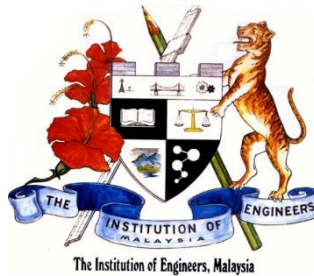


ENGINEERS INSIGHT



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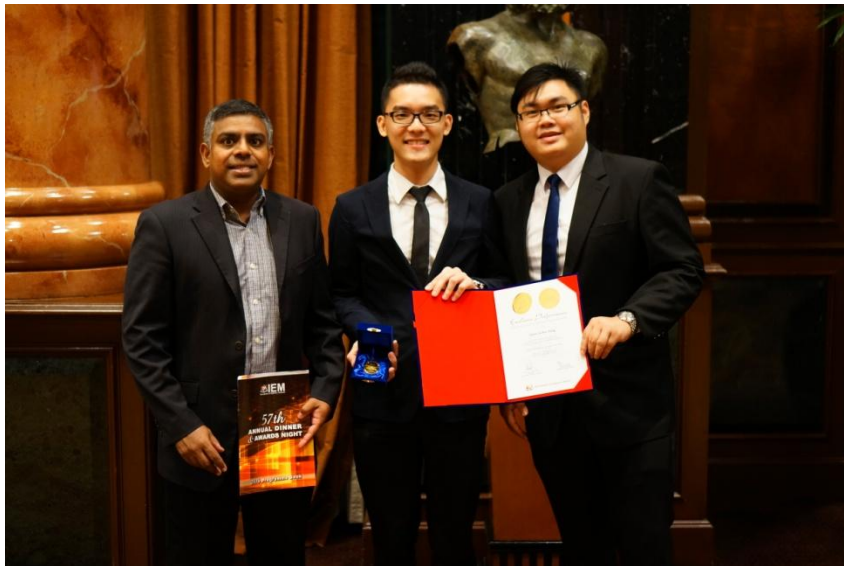


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OF INFORMATION TECHNOLOGY

SCHOOL OF ENGINEERING

APRIL 2016

VOLUME 14



APU Engineering Student Wins 2016 IEM Gold Medal

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If you would like to be a part of the 'Engineers Insight' editorial team or have an article / paper published please contact: shankar@apu.edu.my

'Engineers Insight' is a quarterly newsletter 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.

In recent years, a buzzword known as the “Internet of Things” has been highlighted as one of the upcoming technological trends around the world. As Internet of Things (IoT) is built upon engineering devices and systems, it is therefore beneficial for engineering students to understand what is IoT and its applications. With that, this paper is an adaptation of a well-written article by Chui, Löffler and Roberts (2010) of McKinsey & Company that explains what is IoT and its applications. Do enjoy the adapted article below:-



Information travels along familiar routes. Proprietary information is lodged in databases and analysed in reports. Information also originates externally—gathered from public sources, harvested from the Internet, or purchased from information suppliers. But the predictable pathways of information are changing: the physical world itself is becoming a type of information system. In what’s called the Internet of Things (IoT), sensors and actuators embedded in physical objects—from roadways to pacemakers—are linked through wired and wireless networks, often using the same Internet Protocol (IP) that connects the Internet. These networks churn out huge volumes of data that flow to computers for analysis. There are six distinct type of emerging applications based on IoT, which fall in two broad categories: first, information and analysis and, second, automation and control:

Information and Analysis

As the new networks link data from products, company assets, or the operating environment, they will generate better information and analysis, which can enhance decision making significantly. Some organizations are starting to deploy these applications in targeted areas, while more radical and demanding uses are still in the conceptual or experimental stages.

Tracking Behaviour

When products are embedded with sensors, companies can track the movements of these products and even monitor interactions with them. Business models can be fine-tuned to take advantage of this behavioural data. One well-known application of the IoT involves using sensors to track RFID (radio-frequency identification) tags placed on products moving through supply chains, thus improving inventory management while reducing working capital and logistics costs. In the aviation industry, sensor technologies are spurring new business models. Manufacturers of jet engines retain ownership of their products while charging airlines for the amount of thrust used. Airplane manufacturers are building airframes with networked sensors that send continuous data on product wear and tear to their computers, allowing for proactive maintenance and reducing unplanned downtime.

Enhanced Situational Awareness

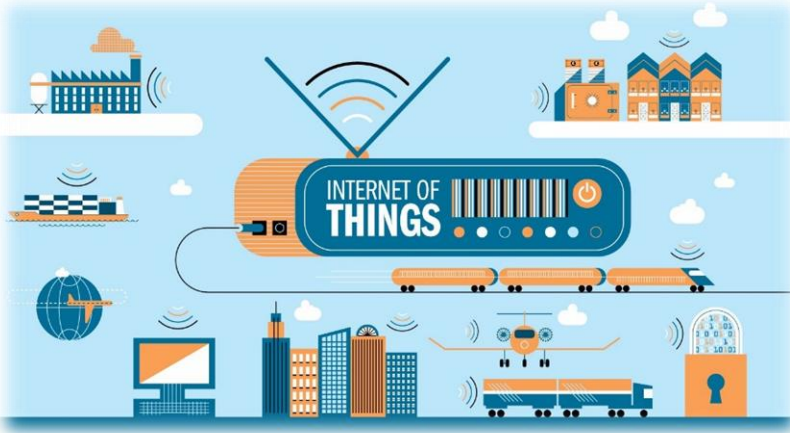
Data from large numbers of sensors, deployed in infrastructure (such as roads and buildings) or to report on environmental conditions (including soil moisture, ocean currents, or weather), can give decision makers a heightened awareness of real-time events, particularly when the sensors are used with advanced display or visualization technologies. Security personnel, for instance, can use sensor networks that combine video, audio, and vibration detectors to spot unauthorized individuals who enter restricted areas. Logistics managers for airlines and trucking lines already are tapping some early capabilities to get up-to-the-second knowledge of weather conditions, traffic patterns, and vehicle locations. In this way, these managers are increasing their ability to make constant routing adjustments that reduce congestion costs and increase a network’s effective capacity.

Sensor-Driven Decision Analysis

IoT can also support longer-range, more complex human planning and decision making. The technology requirements, tremendous storage and computing resources linked with advanced software systems that generate a variety of graphical displays for analysing data have risen accordingly. In the oil and gas industry, for instance, the next phase of exploration and development could rely on extensive sensor networks placed in the earth's crust to produce more accurate readings of the location, structure, and dimensions of potential fields than current data-driven methods allow. The payoff: lower development costs and improved oil flows. In health care, sensors and data links offer possibilities for monitoring a patient's behaviour and symptoms in real time and at relatively low cost, allowing physicians to better diagnose disease and prescribe tailored treatment regimens.

Automation and Control

Making data the basis for automation and control means converting the data and analysis collected through IoT into instructions that feedback through the network to actuators that in turn modify processes. Closing the loop from data to automated applications can raise productivity, as systems that adjust automatically to complex situations make many human interventions unnecessary.



Process Optimization

Some industries, such as chemical production, are installing legions of sensors to bring much greater granularity to monitoring. These sensors feed data to computers, which in turn analyse them and then send signals to actuators that adjust processes—for example, by modifying ingredient mixtures, temperatures, or pressures. Sensors and actuators can also be used to change the position of a physical object as it moves down an assembly line, ensuring that it arrives at machine tools in an optimum position (small deviations in the position of work in process can jam or even damage machine tools). This improved instrumentation, multiplied hundreds of times during an entire process, allows for major reductions in waste, energy costs, and human intervention.

Optimised Resource Consumption

Networked sensors and automated feedback mechanisms can change usage patterns for scarce resources, including energy and water, often by enabling more dynamic pricing. Utilities such as Enel in Italy and Pacific Gas and Electric (PG&E) in the United States, for example, are deploying “smart” meters that provide residential and industrial customers with visual displays showing energy usage and the real-time costs of providing it. (The traditional residential fixed-price-per-kilowatt-hour billing masks the fact that the cost of producing energy varies substantially throughout the day.) Based on time-of-use pricing and better information residential consumers could shut down air conditioners or delay running dishwashers during peak times. Commercial customers can shift energy-intensive processes and production away from high-priced periods of peak energy demand to low-priced off-peak hours.

Complex Autonomous Systems

The most demanding use of the IoT involves the rapid, real-time sensing of unpredictable conditions and instantaneous responses guided by automated systems. This kind of machine decision making mimics human reactions, though at vastly enhanced performance levels. The automobile industry, for instance, is stepping up the development of systems that can detect imminent collisions and take evasive action. Some companies and research organizations are experimenting with a form of automotive autopilot for networked vehicles driven in coordinated patterns at highway speeds. This technology would reduce the number of “phantom jams” caused by small disturbances (such as suddenly illuminated brake lights) that cascade into traffic bottlenecks.

Reference:

Chui, M, Löffler, M and Roberts, R. (2010) ‘The Internet of Things’, McKinsey Quarterly, March 2010. Available at: <http://www.mckinsey.com/industries/high-tech/our-insights/the-internet-of-things> (Accessed: 19 April 2016).

Innovative Designs toward Sustainable Products – Series 1

Sustainable products have always been the driving force in cultivating Innovative ideas. The product that is said to be sustainable through innovation is the design of the bee hive harvesting system.

