

ENGINEERUS

Circulation: 42,000

School of Engineering newsletter • Issue 50 • August 2017

**Joint
Earn &
Learn:
Have your cake
and eat it!**
P2

**Aircraft system
to ensure
you fasten
your
seat-belts**
P6

**Snap a
photo and
win!**
P12

**Solve
a puzzle
— Win a
limited edition
thumb-drive!**
P14

COVER STORY
Saving the world
P11

SKILLS FOR THE FUTURE

Since its launch in 2015, the national SkillsFuture programme has been evolving, providing school leavers with many viable options. **ENGINEERRUS** sums up the developments affecting polytechnic diploma holders.

What is SkillsFuture?

SkillsFuture Singapore (SSG) is a national movement, begun in 2015, which aims to raise the relevance of the skill-sets of our workforce so as to benefit the individual, companies, and the national economy.

The key thrusts of SSG are to strengthen the link between what is learnt in school and what is used or applied in the industry by facilitating the transition of graduating students from studies into the world of work, as well as to encourage life-long learning by providing working adults with opportunities to upgrade themselves and improve their career prospects through part-time courses.

A vital aspect of SSG, among others, is the Earn & Learn Programme which benefits both graduating students as well as the companies they work for.



Earn & Learn Programme (ELP)

Under this programme, fresh ITE and polytechnic graduates are placed with employers under a 12 to 18-month contract, during which they learn through structured on-the-job training and mentorship, as well as concurrent part-time courses, such as those offered by polytechnics. During this time, participants are paid a full salary. In addition, those who join the scheme within a year of graduation will get a sign-on bonus of S\$5,000.

Besides acquiring relevant work experience and skills valued by the industry, participants may also enjoy skills-based wage increments and better career prospects in their company, as well as credit exemptions if they decide to pursue a degree later on.

Joint-ELP programme

Introduced in May 2017, the Joint-ELP is a new enhanced version of the ELP, under which Poly diploma holders will be able to study for a university degree (instead of

just a specialist diploma or certificate) while working for their employers.

Temasek Polytechnic (TP), which is already offering certificate and specialist diploma courses in Aircraft Maintenance, Aviation Management, Semiconductor Manufacturing as well as Big Data & Analytics, Smart Solutions and Infocomm & Digital Media, will partner the Singapore University of Social Sciences (SUSS) and Singapore Institute of Technology (SIT) to deliver ELP in sectors such as Building Services, Facilities Management, and Infocomm Technology.

To enable more individuals to benefit from ELP, SSG will be increasing the number of ELP programmes, from 40 in 2016, to 60 this year. Programmes in new sectors such as Human Resource, Medical Technology and Sports & Wellness will gradually be added. With the expansion, SSG aims to double the number of ELP placements to 1,000.

Joint-ELP @ TP

At TP's School of Engineering, the Joint-ELP has kicked off for graduates from the Diploma in Integrated Facility Management (IFM). A total of 18 IFM diploma holders are pursuing a Bachelor of Science degree in Facilities & Events Management at the Singapore University of Social Sciences (SUSS) while they work full-time for various employers.

A Joint-ELP for graduates from the Diploma in Green Building & Sustainability (GBS) will start in January 2018, allowing GBS diploma holders to read for a degree in Sustainable Infrastructure Engineering (Building Services) at the Singapore Institute of Technology (SIT) while working full time.

More Joint-ELP places for graduates from other TP Engineering diplomas will continue to be added.



Sources: "Boost for Earn & Learn Programme", *The New Paper*, 25 May 2017 & *ST Jobs*, 21 Jun 2017; www.skillsfuture.sg; Photo: NTU

WERE YOU HERE?

Secondary school students and teachers visited our School of Engineering to find out about Poly life, as well as get a taste of TP's renowned idyllic waterfront environment. They checked out the facilities, attended workshops to pick up Engineering-related skill-sets, and had fun learning too. Were you one of them?



