A · P · U
ASIA PACIFIC UNIVERSITY
OF TECHNOLOGY & INNOVATION
SCHOOL OF ENGINEERING

ENGINEERS INSIGHT

APRIL 2014 VOL. 6

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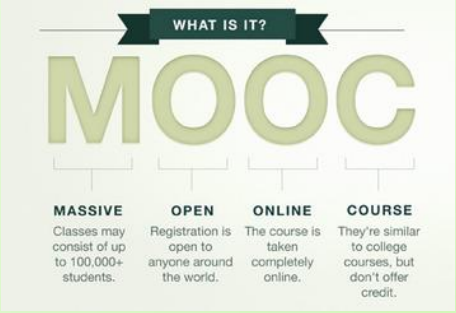
'Engineers Insight' is a quarterly issue by the School of Engineering for the reading pleasure of the staff and students allowing for knowledge sharing and capturing of events for the benefit of engineering education

Massive Open Online Courses



Massive Open Online Courses. Adapted from EdTechReview (2013).

Free education, anyone?

"Really? Free-of-charge?"

"Yes, it's free and everyone has the access to the world-class education!"

Since young, I was taught that "there is no such thing as a free lunch", and that was right most of the time, including education. We need to pay for education from nursery to university until one day when I encountered Massive Open Online Courses (MOOC). It was like a whole new paradigm in high-quality education delivery! Ranging from Art to Science to Engineering, you can basically learn almost any courses via online.

Currently, there are a number of non-profit education platforms partnering with top universities which are available online such as EdX, Coursera and Udacity. Students around the world can choose and participate in numerous courses offered by distinguished professors from prestigious universities including Harvard University, Massachusetts Institute of Technology (MIT), and Stanford University.

For APU engineering students, MOOC is a valuable resource for them to take the initiative in brushing up their engineering knowledge by pursuing some relevant courses. This is for skills enhancement and added values, in addition to what they learn in the set degree curriculum. For instance, Mechatronics students may enroll in Robot Mechanics and Control (by Seoul National University); Electrical and Electronics students – Circuits and Electronics (by MIT); Telecommunications students – Discrete Time Signals and Systems.

MOOC is a global learning platform, not only allow you to learn from the video lectures provided in the online course, but also to participate in the discussions across the globe. Moreover, it is an excellent resource for engineering lecturers to learn interesting delivery methods by top lecturers around the world. Through this, it is believed that the quality of teaching and learning process can be improved to further inspire more talented students.

It takes nothing to join the crowd. I joined a course as well - Embedded Systems – Shape the World, offered by The University of Texas at Austin. It is admirable to see how experienced and passionate professors impart their knowledge to the world. However, to complete an online course, one requires the determination and perseverance as statistics show the average completion rate is less than 7%.

Will MOOC kill the traditional university degree? I believe not, especially for engineering degrees as practical laboratory work is still part of an essential element to train a student to be a true engineer. Instead, MOOC helps to improve conventional tertiary education. Why wait? Let's shop for an online course now and learn something new!

Dr Lim Wee Han

SEDA Malaysia Towards Sustainable Energy Processes

Nowadays, the term sustainability is widely used in many areas, however many are still not exposed to the term "sustainability" and many among us still ask "What is sustainability?", "What is sustainable energy?". **"Sustainable energy"** means energy which, in its generation, provision and use, is such that it meets the needs of the present without compromising the ability of future generations to meet their needs, and includes renewable energy.

SEDA Malaysia was established since September 2011 under the SEDA Act (2011) to promote sustainable energy by implementing the Feed-in Tariff (FiT) mechanism, enhancing the utilisation of indigenous renewable energy (RE) resources to contribute towards national electricity supply security and sustainable socioeconomic development and a host of other policy matters. SEDA was formed to promote the deployment of sustainable energy measures as part of the solutions towards achieving energy security and autonomy. The main function of SEDA was in the establishment and implementation of a special tariff system to catalyse the generation of renewable energy and to provide for related matters. SEDA introduced the FiT system which enables people to invest in renewable energy that they can sell back to the energy provider Tenaga Nasional Berhad. The types of renewable energies available for investment include Solar PV (for individual households and non-individuals), biomass, biogas and small hydro.

The vision of SEDA is to ensure sustainable energy plays an important role in the nation's economic development and environment conservation; ensure existing sustainable energy programmes are managed prudently and efficiently; continuously assess new potential sustainable energy solutions in partnership with our domestic and international stakeholders to diversify and complement the existing portfolio of our existing sustainable energy programmes; and advocate the public towards accepting responsibility in a paradigm shift towards living sustainably.

The Renewable Energy Fund

The 1% surcharge on the TNB bills which go to the Renewable Energy Fund are basically, for all the consumers who buy more than 300kWh/month (i.e. electricity bill exceeding RM77), a 1% surcharge will be imposed, and the money goes to the Renewable Energy (RE) Fund. For example, if you pay RM100 for your bill, you will have to pay an extra RM1. If you pay RM75, there will be no extra charge. As 75% of households in Malaysia does not use more than 300kWh/month, the surcharge will only affect 25% of the heavy users. This seems fair, as polluters will pay more, and people will have the incentive to save energy if they really care about paying an extra 1% on top of their bill.

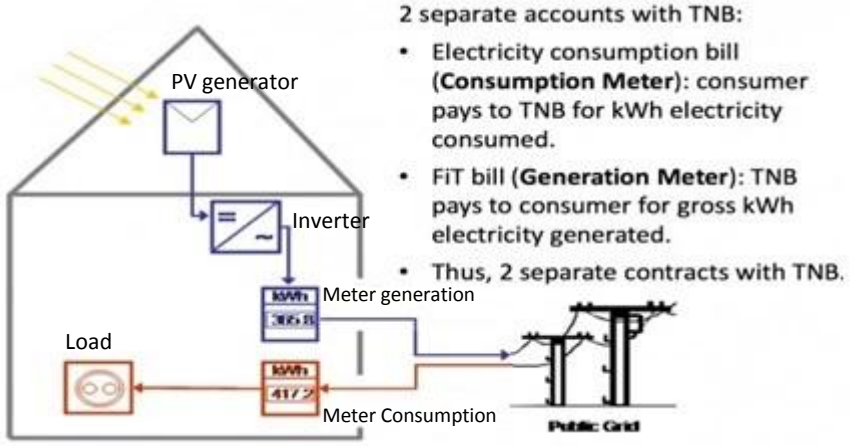


Figure 1 How the FiT is implemented, (Source: SEDA Malaysia)

The RE Fund is channelled to the implementation of Feed-in-Tariffs. As illustrated in the Figure 1, if you install a solar panel on your rooftop, you can sell the electricity to TNB. The energy generated is sold at RM1.75/kWh. However the energy bought is priced at RM0.31/kWh. The sellers of electricity to TNB still pay their electricity bill every month on their consumption, and TNB then reimburses the total amount of money for electricity sold back. When TNB claims money from SEDA, it deducts the prevailing displaced cost and can only claim the positive difference of the two. This is also why there is a quota for FiTs. In order to expand the quota, we need to increase the amount in the RE Fund. The fund was described by the CEO as the "lifeline of FiT". As of now, Malaysia is behind its target to generate 986MW of electricity by 2015 – that's why they are planning to increase the surcharge from 1% to 2%. The negative feedback from the public seems to be a major concern, hence the efforts on public relations (SEDA Malaysia).

Since the implementation of FiT, SEDA Malaysia have approved a total of 2,628 applications with a total installed capacity of 484.03MW and 655 projects have commenced operation with a total installed capacity of 118.19MW. It has been observed that Solar PV has also shown a steady growth in Malaysia. Until 30th September 2013, Solar PV shown the highest percentage for approved applications; 39.72% or 192.26MW of installed capacity compared to bio mass with 152.49 MW or 31.5%; while small hydro and biogas made up the balance of 23.77% (115.05MW) and 5.01% (24.23MW) respectively (SEDA Malaysia). SEDA with the policies that encourage the deployment, innovation, manufacturing, and trade of clean energy technologies will help educated the people on sustainable energy. In the process, these initiatives will enhance the nation's economic, environmental, and national security prospects.

Mrs. Vickneswari A/P Durairajah

The Institution of Engineers, Malaysia

Seminars & Workshops

Workshop on Microcontroller Interfacing & Programming and Linear Circuit Analysis Using Matlab & Simulink

Workshop on "Microcontroller Interfacing & Programming and Linear Circuit Analysis using Matlab &Simulink" is a one-day workshop on two significant domains of engineering conducted by Mr. Veeraiyah Thangasamy and Mr. Shankar Duraikannan. The workshop with 25 student and 2 academic staff participants was held on Saturday, December 14, 2013.