Let's walk through the traditional way of harvesting honey from a bee hive. Harvesting honey from a bee hive on the trees, usually is done at night with smoking. Then people started farming and developed artificial bee hives to harvest honey. They usually smoke the area and use safety suits and face nets to avoid getting stung by the bees as shown in the Figure 1. Usually the honeycombs are placed in a cylinder which rotates at high speed to extract the honey as shown in Figure 2. However the honey that you get after this process will contain pieces of combs, bee body parts or at times the bee itself. They usually use cloth or strainers to remove the unwanted elements from the honey as shown in Figure 3.



Figure 1 - Honey comb removal



Figure 2 - Honey removal from the comb



Figure 3 - Straining Process

However the latest sustainable device to harvest honey made the breakthrough into bee farming and has significantly improved the process of honey extraction. This product is call "Flow™ Hive" as shown in Figure 4, which was designed and developed by father-son, Stuart and Cedar Anderson. This idea all started because Cedar felt bad about bees being crushed during the honey harvest. He was also sick of being stung or having to spend a whole week harvesting his honey.

So you may ask "what is so great about the Flow hive", fine, let me walk you through the entire working principle of the Flow hive. The Flow hive frame fits into any standard "langstroth super" which consist of 8 or 10 frames as shown in Figure 5. Two simple doorways are cut at one end of the box to allow access for honey collection, end frame observation and tool access for operation.



Figure 5 Flow Hive

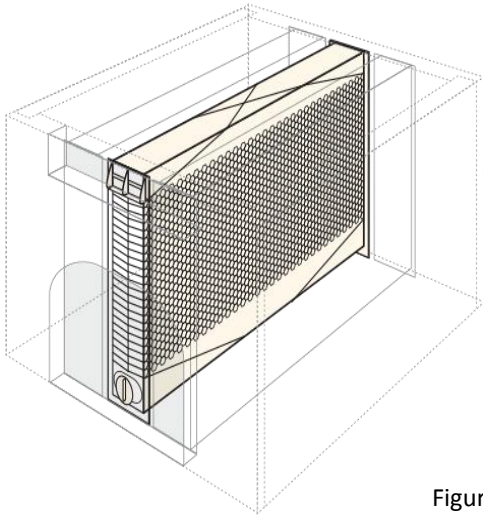


Figure 6 Flow hive frame

The flow frame consist of partly formed honeycomb cells as shown in Figure 6. The bees will complete the comb with their wax till they fill the cells with honey, before finally capping the cells.

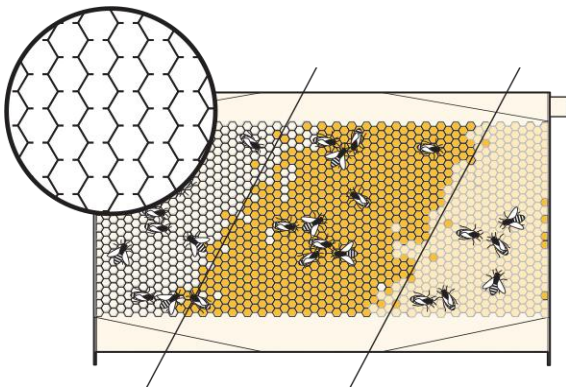


Figure 7 Honeycomb cells

When the frame is full and ready to harvest you can simply remove the tool cap and tube cap, then insert tube into the hole and also insert the tool into the bottom slot. Once this done, the tool 90° is rotated downwards as shown in Figure 7.

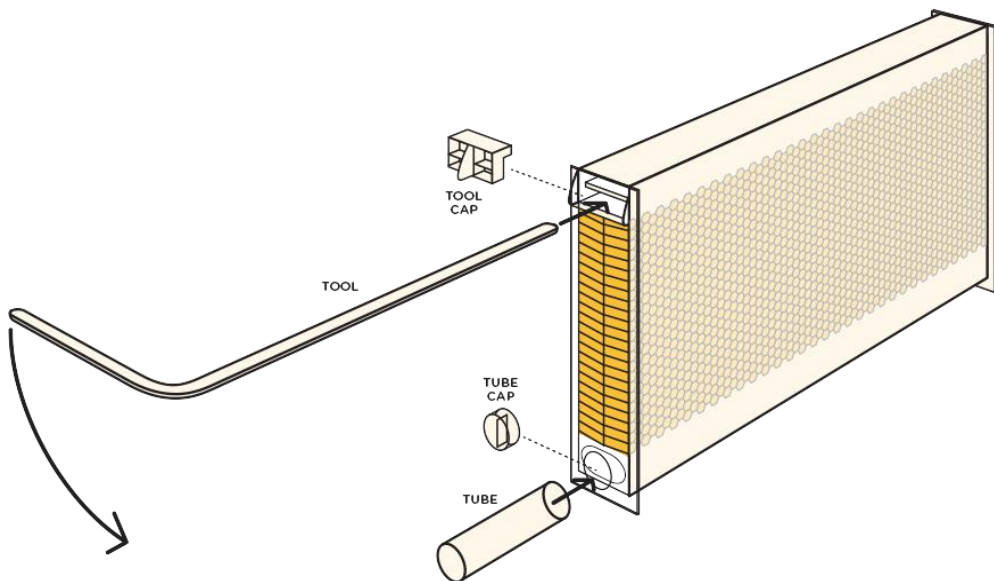


Figure 8 Tool mechanism

This will make the cell inside of the honeycomb to split as shown in Figure 8. This turning will impact the channels for the honey to flow down as shown in Figure 9. However, the bees will remain undisturbed on the surface of the comb.

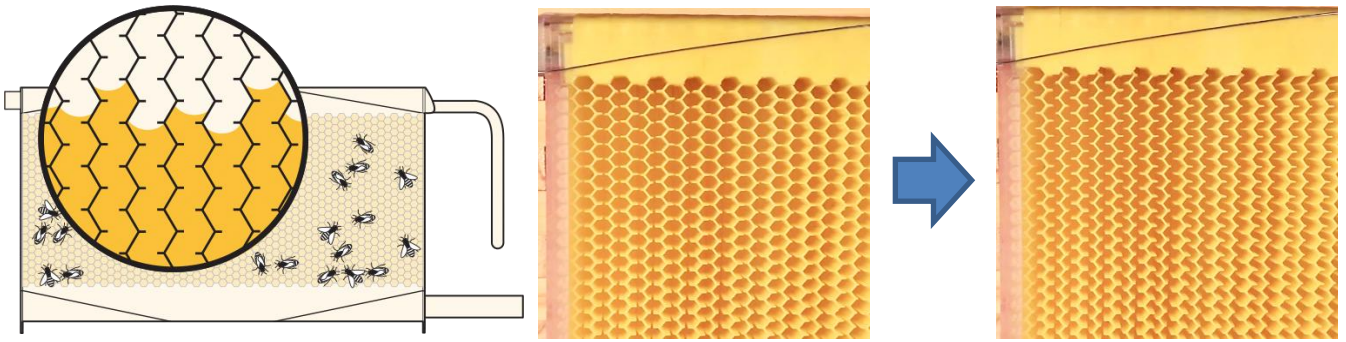


Figure 9 Honeycomb Cells

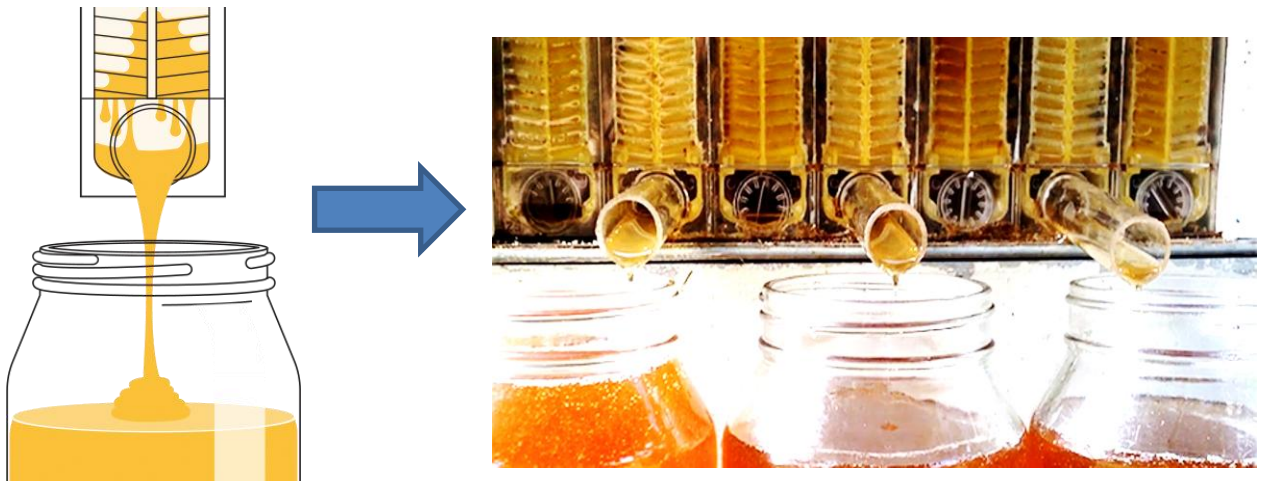


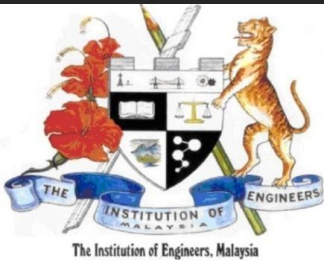
Figure 10 Honey Flow

You have now walked through the entire process of harvesting honey using the Flow hive product so “what make this product sustainable”?. This product does not require anyone to lift heavy boxes for the removal of the honeycombs and furthermore it reduces the labour and cost. Additionally we do not need protective clothing and smoking. It also reduces the harvesting and refining time. Last but not least, it is easy to maintain as this entire product is designed using the “Design for Disassembly” concept.