Geylang Methodist Sec School (17 May '17)



Pasir Ris Sec School (25 May '17)



St Gabriel's Sec School teachers (25 May '17)

APP-SOLUTELY COST SAVING



Worried about your soaring home utilities bills? This mobile app, called “Smart DB”, will help to rein in your electricity consumption.



The “Smart Distribution Board (Smart DB)” mobile app will enable you to monitor your household electrical usage, as well as the energy consumed by each electrical appliance, thereby allowing you to identify which are the energy guzzlers in your home.

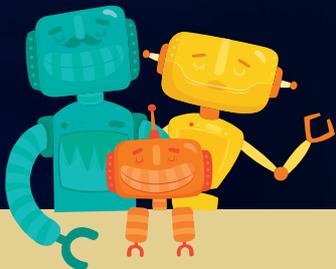
The app can also keep a log of the time at which a particular appliance in the home is used, as well as the duration of use. This means it can be used to monitor the activities of an occupant alone at home, such as a domestic helper or elderly family member.

This invention won the top award in the Poly Student Research Programme (PSRP) on 22 Mar '17.

A second project called “Generating Micro-Gels Using Microfluidic Devices” also won the award. Invented by two Biomedical Engineering students, this highly efficient and economical method of producing Hydrogel micro-particles (also known as micro-gel droplets) will benefit the pharmaceutical and life science industries.



OUR INVINCIBLE ROBOTS



TP School of Engineering reaffirms its robotics expertise at Singapore Robotic Games 2017.

Temasek Polytechnic (TP) maintained its top performance at the annual Singapore Robotic Games held on 18 & 19 Jan '17, winning 3 Gold, 1 Silver, and 1 Bronze awards.

TP's trio of heavyweight Sumo wrestlers (“Batman”, “Hamster” & “King Kong”) made light work of their opponents by sweeping all the medals at stake in the “Autonomous Sumo Robot” category.

In similar style, the defending champion of the “Intelligent Robot” category, named “ABC”, extended the team's unbeaten run to 8 consecutive years.

TP's third Gold award came from the pair of deadly twins, “Turbo Powers” — which won the “Robot Colony” category for the third consecutive year.



This 8-time champion is arguably the most intelligent robot in its class today



Our battle-hardened Sumo wrestler robots

VIRTUALLY THE BEST



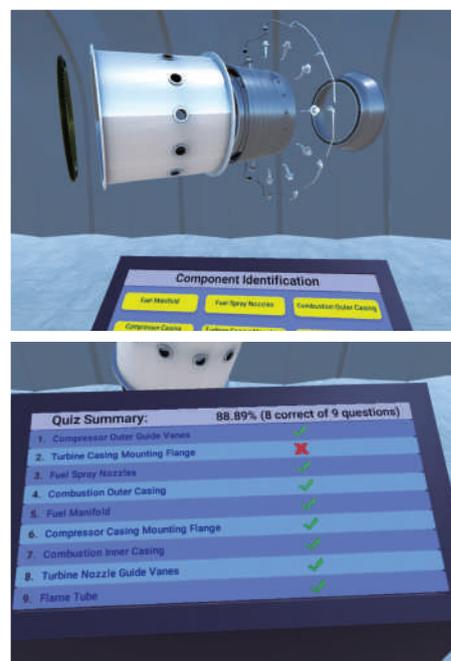
The VR experts from TP (clockwise from front left): Sherly, Zhou Hong, Christopher, Tommy and Poh Hoon



TP staff strike gold in their quest to develop the best virtual learning module for students.

A team of virtual reality (VR) developers from the Interactive Digital Centre Asia (IDC Asia) in Temasek Polytechnic (TP), emerged champion in the InnoVJAM VR+Pedagogy contest held on 25 May '17, beating 36 other teams comprising industry experts and professional training providers, as well as other tertiary institutions.

The VR learning module which they developed is designed to equip students from the Diploma in Aerospace Engineering with the knowledge and skills to perform a visual inspection of an aircraft combustion chamber — which, due to its complex design and location inside the Gas Turbine Engine of an aircraft, is normally difficult to access and view.



