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SINGAPORE POLYTECHNIC | SP

# INNOVATION + ENTERPRISE

# ENTERPRISING INNOVATIONS

INNOVATIONS ARE KEY TO SUSTAINING THE COMPETITIVE ADVANTAGES OF ENTERPRISES. HOWEVER, ONLY ONE TYPE OF INNOVATION CAN TRULY TAKE FLIGHT AND POWER THE ENTERPRISES TO GREATER HEIGHTS – ENTERPRISING INNOVATIONS.



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# FOREWORD



From its inception in 1954 till now, Singapore Polytechnic (SP) has been actively engaged in innovation and enterprise. Over the decades, SP has drawn talents and industry partners from all sectors and regions for this purpose. From this vantage point, SP celebrates its achievements with a showcase of some of the most innovative and enterprising projects. The SP spirit cannot be fully captured in this book alone. Nevertheless, we hope it offers you a definitive view of the role that SP plays as a leader in innovation and enterprise.

### **INNOVILLAGE – THE INNOVATION HUB**

InnoVillage, an innovation hub situated on top of the hill amidst lush greenery, serves as the creative hotbed for industry, staff and students to transform their dreams into reality. The sprawling 2,400 square-metre hub comprises three wings – Academia, R&D and Industry. With the key objective of improving interaction and communication between staff members and students, we provide the platforms for members from different schools and departments to meet, discuss and collaborate on various innovative projects.

InnoVillage is more than just a learning, research and innovation facility. It is also the home to incubate business, test prototypes and transform them into real products.

### **THE JOURNEY AHEAD**

Through this book, let us take you on an adventure through the pathways of innovation and enterprise that our staff and students have taken. And let us dream of what the future might bring.



BLUEPRINT IS ACCURATE AS AT DATE OF PRINT.

### THE STUDENT AGENCY

Other design students learn. SP design students DESIGN. At the one and only school-based student design agency in Singapore, young creative minds work on real projects and get paid! Wild ideas conceived behind apple desktops. Inspiring copy generated underneath ambient lighting. Meet the future creative directors right in here.

### SIRC@SP

A partnership with the Infocomm Development Authority (IDA) to help local companies exploit infocomm technologies to advance their businesses locally and overseas. The Centre provides SMEs with advice and resources in using IT to reap business benefits and enhance their presence in the new economy. We help them take a big leap from their brick and mortar operations to the cyber world.

### DESIGN FACILITY

Design is a constant evolution of thoughts, ideas and philosophies. It is about asking questions, redefining theorems and experimenting with methodologies. We believe in inspiring people through storytelling in design. At the heart of each object lies the message that we sculpt. Because every object in our lives has a story to tell and these stories reflect the human condition.

### LWC-S

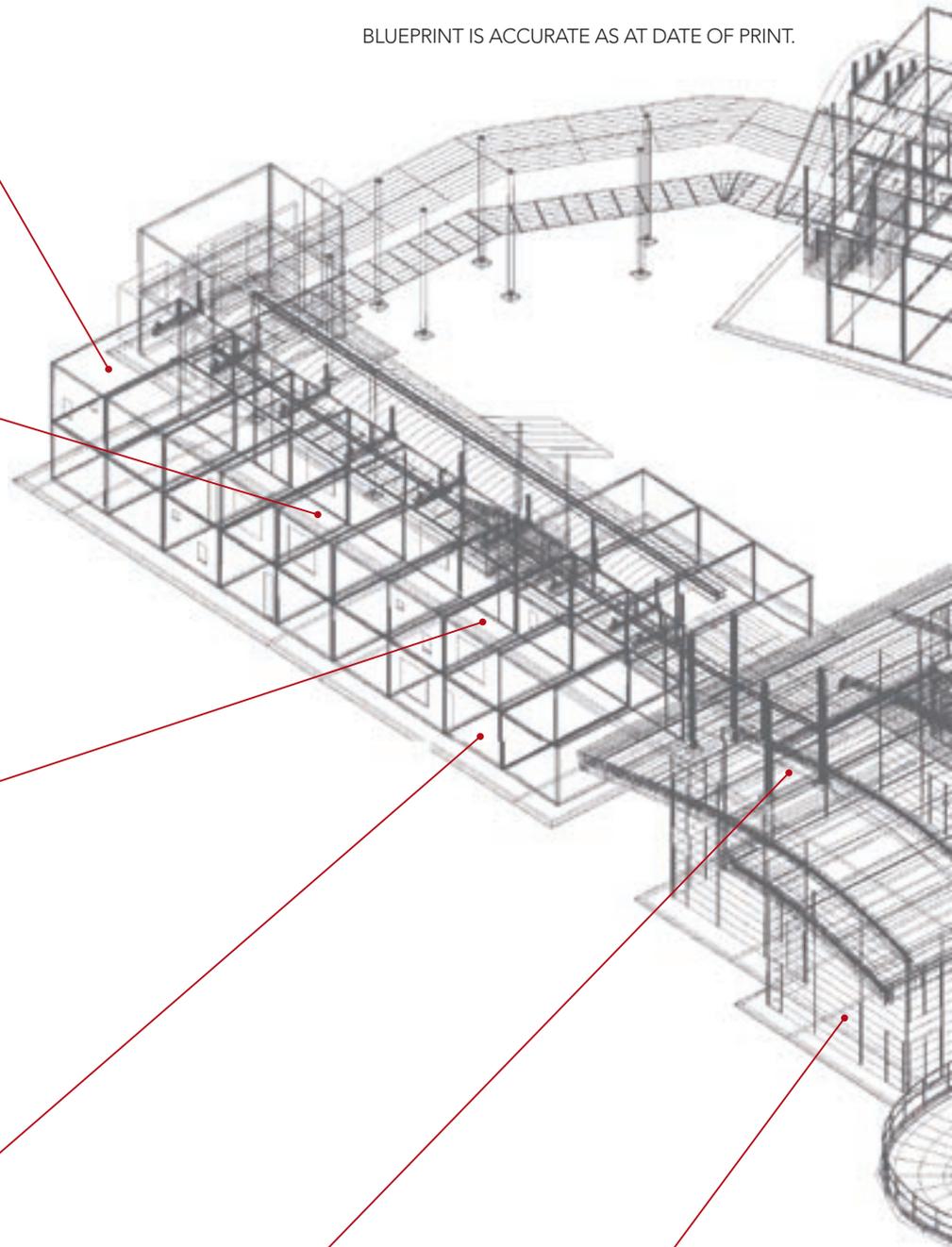
The first and only such lab in Singapore in collaboration with University of Cincinnati and Procter and Gamble. Students from various disciplines will develop new concepts for products and services for the 50+ market. Their designs and business applications will result in new product prototypes. LWC's network with world-class academia, business leaders and design professionals will enable the Centre to develop a broad range product and service innovation in multiple areas.