*For more details, watch a video on:
<http://www.honeyflow.com/gallery-videos/videos/p/60#Z54bL6kkyOI>

Reference:
 Beelntentive Pty Ltd. (2016), *FLOW*, <http://www.honeyflow.com/> [10 April 2016]

Vickneswari A/P Durairajah



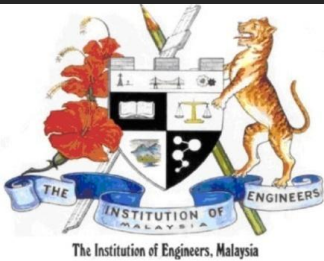
SEMINARS & WORKSHOPS

INTRODUCTION TO REPROGRAMMABLE ROBOTICS (RERO)



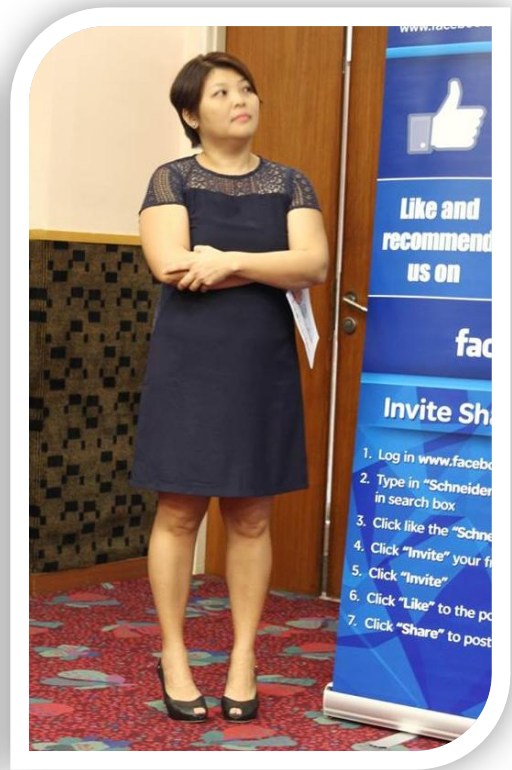
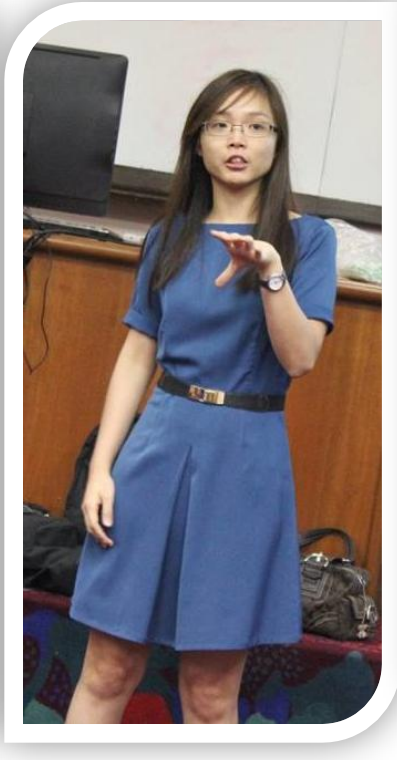
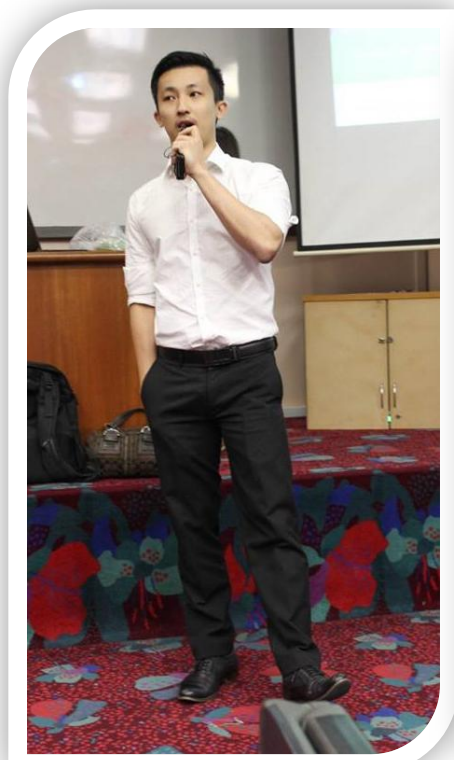
RERO is a multipurpose robotic unit which allows the consumer to redesign/program. RERO involves simple steps as constructing, connecting and playing, as hardware parts are specifically design to for connectivity depending on the consumer needs. Significantly, RERO was specially designed towards ease of programming, through teaching mode or through timeframe software programming. On January 19, 2016 a workshop on Introduction to RERO was conducted by Ms Cheryl Ng which was well received by twenty three students and one staff from SoE.



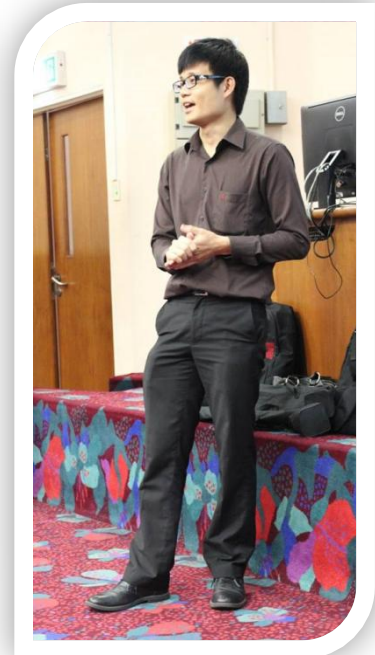


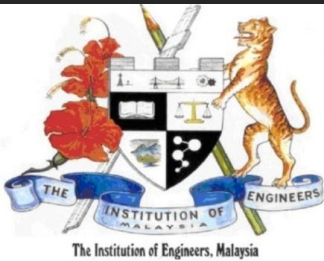
SEMINARS & WORKSHOPS

GO GREEN IN THE CITY BY SCHNEIDER ELECTRIC



Go Green in the City is the ultimate global student competition conducted by Schneider Electric for sustainable energy solutions. On January 28, 2016 Schneider presented an introductory talk on the international Go Green in the City competition. Forty two students along with eight academic staff members attended the talk. The students were briefed on the competition criteria and the benefits of participating in the competition.





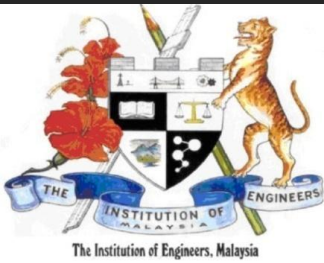
SEMINARS & WORKSHOPS

OPTICAL FIBER TRANSMISSION & THE 40/100G GENERATION



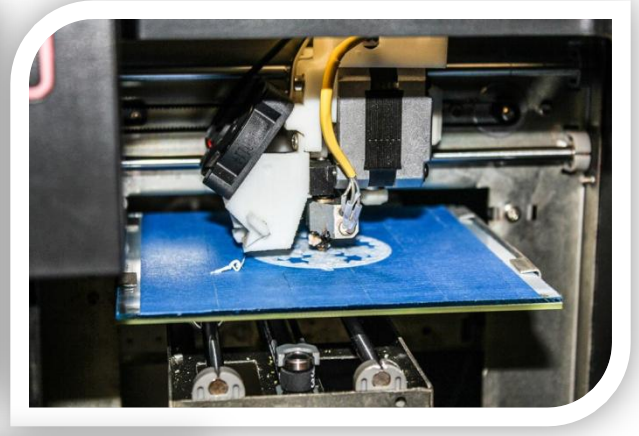
Commscope is a global leader in infrastructure solutions for communications networks and it helps companies all around the world design, build and manage their wired and wireless networks. Commscope delivers innovative fiber connectivity solutions that is required to power the high-speed and high-bandwidth networks of tomorrow. On January 29, 2016 Mr Lau Chin Jien, Senior Application Engineer of Commscope, gave a technical talk on Optical Fiber Transmission and the 40/100G Generation. Eighteen students and one staff from the Telecommunication Engineering programme attended the talk.