CLEAN QUEST FOR VICTORY

Clean Energy students won the Bronze award (Polytechnic category) of the Sembcorp-EMA Energy Challenge held on 29 Jun '17.

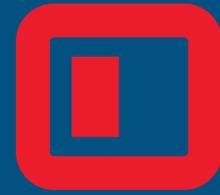
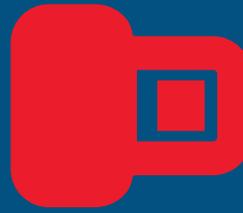
Using the “PowerQuest” computer simulation, the students managed a power eco-system which required them to balance profitability, reliability and environmental sustainability.

They also took part in the “Powering Lives Trail” comprising an experiential tour of SembCorp Cogen @ Banyan and the Pulau Ubin micro-grid test bed, to gain prior insights into the operational challenges of managing energy systems.

The competition was held in conjunction with the Urban Sustainability R&D Congress on 29 Jun '17.



EXCUSE ME,



PLEASE FASTEN YOUR SEAT-BELTS!

The next time you do not fasten your seat-belt in an aircraft, you could be ticked off by a cabin crew within seconds. And it's no use trying to hide your unfastened seat-belt buckles under a pillow either.



Three students from the Diploma in Aerospace Electronics (AEL) have designed an aircraft seat-belt warning system to alert the cabin crew if you have not fastened your seat-belt when you are supposed to.

Called the "Electronic Illumination Seat-belt Detection", this system involves embedding an LED lamp which can flash one of 3 different colours — green, blue and red — inside the "fasten seat-belt" indicator on the passenger's overhead compartment. It also doubles-up as a "call attendant" indicator.

The project won a Commendation award in the annual Tan Kah Kee Young Inventors' Award competition held on 27 May '17.

What the LED lamp colours mean

- **Green:**
Seat-belt fastened when required; passenger is calling for attendant.
- **Blue:**
Seat-belt not fastened, whether required to or not; passenger is calling for attendant.
- **Red:**
Seat-belt not fastened when required; passenger is not calling for attendant.
- **Not lighted:**
Seat-belt fastened when required, or seat-belt not required to be fastened, and passenger is not calling for attendant.



Flex Walker Pro

The "Flex Walker Pro", a modified walking stick that can be pulled apart and split into 2 halves connected by an X-frame so to provide added support to those with weak or injured lower limbs, won a Merit award in the same competition.

Floating Cutlery Stand

This "Floating Cutlery Stand" is a table-top platform embedded with small magnets to repel the magnetised cutlery and cause them to levitate above the table, thereby dispensing with the need for additional cutlery stands. The project won a Commendation award.



WELCOME TO OUR FAMILY!

Thousands of students were welcomed to the Temasek Polytechnic (TP) family during the annual Freshman Orientation held from 19 — 20 Apr '17.

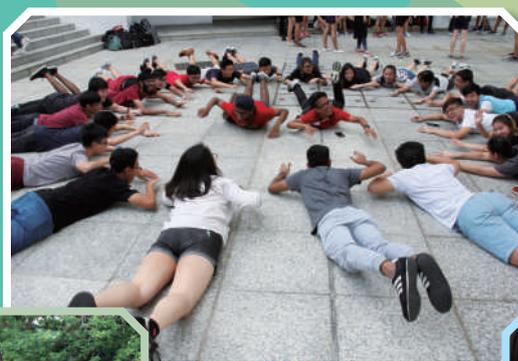
Besides academic briefings and introduction to campus facilities, the freshmen took part in telematch games, bonding activities, cheering contests and the prestigious Temasek Regatta, a dragon boat rowing competition held at the scenic Bedok Reservoir.

Engineering School won the Regatta — the fourth consecutive year that it has done so.

