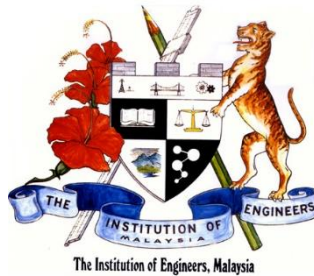


# ENGINEERS INSIGHT



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OF TECHNOLOGY & INNOVATION



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ASIA PACIFIC INSTITUTE  
OF INFORMATION TECHNOLOGY

**SCHOOL OF ENGINEERING**

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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 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.



It is just two weeks to the second Graduation Ceremony of 2016; how time has passed! While it is often a joyous moment in life to reap the fruits that you, as an Engineering Graduate, have sowed four years ago, it is also the time to plan your career path. I am sure that you have aspired to be successful, and would want to move up the career ladder while practising professional engineering. With that aim in mind, I would like to share a few career tips with you:

**Maintain and Expand Your Network.** Continue to maintain ties with ex-classmates, seniors and your beloved lecturers in the University. They may be able to lend you a helping hand, be it introducing you to the existing companies that they are working with, or provide good references for you during your career search. It is also important to extend your network and get to know more people from various walks of life; they might be able to provide good advice and assistance for you to succeed in your career.

**Engage Professionally.** You must register as a Graduate Engineer with Board of Engineers Malaysia (BEM), or any other professional engineering body in your home country if you intend to practice engineering. Not only that, you are highly encouraged to engage with other young or experienced engineers by registering as a graduate member with the Institution of Engineers Malaysia (IEM), the Institution of Engineering & Technology (IET) or the Institution of Mechanical Engineers (IMechE), among others. This will provide you with a platform to continuously develop your skills and knowledge, as well as broaden your network with like-minded people.

**Have a LinkedIn Account.** Do create a profile on LinkedIn (<https://www.linkedin.com/>) and list down all your technical and soft-skills, as well as experience in project-based work. LinkedIn serves as your online resume which is easily searchable by any employers who might be looking for specific skills that you have. Do update your experience as soon as you have gained new skills. Last but not least, connecting with more professionals on LinkedIn will help you to broaden your networking as well.

**Gaining Experience is the Ultimate Working Objective.** Do not go for a job solely because it provides a higher monetary return. As a young and new engineer, you should prioritise on choosing a career that will enable you to develop relevant technical skills, leadership qualities, team-work and be able to be mentored under a competent senior colleague. All these will help you to soar to greater heights in your career; good money will follow through. Do remember, a good career does not equate to good money solely.

There can be many more advices that I can share with you, some of them could be even my own life experiences. However, I would prefer to connect with you online via LinkedIn, or in face-to-face during the School of Engineering's Annual Alumni meet-up. Till then, do cherish and celebrate your success with your loved ones, family and friends. See you at the graduation!

## Innovative Designs toward Sustainable Products – Series 3

Sustainable products have always been the driving force in cultivating Innovative ideas. The product that is said to be sustainable through innovation in my third series is the “Soccket”, the kinetic soccer ball. Let’s walk through the need for the sustainable idea development behind this product. The energy harnessing soccer ball by uncharted play weighs about 30 grams heavier than a standard soccer ball. The ‘Soccket’ is constructed from a custom water-resistant EVA foam that is both durable and soft to the touch. the solid construction eliminates the need for air pumps as well as the risk of puncture and deflation from rough terrain.



Figure 1: “Soccket” the soccer ball (<http://www.unchartedplay.com/>)

The first version of the “Soccket” used inductive coil mechanics which are located inside the soccer ball as shown in Figure 2 which functions technically similar to a common shake-to-charge flashlight, where the rapidly-changing movement and kinetic energy of the soccer ball forces a strong magnet to move back and forth through a long metal coil based on the bouncing of the ball thus producing current and inducing voltage in the coil to generate electricity.

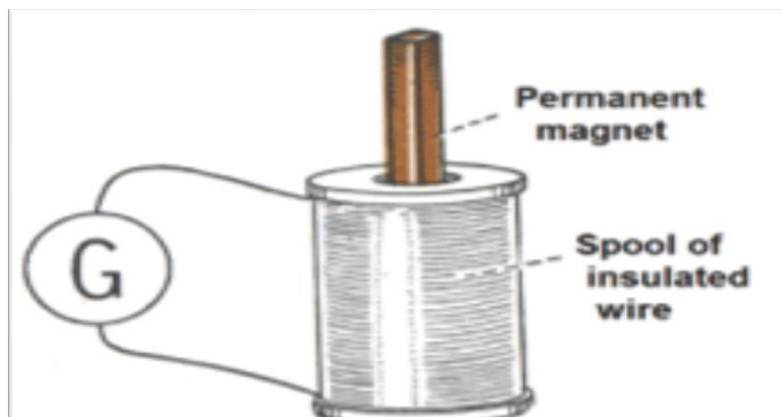


Figure 2 (<http://www.free-energy-info.co.uk/>)

The electrical circuit includes a bridge rectifier that ensures the electricity flows in the current direction, essentially accounting for the constant back and forth movement of the magnet. A capacitor on board stores the pulses of energy, like a battery, only that it can do so instantly. This version of the soccer ball only uses one directional motion to power the device.

