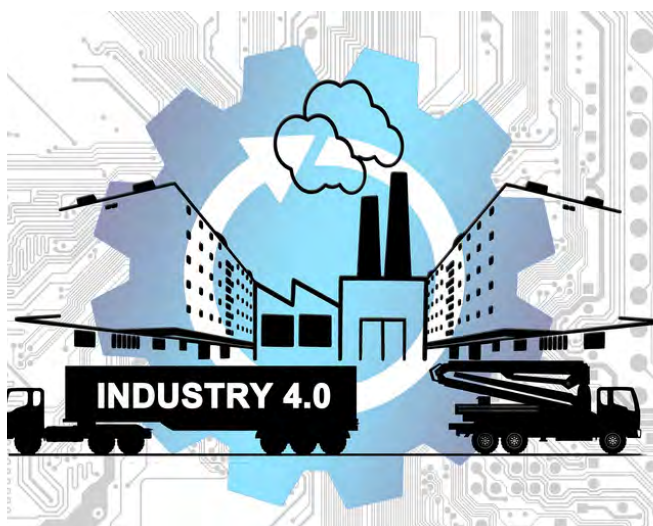
Mechatronics has limitless contribution in manufacturing and a lot of progress has been made in automated manufacturing due to the integration of mechatronics. This automated manufacturing also ensures less wastage of the raw materials which helps in preserving the balance in the environment. In healthcare, using robots to perform a surgical procedure has been a revolutionary step since the year 2000 and this procedure reduces risks in surgery. This field has also contributed to make life easier as it has reached our houses as well. Smart technologies used around the house are getting even smarter by the day. These aspects highly incorporate the fast progress of our society as a whole. The versatility of this field is unquestionable, therefore, there will be more career and research opportunities for Mechatronics Engineering graduates.

BEST FYP FOR SEMESTER 1 2020/2021

STRESS DETECTION SYSTEM USING PHYSIOLOGICAL MEASUREMENTS
BY AMIRUL AIDY BIN AMIRULDIN (1621295)
Supervisor: Dr. Aimi Shazwani Ghazali

The number of people who suffer psychological health issues among youth has risen drastically. Hence, this project aims at developing a minimally invasive stress measurement system using physiological signals. The physiological sensor used in this study is Galvanic Skin Response (GSR) sensor. A set of questionnaires was utilized to quantify the outcomes of the sensor. Results showed that the accuracy of the GSR readings is 97.8%.

A subject doing the stress detection test

FLEXIBLE ROBOT FOR VERTICAL PIPELINE INSPECTION
BY RAMATOULAYE CASSET (1615960)
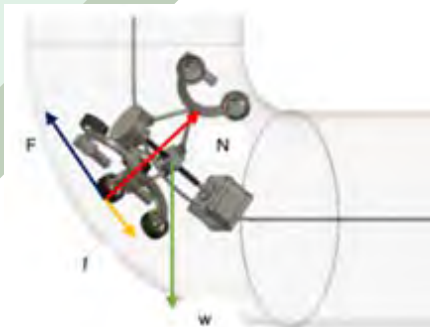**Supervisor: Prof. Dr. Md. Raisuddin Khan**

Illustration of the robot navigating at a curved pipeline

In this study, a new design of an in-pipe robot is proposed to facilitate inspection of vertical pipelines of different inner diameters. Most of the in-pipe robots have difficulty navigating into vertical pipelines and do not include proper self-locking systems against power failure. The new in-pipe robot consists of three identical slider-crank based diameter adaptation mechanisms around a power-screw. The robot has good mobility when moving along horizontal, vertical and curved pipelines. Also, the robot can adjust its diameter to fit pipes ranging from 168 mm to 210 mm inner diameters.