Regatta Results

ENG Team	2013	2014	2016	2017
Girls (Freshies)	1 st	1 st	3 rd	1 st
Girls (Seniors)	1 st	1 st	1 st	2 nd
Boys (Freshies)	2 nd	1 st	1 st	1 st
Boys (Seniors)	2 nd	2 nd	2 nd	2 nd
Overall	Champion	Champion	Champion	Champion

(There was no Regatta in 2015)



GRADUATION 2017

About 1,500 Engineering students received their diplomas over 5 graduation ceremonies held from 3 — 5 May '17 at Temasek Polytechnic's Convention Centre. Congratulations to all graduates!





Ganesh with his GBS lecturers

In his previous polytechnic, **Ganesh Kunasekaran** would often go clubbing, smoke and drink heavily, skip classes, and neglect his studies. Consequently, he failed several modules and was removed from his Aerospace & Avionics diploma course in his final year.

But where Republic Polytechnic turned him away, Temasek Polytechnic (TP) gave him a second chance, admitting him into the Diploma in Green Building & Sustainability (GBS).

Resolving to turn his life around, he worked hard at TP and in May 2017, the 28-year-old graduated with a cumulative Grade Point Average (CGPA) of 3.97, winning the Course Gold Medal and the Lee Kuan Yew Award.

TAKE A CHANCE ON ME

Clubbing addict turns his life around with second chance.



With his proud parents

How did he manage to turn his life around so dramatically? Ganesh explained: "Smoking became synonymous with my old habits, and I felt that in order to change for the better, I needed to start by quitting smoking." Extending his determination to quit smoking to his studies, Ganesh unleashed his full potential and powered to success.

"I will always be grateful to TP for giving me a second chance," said the former student of First Toa Payoh Sec School.

SHE'S EARNING & LEARNING



New Joint-Earn & Learn Programme (Joint-ELP) kicks off with new batch of diploma graduates

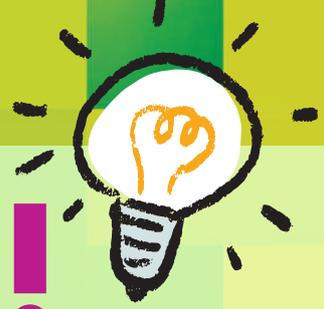
Want to earn a market-competitive diploma holder's salary while you pursue a degree? Well, now you can.

That's what **Fu DeQi**, who graduated with a Diploma in Integrated Facility Management (IFM) in May 2017, is doing. The 20-year-old is among the first batch of diploma graduates on the new Joint-ELP, incorporated as part of the national SkillsFuture initiative.

She is pursuing a Bachelor of Science degree in Facilities & Events Management at the Singapore University of Social Sciences (SUSS), while working full-time as an FM Executive at Exceltec Property Management Pte Ltd. Besides attending night classes at SUSS, DeQi has also been given 2 half-days off per week by her employer, to allow her to catch up on her studies.

When she completes the 9 selected modules which she is doing at SUSS during her 18-month stint with her employer, she will enjoy credit exemptions of up to 50 credit units, effectively shortening her university course by one year.

"The Joint-ELP is like a fast track multi-tasking programme, it saves time!" she assessed.



ENGspire ME!

Can you boil water without heating it?

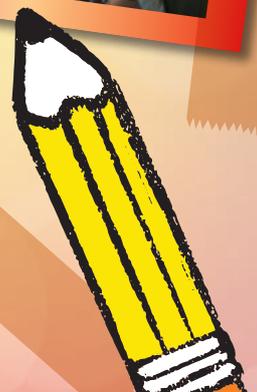
Why is it so difficult to lift a rubber mat on the floor by pinching it from the centre, but much easier if you peel it off from the edge?

Engineering students found out the answers to these and other intriguing questions at the inaugural ENGspire Day event held on 30 Jun '17.

Modelled like an internal Open House carnival, the event showcased about two dozen exciting Engineering exhibits covering various fields of study across the School's 16 diploma programmes, to inspire and pique the curiosity of participants.

First year Engineering students also visited the different booths to collect stamps, which they then exchanged for prizes.

Check out what happened...



WE HELPED TO SAVE GAIA

Students and staff from the School of Engineering spent 3 hours cleaning up East Coast Park beach as part of MediaCorp's "Saving Gaia" project.