The first version was tested in Africa during the summer of 2010 and found that the “Soccket” could only capture energy and it was used for a LED light lasting for 15 minutes. The second version of the “Soccket” was used as a gyroscope as shown in Figure 3 that does the exact same thing as a pendulum based ball. The introduction of the gyro had significantly improved the generation of energy.



Figure 3: Gyroscope Mechanism (<http://www.unchartedplay.com/>)

The gyroscope mechanism captures the energy from all the rolling and bouncing that occurs during a soccer game and stores it into a battery. Once again this version of the soccer ball was tested in Africa during the summer of 2012 and it was found that the “Soccket” could capture energy which can last for 3hrs when a LED lamp was connected to it.

The third version of the “Soccket” used a pendulum-like mechanism inside as shown in Figure 4 that is used in capturing the kinetic momentum generated during play, and stores the energy inside the “Soccket” for later use as an off-grid power source.

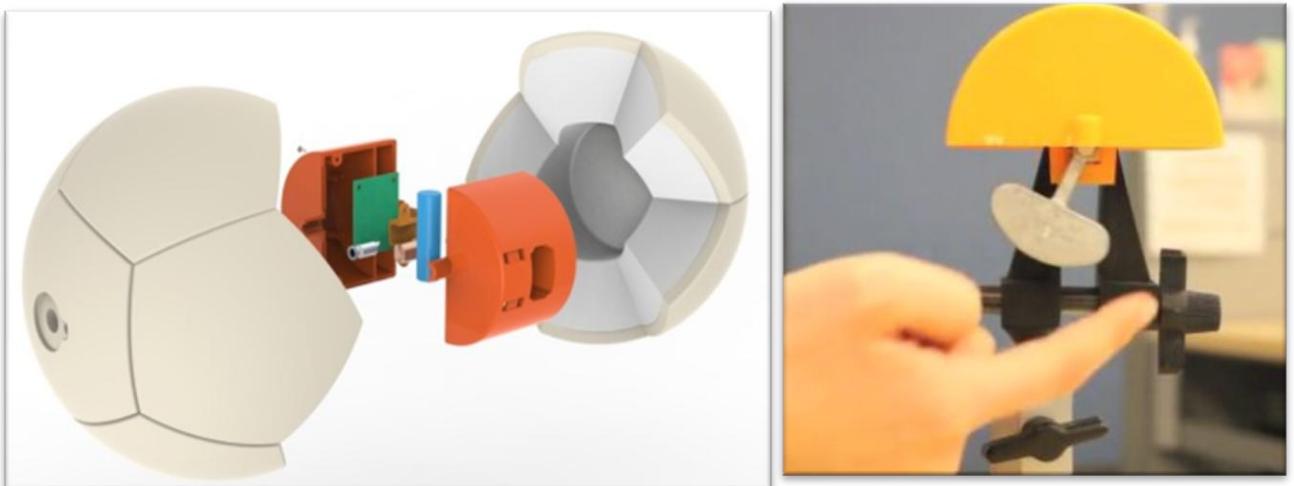


Figure 4: Pendulum Mechanism (<http://www.unchartedplay.com/>)

Similar to the gyro based soccer ball, the pendulum based soccer ball if played for 30 minutes as shown in Figure 5, can simply be plugged into your LED lamp and it can power the LED lamp for 3 hours.



Figure 5 (<http://www.unchartedplay.com/>)

The “Soccket” also has a six-watt power output that can then power small appliances and devices like lamps and cell phones as shown in in Figure 6 and 7. It also can be used to power fans, water sterilizers or hot plates.



Figure 6: Charging a cell phone

(<http://www.unchartedplay.com/>)

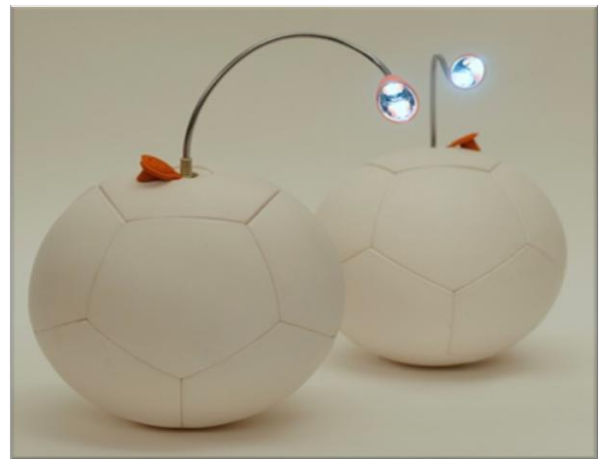


Figure 7: Powering a LED lamp

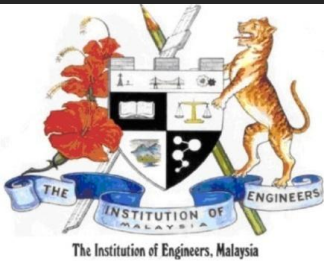
The major advantage of using The “Soccket” is that it is sustainable, where it eliminates the usage of batteries, reduces pollution from battery waste and this directly is energy saving. The most important part of this product is it generates energy for free while we enjoy a healthy sporty activity.