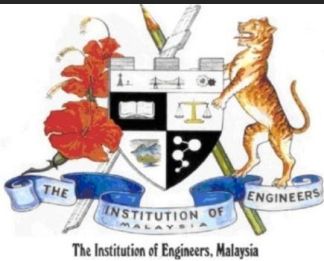
SEMINARS & WORKSHOPS

AUTOCAD AND 3D PRINTING



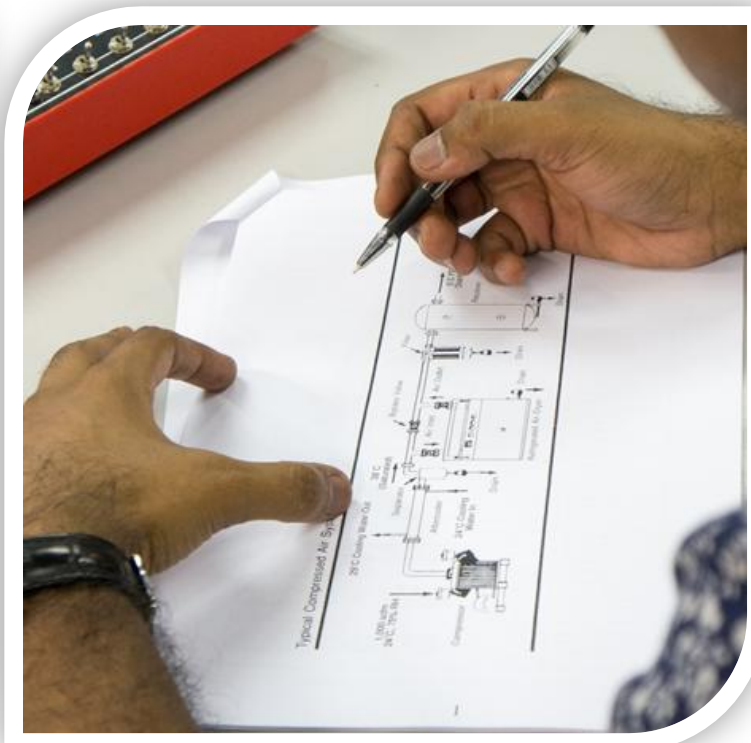
3D printing is an additive technology in which the device is connected to a computer to enable printing of a solid object has quickly become an essential tool in the market. On March 2, 2016 Mr. Vyasa Kandasamy conducted a hands on training and workshop on AutoCAD and 3D printing. Fifteen students and one staff from SoE attended the workshop.





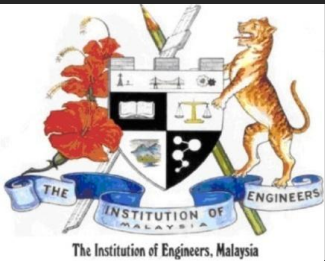
SEMINARS & WORKSHOPS

INTRODUCTION TO PNEUMATICS



On March 19, 2016 a workshop on the Introduction to Pneumatics was conducted by Mr. Erik Selvanayagan of SMC Pneumatics in association with the Malaysian Automation Technology Association (MATA). Eighteen students and two staff from SoE attended the introductory workshop on the technology, application and best industrial practices related to pneumatics.





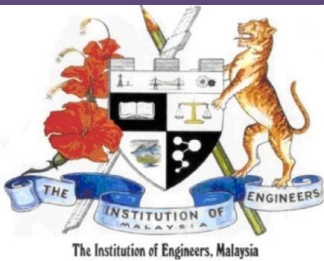
SEMINARS & WORKSHOPS

ANALYSIS OF ELECTRIC CIRCUITS WITH MATLAB & SIMULINK



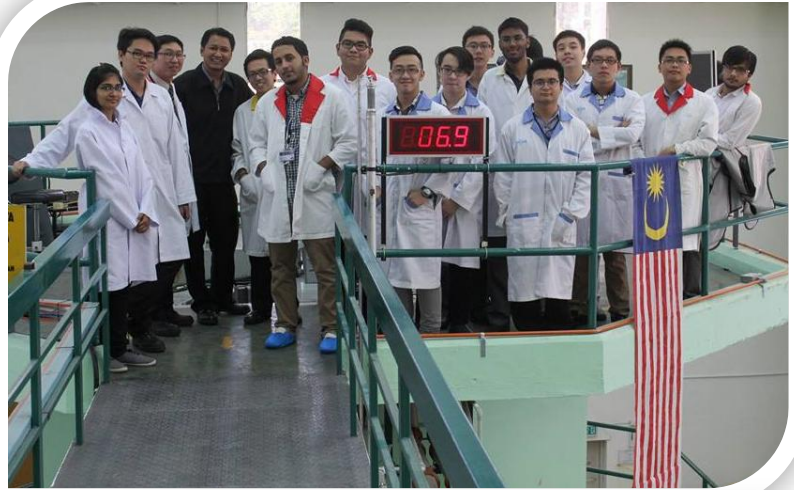
Electrical Circuit Analysis serves as a gateway to all electrical and electronics engineering curriculums across the globe. On March 26, 2016 a workshop on Analysis of Electric Circuits using Matlab & Simulink was conducted by Mr. Shankar Duraikannan. The objective of the workshop was to engage the students in learning circuit analysis through programming and circuit simulation. Twenty engineering students attended the workshop.





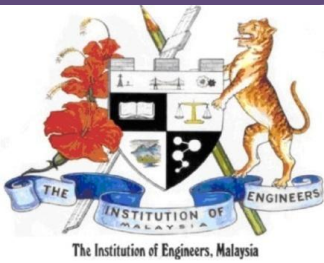
INDUSTRIAL VISITS

Malaysian Nuclear Agency



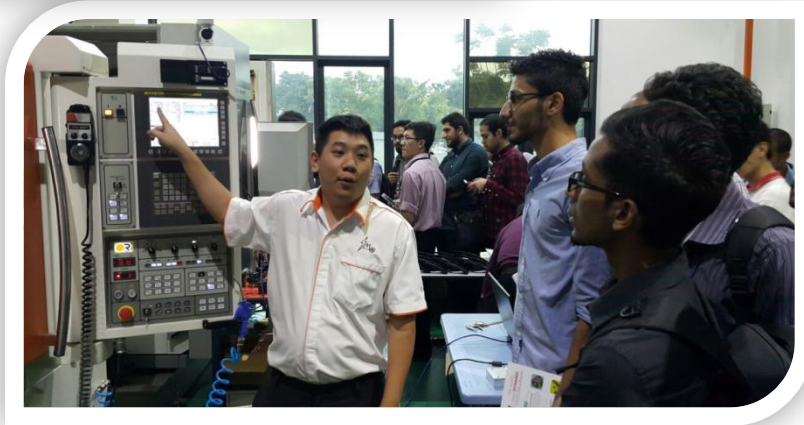
The establishment of Malaysian Nuclear Agency (Nuclear Malaysia) plays a significant role in the development of nuclear science and technology in Malaysia. On January 28, 2016 thirty one students accompanied by two staff from SoE visited the Malaysian Nuclear Agency centre in Bangi and had an opportunity to have a close examination of the nuclear reactors.





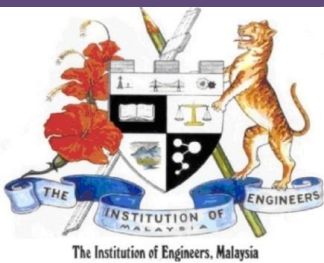
INDUSTRIAL VISITS

IME CNC Center



IME Group is a prominent and esteemed player in the CAD | CAM | CAE and 3D solutions arena. IME Group has a total of seven subsidiaries with more than 100 employees who are dedicated and skilful in handling various solutions for Product Design (CAD), Product Validation (CAE), CAM Solutions, Reverse Engineering (RE) products, Rapid Prototype (RP) solutions. Meanwhile IME also specializes in providing consultancy services, technical support, training and certification to the Malaysian engineering and manufacturing industries, universities, polytechnics and other institution. On February 25, 2016 twenty students accompanied by three staff members visited the IME CNC center.





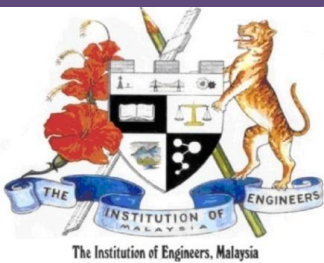
INDUSTRIAL VISITS

Seagate Industries Sdn Bhd, Penang



All participants of this trip to Penang Island arrived at APU around 4am and the van left the university grounds around 4:30am. The participants which includes 2 lecturers and 7 students arrived at the first destination which was SEAGATE around 10am and was first welcomed by Penang Seagate's Mr AS Khor and the staff members. The participants were first led to the meeting room and were given refreshments. Moreover, a speech on what Seagate is about and what it does was given by Mr AS Khor. The presentation on the business plan and growth for the Seagate Company was presented by Mr. Tan Leong Hooi, CEO. The branch that was visited by the participants was the Headquarters and the branch that manufactures sliders for the hard disc. The different products and details of the product was also shown to the participants. Seagate Malaysia has achieved the production of 100 billion sliders. The participants were shown around the facility of Seagate by Mr. AS Khor whereby the facility includes a gym, cafeteria and the manufacturing process of the sliders. A few of the manufacturing processes of the slider from the waver which is a disc shape was witnessed. After which it is cut into bar shape and then into a single block size. Whereby if there is any faults in any of the sliders, it can be traced back exactly to the exact slider as each slider has a serial code. If the slider passes the inspection, it is send to the cleaning process which is in the yellow room for the slider which is also known as a clean room. After the tour of the facility, lunch was provided by Seagate to the participants before they embarked to the next location.