It was a wet and soggy afternoon, as 1,500 Engineering students and staff descended upon East Coast Park beach on 24 May '17, spreading themselves across 5km of the coastline, from Big Splash to Marine Cove, past the Singapore Tennis Centre, all the way to the Seafood Village.

They were taking part in a beach clean-up operation held as part of MediaCorp's "Saving Gaia" project. Armed with trash-bags, leather safety gloves, weighing scales, and lots of zest, the students and staff spent 3 hours doing their bit for the environment, picking up plastic bottles, styrofoam, drink cans, and even discarded furniture and scrap metal — undeterred by a constant drizzle throughout the cloudy afternoon.

Organised as part of the School's LEAP (Leadership: Essential Attributes & Practice) "Service Learning" programme for Year 1 students, the project aimed to inculcate in students the importance of caring for the environment, while giving them the opportunity to exercise self-leadership and self-responsibility.



LET'S GET SNAPPY!

Calling all photo enthusiasts!
Here's your chance to win cool cash by just pressing a button!



FACETS 2017



Theme: Green Buildings @SG

Snap a photo of a building which has received the **BCA Green Mark Platinum** or **Goldplus** award, provide a caption, and submit it via Instagram (**#gbsfacets2017**). Then email the Instagram link with your name, school and NRIC number to: **GBS_T29@tp.edu.sg**

- 1st prize:** \$500
- 2nd prize:** \$300
- 3rd prize:** \$200
- Voters' Choice:** \$100
- Four Merit prizes:** \$50 each

The competition is open to all secondary school students in Singapore.

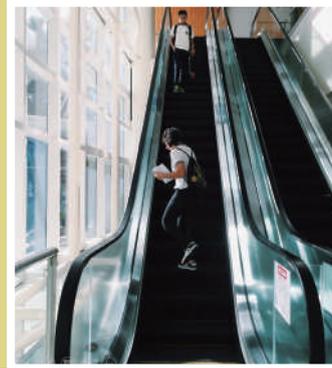
Each contestant may submit up to 3 photos.

Closing date: 15 Oct 2017.



FACETS 2016 RESULTS

Theme: Daylighting in Green Buildings



1st PRIZE:

Siti Zulaikha
(Cedar Girls' Sec)



2nd PRIZE:

Chai Jia Cheng
(Raffles Institution)



3rd PRIZE:

Tan Yong Hui
(Ngee Ann Sec)

MERIT PRIZES:



Indra Basak (Cedar Girls' Sec)



Royden Soh (Anderson Sec)



Darren Kuek (Tampines Sec)



Natalie Low (Crescent Girls' Sec)

VOTERS' CHOICE:



Goh Li Ping (Pei Cai Sec)



A LECTURER WITH CLASS

Engineering lecturer conferred the “Crescendas Medal and Prize for Outstanding Physics Lecturer 2016” award.

How do you teach a Physics concept such that students will understand, remember, and yet enjoy?

Ask Engineering lecturer Mr Tan Kay Yew, who won the “Crescendas Medal and Prize for Outstanding Physics Lecturer 2016” awarded by the Singapore Council of the Institute of Physics (IPS) in February 2017.

The 41-year-old lecturer, who has been teaching Engineering Physics under the Common Academic Programmes in the School of Engineering for the past 5 years, went through a gruelling selection process, including being assessed by a panel of judges and Physics professors from NUS on his subject knowledge, contribution towards Physics education and teaching methodology.

Said Mr Tan: “A good Physics teacher should be able to ‘wow’ students by appealing to their senses, such as by using elements of game, interesting toys, demonstrations and online simulations so as to improve their learning experience”.



LET'S CHILL OUT!

Lecturers from the Diploma in Integrated Facility Management (IFM) decided to try their hands at ice-cream making. One of them, Wiliana Sulistio, reflects on the experience.



By Wiliana Sulistio

Ever wondered how ice-cream is made? Well, the nine of us, comprising former facilities managers, property valuers and architects, decided to stop looking at buildings and facilities and take a look at ice-cream for a change! So we signed up for an ice-cream workshop conducted by Icecreamskool.

