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ASIA PACIFIC UNIVERSITY
OF TECHNOLOGY & INNOVATION
SCHOOL OF ENGINEERING

ENGINEERS INSIGHT

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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.

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PERSONAL TRAITS OF ENGINEERING STUDENTS



<http://cdn.wonderfulengineering.com/wp-content/uploads/2014/03/engineering-pictures-6-798x350.jpg>

Many of you have enrolled into engineering studies due to interest in science and technology. However, there are also many of you that have chosen engineering programmes due to parental persuasion, peer pressure or even the “cool” factor of being an engineering student! No matter what the reason is, you should enjoy every moment of the learning experience offered to you.

Many engineering graduates from APU have landed themselves with successful careers; many of them are doing very well academically while at APU. So, what qualities or traits do they possess to be successful? I have listed the following traits that an engineering student should possess:-

Inquisitive Mind-set

Being an inquisitive person, you are intellectually curious and are always eager for new knowledge. You will explore new knowledge via literature research or by simply asking questions based on the Five W's and one H, i.e. WHO, WHAT, WHERE, WHEN, WHY, and HOW. Being an inquisitive individual, you will obtain information from various stakeholders to seek for the knowledge. In the process, you will digest various conflicting information from stakeholders to get the information you need.

Analytical Thinking

Information and data are aplenty in this age of time. Being someone with analytical thinking, you will attempt to understand a given problem by collecting data and information. You will make sense from the data collected via statistical methods, critically analyse the information gathered with an aim to obtain a meaningful summary. Furthermore, you will review possible solutions to the given problem and compare the effectiveness of various alternatives with systematic testing. Finally, you will analyse the test outcome and choose the most appropriate and well justified solution.

Communication Skills

Being an engineering student, you should take every available opportunity to practise your communication skills, especially in English. Presentation sessions with lecturers are useful means of practice but participation in competitions would be highly beneficial. There are competitions that allow you to share your views and thoughts on issues relevant to safety, health, social, cultural, legal and environmental aspects and relate them to engineering innovations.

Team-Work

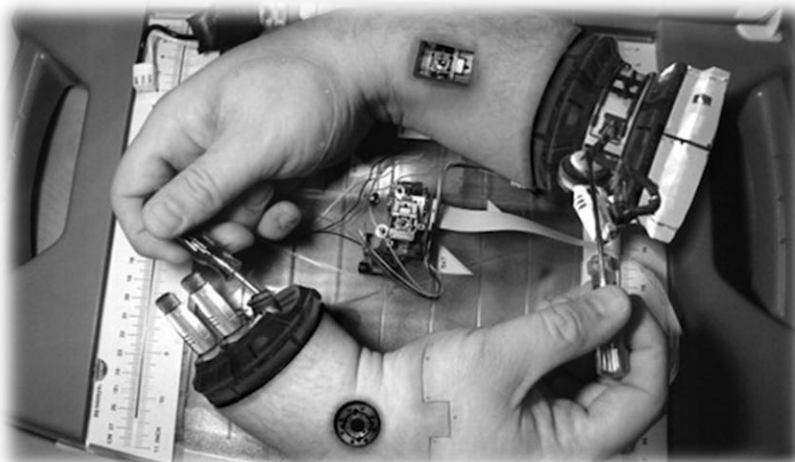
The ability to work with your peers is important as it enables you to develop skills in leadership, delegation, time-management and even management. There are plenty of team-work opportunities such as in group assignments, group-design projects or even in an informal tutorial discussion group sessions. It helps to work in groups as in the real world most engineering solutions are developed in teams. Always remember that a good engineer is a good team-worker and an excellent engineer is a great team-leader!



Human Pyramid [<http://i.ytimg.com/vi/iJO3ZRP5oU/maxresdefault.jpg>]

Hands-On

You will not be calling yourself an engineering student if you do not like to work with things! There is much to be learned transferring design and simulation work into practical implementation; these are only possible if you are willing to get your hands dirty by picking up necessary psychomotor skills in working with tools and instruments. Opportunities are present in the Engineering Design module as well as during the laboratory sessions for you to familiarise yourself with the tools. Therefore, you should be actively participating in the laboratory sessions rather than just sitting and observing. You will regret later on in your career when you find out that your colleagues know far more than you.



Hands-On Experience [<https://www.volacci.com/files/hands-on.jpg>]

In conclusion, the afore-mentioned personal traits are highly important for you as an engineering student for a successful engineering career. Plenty opportunities are provided by the School of Engineering to train and equip yourselves with these traits. What we need from you is purely your pro-activeness in participating in the activities throughout your study.

Dr. Thang Ka Fei



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GO GREEN

SUSTAINABLE GREEN HOME

Nowadays, the term sustainability is widely used in many areas such as product design & development, manufacturing, renewable energy, construction, farming, fishery and many more industries.

However many are still not exposed to the term “sustainability” and many among us still ask “What is sustainability?”, “How sustainable is the product?”, and “Why is sustainability important nowadays?”. To answer all these questions in the best possible manner would be to introduce the “Sustainable Home”.

A sustainable green home is more than just a catch phrase. It is a comfortable, low-impact, modern, money saving investment for a brighter future. There many ways of developing a sustainable green home and one of the ways is to implement a simple sustainable green home by using the PassivHaus Principle which responds to the climate and surrounding environment. It uses water, electricity, and other resources more efficiently which results in a cheaper to run and less wasteful home.