INDUSTRIAL VISITS

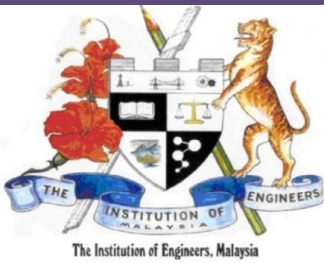
Seagate Industries Sdn Bhd, Penang



The participants of the trip left Seagate around 1pm and they headed to the next location on the agenda which was the Penang Peranakan Mansion. The participants was given a tour around the mansion by a typical Nyonya elderly woman who was the tour guide. Moreover, the history of BaBa and Nyonya was explained by the tour guide. Furthermore they were shown around the mansion and shown how Baba and Nyonya people lived. After the tour, the participants were given free time to move about the mansion and time to buy souvenirs. After the participants were done with the Penang Peranakan Mansion, they were showed around the old streets of Penang and the mural arts of the streets. The participants moved on to the next location on the agenda which was Fort Cornwallis which was the place where Francis Light defended Penang from the invaders. The participants also visited the chapel inside the fort where a movie about the history of the fort was shown. Lastly, the participants were brought to Kek Lok Si Temple as the last destination. Around 7pm, the participants left the island and headed back to Kuala Lumpur and arrived around 12:30am. The group included five students from SoC, two students from SoE and two lecturers .



Ngie Kok Sin



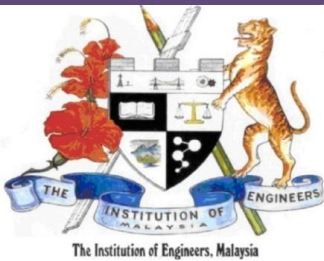
INDUSTRIAL VISITS

MEASAT



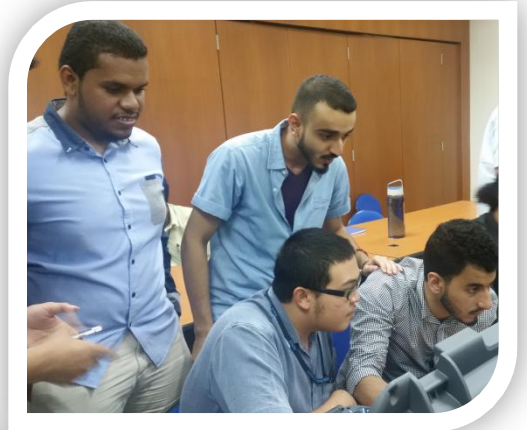
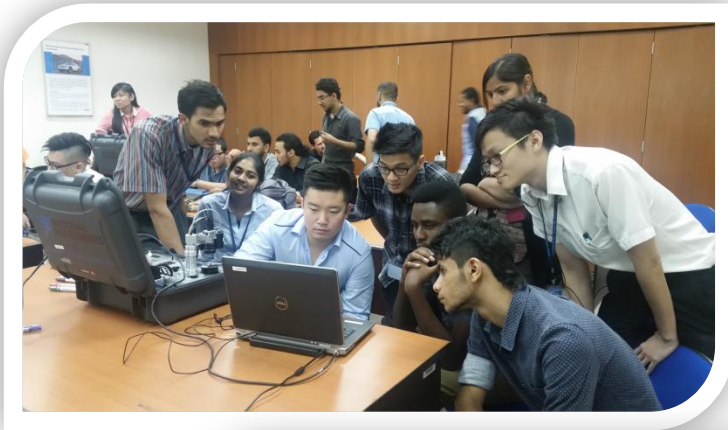
The MEASAT group is a premium supplier of services to leading broadcasters, Direct-To-Home (DTH) platforms and telecom operators. With a capacity across six (6) communication satellites, MEASAT provides satellite services to over 150 countries representing 80% of the world's population across Asia, Middle East, Africa, Europe and Australia. On March 22, 2016, twenty four students from the Telecommunication Engineering programme accompanied by three staff visited MEASAT teleport and broadcast center in Cyberjaya.





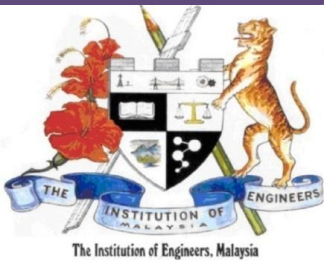
INDUSTRIAL VISITS

National Instruments Academic and Innovation Nucleus NI-AIN



The NI-AIN innovation nucleus is geared towards enabling and supporting the building of a “Test and Measurement Innovation Hub” in the industrial corridors of Malaysia. On March 22, 2016, twenty four students accompanied by three staff attended the cRIO Hands-On Seminar Onsite in NI-AIN.





INDUSTRIAL VISITS

EPE Switchgear Sdn Bhd



EPE was established in 1972 as Electrical Power Engineering Sdn Bhd to manufacture and market electrical switchgear & power distribution product / equipment. On March 24, 2016, nineteen students of Electrical & Electronic Engineering programme accompanied by one staff visited EPE Switchgear facility.

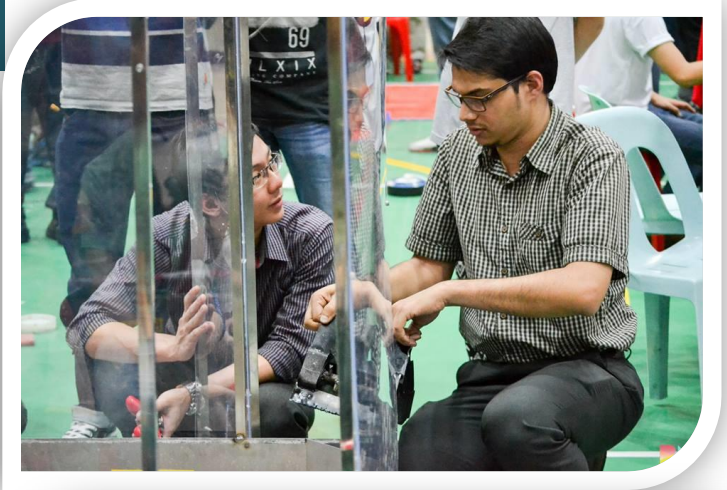




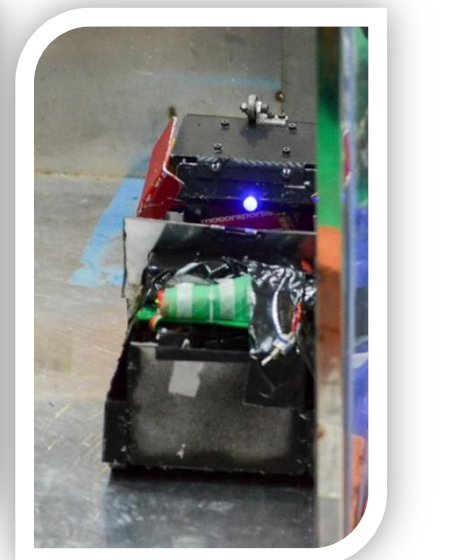
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SOE COMPETITIONS

Malaysian Robotics Championship



MRC 2016 offered robotics hobbyist and Malaysia's students an opportunity to learn by means of a friendly competition against their peers where they took responsibility for the design, assembly, and performance of a battle robot that will fight till the end against an opponent's robot in a custom designed game field. The SoE robotics participated in the competition.



2016 IEM GOLD MEDAL



APU Engineering graduate, Andrew Teh Boon Kheng, was awarded the prestigious IEM (Institute of Engineers Malaysia) Award in conjunction of the 57th IEM Annual Dinner held on 16th April 2016.

The IEM Gold Medal is awarded to the best overall final year Engineering student in a local Institution of Higher Learning.

The Institution of Engineers, Malaysia (IEM) was established in 1959. Membership of the Institution is currently about 28,000 and the growth rate is about 10% per annum making it one of the largest professional organization in the country. In order to support the needs of members, the IEM has 8 Standing Committees to attend to the different administrative functions of the Institution. To support the multidisciplinary needs of engineering practice, there are 16 Technical Divisions and 4 Special Interest Groups to look after and to organize activities for the different disciplines. There is also a Young Engineer Section and Women Engineers Section that caters exclusively to the younger members and women engineers respectively.

Andrew Teh having qualified as a Mechatronics Engineer is currently employed as an Sales & Application Engineer at KEYENCE Sdn Bhd. KEYENCE is an innovative leader in the development and manufacturing of industrial automation and inspection equipment worldwide. Their products consist of code readers, laser markers, machine vision systems, measuring systems, microscopes, sensors, and static eliminators.

Having achieved this award 3 years running is a result from the strength of the engineering curriculum offered and the dedication of the academicians who have constantly delivered sound technical knowledge to all APU engineering students. A lot of credit also goes to how the School of Engineering emphasizes on the quality of delivery which has been managed in a strategic and focused manner by the Head, Dr Thang Ka Fei.

APU's past winners who all now excelled in the industry were Chu Yee Chaw (2014) and Tan Chin Sern (2015).