Working in pairs, we learnt that we had to cook a mixture of milk, flavouring, egg yolk and sugar over a low heat, and then freeze it. Yes, it's that simple! Or so we thought.



Even though everyone used exactly the same amount of the same ingredients and did precisely the same steps, the ice-cream produced by each group tasted differently — some were tasteless, some too powdery and some not creamy enough. Why?

In retrospect, we realised that the cooking process made all the difference! The temperature, duration of heating, and the stirring of the mixture affected the eventual flavour, texture and consistency of the ice-cream.

Just like how we groom our students — we need to apply the correct teaching methods and nurture them patiently, in order to extract their fullest potential.

A GREEN JOURNEY DOWN UNDER

Thirty-seven Engineering students went down under for a study trip from 20 — 25 Mar '17. One of them, Jonathan Ang, from the Diploma in Green Building & Sustainability (GBS), shares his memorable moments.

By Jonathan Ang (GBS)

As we exited the airport, the cool stinging breeze and bright sunshine welcomed us to Perth, Australia.

First up was a visit to the Green Skills Training Centre which featured a “peel back” construction method to expose building structures, allowing the Centre to be used as a teaching tool.

At the Grove Library, we checked out an exhibition showcasing the eco-measures which had failed — yes, failed. For instance, a project to reuse sewage water from toilet bowls had failed because not enough people were using the toilets, and the company supplying the good bacteria to break down the faeces had closed down, so the faeces remained as faeces!



Basking in the sun at Rottneest Island

A memorable company we visited was Biogas Renewables, which implements anaerobic digestion to harness clean energy. The smell there was horrible. Rotting food is delivered to this site, dumped into a mixer to sieve out the plastics, and then put into a digester with anaerobic bacteria. The biogas produced is then harvested to power a turbine and generate 15 megawatts per hour!

We also visited Rottneest Island where walkways made from recycled plastic bags, solar panels, a wind turbine and a desalination plant together enable the island to be self-sustaining.

It was an enriching trip which brought to life what we have learnt in school.

FIGURE IT OUT...

AND WIN A LIMITED EDITION 16GB WOODEN THUMB-DRIVE!

The last digit for $7^5 = 16807$ is 7.
By looking for a series of patterns,
what is the last digit for 7^{16807} ?



ANSWER TO PUZZLE #13

A bottle of beer costs \$2. In addition, for every 2 empty beer bottles that you return, you get 1 bottle of beer free. Furthermore, for every 4 beer bottle caps that you return, you get another 1 bottle of beer free. How many bottles of beer in total can you get with \$10?

Answer: 15 bottles

Winners:

Alvin Thor (Beatty Sec), Muhd Hariz bin Jali (Admiralty Sec), David Gabriel Ty Macalintal (Dunman Sec), Amanda Cheng (Pei Hwa Sec), Velonza Monica Joelle Laza (Tampines Sec), Sharifah Ruqayya bte S.K.Alsagoff (Pasir Ris Sec), Tan Junxi (Maris Stella High), Amina Afreen (Cedar Girls' Sec), Liu Weining (Hong Kah Sec), Jeanette Leong (Yuan Ching Sec).

This contest is open to secondary school and ITE students only.

Email your answers, with full name, school, and HP number, to: cheeseng@tp.edu.sg with the subject title, “**Engineerrus Maths Puzzle #14**”.

The first 10 correct entries drawn after the closing date **(1 Nov 2017)** will each win a limited edition 16GB wooden thumb-drive. Winners will be notified by email.