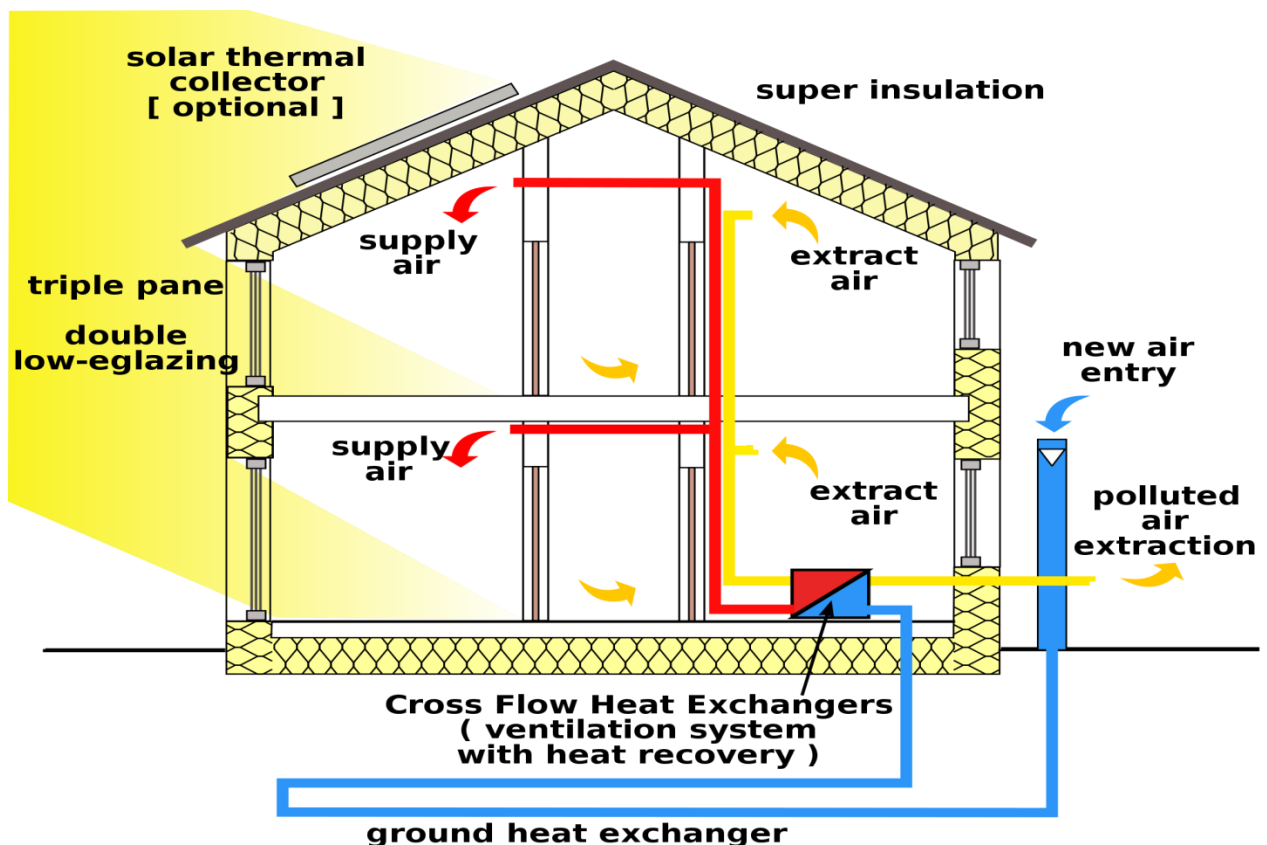


Figure 1: Passivhaus Home (<http://www.passivhaus.org.uk>)

What is the Passivhaus principle or design? Passivhaus design as shown in Figure 1, seeks to eliminate the need for space heating and cooling and is based on the principle of reducing heating loss to a minimum which is the most cost-effective and most robust way of achieving a low carbon building. Instead of complicated design and expensive bolt-on renewables, Passivhaus design relies on a simple 'tea cosy' effect maximising the use of super insulation and stringent airtightness, paying meticulous attention to the removal of thermal bridges. By combining this with passive solar gain, mechanical ventilation and heat recovery systems, Passivhaus design can create a healthy and comfortable building that requires minimal heating.

The other green method could be implemented by just incorporating simplicity as listed below to build or develop a Green home. Figure 2 shows an example of a typical example of a sustainable green home.

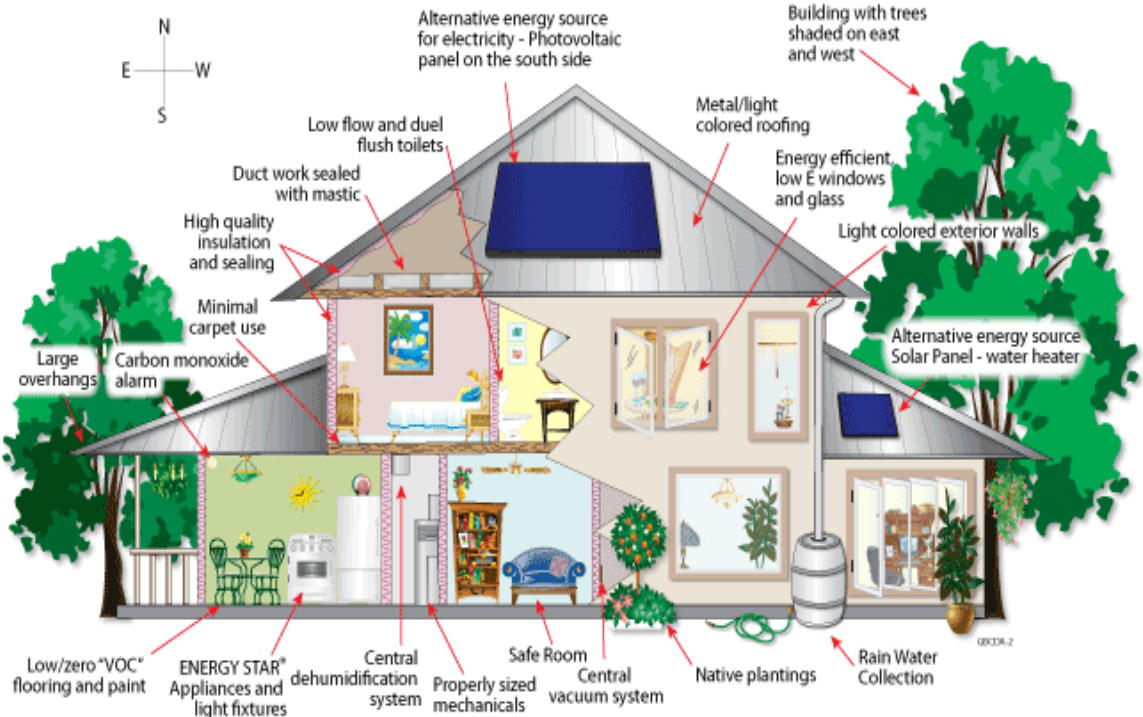


Figure 2: Sustainable Green Home (<http://www.devlings.com/>)

Green design – from inception forward, aspects of your home or commercial space can and should be designed to maximize efficiency and minimize energy and resource usage. Example, simple changes to layout, material selection, orientation, etc. can make all the difference.