The “ Soccket” has been made to target the people that rely on the kerosene lamps used in rural areas in India, South Africa, Tanzania, Mexico, El Salvador, Honduras, Costa Rica, Nigeria and many other 3<sup>rd</sup> world countries with limited or no access to electricity.

Follow this series and you will able discover and embrace many products that are designed and developed using the sustainable techniques.

For more info on the “Soccket” watch it at: <https://www.youtube.com/watch?v=HaT5JHBPHPg>

Vickneswari A/P Durairajah



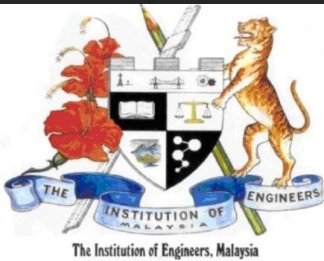
# SEMINARS & WORKSHOPS

## INDUSTRIE 4.0 - IoT



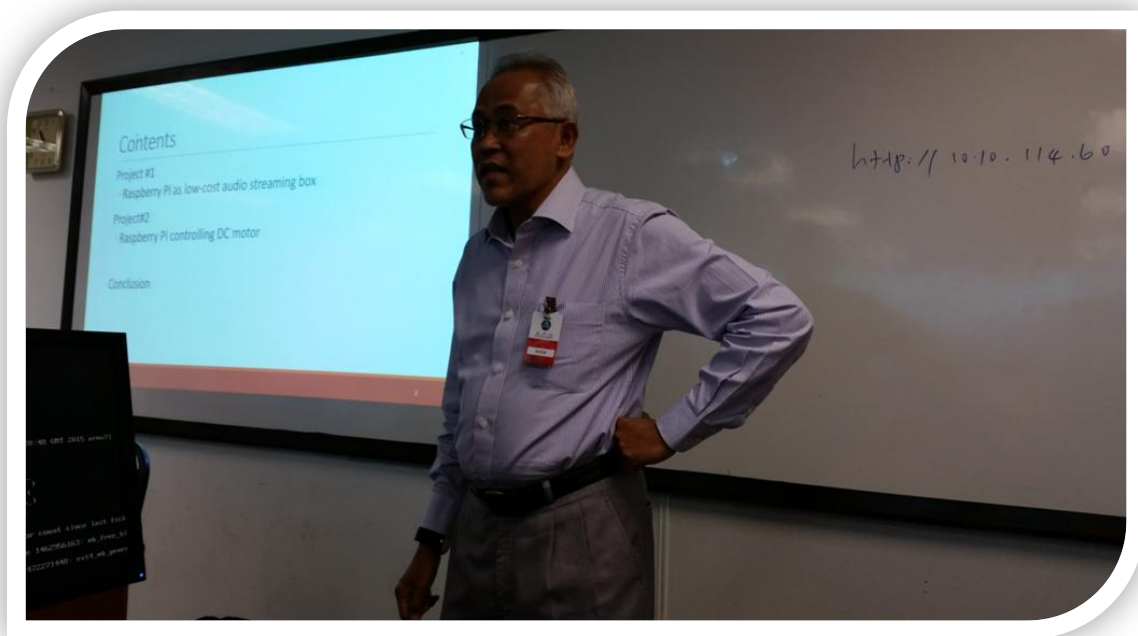
The invited talk on Industrie 4.0 by Ir Johnson Tan on August 17, 2016 covered industry digitization specifically in the financial and insurance services, computers and electronics, media and telecommunications. The talk further elaborated on the process of digitization, where it is taking place on a global scale, the benefits for companies and the creation of new business models. It was attended by 29 students and 4 SoE staff.