The "Microcontroller Interfacing and Programming" workshop gave the participants an opportunity to be familiar with 8051 microcontroller besides Keil uVision and Multisim softwares. It showed how two different platforms can work simultaneously to program and simulate a microcontroller. This type of workshop shows the participants how a microcontroller circuit can be tested and simulated before implementing it on the breadboard.

The '"Linear Circuit Analysis using Matlab and Simulink" workshop gave a great opportunity to the participants to realize and understand the significant use of Simulink in the engineering field. It showed how a complicated circuit on the breadboard can be firstly tested and analyzed using MATLAB and Simulink to have an idea of the expected outputs before implementing the circuit. The participants appreciated the use of Simulink which can ease their work in many levels.

Seminars & Workshops

The Institution of Engineers, Malaysia

Improving Formula 1 Engine Performance by Reduction of Friction

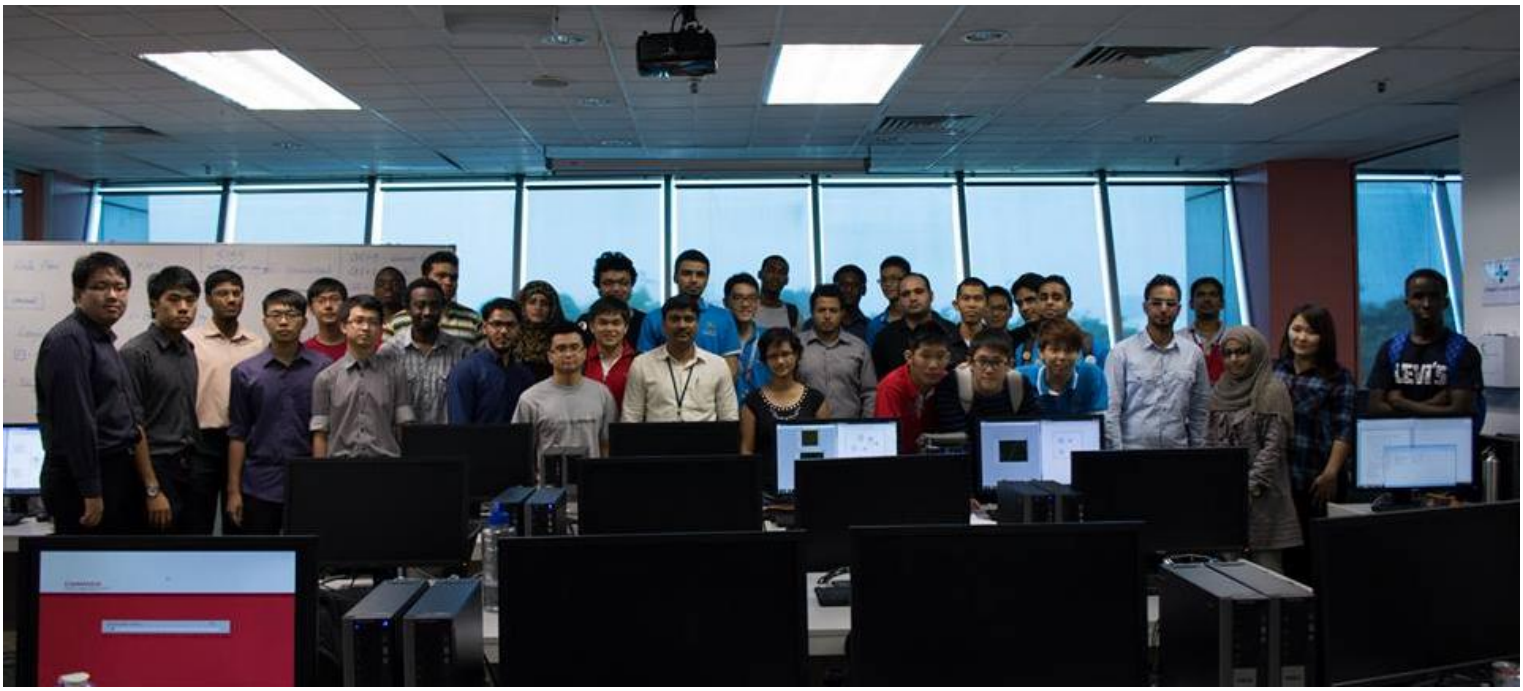
The seminar on “Improving Formula 1 Engine Performance by Reduction of Friction” by Prof. Dave Chesire of Staffordshire University was a knowledge sharing session on techniques to enhance the performance of Formula 1 engine by decreasing the friction. 41 students and 11 staff of School of Engineering attended the seminar.

Prof. Dave discussed the influence of the shapes, characteristics of the crank shaft on the engine’s performance, the effective design shape of engine’s crank shaft to reduce the friction when the crank moves. Besides, he also discussed how the friction of crank shaft can be reduced effectively by using grinding method in order to smoothen the surface of the crank shaft. Furthermore, he discussed on the vibration inside the engine that acts as an important factor to affect the engine performance.

Workshop on LabVIEW for Everyone

LabVIEW programs are called virtual instruments, or VIs, because of their appearance and operation imitate physical instruments, such as oscilloscopes and multimeters. LabVIEW contains a comprehensive set of tools for acquiring, analyzing, displaying, and storing data, as well as tools to help you troubleshoot codes you write.

A workshop on “LabVIEW for Everyone” was conducted by Mr. Chitturi Venkatratnam, on Saturday, January 25, 2014. 36 students and 2 staff attended the workshop. The workshop focused on four core LabVIEW concepts namely the LabVIEW Environment Basics where the students learn the most important building blocks for any LabVIEW applications, including the front panel, block diagram, palettes, controls, and indicators; Graphical Programming Basics where they see how to connect functions and work with a variety of datatypes when constructing applications; Common Tools to view a collection of important tools and common user functions that all users should be familiar with; and finally the Debugging Tools , the simple tools and techniques to understand the behavior of code and address problems or bugs.



Seminars & Workshops

The Institution of Engineers, Malaysia

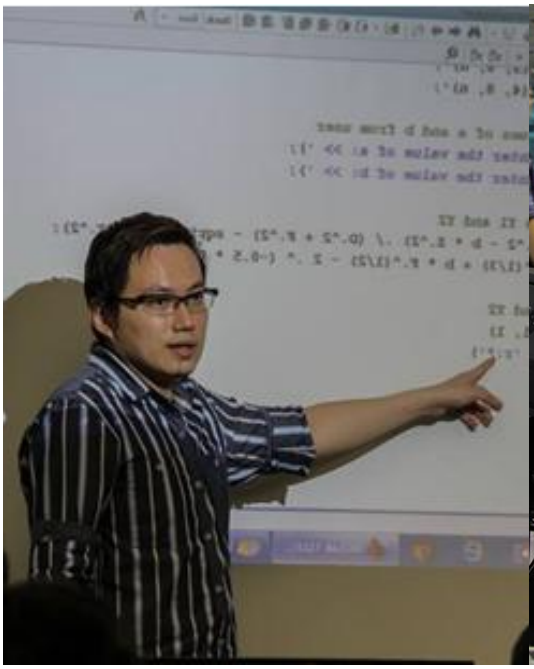
Active RFID System in Multi-Hop Wireless Sensor Network

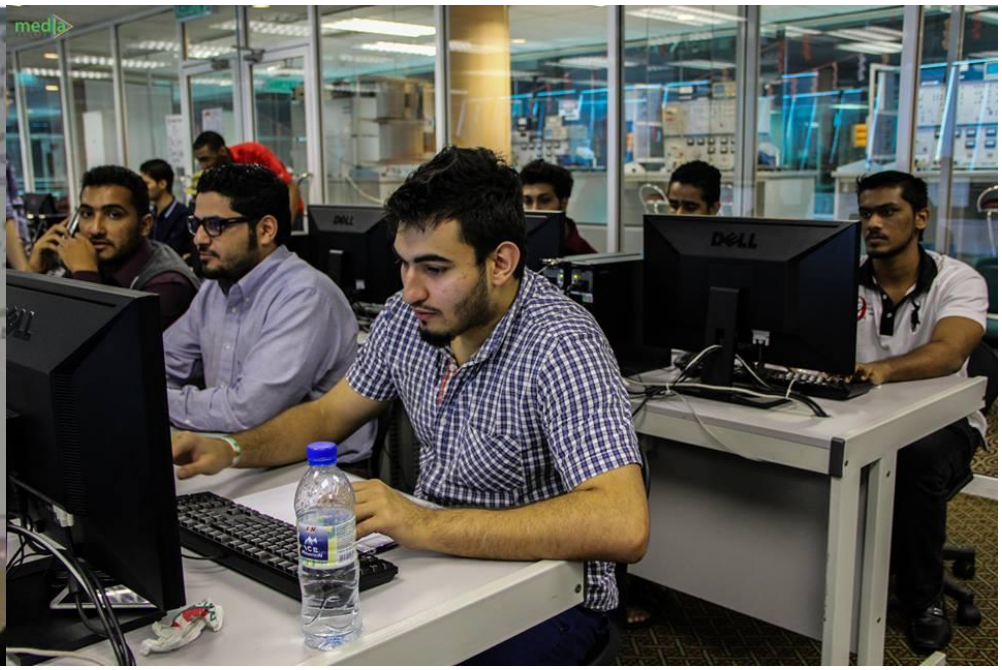
Radio Frequency Identification (RFID) is a type of automatic identification using radio waves to automatically identify people or objects, which in the past decade has seen new developments enabling the technology to meet growing modern demands.