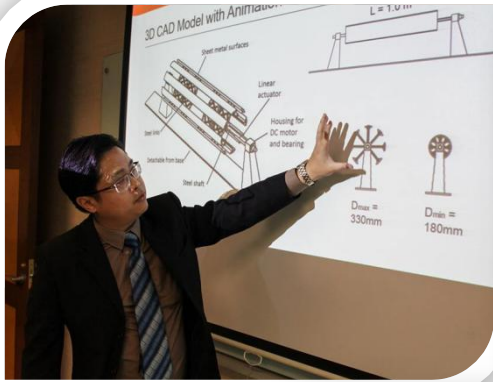
Prof Dr Ir Vinesh Thiruchelvam



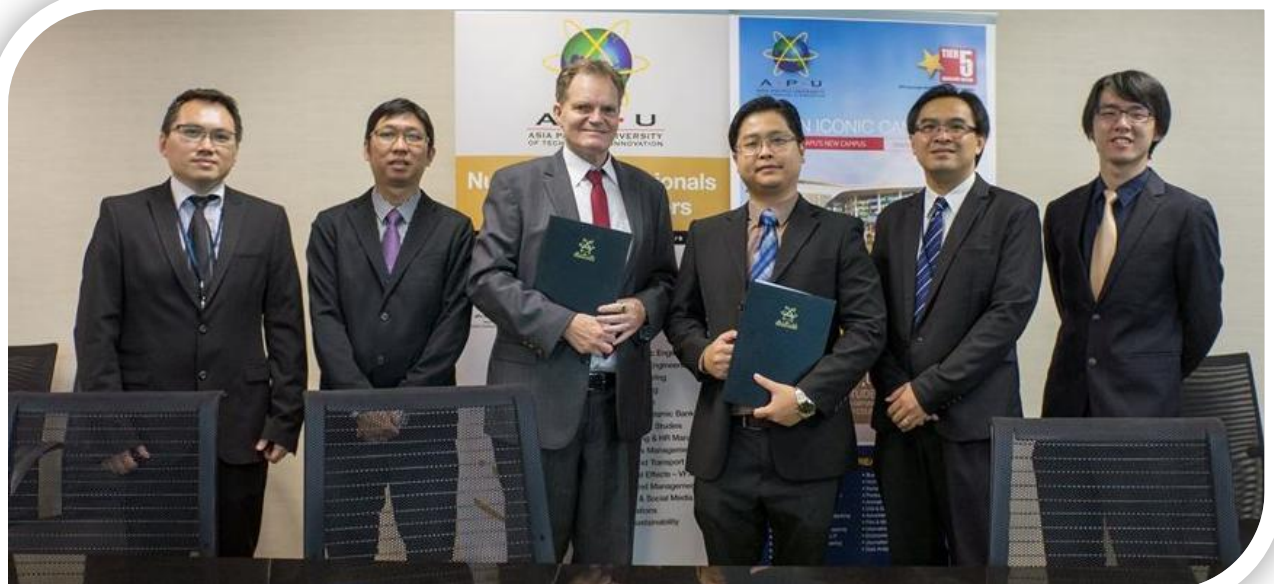
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SCHOOL OF ENGINEERING

SOE COLLABORATIONS

Memorandum of Agreement (MoA) with LCC Industrial Supply and Engineering Sdn Bhd



LCC is an supplier of industrial hardware solutions and engineering services to industrial manufacturers and producers. The products of LCC range from tools and machinery, pipes and fittings, static equipment, rotating equipment and fiber glass reinforced plastics. A Memorandum of Agreement (MoA) with LCC was signed to undertake collaborative projects, prototype development and publications.





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SOE CONFERENCES

SoE @ ICMIGM 2015, Erode Sengunthar Engineering College, India



An International Conference on “Modern, Intelligent and Green Manufacturing- ICMIGM 2015” was organized by Department of Mechanical Engineering, Erode Sengunthar Engineering College, India jointly with APU on December 11-12, 2015 as a part of MoU signed in 2013. Mr Arun Seeralan represented the School of Engineering at the conference. Post the conference the renewal of the MoA for 2016 /17 was signed.

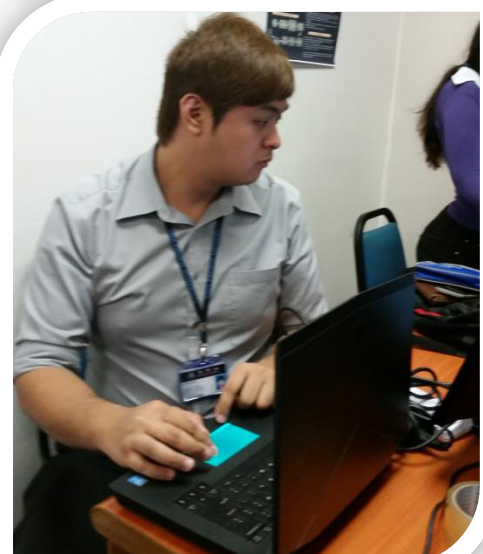
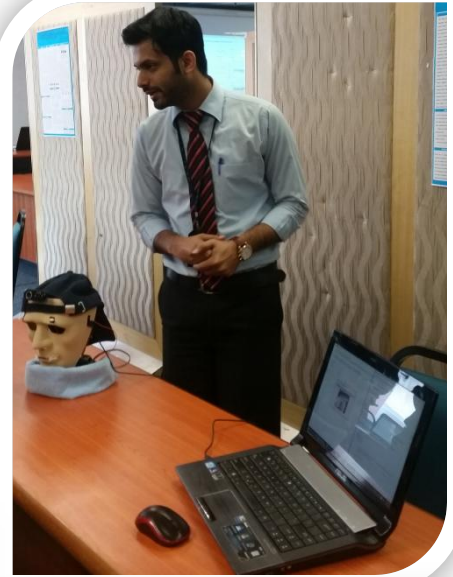


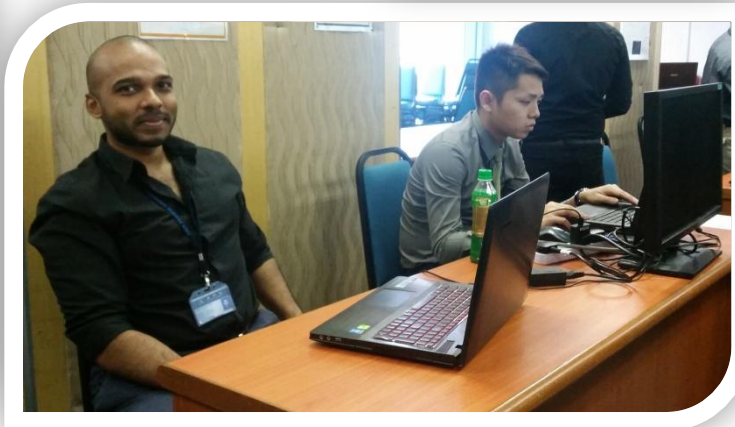
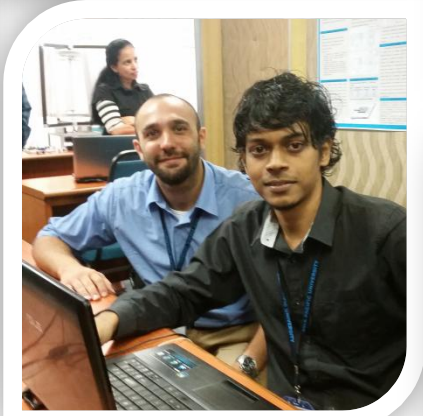
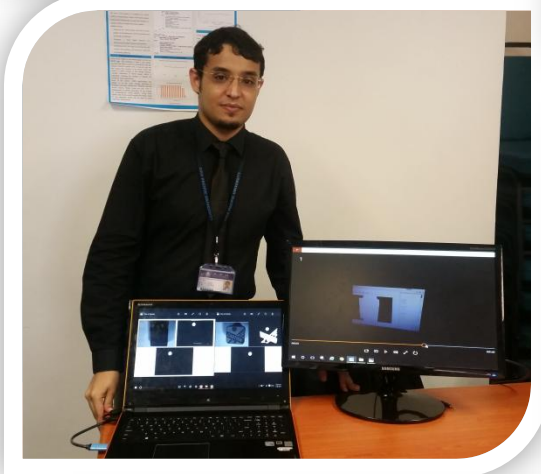
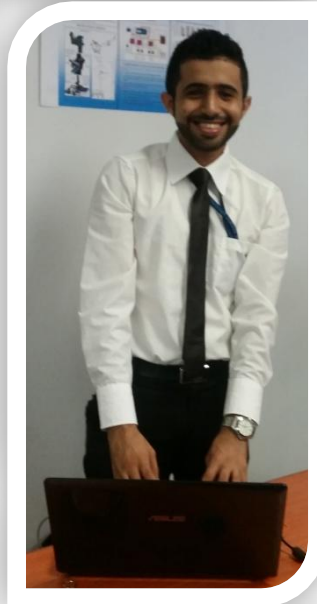
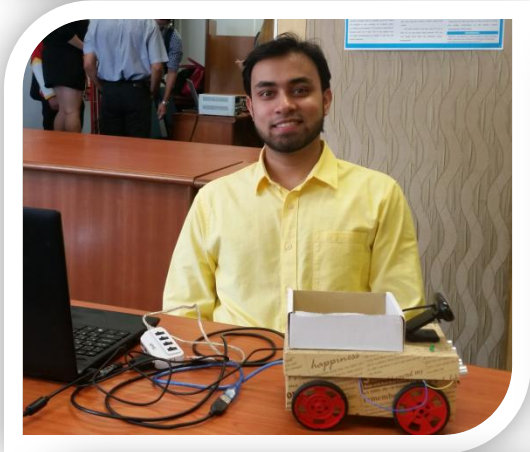
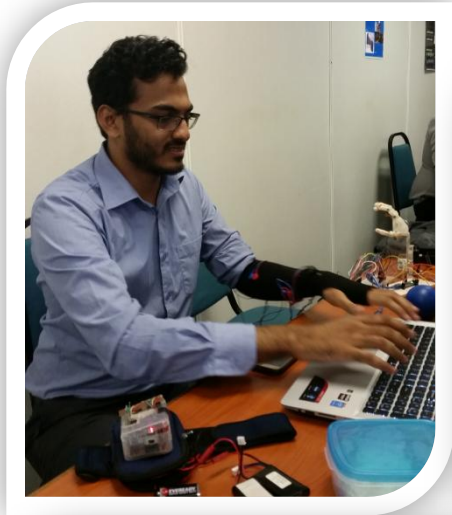