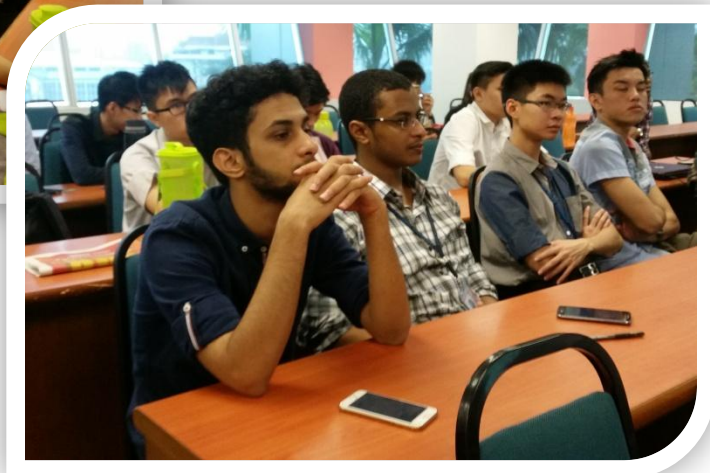


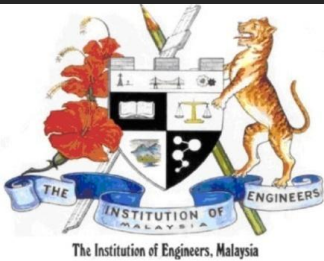
# SEMINARS & WORKSHOPS

## RASPBERRY PI MUSIC BOX



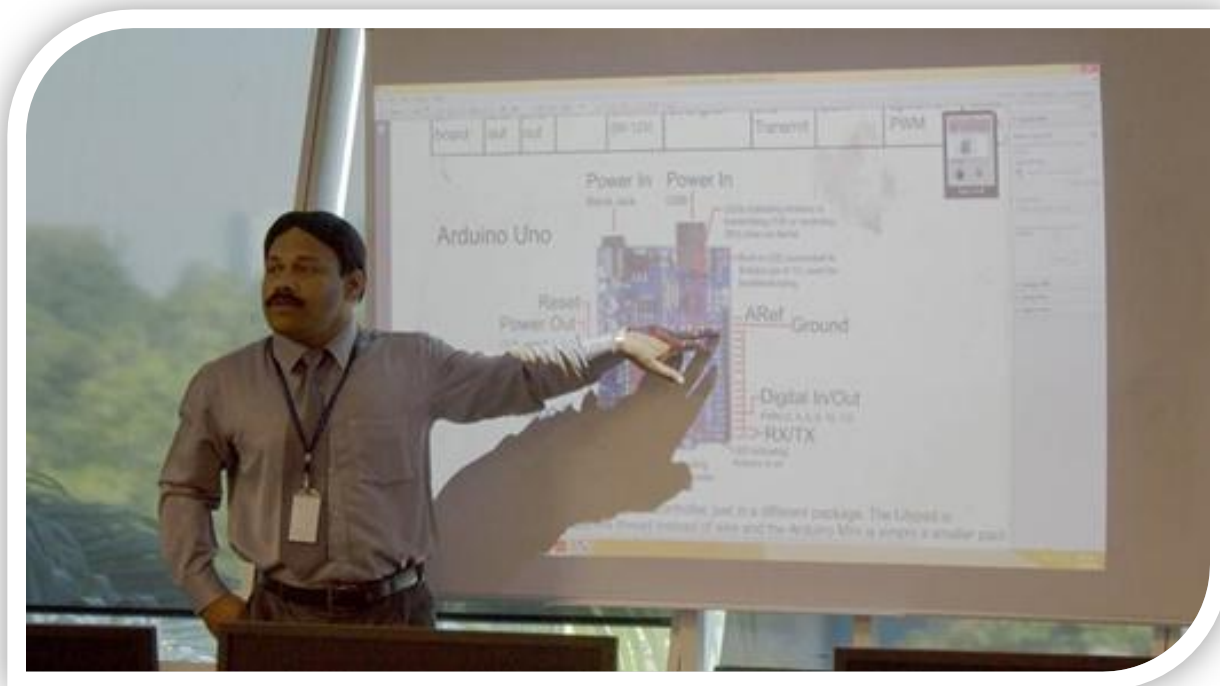
The invited talk on 'Raspberry Pi Music Box' by Ir Zulkeflee was organized on August 26, 2016 exclusively for the telecommunication engineering students. The talk was actually a demonstrative hands-on experience on designing projects using Raspberry Pi with a detail insight to the design of the 'Music Box' using Raspberry Pi. It was attended by 50 students and 4 SoE staff. Incidentally Ir Zulkeflee also is also a member of the school's Industry Advisory Panel (IAP)





# SEMINARS & WORKSHOPS

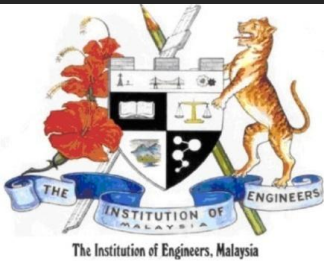
## ARDUINO PROGRAMMING AND INTERFACING WORKSHOP



On September 24, 2016 a workshop on 'Arduino Programming and Interfacing' was conducted by Dr Veeraiyah Thangasamy. The workshop had an intermediate session which focused on interfacing and programming of sensors, displays and motors and an advanced session which focused on interfacing and programming of RFID, GSM 900 and GPRS. It was attended by 18 students and 1 SoE lecturer. The school would also like to congratulate Dr Veeraiyah on his PhD completion recently.