MODELLING OF HUMAN CERVICAL SPINE USING SYSTEM IDENTIFICATION APPROACH
BY MOHD AMIEROL BIN MOHD ZAID (1629881)
Supervisor: Dr. Nor Hidayati Diyana Nordin

Neck and back pain contribute to the highest level of injury in developed countries. Nevertheless, spine condition could not be accurately measured for sitting and non-load bearing activities due to the lack of testing devices to analyze the spine system. Therefore, in this work, the mathematical model of the human cervical spine was developed using MATLAB System Identification toolbox. The mathematical model was compared with first, second, and third order models. The third order model is seen best to describe the C6 and C7 of cervical spine, at a percentage of 98% and 96.12%, respectively.
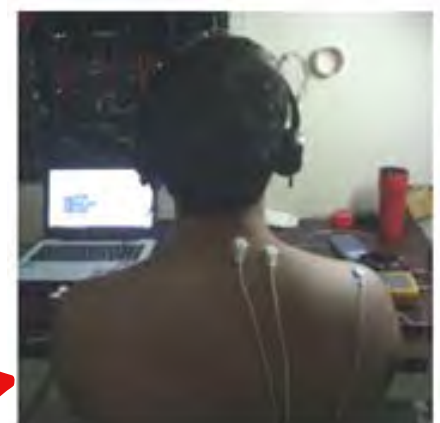
A subject for the cervical spine identification

BEST FYP FOR SEMESTER 2 2020/2021

DEPRESSION DETECTION USING NATURAL LANGUAGE PROCESSING ON BAHASA MALAYSIA NON-CLINICAL TEXT BY NUR AIMAN BINTI MOHD FUAD (1716510)
Supervisor: Dr. Nik Nur Wahidah Nik Hashim

Depression is viewed as the largest cause of the world mental illness statistic, and it keeps increasing globally including Malaysia. Two main issues that prevent early diagnosis of depression in Malaysia are the limited number of psychologist ratios to patients and the stigma from the society that relates depression with insanity. The main objective of this study is to develop an automatic detection depression via the language usage in written text using Natural Language Processing (NLP). These texts were then classified using common classifier models with 95% accuracy.

Some of the text detected for the study

AN AUTOMATIC STENCILING FOR STEEL PIPE BY MUHAMMAD FARIS BIN NOR FATHI (1715743)
Supervisor: DR. ABDUL HALIM EMBONG
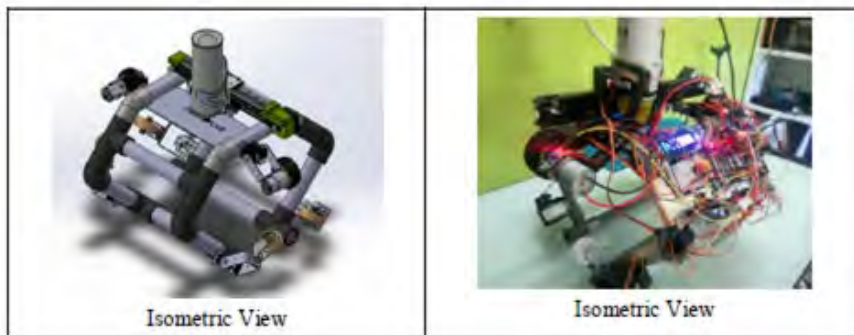

Isometric View   Isometric View
Illustration of the robot stenciling on a pipe

In the current industrial situation, pipe labelling is essential to make sure all the pipes are labelled accordingly. In this project, a robot that is capable to automatically label and print on the pipe surface was designed. It is designed to work on the curved shape of different sizes of the pipe automatically by gripping or clamping before printing on the pipe surface. The robot is seen capable to grip two different diameters with specific distance of stencilling by varying the angle of the servos as calculated.

DEVELOPMENT OF AN ADAPTIVE VIBRATION ABSORBER MOUNTED ON MULTI-STOREY BUILDING BY WAN AHMAD IZUDDIN BIN WAN JUSOH (1626873)
Supervisor: DR. KHAIRUL AFFENDY MD NOR

The complete system showing vibration absorber on a 3-storey model

A vibration absorber is an effective engineering development that is widely used to reduce the vibration induced by certain unexpected conditions such as seismic excitation or any external forces applied to the structure. However, the natural frequency of conventional vibration absorbers is fixed and cannot be changed afterwards. Therefore, in this study, an adaptive vibration absorber was designed to solve this issue. The adaptive vibration absorber can adjust its stiffness to tune its natural frequency. It is recorded that the reduction of vibration on a three-storey building model, with the presence of the adaptive vibration absorber is reduced to 90.78%.