The seminar “Active RFID System in Multi-Hop Wireless Sensor Networks” conducted by Dr. Raed Mohammed Taher Abdulla on Wednesday, January 29, 2014 discussed on technical aspects of combination of ZigBee-based RFID. Protocols and hardware/firmware for reduction of overall power consumption of the tags, and transmission latency. 25 students and 3 staff attended the seminar.

Seminars & Workshops

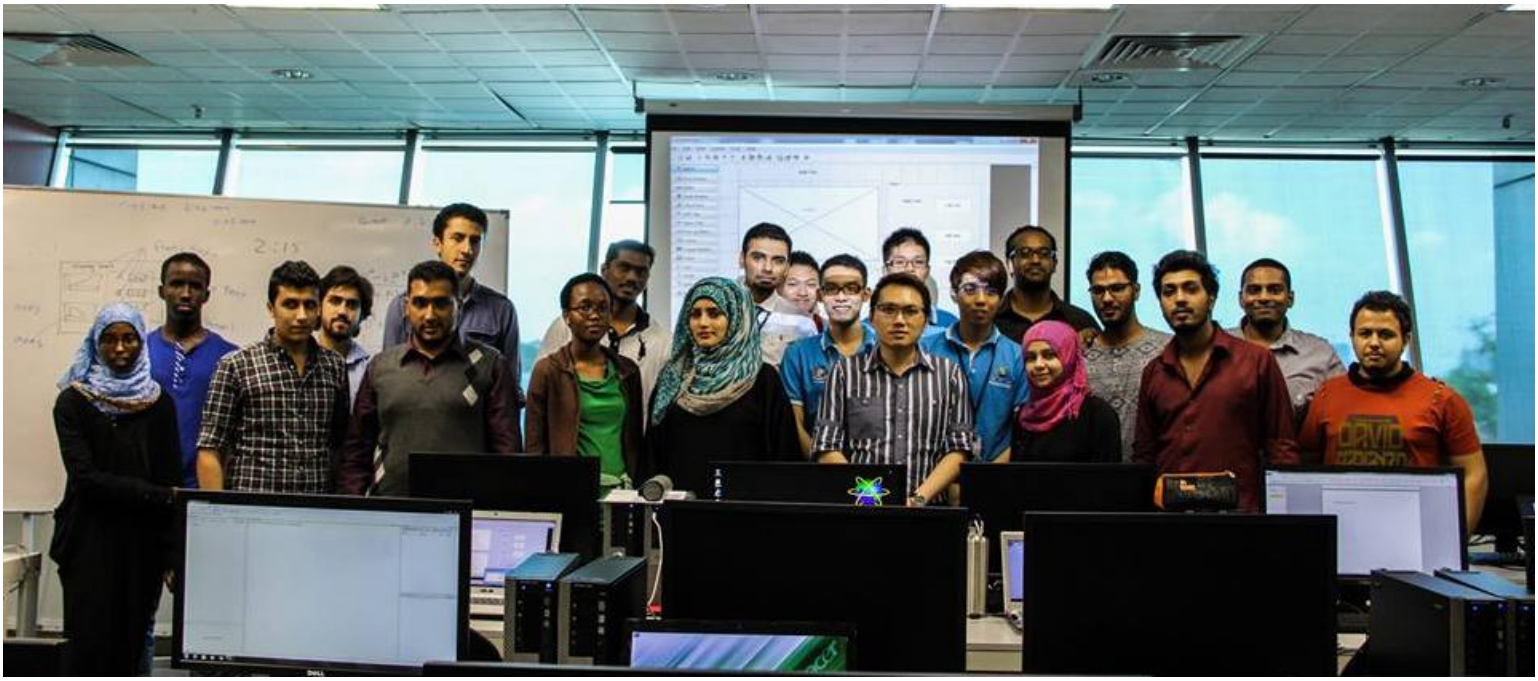
Workshop on Development of Engineering Software Application With Matlab





The availability of technical environment such as MATLAB is now reshaping the role and applications of laboratory projects to involve students in more intense problem-solving experience. This availability also provides an opportunity to easily conduct numerical experiments and to tackle realistic and more complicated problems. MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming environment. Furthermore, MATLAB is a modern programming language environment: it has sophisticated data structures, contains built-in editing and debugging tools, and supports object-oriented programming. These factors make MATLAB an excellent tool for research.

The one-day workshop on "Development of Engineering Software Application with MATLAB" was conducted by Dr. Thang Ka Fei on Saturday, February 15, 2014. This advanced workshop was targeted at the pre-final and final year engineering students. 34 Students attended the workshop. The workshop focused on the Design of User Interfaces and Engineering Case Studies with Hands-on Examples.



Seminars & Workshops

Usefulness & Advantages of Solar Energy & Utilization of Solar Energy and its Application

A technical sharing session on “Usefulness & Advantages of Solar Energy & Utilization of Solar Energy and its Application” by Ms. Iris Tan and Mr. Jeffery Yap from Certo Solutions Sdn. Bhd. was held on Wednesday, February 19, 2014. Ms. Iris Tan, the marketing manager of CERTO Solution Sdn. Bhd., shared on the details of the company as the provider of sustainability solutions for their customers. They provide services like water harvesting system installation, solar panel installation, and other environmental beneficial solutions. Ms. Iris Tan spoke on the concept of sunlight harvesting. Also, she explained how investors can invest on the installation of solar panel and get advantage from it by selling the harvested energy which is the voltage to the biggest electricity utility company, TNB Malaysia with fastest Return on Investment (ROI). Mr. Jeffrey Yap demonstrated the products of the company such as the One-Touch Powered Lamp and Solar BBQ. 65 students and 9 lecturers attended the seminar.

Seminars & Workshops

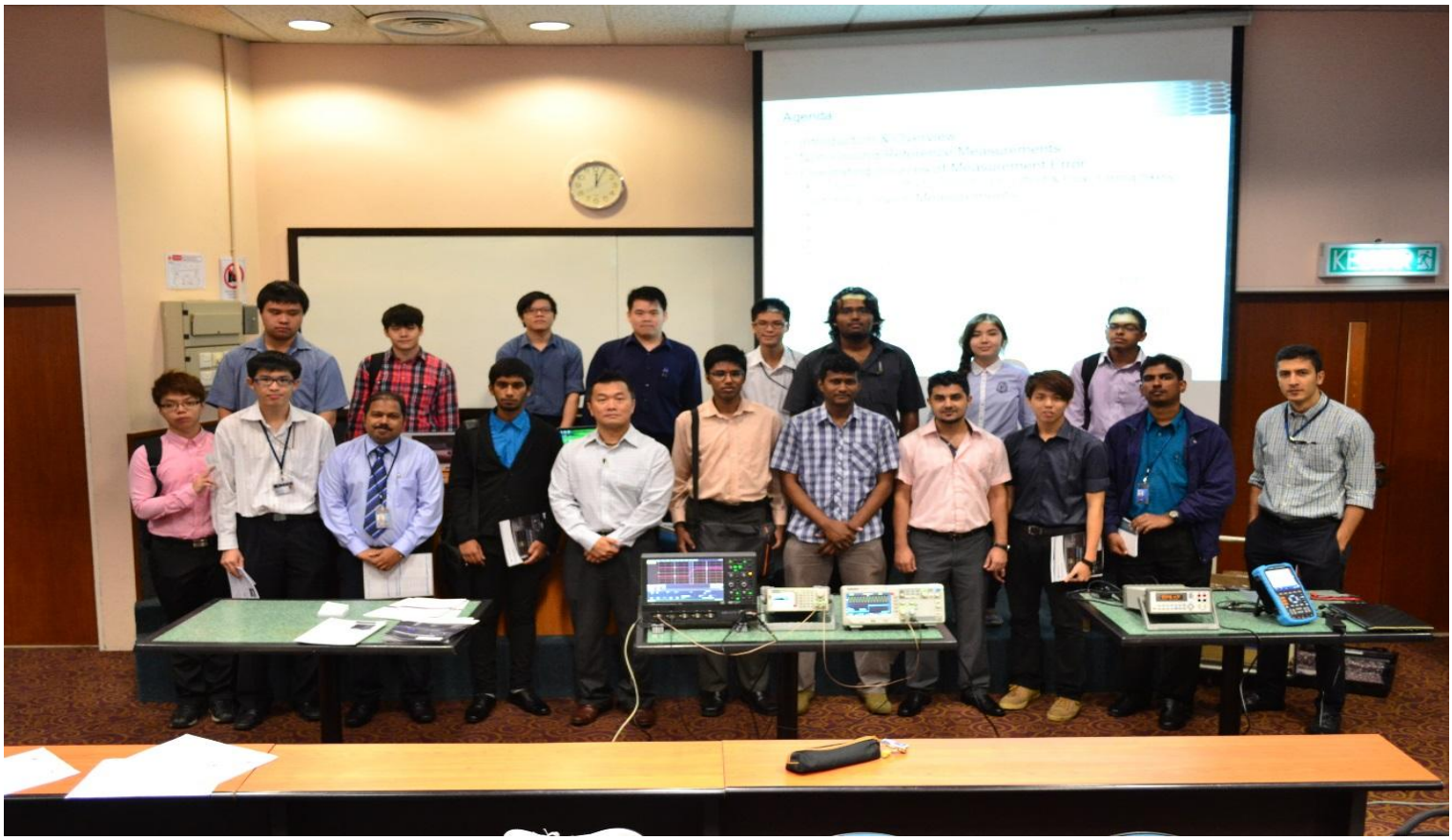
Genetron Test and Measurement Equipment Road Show