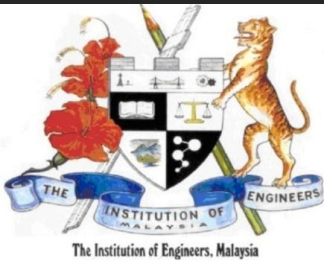
# SEMINARS & WORKSHOPS

## THERMO ELECTRIC GENERATION – AT ERODE SENGUNTHAR ENGINEERING COLLEGE



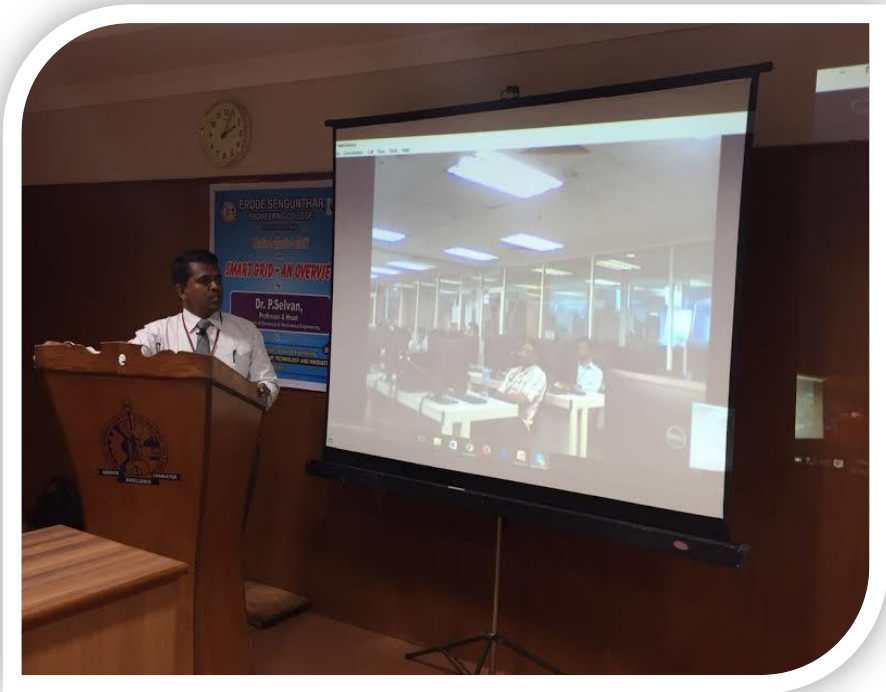
At Erode Sengunthar Engineering College (ERC), the Department of Mechanical Engineering student's association, ISTE student's chapter, IE(I) student's chapter and Indian Institution of Production Engineers (IIPE) student's chapter organized a leader's talk on "Thermo Electric Generation" on July 6, 2016. Mr. B. Arunseeralan, was the resource person. It was nice of Mr Arun who is part of the SoE academic team to share his knowledge to ERC students during his recent trip to India.





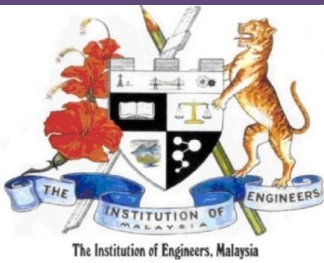
# SEMINARS & WORKSHOPS

## SMART GRID AN OVERVIEW – ONLINE INVITED TALK



On June 27, 2016, Dr. P. Selvan, Professor & Head, Department of Electrical and Electronics Engineering of Erode Sengunthar Engineering College, delivered a online talk on 'Smart Grid – An Overview'. The talk was conducted as a part of APU MoU with the engineering college. The talk was broadcasted live to APU engineering students .





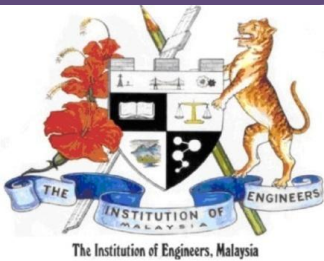
# INDUSTRIAL VISITS

## TM Research and Development



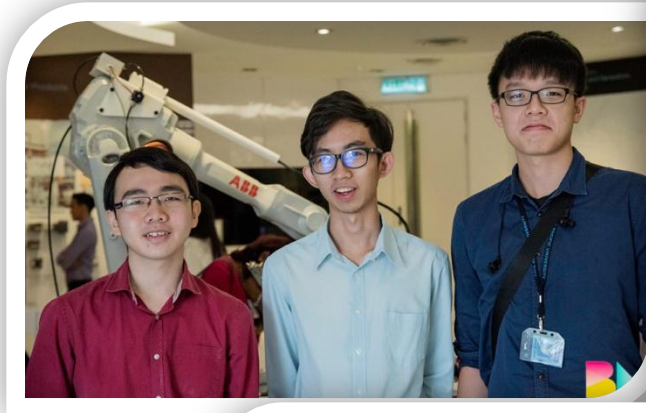
The visit to Telekom Malaysia Research and Development on September 7, 2016 by 15 students studying telecommunication engineering accompanied by 3 staff was guided by Ms Nor Haziyana Binti Zakaria'. The students had a great opportunity to gain in-depth knowledge on research in the telecommunication industry specifically in connectivity and data services. The students were given a real time demonstration of the ongoing research in augmented reality and radio over fiber. The students were excited by the enthusiastic and relaxed research environment at TM R&D.





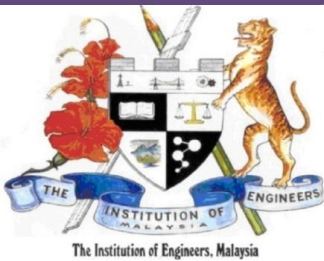
# INDUSTRIAL VISITS

## ABB Malaysia Sdn Bhd



On September 15, 2016, 26 students accompanied by 2 staff visited ABB Malaysia Sdn Bhd. The students had an exclusive tour of the MVDC/LVD assembly and testing facility.





# INDUSTRIAL VISITS

## Clipsal Manufacturing Malaysia Sdn Bhd



On September 30, 2016 thirty one students accompanied by two staff members visited Clipsal Manufacturing Sdn Bhd. Miss Teoh, Mr Lim, Miss Kong, Mr Dev, Mr Alberto, Miss Michelle and Miss Hafiza guided the students and demonstrated the process of switch manufacturing. The students even had an hands on training session on how to assemble the switches.





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# SOE COMPETITIONS

## Inotech 2016

“InoTech 2016” is an event planned and organized for innovative young engineering students to exhibit their talents on recent technologies in their relevant field of engineering in the Invention & Innovation Exhibition. Competition is incorporated with the exhibition to increase the motivation and competency of students to prepare them for the industrial difficulties of the real world. The purpose of this activity is to equip students with the skills of thinking clearly and constructively, speaking persuasively and listening critically while exploring their ability to solve technical problems creatively and sustainably.