Lumber, wood products and other materials – recommend and encourage the use of renewable plant materials such as bamboo, and lumber from managed forests, and, when available, high-quality reclaimed woods, stones and recycled materials.

Insulation – recycled plastic and soybean based insulation systems increase the structural integrity of the building by up to 300%.

Water Reclamation Systems – plumbing systems salvage grey-water and black water and redirect it for irrigating landscaping as shown in Figure 3.

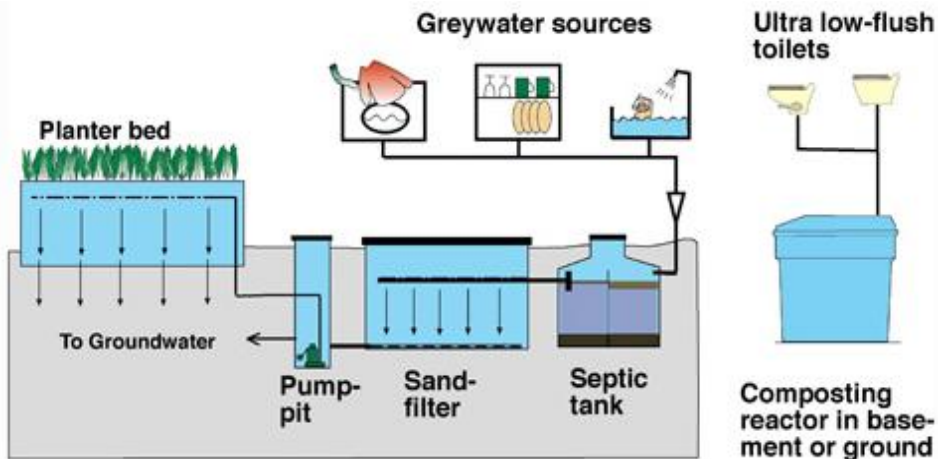


Figure 3: Grey-water purification and black-water treatment (<http://www.compostera.eu>)

Solar Energy or any renewable energy – is a way of powering a house with solar and photovoltaic systems or other renewable energy as shown in Figure 4 to help defray the cost of the energy, resulting in thousands of dollars saved, with absolutely no pollution.

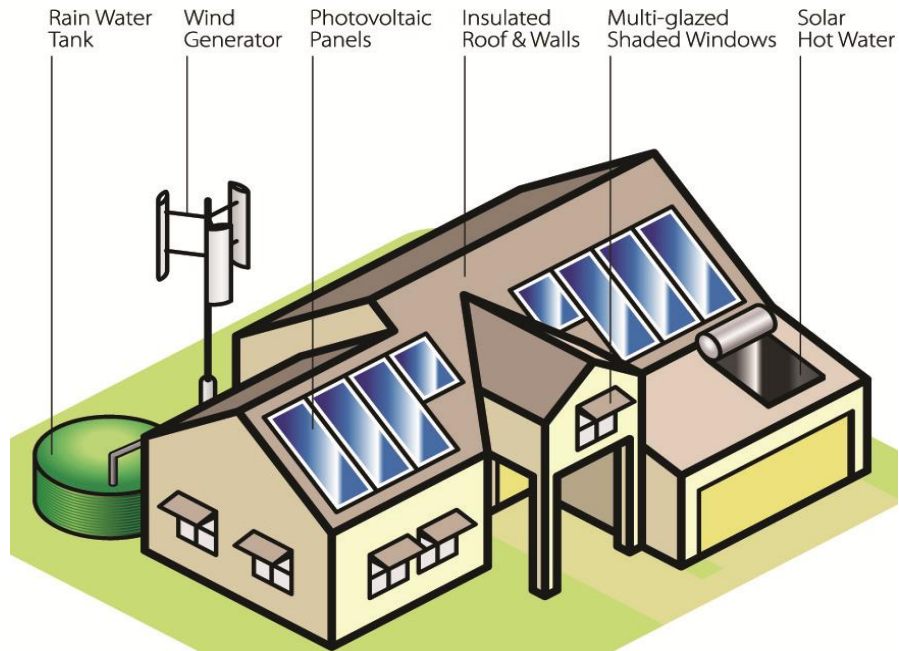


Figure 4: Sustainable Green Home(<http://efergy.com>)

Energy star appliances – is simply choosing energy conserving appliances that will save hundreds, if not thousands each year as an example based on the utilization of the inverter technology.

Smart Home technology – is having able to turn your air conditioner on 30 minutes before you arrive home, or to monitor your hot water usage from your Smartphone or iPad device. A Smart Home system as shown in Figure 5 allows you to both monitor and control every aspect of your home. You can even set alarms to tell you when you are approaching certain energy usage limits, which will help you adjust habits to create the lowest possible energy usage.