Measurement and test engineering constitutes an indispensable element in the industrial production process. Ultimately you need to identify whether and where problems occur, where action is needed and what has to be done.

The Genetron Test and Measurement Equipment Road show by Mr. Cheng Kel Veen on Wednesday, February 26, 2014 highlighted the significance of equipment precision in test and measurement. The road show started with the concept of vertical resolution followed by the difference between 8-bit and 12-bit acquisitions characteristics, advantages and disadvantages. The concepts were related to the application of the oscilloscope.

The road show demonstrated the types of digital oscilloscope in the market such as 8-bit and 12-bit oscilloscope and introduced a new model of 16-bit oscilloscope by TELEDYNE LECROY and its precision in measurements compared to the 8 bit and 12 bit oscilloscope.

30 students and 3 staff attended the seminar. The students had an hands-on experience in measurement using 8 bit and 16 bit oscilloscope and were able to appreciate the difference in the precision of the measurement.



Seminars & Workshops

The Institution of Engineers, Malaysia

Engineering in Industry

The shortage of appropriately-skilled labour across many industries is emerging as a significant and complex challenge to growth and future. According to survey, each year millions of graduates and post-graduates are added to the workforce. However, of these only 25 percent of technical graduates and 10-15 percent of other graduates are considered employable by the rapidly growing IT, ITES and other core industry segments. Hence, what we have today is a growing skills gap between the industry and academic. To double and triple the workforces it has become imperative to prepare and plan for a world-class, competent, talented and innovative workforce.

The seminar on “Engineer in Industry” by Mr. Imama Karim Mamba Ushama and Mr. Elbara Eldaw Elnour on Thursday, March 6, 2014 was an inspirative address of the industrial expectations on the students skills upon graduation. The seminar highlighted the blooming areas of engineering and the skills that are required to acquire a job in those areas upon graduation. Finally the presenters called out the students with innovative ideas to take up their internship in their organisation. 62 students and 8 staff of school of engineering attended the seminar .

Seminars & Workshops

Telecommunication Engineering and Telecommunication Industry

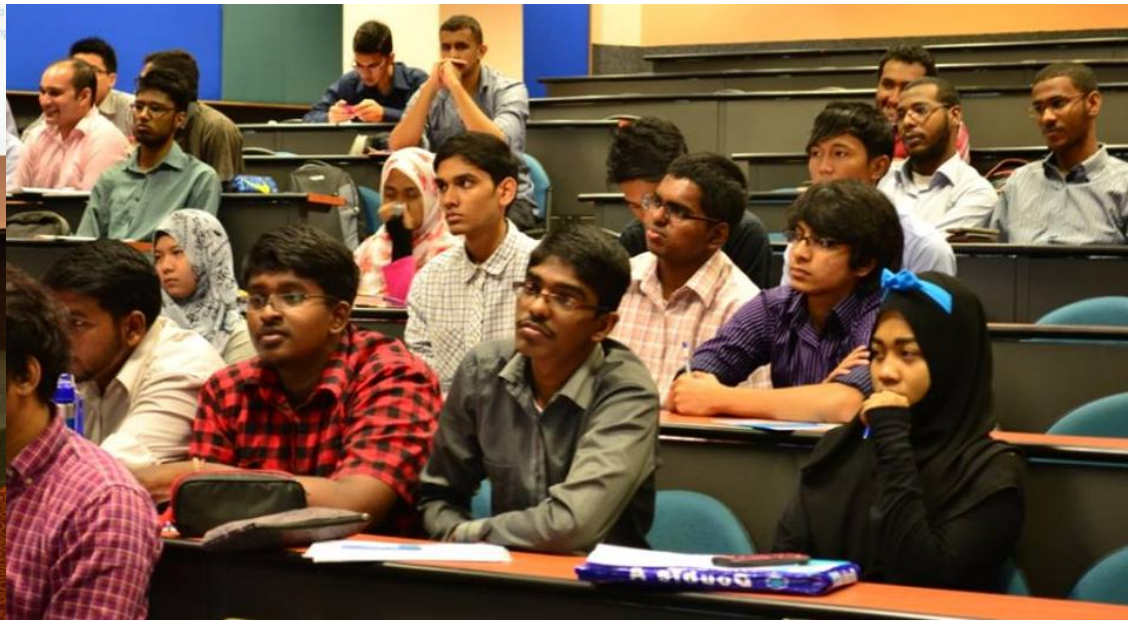
The main objective of the telecoms industry is to allow people to communicate, whether they're talking on traditional fixed-line telephones, or using mobile devices to send and receive data from the cloud. Telecom companies include Nokia, Siemens, Huawei, Ericsson, TM, Digi, Maxis, Celcom, etc. The sector is broadly split into vendors and carriers: vendor companies such as Nokia Siemens, Huawei, and Ericsson sell the hardware and software products that carrier companies such as TM, Digi, Maxis, Celcom use in their networks. Activities vary by company and industry sector, but generally include research and development of hardware or software, technical sales and marketing, and installation and technical support. Companies like TM, Digi, Maxis and Celcom that run large networks and data centres are also involved in infrastructure and networking activities.

A seminar on “Telecommunication Engineering and Telecommunication Industry” was conducted by Digi Sdn. Bhd. on Thursday, March 13, 2014. 45 students and 7 staff attended the seminar. The seminar started with the introduction to Digi by the HR team followed by the technical over view of telecommunication industry, typical roles responsibilities and challenges of telecommunication engineers and elaboration on several technical projects of Digi like LTE and beyond. The company finally briefed on the internship opportunities for the students and welcomed the students to take up their internship in Digi.

Seminars & Workshops

The Institution of Engineers, Malaysia

Guidelines on Engineering Assignment and Lab Report Writing



Report writing is an essential skill for professionals. A report aims to inform, as clearly and succinctly as possible. Writing reports and assignments can be a daunting process.

The seminar on “Guidelines on Engineering Assignment and Lab Report Writing” conducted by Mr. Chandrasekharan Nataraj on Thursday, March 27, 2014 was designed to help the students to develop the skills they need to write assignments and lab reports effectively for academic purposes. The seminar was a guidance for the students to interpret questions and to plan, structure and write their assignment and lab report. 33 students and 10 staff attended the seminar.

Industrial Visits

Yakult Manufacturing Plant

Yakult drink is a high quality probiotic in the form of a cultured milk drink selling over 32 countries including Malaysia. It comes with over 30 billion live Shirota strain in each bottle, a probiotic bacteria found only in Yakult drink that was discovered by Dr. Minoru Shirota back in 1930. This is proven to be health beneficial to human being by improving the balance of our intestinal flora. On Friday, January 24, 2014, the IEM-APU student section organized an industrial visit to manufacturing plant of Yakult drinks. 31 students accompanied by 3 staff had the opportunity to visit the plant. During the industrial visit to Yakult, the students were briefed on the history of the Yakult drink and the students witnessed the process of the whole manufacturing process that take place in the clean room. Approximate 20 workers at the plant monitor the manufacturing process which is fully automated. At the end of the session, the students had a chance to taste their product which are Yakult Ace and Yakult Ace light (less sugar).