The event was conducted within the university campus on the **18<sup>th</sup> of August 2016** and jointly organized with the Institute of Engineers, Malaysia (IEM). IEM via the engineering education division annually supports design competitions within local universities and for 2016 we were fortunate to have their support for APU's Inotech 2016. IEM's contributions were to make available judges for the Inotech Design Competition, promote the event within the IEM circle of publications/magazines/bulletins and also to endorse APU as a partner in design innovation for the development of Science, Technology, Engineering and Mathematics (STEM) education in Malaysia.



This is a competition open to external participants as well and this year we were very happy to have 15 teams from UniKL MICET also competing. A total of 60 projects were registered to participate in the event, each showcasing very impressive innovations which wowed our guest judges. Our judges this year were Ir. Assoc. Prof. Mandeep Singh (IEM), Ir. Dr. Thariq (IEM), Ir. Wong Choong Onn (Technip), Mr Mano Subramaniam (MATA), Mr KM Chua (MATA) Ir. Thavanendran (IEM), Mr. Chua Yaw Long (IEM).

The first prize winners were Sharifah Nazura Bt Syed Jasnin, Nur Asmanira Bt Che Rohalim and Fitriyaltul Aiman Bt Mohamad Badran from UniKL, for the project 'Innovative Technology for Enhanced Extraction of Mahkota Dewa by Ohmic Heating'. Second prize winners were Theye Prasad a/l Moganna Sunthar, Dinesh Kumar Vijeyan and Subashini Pannerselum, also from UniKL, for the project 'Surface modification of bricks through hydrophobic coating by extracted and deacetylated chitosan (Dendrobranchiata) prawn shell'. The third prize winner was Huang Jiann Jer from APU, for the project 'An automated glove defects inspection system based on machine vision.'