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ASIA PACIFIC UNIVERSITY
OF TECHNOLOGY & INNOVATION
SCHOOL OF ENGINEERING

SOE FINAL YEAR PROJECTS

Final Year Projects – UC4F1504-ME-EEE-EEIT-TE





Know your Learning Style

Shankar Duraikannan

Every one of us undertake education to gain self improvement through knowledge. Our knowledge quest need not be as great as scientists who invented, discovered and created things we enjoy today, but surely a significant part of our life that paves way to better prospects in life. No doubt everyone of us will agree that this life changing knowledge is gained through learning. Therefore understanding learning styles and identifying our learning styles will enable us to learn faster and easier. Learning style models, group the common styles that people learn. Several learning style models are reported specifically David Kolb's model, Peter Honey and Alan Mumford's model, Neil Fleming VARK model and Anthony Gregorc's model etc. Learning styles differ from person to person. Some may have one dominant way of a learning style and some may have two or more of mixed styles of learning. In today's scenario one is required to have multiple styles of learning to have an effective learning, through all formats of teaching and learning processes. Identifying our dominant, moderate and weak styles of learning, will help us to exercise and strike excellence in all styles of learning.

Seven Learning Styles

Several learning style models are reported by researchers. The seven learning style model which is an enhanced model of Visual, Aural, Read/Write and Kinaesthetic (VARK) model is discussed in this article. The seven styles of learning are Visual, Aural, Verbal, Kinaesthetic, Logical, Solitary and Social. These classifications of the learning styles are based on Howard Gardner's multiple intelligence theory which provides seven types of intelligences. Have a glance at the figure below to recognize your dominant learning style. Also several online interactive questioners are available to identify your learning style.



Seven Styles of Teaching and Indicators (source: <https://tackk.com>)

Techniques for Learning Styles

On recognizing your own learning styles you can use techniques better suited to you, which in turn can increase speed and quality of your learning.

If you are a **visual learner** you will prefer to use visuals pictures and spatial understanding.

- Use images, pictures and other visual media to help you learn.
- Use colors, layout and spatial organization in your association and use visual words in your assertions.
- Use mind maps.
- Replace words with pictures and use colors to highlight major and minor links.



If you are a **aural learner** you will prefer using sound and music. Use sound, rhyme and music in your learning.

- Use sound recording to provide a background and help you get into visualizations.
- When creating mnemonics or acoustics, make the most of rhythm and rhyme, or set them to a jingle or part of a song.
- If you have particular music that makes you want to 'take the world' play it back and anchor your emotions and state.



If you are a **verbal learner** you will prefer using words both in reading and writing.

- Try the techniques that involves speaking and writing
- Make the most of the word based techniques such as assertion and scripting.
- Record your scripts using a audio recorder and use it latter.
- When you read contents aloud make it dramatic and varied.
- Try working with others and using role play to learn verbal exchanges.



If you are a **kinesthetic learner** you will prefer using your body hands and sense of touching

- Focus on the sensation you would expect in each scenario.
- For assertion and scripting, describe the physical meaning of your actions.
- Use physical objects as much as possible.
- Keep in mind as well that writing and drawing diagrams as physical activities.
- Use role play, either singularly or with some one else to practice skills and behaviors.



If you are a **solitary learner** you will prefer to work alone and use self study.

- Align you goal and objectives with personal beliefs and values.
- Create a personal interest in your topic.
- When you associate and visualize, highlight what you would be thinking and feeling at the time.
- You drive yourself by the way you see internally
- Modeling is powerful technique for you.
- Be creative with role play.
- Your thought have large influence on your performance and safety.



If you are a **social learner** you will prefer learning in groups or with other people.

- Aim to work with others as much as possible.
- Work on some of your association and visualization with other people.
- Try sharing your key assertions with others.
- Working in groups to practice behaviors or procedures helps you understand how to deal with variations

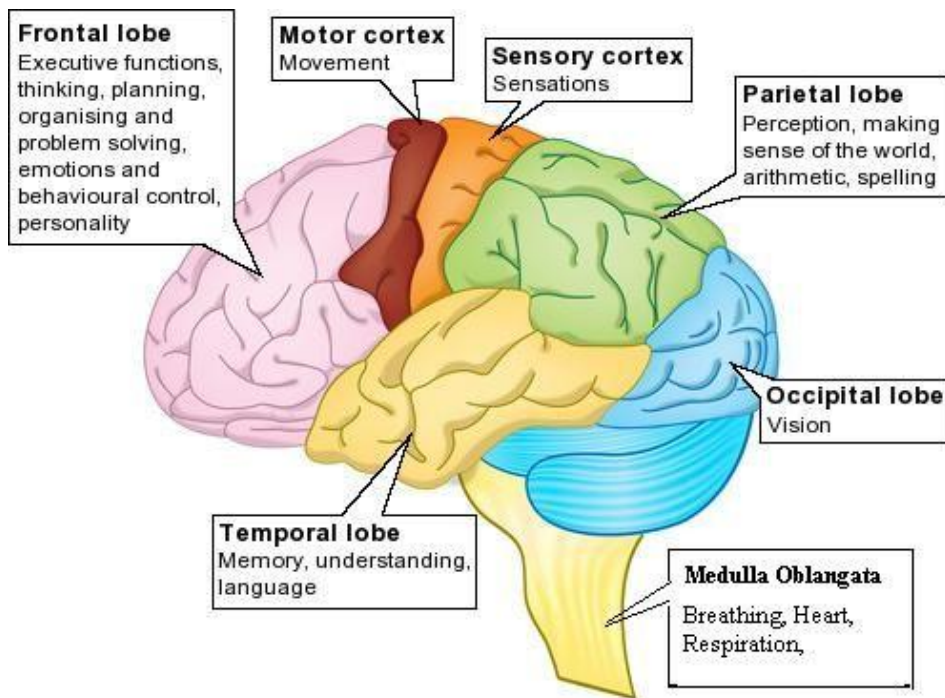


If you are a **logical learner** you will prefer using logical reasoning and systems

- Aim to understand the reasons behind your content and skills
- Create and use list by extracting key points from your material.
- Remember association often works well when its illogical and irrational.
- Highlight your ability to pickup systems and procedures easily.
- You may find it challenging to change existing behavior or habits.



Multiple & Combined Learning Styles for Effective Brain Utilization



Research indicates that only 10 % of the human brain is used and on the other hand research also shows us that each learning style uses different parts of the brain. For instance;

Visual: The occipital lobes at the back of the brain manages the visual sense. Both the occipital and parietal lobes manage spatial orientation.

Aural: The temporal lobes handle aural content. The right temporal lobe is especially important for music.

Verbal: The temporal and frontal lobes, especially two specialized areas called Broca's and Wernicke's areas (in the left hemisphere of these two lobes).

Physical: The cerebellum and the motor cortex (at the back of the frontal lobe) handle much of our physical movement.

Logical: The parietal lobes, especially the left side, drive our logical thinking.

Social: The frontal and temporal lobes handle much of our social activities. The limbic system (not shown apart from the hippocampus) also influences both the social and solitary styles. The limbic system has a lot to do with emotions, moods and aggression.

Solitary: The frontal and parietal lobes, and the limbic system, are also active with this style.

Adapting a multiple and combined learning style will allow you to use you brain effectively and excel in advanced learning techniques that feeds your knowledge quest. By practice its possible to excel in all learning styles.

Final Note to students

Hope this article would have given you an insight into learning styles and enabled you to identify your learning style. You can follow the techniques highlighted in this article to enhance your learning style. It is also suggested that you can take up a learning style identification assessment available online to precisely identify your learning style and enhance your learning.

If you are a facilitator reading this article, hope this article will help you to know in terms of learning styles, the variety of students you would be addressing in your class and guide you in preparing your presentation to engage the complete variety of students.

Further Reading

This article is a compilation of information on Learning Styles from several websites namely <http://oedb.org>, <http://www.learning-styles-online.com>, <http://edudemic.com>, <http://www.educatorstechnology.com>.

Multiband RF Power Amplifier with Novel Transformer Matching

Veeraiyah Thangasamy

RESEARCH PROBLEM

With increasing consumer demand for wireless devices to support multiple air standards and applications, there have been increased trends for the implementation multiband (MB) power amplifier (PA) for wireless handsets. However, PAs using conventional transformer based matching has narrow bandwidth resulting in two or more PAs resulting in increased power consumption and decreased battery efficiency. As such, this research is focused at increasing the bandwidth of the PA by using a novel double secondary transformer based matching.