BEST IDP FOR SEMESTER 1&2 20/21

WATER COOLING SYSTEM FOR SMARTPHONES

BY MUHAMMAD YUSOF (1624417), AMMAR AHMED (1612863), HARITH ABDELRAHMAN (1520887) & MOHAMAD ZULFAHMI (1627507)

SUPERVISOR: DR MOHD ASYRAF BIN MOHD RAZIB

Solution for smartphones' overheating problem: closed loop smartphone water cooling system.

Simulation (left) & Whole product connected to the smartphone (right)

LIBRARIAN ROBOT

BY ALYA SYAFIKAH (1812982), FATIMA AZ-ZAHRA (1819330), ANISAH FARZANA (1814278), NUR ADLINA (1817568) & AMIRAH HUSNA (1817972)

SUPERVISOR: DR HASAN FIRDAUS BIN MOHD ZAKI

Solution for the lack of automation & different height limitations that librarian face during book retrieval process: automated book retrieval robot with high range of reach.
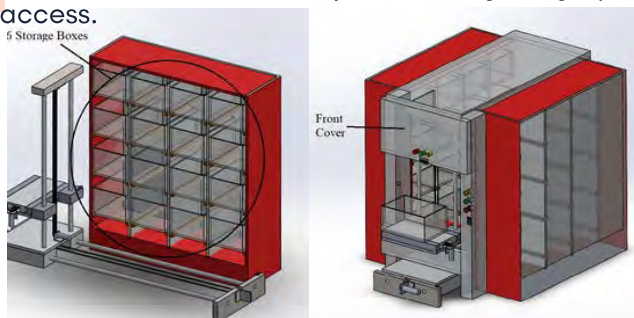

Design using MOI3D (left) & Actual developed product (right)

AUTOMATIC STORAGE RACK

BY MUHAMMAD FARIS (1715743), FARIZ HAZMI (1716639), MUHAMAD NAIM (1625557) & NURUL ALYA SOFIYA (1719480)

SUPERVISOR: DR ABD HALIM BIN EMBONG

Solution for theft cases occurs in the mosque: a storage that can keep the visitors' belongings safe with automated system using fingerprint access.

Drawing of the automatic storage rack

SMART CANE

BY DAKHEL ABDULRAHMAN (1621727), ALYAMANI FAISAL (1626471), ESAM YAHYA OMAR (1713467), MUHAMMAD HAFIZ ZULHILMI (1811325) & IFFAH NADHIRAH (1815204)

SUPERVISOR: DR HAZLINA MD YUSOF & DR AIMI SHAZWANI GHAZALI

A smart cane with vibration alert system and remote switch control system to help the visually impaired.

Obstacles are placed below and above of the user's knee to determine the efficiency of the proposed Smart Cane

SMART BABY SWING

BY ADLI MUSTHAQEEM ABIDIN (1715311), ABDULLAHI ABDI ABUBAKAR HASSAN (1529355), AHMAD BASHIR AHMAD FAUZI (1622415), NURUL HANIM AMIR (1611266), MUHAMMAD ASYRAAF NOOR AZAMAN (1716133)

SUPERVISOR: DR HAZLINA MD YUSOF & DR AIMI SHAZWANI GHAZALI

A smart baby swing using slider crank mechanism and inclination system with alarm system when baby cries
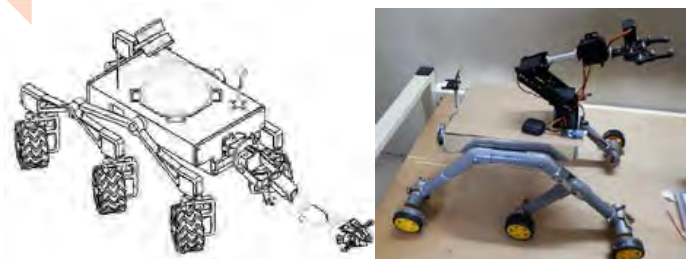

Proposed design (left) & Actual developed product (right)

SEARCH AND RESCUE ROBOT (BUMBEE BOT)

BY MUHAMMAD IZZAT (1717987), ABDUL RAHMAN (1625085), WAN AHMAD IZUDDIN (1626873) & AISYAH (1714126)

SUPERVISOR: DR AZHAR MOHD IBRAHIM

Solution to assist firefighters in searching and rescuing the victims during fire in the building sooner: search and rescue robot.