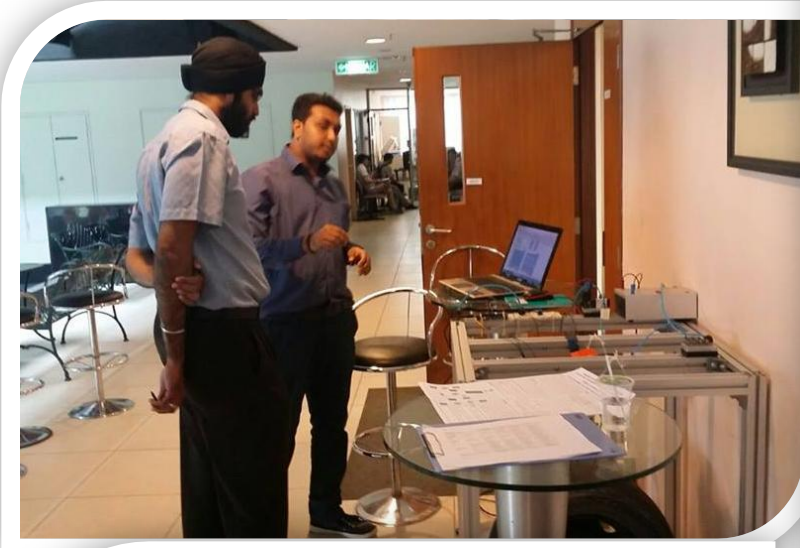




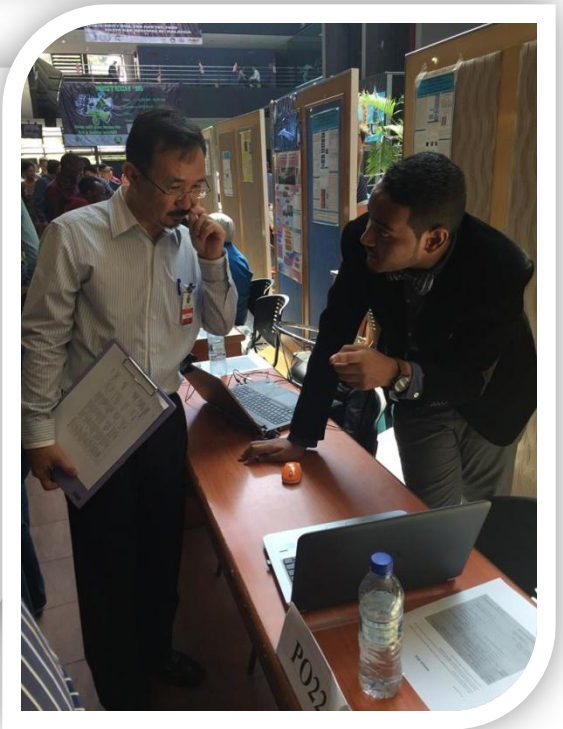
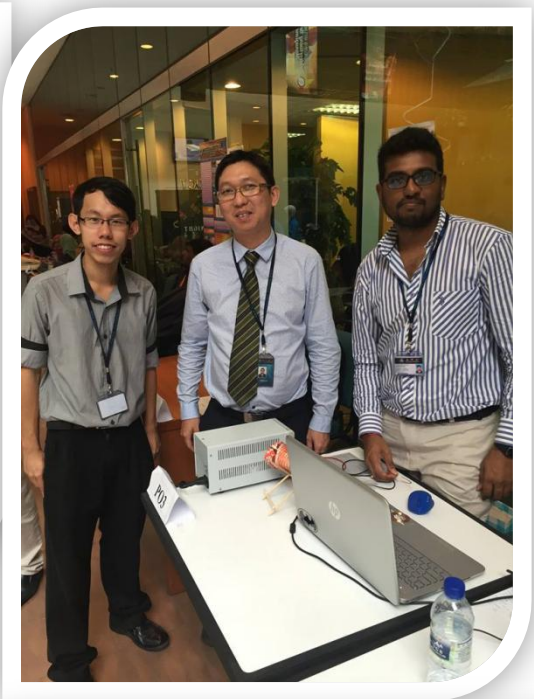
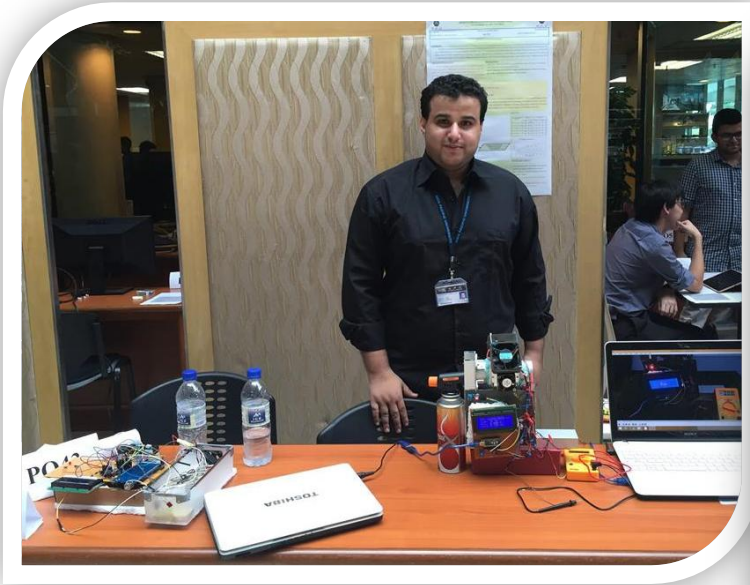
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# SOE FINAL YEAR PROJECTS

## Poster Presentation UC4F1511ME-TE-EEIT-EEE







## Automatic Car Park Management System Using Face and Vehicle Registration Recognition

G. Subhashini, Mohamed Elfatih Markhi, Raed Abdulla

### Abstract

The system is designed as the authorized automatic vehicle identifier with respect to vehicle owner identification, for the security of the highly restricted areas like housing areas, defence military areas, parliament areas etc. Both of the number plate recognition and the vehicle owner recognition use the image identification technology. The image of the vehicle plate number and the vehicle owner are captured by using a camera and processed with MATLAB. The technology adopted in this research can be utilized not only for the security but also in other fields such as parking fee collection, automatic speed control, tracking stolen cars, automatic toll management and access control to limited areas, etc.

### Introduction

Parking management systems can vary at levels of efficiency primarily due to the nature of parking lots which is typically to occupy a significant number of parking spaces, and the traffic of cars coming in and out parking lots. With that, entry and exit become of the utmost importance as this is where the traffic and identification can be monitored with a greater deal of scrutiny. As such, image processing technology comes into play, utilized to manage vehicle IDs and human faces. The use of this was to reduce human error involved that may be inaccurate due to the frequency of parkers.

### Related Work

Young [1] states it is an analysis on images that involves 'image understanding' in order to perform particular operations or use them for information purposes. In this case, information for image recognition between faces of drivers and vehicle number plates. According to Buhmann, (2005) [2], it is the "reproduction" of images in machines, with the similar capability as the human eye for identifying objects, rendering it the most effective tool and system for this system. In an 'Accuracy Enhancement for License Plate Recognition' system, the importance "correcting images and removing boundaries" is crucial as Zheng et al [3] state that a much higher recognition accuracy is obtained. Chuang et al. [4] features Ada Boost algorithm and super resolution technique which focuses on generating the most accurate detection of images.

### Proposed System

When the system runs, the first camera will capture an image of the vehicle plate number for processing. The process is a combination of codes to identify and recognize the text using optical character recognition. The outcome of the first process is displayed in the form of a text. When the outcome of the plate recognition system is evaluated, the system checks the data base if the plate number exists. However, if the plate number exists in the database, the owner details will be shown in a GUI form.