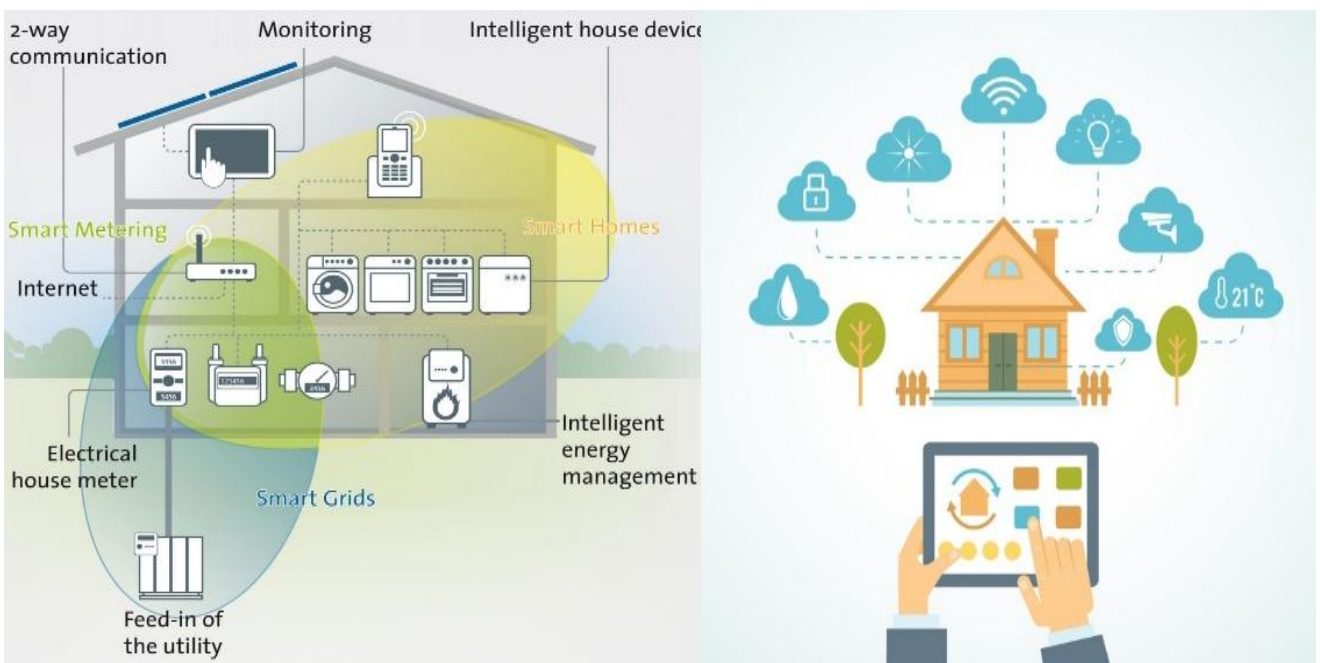
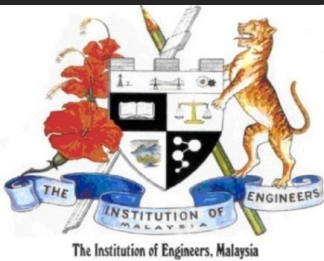
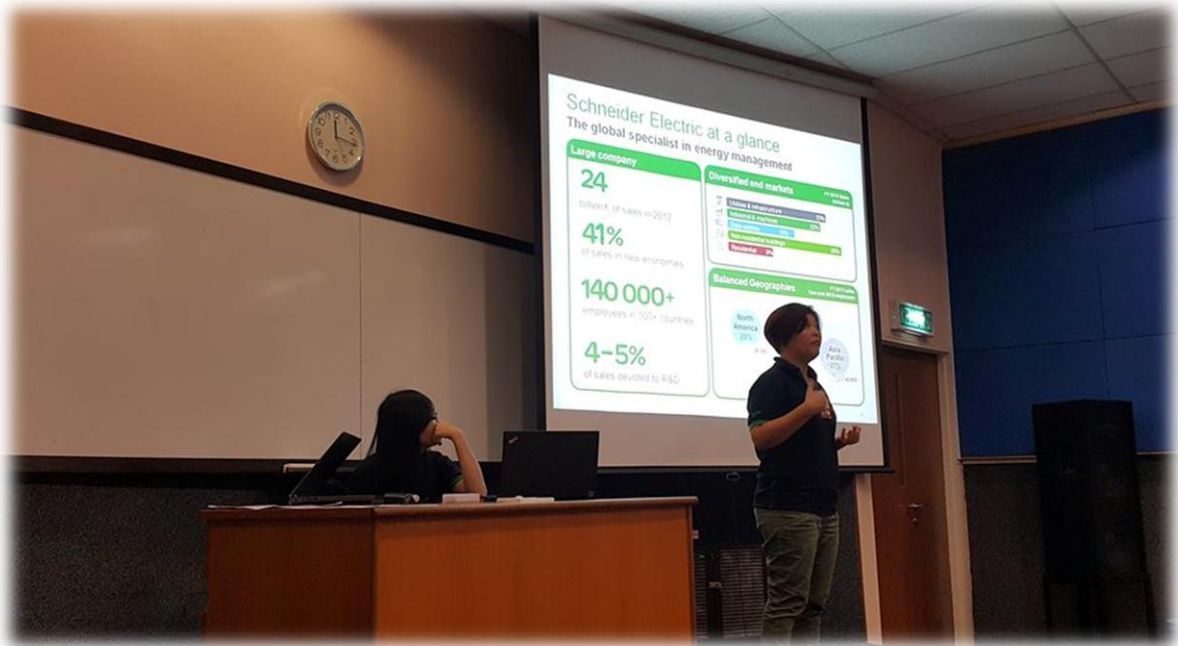


Figure 5: Smart Monitoring and Control for smart home(<http://www.ehi.eu/article/smart-metering-and-smart-home>)



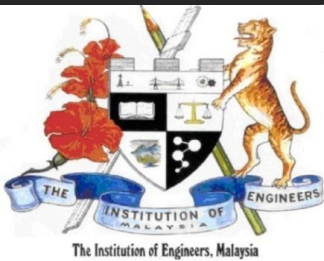
SEMINARS & WORKSHOPS

Go Green in the City



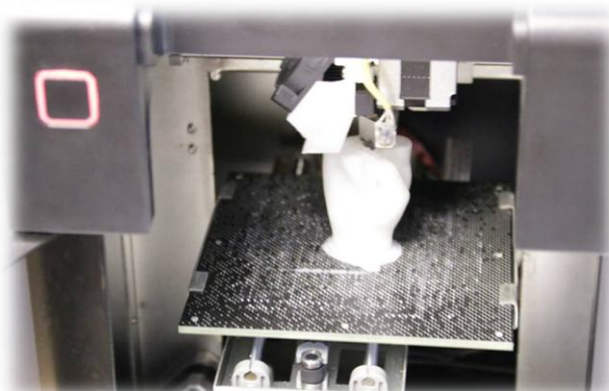
Go Green in the City is global business case challenge hosted by Schneider Electric every year. The competition revolutionized energy management and enabled the participants to have career opportunities with Schneider apart from a trip around the world for the winners. As an introduction and invitation talk to the students of APU, Schneider conducted an introductory talk on Go Green in the City competition on January 15, 2015. The talk was attended by 32 students and 5 staff members.