Industrial Visits

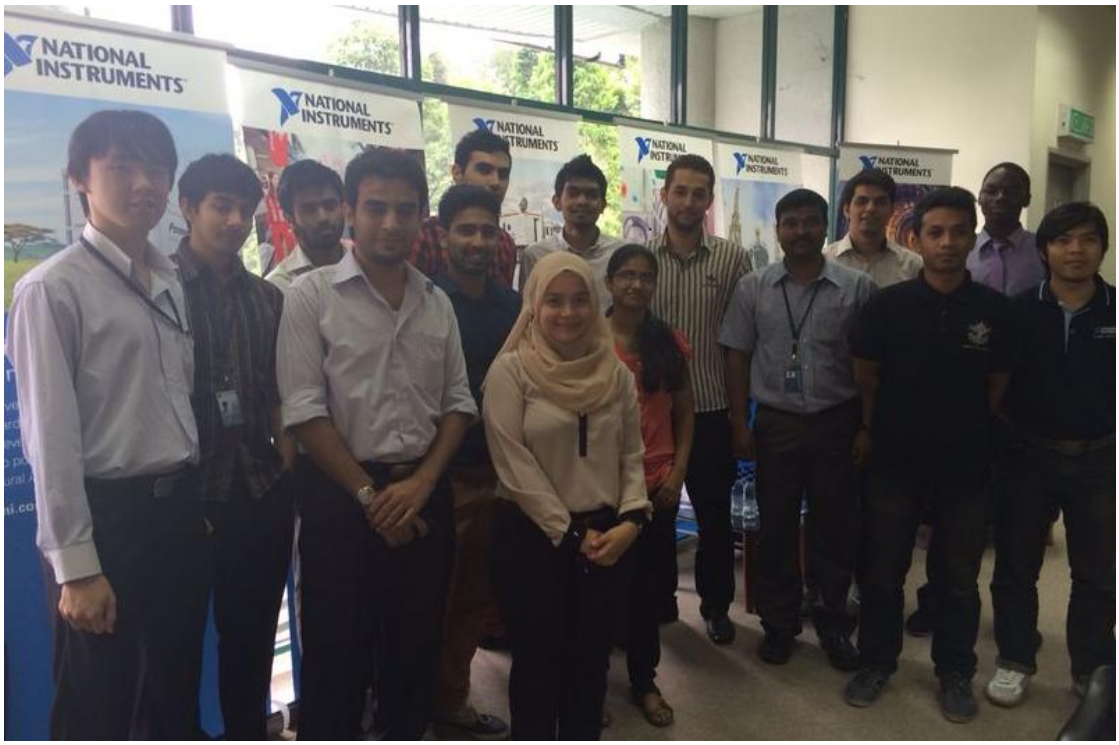
The Institution of Engineers, Malaysia

MEASAT Satellite Systems Sdn. Bhd.

MEASAT is one of the largest supplier of satellite communication services to leading international broadcasters, Direct-To-Home (DTH) platforms and telecom operators. On Thursday, February 13, 2014, IEM-APU student section arranged for an industrial visit to MEASAT. 25 students accompanied by 3 staff visited the satellite facilities at MEASAT. At MEASAT, the students were given the briefing of the history of MEASAT, different types of the Satellite launched and most importantly the working and the structure of satellite and the monitoring system. The students were excited on the achievements of MEASAT that has launched in total 5 satellites since 1996 providing the service to over 150 countries across Asia, Middle east , Africa Europe and Australia. They are the state-of-art MEASAT-3 and MEASAT-3a at 91.5°E which support Asia's premium DTH(direct –to-home) and MEASAT -2 at 148.0°E and MEASAT-5 at 119.5°E supporting video distribution. The students were also briefed on the satellites MEASAT-3 and 3a that will be further strengthened with the addition of MEASAT-3b in 2014 and MEASAT-3c in 2015. After the briefing, student visited the Network Management Centre which they monitor customer traffic carried on the MEASAT network and provide emergency customer support.

Industrial Visits

National Instruments Academic Innovation Nucleus



A group of 11 students accompanied by a staff visited National Instruments Academic Innovation Nucleus located at Technology Park Malaysia on Wednesday, February 26, 2014. They also attended a seminar on “LabVIEW for Designing Embedded Control and Monitoring Systems”. Later on, the students were exposed to the Data Acquisition Cards of National Instruments. No doubt, NI LabVIEW is the ultimate system design software used by engineers and scientists to efficiently design, prototype, and deploy embedded control and monitoring applications. It combines hundreds of prewritten libraries, tight integration with off-the-shelf hardware, and a variety of programming approaches including graphical development, .m file scripts, and connectivity to existing ANSI C and HDL code. Whether designing medical devices or complex robots, LabVIEW reduces time to market and the overall cost of embedded control and monitoring.

SoE Collaborations

Signal Transmission Sdn. Bhd.

On the 4th of March 2014, the Memorandum of Agreement between Signal Transmission Sdn Bhd and APU's School of Engineering was signed to enable the starting of the collaboration on the project titled, "Application of Arduino Microcontrollers in Farm Automation". Signal Transmission is an ISO 9001: 2000 certified company specializing in design and manufacture of control, instrumentation & automation systems including software engineering, installation, commissioning, testing and servicing. The project has been suited for a Final Year Project development and is currently undertaken by 4th Year Mechatronics Engineering student Rajaram under the supervision of Mr Alvin Yap Chee Wei (academic) and Mr Tan Beng Kee (industrial).

The current project development shall encompass the following with the application of Arduino Microcontrollers:

- Applying fertilizer in correct concentration during irrigation, known as fertigation.
- Record and Logging of Data.
- Time and duration of fertigation, amount of water and fertilizer used.
- Soil moisture content.

K-Plastics Industries Sdn Bhd

On the 1st of March 2014, the Memorandum of Agreement between K-Plastics Industries Sdn. Bhd. and APU's School of Engineering was signed to enable the starting of the collaboration on the project titled, "Design and Development of An Automatic Reordering System Utilizing Kanban System for Color Masterbatch". K-Plastics has a large manufacturing base in Nilai and Singapore with core production directed at Shell's lubricant plastic products that cover a market share of 80% within the South East Asia region. The project has been suited for a Final Year Project development which will be further expanded into upcoming FYPs and is currently undertaken by 4th Year Mechatronics Engineering student Chong Yee Liang under the supervision of Mr Sathish Kumar (academic) and Mr Chew Eng Lee (industrial).

The aim of the projects is to design and develop a sustainable automatic reordering of raw material in the plastic product manufacturing industry.

The objectives to be attained is as follows:

- To design and develop a sustainable reordering raw material system using kanban cards.
- To implement, test and analyse the developed system at the stock house of the manufacturing industry.
- To automate the developed system using RFID or image processing technique.

Asia Pacific Centre of Robotic Engineering (APCoRE)

The APCoRE is an initiative by APU SoE to develop the robotic engineering field within APU. The centre is doing research in various areas of robotics especially humanoid robot development, robotic sensors, robotic vision and biomedical robotics. This will involve lectures by industrial experts and in-house research activities in these areas. The centre will also be a meeting point for students and lecturers to share ideas and innovation.
The centre will also develop collaboration with industry to keep the research and technology used to be relevant and current.

Aim;
To develop APU SoE's in house robotic engineering research.

Objective:
• To work with industry to improve efficiency and solve problems in manufacturing by using robotics technology.
• To develop robotic technology that will aid humans and improve the quality of life.
• To motivate and inspire students to be involved in robotics technology.

The APCoRE work will tie into APU vision of becoming a world class innovative university.

Current On-Going Research Activities:

Biomedical Robotics
The development of a humanoid robot is at the pinnacle of robotics technology in terms of robot architecture.
The technology that is currently being explored is "Development of robotic exoskeleton for human limb rehabilitation".

Robotics Vision Development
The technology that is currently being explored is "Developing software for image recognition and understanding", "Incorporating AI into image processing" and "Developing mapping technology with vision".

https://www.facebook.com/asiapacificcore/

SoE Competitions

Go Green in the City competition by Schneider Electric 2014

Our team of 2 students from School of Engineering reached the Finals of the Go Green in the City competition organized by Schneider Electric. They finished runners up at the finals on 10th of March 2014 in Malaysia and were placed in the top 50 in the world among 22 countries that took part. It was open to all universities in Malaysia and around 250+ teams took part in the competition Worldwide. Our Student Team have won the RM500 cash prize, a trophy & Certificates of Honor.

Team Name – Green La Vie
Students – Syed Abdullah & Cleopatra Musa
Academic Mentor – Assoc Prof Ir Dr Vinesh Thiruchelvam
Title of Invention Design – "Eco-Friendly Gymnasium"

Our congratulations to our students on this achievement!