POWERING TO CLEANER WATERS

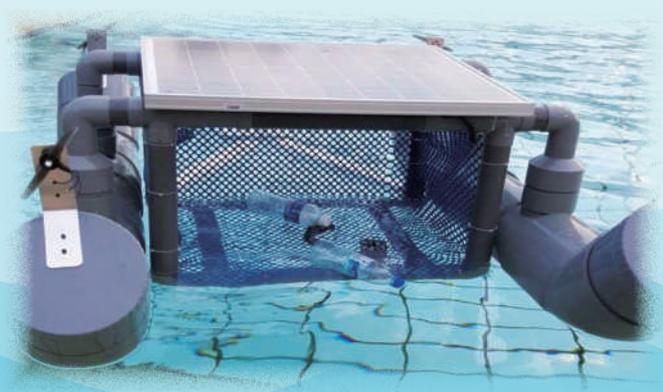
Reservoirs, rivers, lakes and beaches in Singapore would be cleaner than ever before, if an invention by three students from the Diploma in Clean Energy (CER) is implemented.

Harnessing technology to help protect the environment, three CER students invented the “Watercraft Guard”, a solar-powered craft capable of scouring the surface of the water to collect floating debris such as plastics as well as pollutants such as oil — without human intervention. Equipped with GPS, it can navigate to specific locations on its own, while an ultrasonic sensor mounted on the front pans 180° to detect obstacles.

More than just a garbage collector, the device can also collect water samples for research, while a temperature sensor collects data on water temperature, which is then stored in an SD card.

controlled by an Arduino microcontroller and powered by a solar panel located on the roof of the craft.

As the craft moves, rubbish on the surface of the water floats naturally into the enclosure in the centre. In addition, an optional drum with a V-shaped funnel can be attached at the back of the craft to collect oil slicks. Since oil floats, the heavier water in the drum is then released through an exit at the bottom of the drum, while the oil is retained.



How it works

The craft is powered by 4 brushless motors at each corner which propel the craft like a drone, allowing it to glide on the surface of the water. When the ultrasonic sensor detects an obstacle in front, it deactivates the motors on either the left or right side of the craft, thereby steering it in the desired direction. The entire set-up is



Ultrasonic sensor mounted on a servo motor which pans 180°



The oil slick-collecting drum

The project won a Gold award in the annual IES Community Innovation Challenge held on 29 Apr '17, as well as a Commendation award in the annual Greenwave Environmental competition on 23 Feb '17.

AIR CRASH 101

A passenger airliner has just crashed into the sea off Singapore's east coast, with more than a hundred passengers and crew members on board. As rescue workers rush to scour the sea for survivors, anxious family members swarm the airport office demanding for answers.

No, it's not real; it's an emergency scenario in Changi Airport's annual air crash simulation exercise, dubbed "Exercise BobCat", held on 20 Jul '17.

About 100 students from the Diploma in Aviation Management & Services (AMS) took part in the exercise, playing the roles of injured passengers and their next-of-kin.

AMS lecturer Mr Alvin Lee said: "The exercise allowed our AMS students to gain valuable first-hand insight into the emergency operations and business continuity processes of a world class airport, helping to bring what they learn in the classroom to life".



National Geographic



AMS student, Wei Rong, being made-up as an "injured" passenger

ENGINEERING DIPLOMA COURSES



- 3D Interactive Media Technology
- Aerospace Electronics
- Aerospace Engineering
- Aviation Management & Services
- Biomedical Engineering
- Business Process & Systems Engineering
- Clean Energy
- Computer Engineering
- Electronics
- Green Building & Sustainability
- Integrated Facility Management
- Mechatronics
- Microelectronics

CONTACT

Tel: 6780-5144
Email: enghotline@tp.edu.sg
Website: www.tp.edu.sg/eng
Facebook: [facebook.com/TP.Engineering](https://www.facebook.com/TP.Engineering)
YouTube: [youtube.com/TPEngSch](https://www.youtube.com/TPEngSch)

SPECIAL PROGRAMMES

- Common Engineering Programme
- Electrical & Electronic Engineering Programme
- Mechatronics & Aerospace Programme

PUBLICATION ENQUIRIES

Editor: Edwin Loo
Outreach Marketing Executive: Angela Cheong
Email: engineerrus@tp.edu.sg

*Join us as student journalists or photographers! Training will be provided.
 For enquiries, please email: engineerrus@tp.edu.sg*