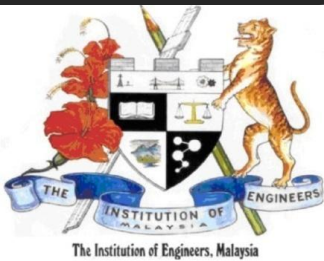
SEMINARS & WORKSHOPS

Introduction to AutoCAD and 3D Printing



AutoCAD with 3D printing is the leading 3D engineering technology in today's manufacturing world. On January 30, 2015, a sharing session with hands-on training on AutoCAD and 3D printing was conducted by Mr. Vyasa, who explained the student on the recent trends of AutoCAD and 3D printing. The students had an opportunity to 3D print the models designed by them using AutoCAD. 34 students and 2 staff members attended the sharing session.





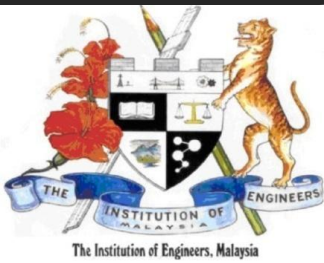
SEMINARS & WORKSHOPS

Image Processing with MATLAB



MATLAB with built in Image Processing Toolbox is a high end computation and engineering tool for Image Processing with capabilities to explore, enhance, analyze, segment and transform images. On February 28, 2015 a workshop on MATLAB for Image Processing was conducted by Dr Thang Ka Fei. The workshop with case studies on image processing tools and techniques was attended by 26 students and 1 staff member. The advanced level workshop was fine tuned to address the needs of final year students to carryout their final year projects in image processing with focus to image manipulation and processing.





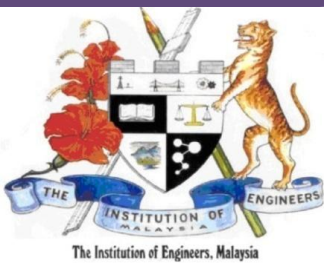
SEMINARS & WORKSHOPS

Solidworks and AutoCAD 2D



CADD Centre is a worldwide recognized training centre providing high level training on designing softwares such as Creo, SolidWorks and AutoCAD in the engineering field. On March 26, 2015 a 'Learning Session with Demo & Hands-on Practice for SolidWorks & AutoCAD 2D' was conducted by CADD Quest Team. The session allowed the 30 student participants who registered for the workshop to have a hands-on experience on SolidWorks & AutoCAD.





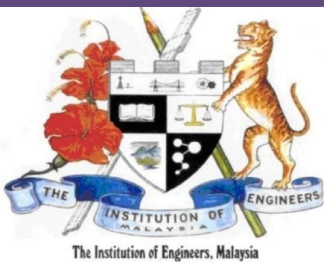
INDUSTRIAL VISITS

Sift Center Sdn Bhd



Sift Center Sdn Bhd business is broadly diversified across various industry groups, covering the fields of Advanced Composites, M&E Automation, CAMCAD, Road Pavement Solutions, 3D Architecture Design and Fabrications, Renewable Energy Solutions and the Diving Industry. On January 27, 2015 20 students accompanied by a staff member visited the Sift Center Sdn Bhd production centre where they had an opportunity to personally experience a 3D CNC Machine for Plug and Mold Productions.





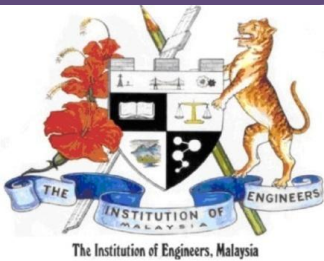
INDUSTRIAL VISITS

Proton Malaysia



PROTON was established in 1983 as part of an ambitious national industrialization plan and has since pioneered Malaysia's capabilities in automobile engineering, research, development and manufacturing. Proton today is Malaysia's largest manufacturer of automobiles and the only full-fledged OEM car manufacturer in Southeast Asia. On February 15, 2015, 37 students accompanied by 2 staff members visited Proton Tanjung Malim. The students witnessed the complete manufacturing process of cars which was an engineering experience to be remembered.