### Circuit Diagram

The ultrasonic sensors work to alert the camera of vehicle presence, which then proceed to perform image recognition on the vehicle plate and face. The Arduino then allows the interface to generate results and the GSM module to notify car owners as shown in Figure 1

### FINDINGS & TESTING

A total of six tests were conducted for the image recognition. Two identical experiments representing the equal parts of the systems operations (face and license). As such, the two main experiments of these properties were testing during the main stages of registering process at entry and exit points. Additionally, to represent the other mechanics, three tests consisting of; 'GSM efficiency Test' 'Sensor Testing' and 'Sample Testing' were carried out

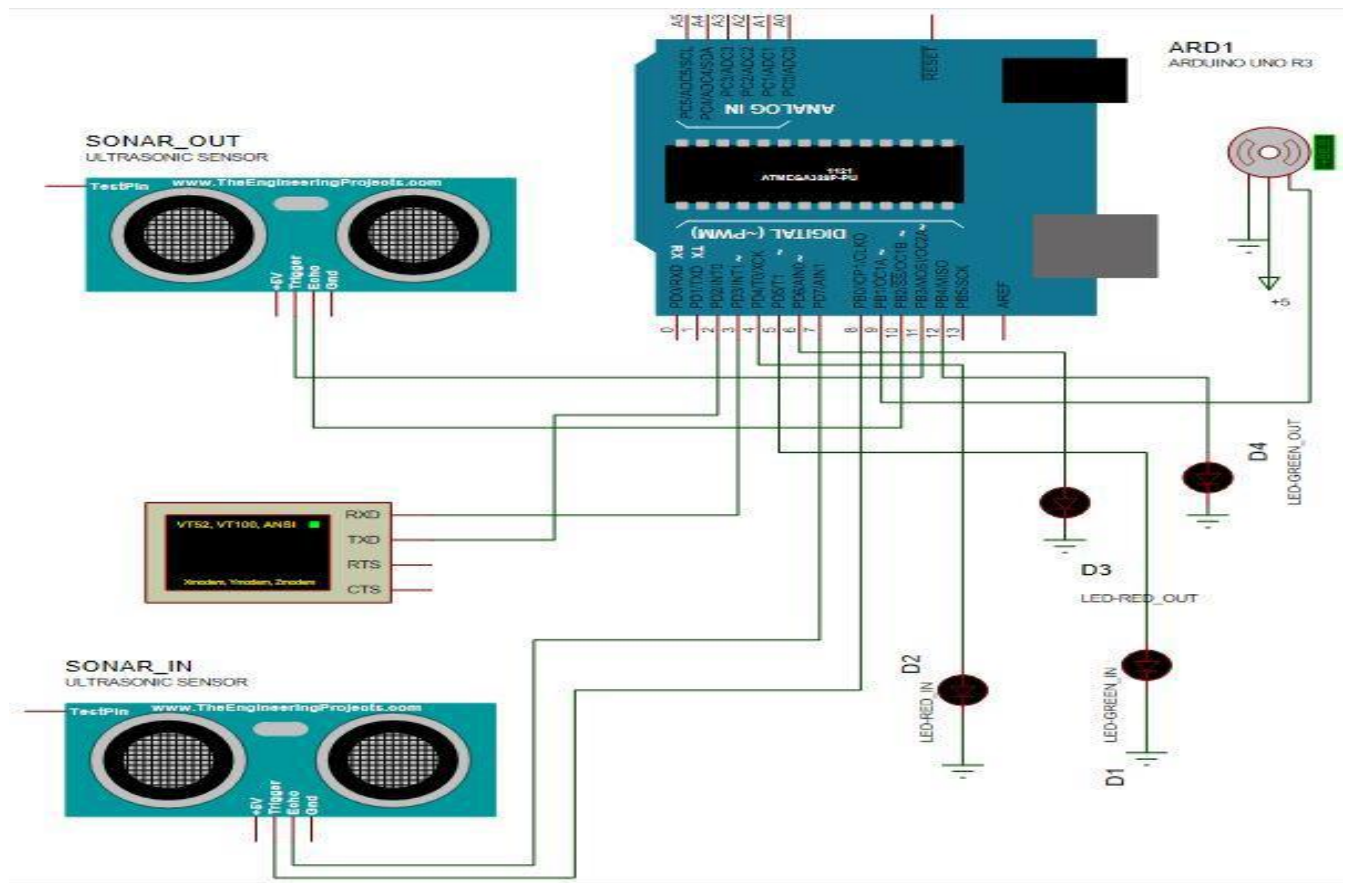


Figure 1: Circuit Diagram

### Conclusion

The inception of this robot was a conscious effort from the get-go to create a security-based system in more ways than one. Security in terms of ensuring functionality carries out all the safety measures correctly and accurately. Accuracy was an imperative of this system not only to ensure safety but in terms of the recognition processes achieving consistent and satisfactory results. A great deal of what makes this system unique is its multi-functionality in a mutually beneficial way. The two parts work well together in a manner that is logical and equally cohesive.

### References

- M. Young, "The Technical Writer's Handbook". Mill Valley, CA: University Science, 1989.
- J. Buhmann, J. Malik and P. Perona, "Image recognition: Visual grouping, recognition, and learning", Proceedings of the National Academy of Sciences, 96(25), pp.14203-14204, 1999.
- L. Zheng, X. He, B. Samali, L. T. Yang. "An algorithm for accuracy enhancement of license plate recognition", Journal of Computer and System Sciences, 79(2), pp.245-255, 2013

## Refresher Seminar on Bloom's Taxonomy



On September 29, 2016, Assoc. Prof. Ir. Dr. Mandeep Singh, External Examiner for Telecommunication Engineering programme of School of Engineering, delivered a session to the staff members of School of Engineering, on "Bloom's Taxonomy", in which provided a refresher as well as shared on how verification of Bloom's is done at UKM.



GRADUATION IS THE FIRST STEP OF SUCCESSFUL CAREER