INTRODUCTION/LITERATURE

The 4G and next generation networks (NGN) transceivers are required to operate on a number of frequency bands. However, the PAs, those especially in the LTE spectrum have narrow bandwidth of operation. For example, the PA presented in [1] is using InGaP/GaAs HBT process operates in 820MHz-920MHz bandwidth; the dual-mode PA presented in [2] using InGaP/GaAs HBT operates in the 1.7GHz-2.0GHz bandwidth; and GaN HEMT based MB PA presented in [3] operates in the 1.8GHz -2.3GHz band. A few works on CMOS process have been reported on multiband PAs integrated circuit design in the literature. For example, a switching mode PA [4] presented in the 90nm TSMC CMOS technology operates with 1.6GHz-2.6GHz bandwidth. Another PA presented in [5] was designed using 130nm CMOS process which covers the frequency range 1.6GHz-1.9GHz. Though a number of works are reported in the literature in the LTE bandwidth spectrum, their bandwidth of operation is not sufficient to cover the multiband requirement of RF front-ends. When a transformer is used for matching it results in a narrow bandwidth; this includes PAs in [5]–[7].

The proposed MB PA in this work utilizes a novel single primary and double secondary transformer based matching. The use of double secondary transformer widen the bandwidth of the PA than the transformer with single secondary making it suitable for multiband requirement of emerging smartphones and next generation (NGN) applications; and also the proposed MB PA in CMOS will provide a greater integration possibility with other blocks in a mobile device in comparison to PAs implemented with other process technology.

MATERIALS AND METHODS

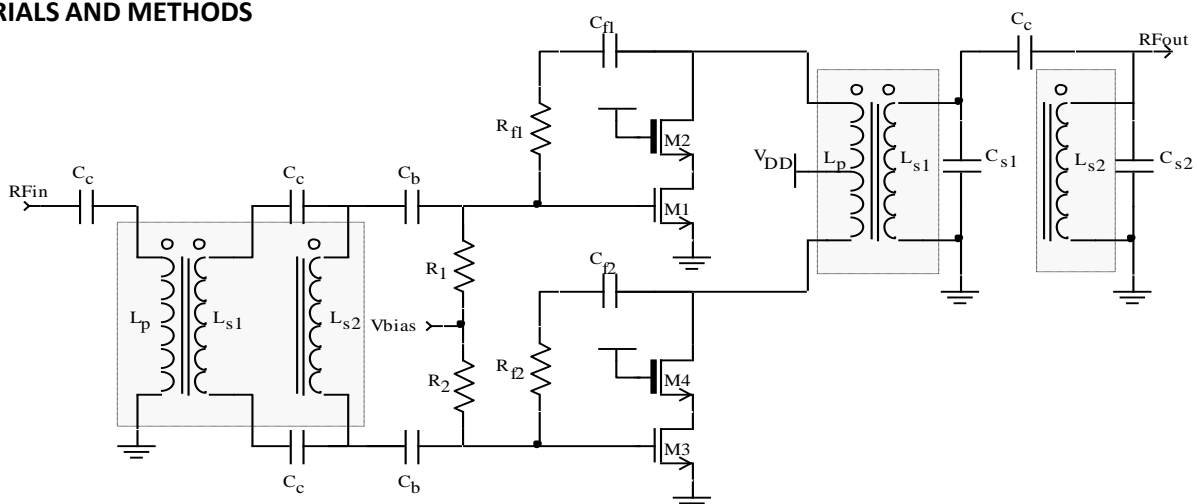
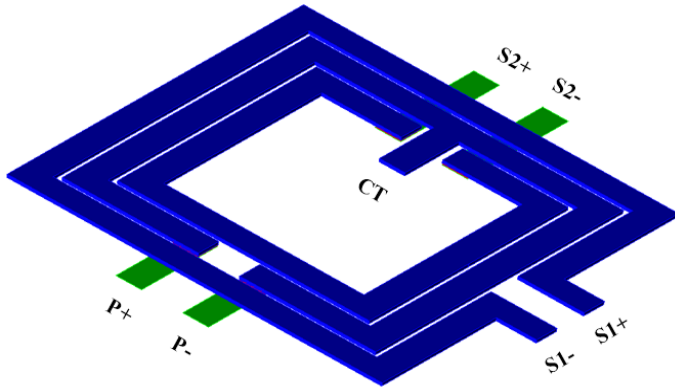


Fig. 1. Schematic diagram of the proposed MB PA using double secondary matching transformers

Fig. 1 shows the complete schematic of the proposed multiband PA with double secondary transformer; and **Fig 2** shows the layout of the transformer. In the proposed transformer there are two secondaries; energy is transferred from the primary into both the secondaries by means of mutual coupling. Both the secondaries are tuned by parallel capacitor for two different frequencies in the desired frequency bandwidth range as given by Eqn. (1) and (2); where $f_{c,s1}$ and $f_{c,s2}$ are the resonant frequency of the secondary tuned circuits and these two frequencies should fall within the bandwidth of the PA and should be at equidistant from the center frequency of the band to get flat pass band response.



$$f_{c,s1} = \frac{1}{2\pi\sqrt{L_{S1}C_{S1}}} \quad \dots\dots\dots(1)$$

$$f_{c,s2} = \frac{1}{2\pi\sqrt{L_{S2}C_{S2}}} \quad \dots\dots\dots(2)$$

Fig 2. Layout of novel single primary and double secondary transformer

RESULTS AND DISCUSSION

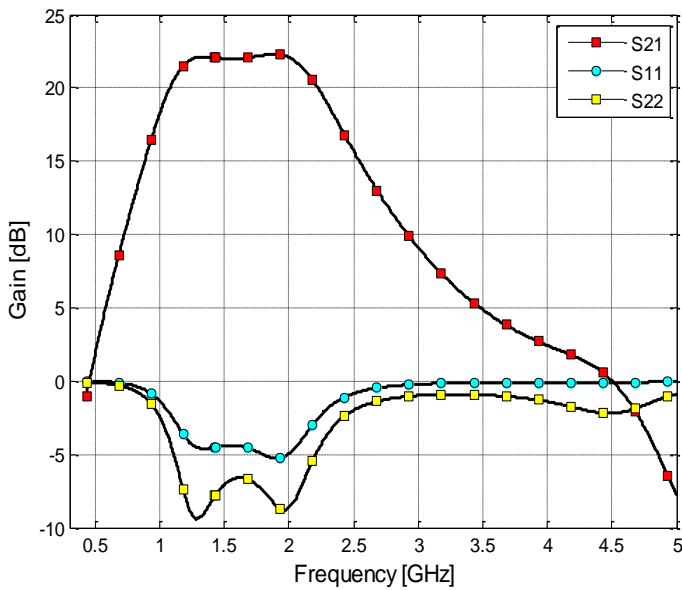


Fig. 3. S--parameters (S21, S11, S22) of the proposed MB PA

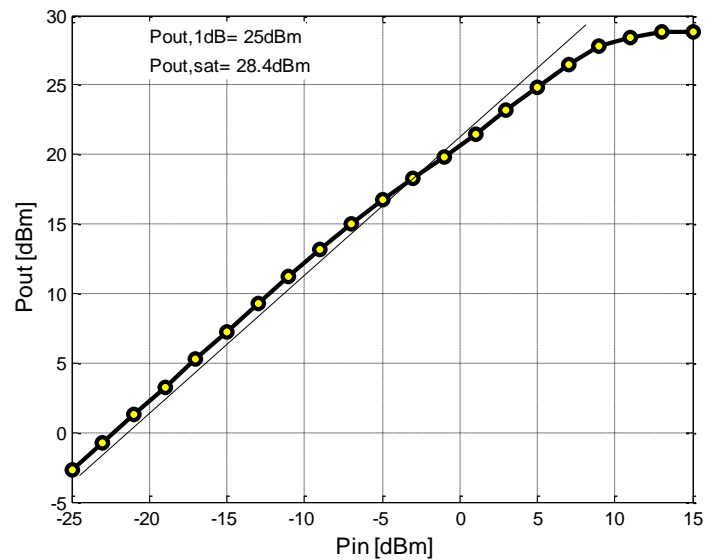


Fig. 4. Power output versus power input of the proposed MB PA at 1900 MHz

The proposed design of multiband PA was simulated using Cadence Spectre in the 130nm CMOS process. The obtained S-parameters are shown in **Fig. 3**; which has the gain of 22.5dB with bandwidth from 1GHz-2.3GHz. It can be seen two peaks in the S22 response which are due the double secondary tuned circuits that had increased the 3dB bandwidth of the PA. This wide bandwidth obtained can cover 11 FDD LTE bands: band 1, 2, 3, 4, 9, 10, 11, 21, 23, 24 and 25. The obtained S11 and S22 are nearly -5dB and -9dB respectively making the PA well matched to the source and the load.

The PA output power versus input power is shown in **Fig. 4**. It was obtained from the periodic steady state analysis at 1900MHz. The response is linear with the power at 1-dB compression point as 25dBm and saturated power as 28.4dBm. Power amplifier for LTE application requires only 23dBm output power; thus making this design fulfills LTE class-3 power output specification.



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SOE EVENTS

2016 IEM-APU Student Section Handover Ceremony



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Team Work - Coming together is the Beginning