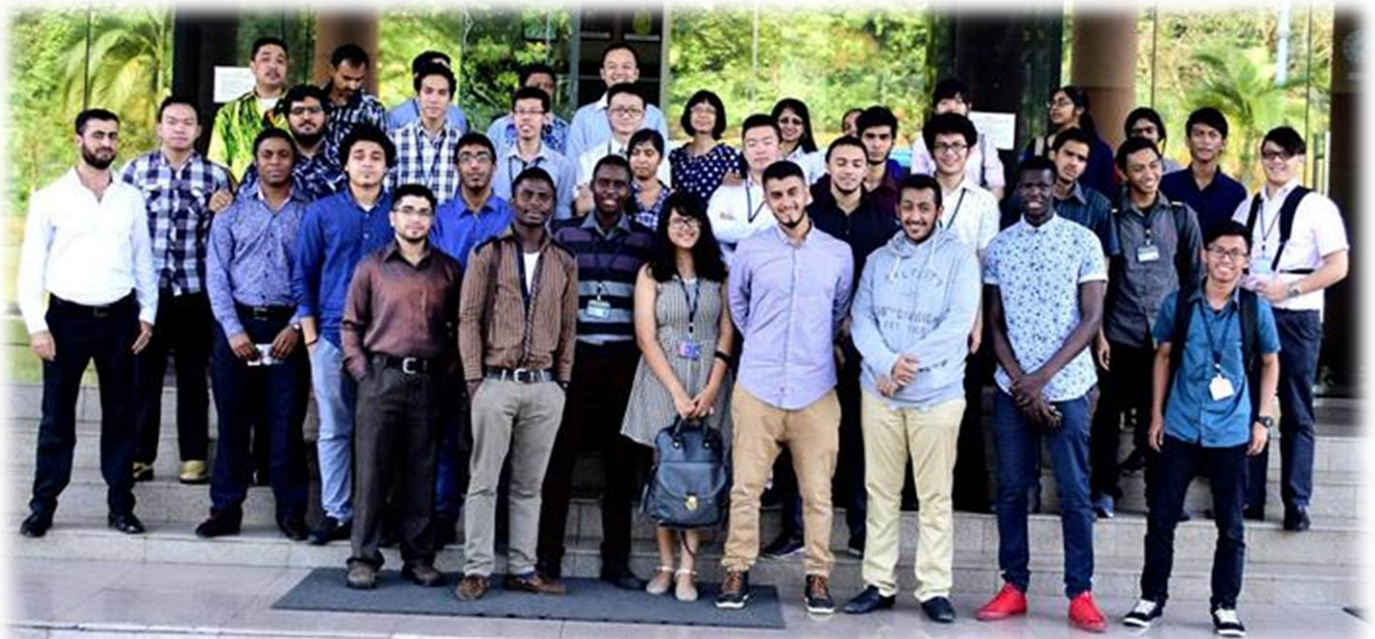


INDUSTRIAL VISITS

Malaysian Nuclear Agency



Malaysia Nuclear Agency is a progressive national research institution on nuclear sciences. Malaysia's progressive programme on industrialization and manufacturing was reflected via the Malaysian Nuclear Agency through the establishment and development of important nuclear laboratories and facilities. Through these facilities, nuclear science and technology assume an important and significant role in the national nuclear development programme. On March 5, 2015 30 students accompanied by 6 staff members visited the Malaysian Nuclear Agency where they had a life time opportunity of visiting the nuclear reactor and irradiance center.



Path Finder Robotics Competition 2015



We are pleased to announce that our students from the School of Engineering (SoE) achieved remarkable results in the Pathfinder Robot Competition 2015, which was held on 14 March 2015 (Saturday). Among the 3 teams who represented APU in the competition, Team MechatronicsFly successfully bagged the 1st Runner Up prize and walked away with RM 1,000 cash, medals and certificates, whereas Team E-Home achieved as one of the winners of the Creativity Award. The competition, organised by University of Nottingham, saw participation of 20 teams from local and private universities nationwide. Mentored by Mr. Arun Seelaran B. and Mr. Alvin Yap Chee Wei, the APU teams demonstrated outstanding skills and teamwork throughout the competition, which consisted of 3 sections: Build, Code and Race. The 3 teams of students who participated in the competition are as below:

MechatronicsFly:

Mentor: Mr. Arun Seelaran B.

Students: Obay Fares Alashkar, Ubaid Ur Rehman Khan, Suhail Sadeq Noman Al-Nabhani and Abdul Basit

E-Home

Mentor: Mr. Alvin Yap Chee Wei

Student: Haw Wai Kit, Huang Jiann Jer, Syed Abdullah Medni, Andrew Teh Boon Kheng and Chan Wai Sum

Storm Energy

Mentor: Mr. Alvin Yap Chee Wei

Students: Lau Yenn Yie, Christian Triputra Teng, Kong Yin Zeong, Lim Kim Hong and Shawn Hosea Ramish





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SOE COMPETITIONS

Schneider Electric Go Green in the City 2015



We are pleased to announce that our students achieved astonishing results in the recently concluded Schneider Electric's 'Go Green in the City' competition. Among the 184 teams which came from universities nationwide, both of the APU teams emerged as finalists of the competition. The teams comprised students from the Faculty of Computing, Engineering and Technology (FCET), as listed below.

Team: Eco-Friendly Innovators

Project: Innovative & Eco-Friendly Ceiling Fan

Members: Jugernauth Rishi and Jasmine Kaur Buttar

Team: X00FF00

Project: Infinite Loop

Members: Choon Yun Lim and Breena Theseira

We are absolutely proud of the students' success and consistency in earning good placements in the competition over the last 2 years. This has indirectly increased the confidence of Schneider Electric in our students' capabilities, apart from making way for more internships and employment opportunities in the future.



Institute of Engineers Malaysia (IEM)



On the 6th of January 2015, APU signed a prestigious MoU with the Institute of Engineers Malaysia (IEM). IEM was established in 1959 and its primary function is to promote and advance the science and profession of engineering in any or all of its disciplines and to facilitate the exchange of information and ideas related to engineering. IEM has over 30,000 members and represents all engineers in Malaysia. IEM's President, Dato' Ir. Lim Chow Hock together with senior members of the council graced the signing ceremony. CEO of APIIT Education Group, Datuk Parmjit Singh together with Deputy Vice Chancellor, Prof Ron Edwards and Vice-President of Operations, Mr Gurpardeep Singh welcomed the guests. The IEM representatives were highly complimentary about APU's development, vision and mission in education as briefed by Datuk Parmjit. The IEM-APU Student Section (IASS) also presented their activities and achievements for 2014 which also received congratulatory remarks from all the guests present. Currently there are 140 student members of IEM and the mission for 2015 is to increase this number and all engineering students are strongly encouraged to join IASS for it is very beneficial. The event ended with the IEM guests being given a tour of the technical facilities in APU. The guests were very impressed with the development of the new campus. IEM has pledged full support to the IASS and engineering education at APU.