Proposed design (left) & Actual developed product (right)

WALL OF FAME

Congratulations!

The department proudly presents the following members who received various awards and recognition for their significant contribution, as well as new role appointment in IIUM

TOP 10 CONTRIBUTORS TO IIUM'S RESEARCH PERFORMANCE (IIUM TAKRIM DAY)

COMMUNITY & INDUSTRIAL PARTNER AWARD (IIUM TAKRIM DAY)

TOP 30 CONTRIBUTORS TO IIUM RESEARCH PERFORMANCE 2020 (IIUM TAKRIM DAY)

APPOINTED AS TREASURER OF IEEE OCEANIC ENGINEERING SOCIETY, MALAYSIA CHAPTER

APPOINTED AS EXPERT ADVISORY COUNCIL FOR PETROSAINS RBTX CHALLENGE 2021

ASSOC. PROF. DR. ZULKIFLI BIN ZAINAL ABIDIN

ASSOC. PROF. DR. TANVEER SALEH

APPOINTED AS EX-COMM MEMBER IEEE RAS MALAYSIA CHAPTER (2021-2022)

TOP 30 CONTRIBUTORS TO IIUM RESEARCH PERFORMANCE 2020 (IIUM TAKRIM DAY)

ASSOC. PROF. DR. YASIR MOHD MUSTAFAH

APPOINTED AS DEPUTY DIRECTOR, SEJAHTERA CENTRE FOR SUSTAINABILITY AND HUMANITY

APPOINTED AS DIRECTOR, ROBOCON MALAYSIA 2021

ASSOC. PROF. DR. SHAHRUL NAI'M SIDEK

TOP 30 CONTRIBUTORS TO IIUM RESEARCH PERFORMANCE 2020 (IIUM TAKRIM DAY)

PROF. DR. AMIR AKRAMIN SHAFIE

🏆 APPOINTED AS DIRECTOR, RESEARCH MANAGEMENT CENTRE

DR. SYAMSUL BAHRIN ABDUL HAMID

DR. NOOR HAZRIN HANY MOHAMAD HANIF

🏆 APPOINTED AS TREASURER OF IEEE WOMEN IN ENGINEERING

🏆 APPOINTED AS HEAD OF MICROCREDENTIAL UNIT, OFFICE OF THE DEPUTY RECTOR (ACADEMIC AND INTERNATIONALISATION)

SR. NUR AIMAN MOHD FUAD

SUPERVISOR: DR. NIK NUR WAHIDAH

BR. MUHAMMAD HAFIZI ABDUL MALIK

SUPERVISOR: ASSOC. PROF. IR. DR. SITI FAUZIAH TOHA

🏆 WON OVERALL BEST PRESENTATION AWARD 6TH KL INTERNATIONAL CONFERENCE ON BIOMEDICAL ENGINEERING

🏆 WON 3RD PLACE INNOVATE MALAYSIA DESIGN COMPETITION 2021

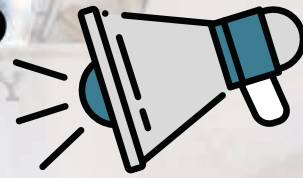🏆 WON GOLD MEDAL IN MALAYSIA TECHNOLOGY EXHIBITION (MTE 2021)

BR. SHAHLAN DALIL

🏆 APPOINTED AS HEAD OF SAFETY MANAGEMENT UNIT, KOE

ANNOUNCEMENTS

POST-GRADUATE OPPORTUNITY

Research Topic: Hand Pose Recognition Under Dexterous Articulation in Daily Activities for Tele-Rehabilitation

Requirement:
- Possess Bachelor and Masters degree in Mechatronics / Electrical/ Mechanical Engineering.
- Have some knowledge in Machine Learning or Artificial Intelligence.
- Committed to finish the 3 years study.
- Persistent and willing to work hard.

Monthly allowance will be provided.

Please email your CV and transcript to:
Dr. Norsinnira Zainul Azlan
sinnira@iium.edu.my
03-64214456

WE ARE LOOKING FOR OUR MCT ALUMNI!

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SO WE CAN REACH YOU:**
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RISALAH

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