SoE Competitions

APU Materials Lecture Competition 2014





On Friday, February 21, 2014, the APU Materials Lecture Competition 2014 was held. This competition was a preparatory competition towards the selection of participants for the Malaysian Materials Lecture Competition 2014. 7 students participated in the competition and the winner was selected to participate in the Malaysian Materials Lecture Competition 2014. The student Kudzai has gone on further and taken part in the National Semi-Finals on April 3, 2014 at UiTM, Shah Alam. He has managed to be part of the final 5 that have now qualified for the National Finals which is to be held in May 2014. Reaching the Finals, the student has already won RM500 in cash. Kudos to Kudzai and the academic mentoring that he had been receiving from Ms Jacqueline, Mr Lim Siong Chung, Dr Lai Nai Shyan and Dr Lim Wee Han.

Innovation Ambassador Development Programme (IADP) at Genovasi

Tan Chin Sern

I have been given a golden opportunity to participate in the Innovation Ambassador Development Programme (IADP) at Genovasi. Genovasi is the only Design Thinking School in Malaysia and a regional partner of the Hasso Plattner Institute (HPI) School of Design Thinking at Potsdam University, Germany where the HPI School of Design Thinking is a sister institute of the prestigious d.school at Stanford University. This is a 10-week programme where participants will learn innovation methodologies, collaborate in cross-disciplinary teams and work on hands-on challenges in solving real world problems.

In this challenging era, we often need to think out of the box in order to find better solutions to everything from working field to personal problems which involved critical thinking skills and problem solving. In Genovasi, it was more than just critical thinking skills because its approach is about understanding the problem by experiencing or empathizing with those who suffer the problem before developing a possible solution. The solution itself, most likely, go through multiple prototypes and this is the key stage to the success of the solution which may or may not be the result of “outside-the-box” thinking.

For the first 3 weeks in Genovasi, we were grouped in teams with multidisciplinary and introduced with their design thinking methodology of solving problems using “Empathise-Define-Ideate-Prototype-Test” approach to practise on a case study about “Redesigning the car park experience in the public for women” under coaches’ supervision. The following 7 weeks were spent on the new case study about “Redesigning the Malaysian bazaar experience” with collaboration with project partner from Pestle & Mortar Clothing, P&M creative director Mr Hugh Koh and operations director Mr Eddie Samad. They shared the origins of their organization and aspirations and relevant information were recorded using the Empathy map to scale down the focus area. We agreed that P&M aims to create a good experience for the user and thus, decided to find out more about what constitutes a “good experience”. To do this, we had to go to the ground to speak to the users.

After we have identified a specific “design gap” based on a user needs, we frame the problem in a way that allows it to identify solutions. After this stage, quantity trumps quality and we come up with as many ideas as we can to discover a solution where each idea is either a service or a product. Once we have decided on an idea, we build a prototype that will allow us to gauge user response and we iterate prototypes based on feedback received. Last but not least, we allow users to experience our prototype and record any questions, ideas or feedback that they have as this provides the information for the reiteration of our prototypes. Final presentation was conducted to the project partner for review and possible continuing working on the proposed idea with project partner if interested.

Apart from critical design thinking and problem solving, we get to chill during warm up and team sharing session. Warm up session is a quick 5 to 10 minute's wake-up activity where it is held before the class commences and after lunch time or whenever a team is feeling stress or confused. In addition, there will be a team sharing session held every time before class ends. In team sharing session, the selected team members of the week will get to introduce themselves and free to express their thoughts about anything from working life, politics to personal interest & experience. It was really fun and enjoyable to listen to everyone's opinions and stories and we even got the chance to watch a guitar live performance from a local artist, Mr Az Samad.

Ultimately, wild ideas are highly encouraged in Genovasi as they believe "What your mind can conceive and believe, it can achieve" quote by Napolean Hill. From this, we even came up with our own quote, "In Genovasi, where everything is possible!". Upon completion of the programme, qualified graduates will be offered with a certificate and the opportunity to gain practical experience through placement in Malaysia's top corporations, government ministries and agencies or government-linked companies (GLCs). The programme has one main prerequisite and that is, you have to be a graduate (a Bachelor's degree holder, or in your final year in obtaining it), your specialisation is immaterial. The programme is open to all fields and industries as long as you are keen to learn to innovate.

DUAL-STAGE BIOMETRIC-BASED ATTENDANCE LOGGING SYSTEM USING NEURAL NETWORK TECHNOLOGY

Liw Sun Hung, Dr Thang Ka Fei

INTRODUCTION

An attendance logging system is proposed to help universities and educational institutions to take accurate attendance of student. This system consists of two biometric-based verification stages which are speech and facial recognition. Meanwhile, Artificial Neural Network (ANN) is also used as the classifier to the two recognition modules in order to improve their robustness. The database is also developed for the attendance system in order to store student information and work as a server. The accuracy of the system as well as elapsed time for a student to take his/her attendance with the system will also be investigated and discussed.

ARCHITECTURE OF ATTENDANCE SYSTEM

The architecture of the proposed attendance logging system is illustrated in Fig 1. In this system, the student firstly has to go through the voice recognition module by selecting appropriate coordinates from the student list page. Next, the system will capture student facial image in order to take his/her attendance. Besides, Fig 2 shows the flow diagram of the attendance system.

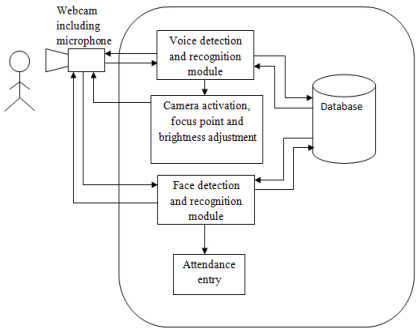


Fig.1. Architecture of attendance logging system

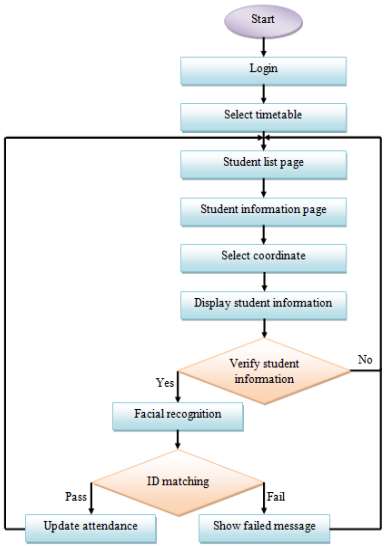


Fig.2 Flow diagram

DEVELOPMENT OF SPEECH RECOGNITION SYSTEM

The recorded speech signal will firstly undergo a low-pass filtering process. The filtered signal will be segmented as individual words by using end-point detection technique. Each extracted word is then undergone feature-extraction using MFCC as illustrated in Fig.3. Lastly, Neural Network is used as a classifier and is trained based on the extracted features.

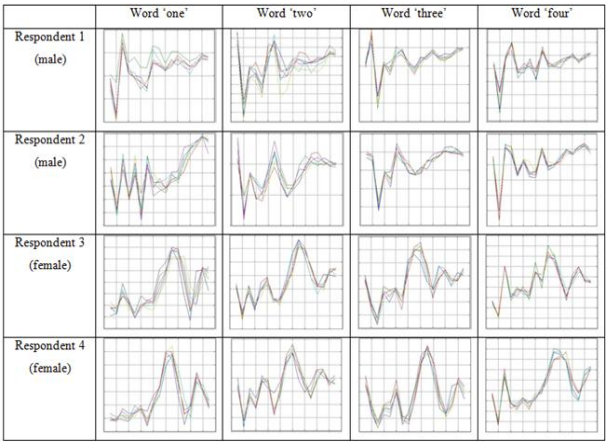


Fig.3. Extracted voice features

DEVELOPMENT OF FACIAL RECOGNITION SYSTEM

Firstly, the students facial image is captured and converted into grey scale. After that, 2-D wavelet transform will be applied to the image for feature extraction. Meanwhile, the resolution of the image is resized from 240x190pixels to 30x24pixels as shows in Fig.4. Finally, Neural Network (NN) is then used as a classifier and is trained based on the extracted features.

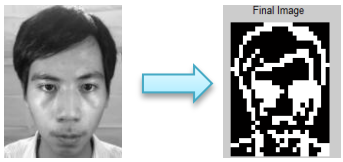


Fig.4. Feature extraction for facial image

DEVELOPMENT OF GRAPHICAL USER INTERFACE

A simple and clear GUI for the attendance system is developed by using MATLAB software in order to provide convenience for students to use it as illustrated in Fig.5.