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SOE FINAL YEAR PROJECTS



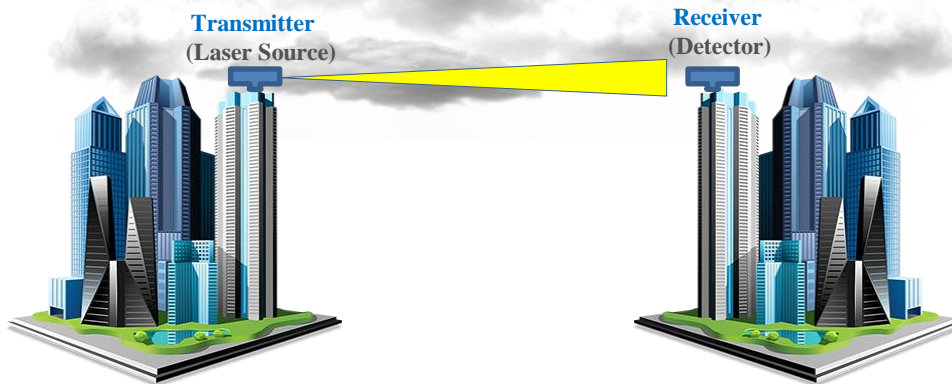
**Final Year Project
Presentation
UC4F1404**



Optical Wireless Communications

Mohammed Abdulhafedh & Dr. Mazen Radhe Hassan

In the past three decades, the demand for high-speed communications has increased dramatically, while fiber optical communications has been applied in the majority of data transmission networks. Optical fiber has advantages over existing copper wire in long distance and high demand applications. The ever increasing need for higher bandwidth and higher speed optical data and communications transmission is driving the development of 100 gigabit per second (Gbit/s) communication links. However, infrastructure development within cities is difficult and need much time and fiber optic system is complex and not cheap.



Optical wireless communications

Free-space optical communication (FSO), or optical wireless communication (OWC), is an optical communication technology that uses light propagating in free space to wirelessly transmit data for telecommunications or computer networking. Optical wireless communication has become a practical high bandwidth access tool.

OWC has many advantages such as high transferring speed, fine light beam direction, high privacy, without the allowance of radio frequency usage, not influencing the municipal construction, low cost, wide communication frequency band especially because laser source has the high direction, thin emitting light beam, and enables to transfer quite a lot of data in the short time, it has the short communication time, high privacy and interference immunity and can prevent from being wiretapped and detected effectively etc. Laser sources have a wide application in civil and military fields, and have become a new communication technology with the high competitive ability.

OWC system consists of a transmitter, wireless channel (free space or atmospheric) and receiver (detector). The transmitter converts the electrical signal to optical signal and the light propagates through the channel into the receiver. The transmitter includes modulator which convert bits of information to signal, laser driver provides the injection current to laser source and stabilizes its performance and the telescope which aligns the laser source beam to the receiver photo detector.

In the channel, the signal is attenuated and blurred due to noise and absorption. The receiver includes telescope for collecting the incoming signal and drives it to filter, filters remove the radiation background, photo detector which converts the optical signal to electrical signal and decision unit which can determine nature of information bits based on amplitude of signal pulse. Nowadays OWC systems usually operate with well-established near-IR laser sources of 0.785-, 0.85, and 1.55 μ m wavelengths. The reason of going to 1.55 μ m wavelength is that the attenuation is less than other wavelengths.

OWC is affected by weather conditions such as clear, haze, thin fog, light fog, heavy fog and can affect those wavelengths in different ways. It is feasible to enhance the system performance such as link range and data transfer rate by increasing transmitting power and decreasing laser beam divergence angle. In order to enhance the communication system, increasing the current signal might be the way to reduce the effect of the background noise or noises of the system thus the bit error rate BER will be decreased and the system performance works effectively

Many years ago, when people encountered wired communication devices, communication bandwidth was very limited as in few KHz where at that time researchers saw twisted pair cables very unique. While, as the time passed, technology increases and directly proportional to this number of user increased, researchers came out with relatively developed communication channels such as coaxial cable (capable of few MHz) and waveguide (capable of few GHz). Moreover, as discussed number of user increased needed bandwidth and hence frequency of operation increases. In this manner, recently companies came out with optical fibre channel (capable up to few TeraHertz (THz) frequency).

Terahertz Photoconductive antennas are one of the most promising types of antenna those have been used in order to harness the unique properties of terahertz waves for many applications. In this manner, THz photoconductive antennas are the most common device in the manner of generation and detection of the THz waves which in this manner very different from conventional Radio Frequency (RF) and Microwave Antennas (WA). One of the main reasons which makes the THz antenna more unique than others is that, when this device is used for detection and generation purpose, it provides relatively very high signal to noise ratio. Terahertz Photoconductive antennas can be represented schematically in Figure 1.

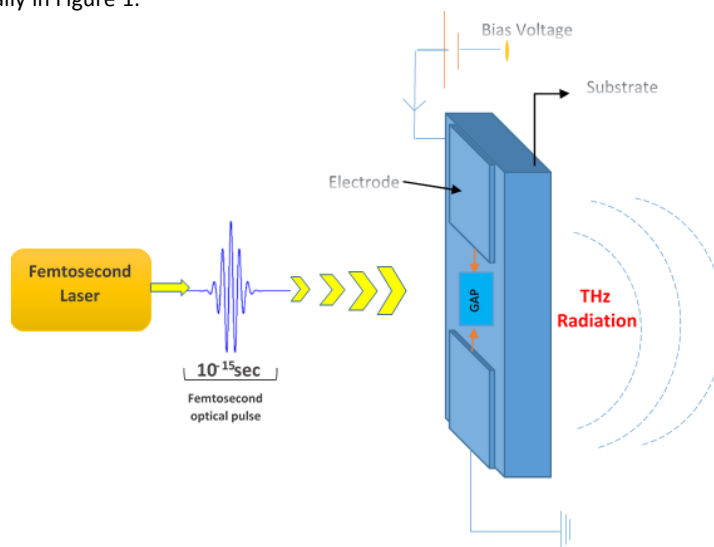


Figure 1. Basic structure of THz antenna

THz photoconductive antenna is biased by DC voltage with a specified value to produce a current driven through the electrodes. The conductivity of the gap can be controlled/excited by a femtosecond laser pulse. When femtosecond laser pulse is focused on the antenna gap, photocurrent is generated due to the excited electrons and holes during very short time. The accelerated current would produce an electromagnetic TeraHertz wave.

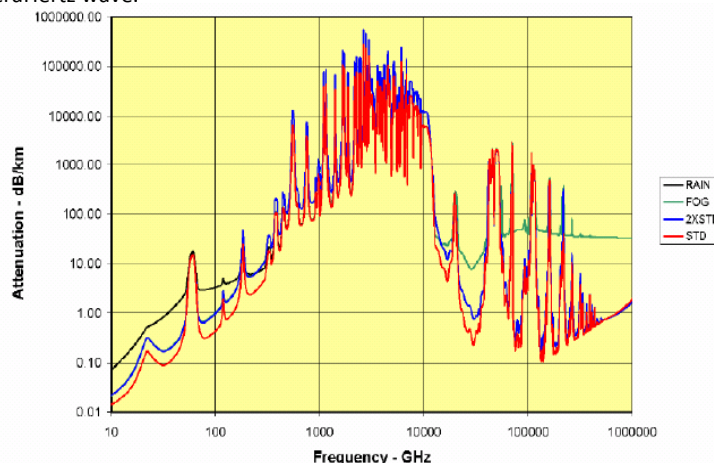


Figure 2. Attenuation of THz radiation for different atmosphere conditions [1]

THz Electromagnetic radiation has specified atmospheric characteristics as shown in Figure 2. THz waves have extremely high absorption in the atmospheric due to mainly water vapour. Researches are in progress to find effective solutions to overcome such attenuation attempting to open transmission windows for THz wireless communication. There are many variety of fields interested in THz- pc antennas. Such as; security purposes, biology and medicine, medical imaging, material spectroscopy and sensing, last but not in pharmaceutical industry. In addition, THz wireless communication can provide huge bandwidth for high data demands and the researchers are investigating response of atmosphere channel to THz digital pulses in order to overcome the corresponding attenuation.

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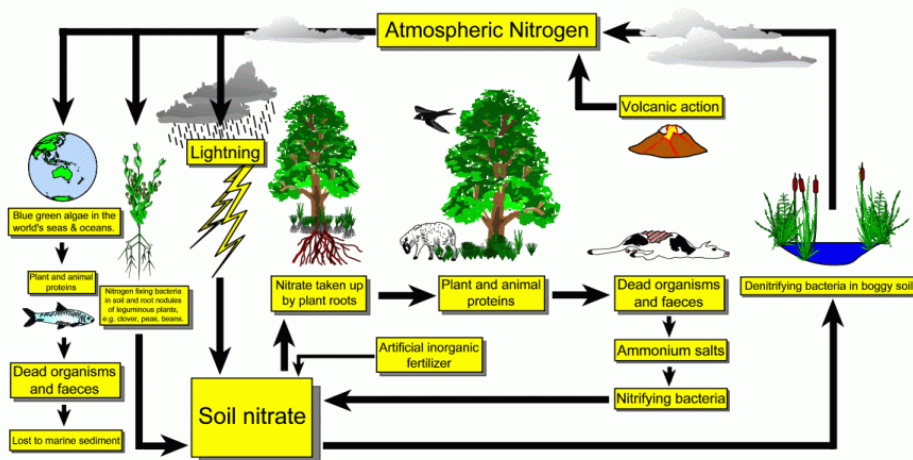
As the 20th century drew to a close, a rising number of researchers agreed that humanity's rapid growth during the 19th and 20th Century came at the cost of significantly damaging the Earth. In response to this, the United Nations developed the Brundtland Report. The report introduced the term 'sustainable development' as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Today, sustainable products and projects are in high demand as there is an increased awareness among the general public with regards to the dire situation of the Earth's future. In spite of this increase in awareness, sustainable development faces many major challenges in trying to meet consumer demands. Three of the major issues that will be illustrated in this article include, the challenge of finding a complete replacement of fossil fuels, providing clean and fresh supplies of water that would meet the demands of the ever increasing human population and 'fixing' the nitrogen cycle.

Many potential fuel sources have been promoted by the media as the complete replacement of fossil fuels. However, each of these alternative energy sources faces their unique challenges. For example, solar power is highly dependent upon the local climate and the time of the day to provide an adequate amount of energy. The erratic nature of wind currents makes wind energy an unreliable source. Also, the high cost of the technology required to generate alternative energy turns away many people in the medium and low income groups, from adopting alternative energy sources. Fossil fuels are still being reluctantly relied upon because of their reliability and relatively cheap cost. A major engineering challenge would be to design or introduce an energy source as reliable and as cost effective as fossil fuels in meeting consumer demands damaging the environment.

Water is a key component for life on Earth. Therefore, the preservation of clean supplies of water has become a major area of concern in sustainable development. Among the many challenges faced in this task is the ever growing human population. It is estimated that at the current growth rate, the human population would reach 16 billion by the year 2100. At this point the demand for water would greatly exceed the supply to the point that flora and fauna could face immediate extinction due to the lack water. Signs of this are already evident, as today 2.5 billion people live in water-stressed nations. In these places water is in such shortage that livestock and crops need to be forsaken in order to meet the needs of the citizens. The challenge faced by engineers today would be to produce systems of water management that would be able to support need of the growing human population without adversely affecting flora and fauna.

Another key issue that would need to be addressed immediately is 'fixing' the nitrogen cycle. The cycle plays a central role in food production. Nitrogen from the air is fixed onto plants that would synthesize protein from the fixed nitrogen. Excessive amounts of nitrogen oxide being released by cars and agriculture have doubled the amount of nitrogen in the air. This has led to an increase in global warming and acid rain. On a more fundamental level the presence of excessive nitrogen is disrupting the cycle, greatly affecting the health of plants. An engineering solution would need to be introduced to remediate the problem. Part of the solution would be designing methods of agriculture that would be able to meet consumer demands without releasing excessive amounts of free nitrogen into the atmosphere.

The Nitrogen Cycle



To summarize, three major challenges faced in sustainable development are finding alternative energy sources that can rival fossil fuels, maintaining clean and unpolluted sources of water for the growing human population and restoring the balance of the nitrogen cycle. Engineers face major problems in trying to overcome these challenges. However, history has proven that when civilizations are faced with great threats human ingenuity has prevailed, enabling civilisations to rise up stronger. This time around, sustainable development is the challenge that civilizations must overcome to ensure their continued existence.



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SOE EVENTS

IEM-APU Student Section Handover Ceremony

IASS
Office Bearers
2014



IASS
Office Bearers
2015



STAYING UNITED ENSURES THAT YOU ARE STRONGER AS A UNIT