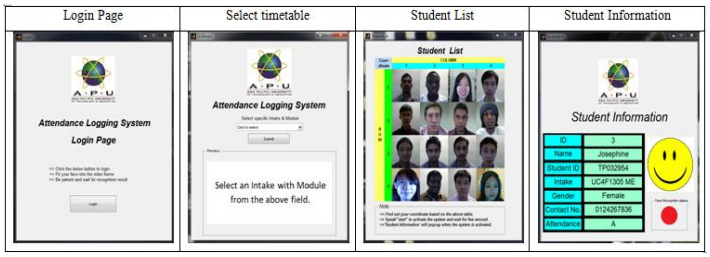


Fig.5. Attendance logging system GUI

CONCLUSION

The developed attendance system consists of two biometric-based verification stages that integrate with neural network technology. In real-time testing, the voice recognition module has higher recognition rate compare to the facial recognition module. A student will require around half a minute to take his/her attendance from the system.

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WIDEBAND AND REDUCED SIZE MICRO-STRIP ON-BODY ANTENNA FOR WIMAX AND LONG TERM EVOLUTION (LTE)

Ajmal Hussain Shah, Veeraiyah Thangasamy

Introduction

Antenna is an essential building block of any communication system. Since last decade, there has been remarkable growth in design and developments of antennas for wireless communication industry especially micro-strip antennas.

Wireless Body Area Networks (WBAN) has recently received great attention by researchers in the telecommunication industry due to its distinctive features i.e. miniaturized use in sensors for health care and military applications. WBAN devices are capable of achieving high data rates by exploiting low power. The concept of Micro-strip patch antennas was first introduced in 1953 but due to insufficient supply of suitable substrates the concept was not practically implemented [1]. Recently, Spiral, bowtie and broadband dipole antennas have been proposed, which fulfil the requirements of the Body Wearable antennas for VHF/UHF bands at 100 MHz and 250 MHz respectively [2]. In this article, design and analysis of a wideband and reduced size ON-Body Micro-strip antenna is presented.

Antenna Design

The parameters of the antenna are calculated at 3.5 GHz. Since the dielectric substrate has significant impact on both the radiation pattern and the impedance of a Micro-strip antenna. It is then essential to choose right substrate material for an antenna. Beside other electrical properties, dielectric constant and loss tangent are the most critical features when selecting substrate. In contrast, Blue Indigo Jean is light in weight and thus suitable substrate for the antenna. The proposed antenna dimensions are 30 x 35 mm^2 with the substrate material thickness of 0.8 mm, a tangent factor of 0.03, and a dielectric constant of 1.67.

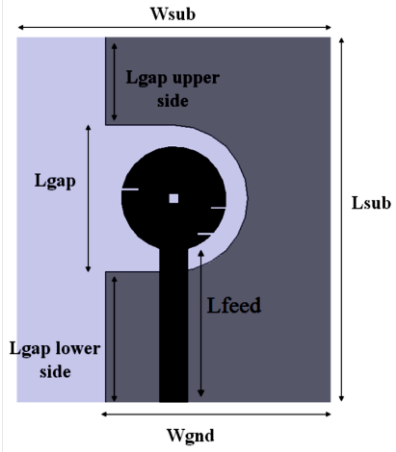

FIG 1. The Antenna Geometry

In practice, there are a couple of antenna feeding techniques. However, line feed technique possesses great features, and thus it is used. The line feed is 3 mm wide and 14.7 mm long and provides 50 Ω input impedance. To provide a perfect matching, Copper is used for the transmission line and the patch. The antenna geometry is shown in FIG 1. Partial ground technique is used to increase the bandwidth and the inverted T-slot is added on the ground plane enhancing the return loss and the bandwidth.

Simulation Results

The antenna is simulated and analyzed with using Return Loss (S_{11}), Bandwidth (BW), Radiation Pattern and Gain (S_{21}) at 3.5 GHz. The results show that there is remarkable bandwidth improvement. Beside 3.5 GHz resonant frequency, the antenna has been simulated at various WiMAX and LTE bands as well. Initially the transmission line width calculated as 3 mm and then reduced to 2.59 mm for better results. The width and length of the proposed antenna are 30 mm x 35 mm respectively . FIG 2 shows the comparative results of the return loss for the transmission line widths of 3 mm and 2.59 mm.

In the figure, a minimum return loss of -41.25 dB for 2.59 mm is shown. In FIG 3, a bandwidth of 4.3 GHz at 3.5 GHz resonant frequency for the transmission line width of 2.59 mm is evident.

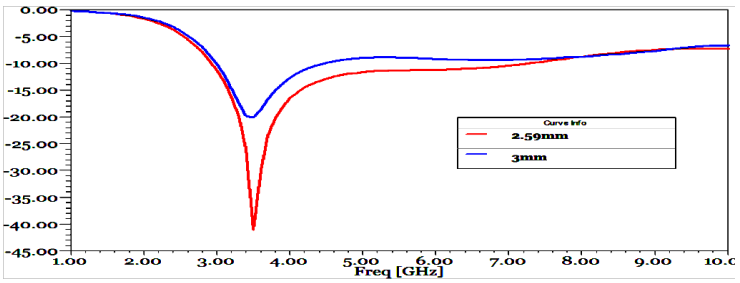

FIG 1. S_{11} Comparative results

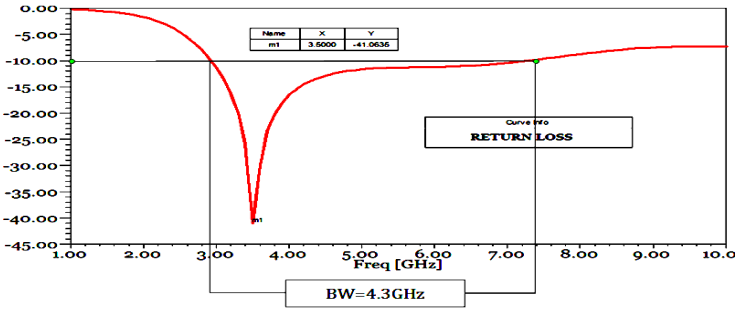

FIG 3. Bandwidth @ 3.5 GHz Resonant Frequency

TABLE I presents the performance evaluation of the proposed and the existing antenna [3] designs.

TABLE I: ANTENNA Performance Evaluation at 3.5 GHz

PARAMETER	Existing Design [3]	Proposed Design
Length	44mm	35mm
Width	44mm	30mm
Thickness	1mm	0.8mm
Bandwidth	210MHz	4.3GHz
Gain	5.68dB	3 dB
Return Loss	-29.5dB	-42.1 dB

Results clearly indicate that the proposed design not only enhances the bandwidth but also reduces the size of the antenna. This bandwidth enhancement is due to appropriate selection of the suitable dielectric substrate and the optimum antenna design procedure. Moreover, the return loss results satisfy the WiMAX and LTE standards as well.

Conclusion

A modified on-body Micro-strip patch antenna for WiMAX and LTE frequency bands has been proposed. The dimensions of the proposed antenna not only reduce the antenna size by 23.3 % but achieve a significant bandwidth improvement of 116% which is 4.3 GHz as well at 3.5 GHz resonant. Thus the proposed design enhances the bandwidth over the WiMAX and LTE frequency bands under the ISM band.

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Surface Quality Measurement Using Laser Technology for Lathe Machine

Sheragin Tavassoli, Suresh Gobee

1 INTRODUCTION

In the machine tool industry, the finished quality of objects being machined is important. For instance, the round surface of a piston inside a cylinder has to be smooth and flat in order for it to move up and down while causing minimum friction with the cylinder's body. Therefore it is necessary to monitor the surface roughness of such objects during production. The roughness of a surface can be defined as the displacement of the surface along a length or an area. Mathematically, roughness is expressed as the arithmetical mean roughness as shown in figure below and expressed by the following formula:

$$R_a = \frac{1}{l}\int_0^l |f(x)|dx$$

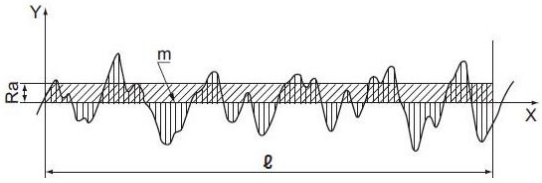

Figure 1 : Arithmetical Mean Roughness.

Where R_a is the arithmetical mean roughness, *l* is the sampling length and *f(x)* is the function of the height between peaks and valleys in the range of the sampling length *l*, respectively [1, 2].

Generally, roughness measurement systems are categorized into two methods; Contact method (A.K.A. Mechanical Profiler) and Non-contact. Contact methods use a stylus in contact with the object/work-piece for taking measurement. However in the Non-contact method, as the name indicates, the roughness of work-piece is measured without making any contact with it. This paper focuses on non-contact roughness measurement system based on scattering method.

2 METHODOLOGY

Based on the principle of scattering method, a U shaped design is developed to detect and measure the intensity of the reflected laser beam from the work-piece. A laser diode is positioned in an angle of 45° to strike a laser beam on the work-piece. A differential photodiode (shown in blue color) and two phototransistors (shown in green) are used to detect the angle of reflection of the laser beam as shown in Figure 2a.

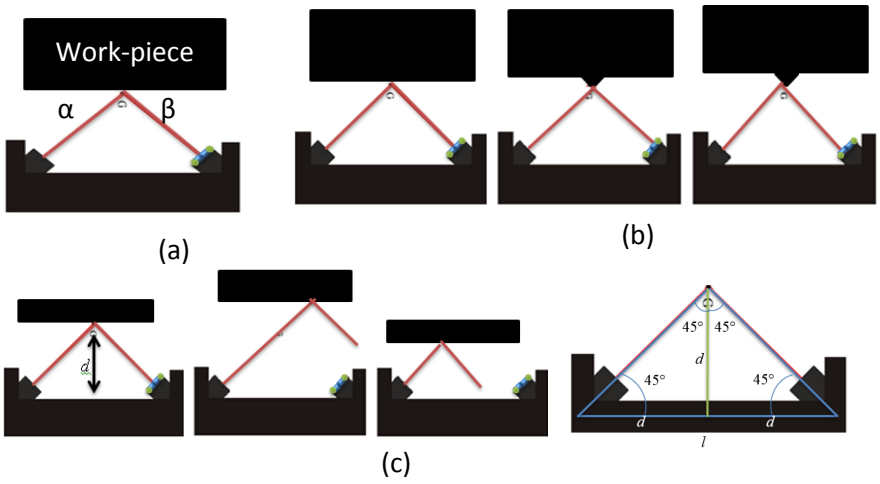

Figure 2: a) Design of U-shaped detector and work-piece. α is the incident angle and β is the reflected angle of the laser beam. b) Variation of angle of laser beam reflection on the detectors. c) From left to right: Correct distance between work-piece and head.

A differential photodiode is nothing but a double photodiode with extremely high homogeneousness and high photosensitivity separated with a distance of 0.09mm. Its outputs are measured differentially which produces positive and negative voltage whenever the reflected angle varies across each photodiode as shown in Figure 2b. The two phototransistors are positioned at each side of the differential photodiode to detect farther angles of reflection. The outputs of the phototransistors are measured differentially as well. Differential measurement is used to prevent the effects of surrounding lights and noises on the detectors. Moreover, it is important that this U-shaped design should have a specific distance from the work-piece which is fixed throughout the measurement. Figure 2c shows the importance of this matter. This distance *d* can be calculated through triangulation. As the incident/reflected point on/from the work-piece has to be in the center of the length (*l*) (between the two sides of the U-shaped design) and based on an Isosceles triangle; the distance *d* has to be half of *l* as shown in the Figure 2c. Furthermore, this U-shaped design (header) is attached to a power screw mechanism powered by a stepper motor that allows it to move forward and backward with an accuracy of 0.1mm through micro-stepping. Figure 3 below shows the design of the body of the abovementioned mechanism.

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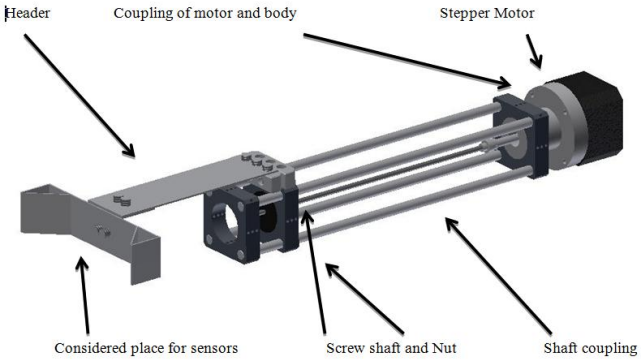

Figure 3: Design of the body of the system

4 SYSTEM OPERATION AND PROGRAM

A program is developed in LabVIEW to cover the whole operation of the system and a Data Acquisition Card USB-6008 from National Instruments (NI) is used to process the inputs and outputs of the system. The developed program allows the user to have a user interface system to key in the nominal diameter of the work-piece and observe the position of the header as well as monitoring and recording the variation of voltages caused by the variation of the angle of reflection across the optical sensors. The outputs of optical sensors are then processed through several calculations to convert the electrical signals to roughness.

5 ROUGHNESS CALCULATIONS

Data on the measuring of the surface roughness of a reference work-piece with known roughness is collected and recorded. The Data Acquisition card (DAQ) takes measurements at a sampling rate of 1 kHz (1000 points per second). By use of a statistics block, the mean of the data is taken for every 100ms to reduce the small fluctuations in data and stabilize them. A mathematical relation between voltage signals and roughness is then developed based on the analysis of the results in comparison with the given actual roughness of the specimen. Figure 4 below shows the specimen used for measurement. The specimen has 8 parts machined at the different cutting speeds and feed rates. Measurements taken of the specimen are shown in the Figure 5 with the respective section number (shown in red color). It is difficult to get the exact function of a roughness mathematically. Therefore Taylor's approximation is used to estimate the behavior of its function. For round work-pieces, the roughness function is dependent on two parameters: the feed rate and the cutting speed. In the finishing stages of machining, these two parameters are kept constant for better finishing quality. An arithmetical mean is applied on the function of measured voltage to get the roughness of each section. Based on the data collected a formula of the function is found and applied on the output signal of optics to convert the voltage to roughness.

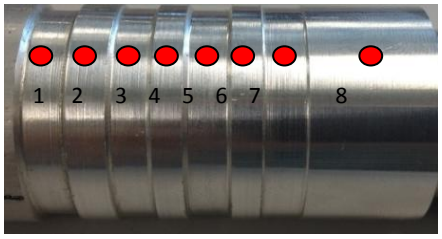

Figure 4: Reference work-piece that has 8 different roughness on each section

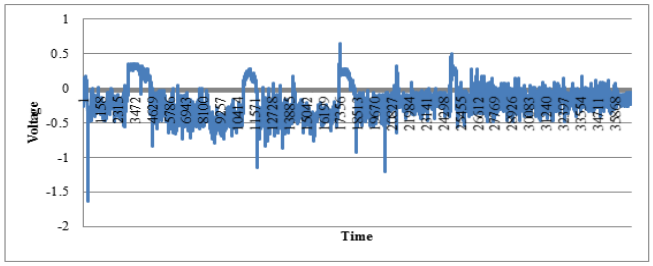

Figure 5: a. Recorded measurement of surface roughness at a sampling rate of 1KHz. b. Arithmetical Mean of the measurement graph

6 DISCUSSIONS AND ANALYSIS

Inaccuracy of system

Several measurements have taken place to ensure the operation, repeatability and accuracy of the system, the system has an inaccuracy of 3.96% at most. The inaccuracy of the system could be reduced by the use of more optical sensors placed at the reflection part to cover a bigger area as the system has certain limitations.

7 CONCLUSION

The surface quality measurement system using laser technology for lathe machines provides the advantage of sufficient measurement systems for the machine industry by the use of a simple and cheaper mechanism compared to existing measurement systems. The system can be easily mounted on the carriage of a lathe machine that moves along the length of a work-piece and can easily take the online and offline measurement with an accuracy of 96.4%.

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The School of Engineering is proud to announce that the 4 programmes offered have been fully accredited by the Board of Engineers Malaysia (BEM) via the evaluation undertaken by the Engineering Accreditation Council of Malaysia (EAC). These degrees are now recognized and approved under the Washington Accord. This recognition allows for students who have qualified from these 4 programmes to be on the same qualifying platform as engineering degrees offered in 13 other countries in terms of pursuing post graduate studies or seeking job opportunities at these 13 countries. These countries are Australia, Canada, Chinese Taipei, Hong Kong, Ireland, Japan, Korea, Malaysia, New Zealand, Singapore, South Africa, Turkey, the United Kingdom, and the United States. Recognition by the Board of Engineers Malaysia (BEM) allows for APU Malaysian engineering graduates to register themselves upon as Graduate Engineer as start towards a pathway to becoming a Professional Engineer. This same process is applied for all international students in which registration with the local country's professional bodies is now officially permitted via this accreditation approval by BEM and recognition under the Washington Accord.

The School of Engineering would like to thank the following parties;

- The University Management for supporting student activities and academic changes proposed.
- Lecturers who supported in carrying out their duties in line with the curriculum and programme requirements by EAC.
- Admin and laboratory staff for the continuous application of quality assurances on documentation or assessment processes and the availability of learning resources.
- All the engineering students who supported during the EAC visit interviews.
- Industry Advisory Panel members and External Examiners for sharing their industrial expertise and academic inputs.

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