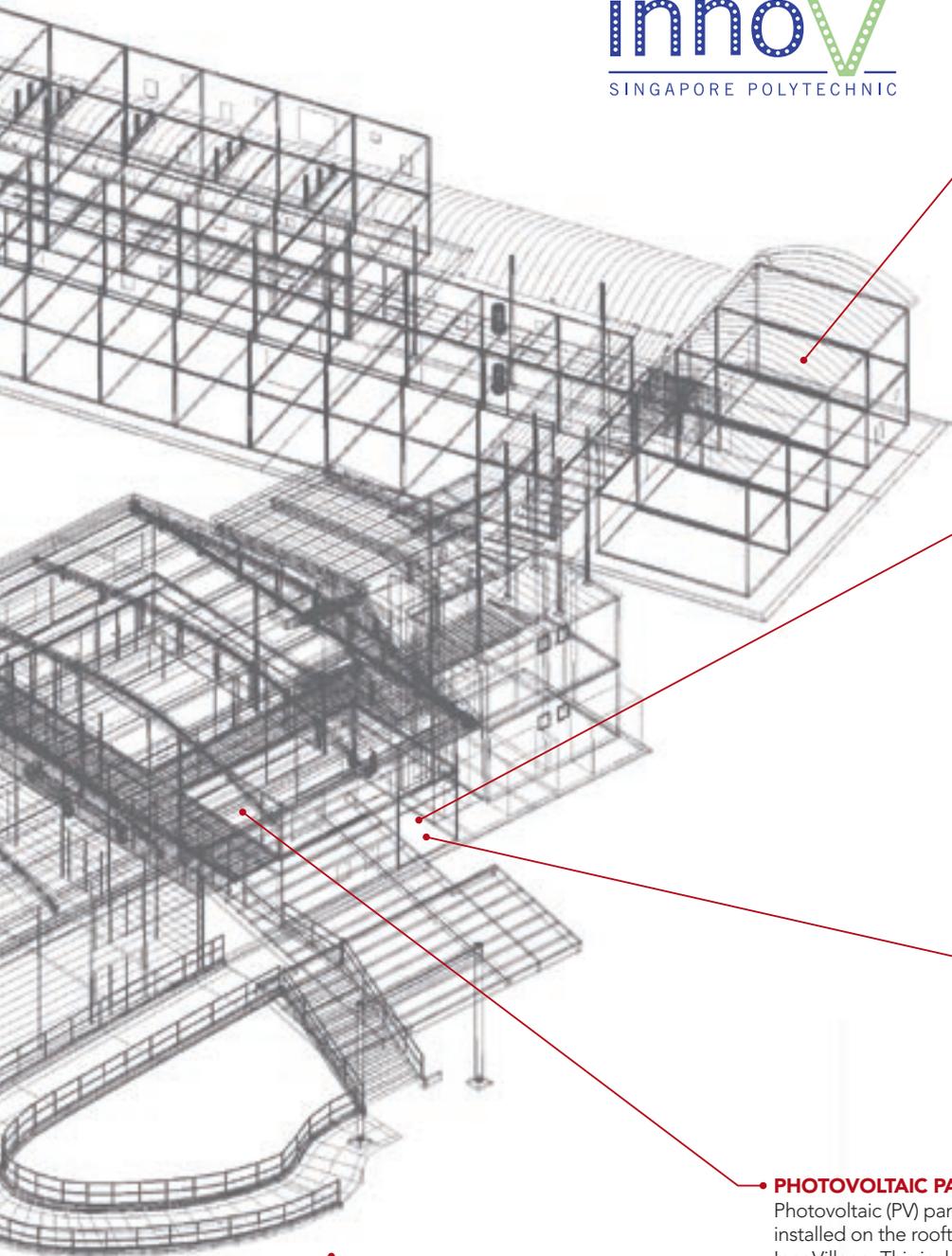
### SOLATUBE

The florescent tubes you see around InnoVillage are no ordinary lighting instruments. These are called Solatubes, designed by Solatube International, the leading innovator and leading manufacturer of Tubular Daylighting Devices (TDDs). Solatubes Sun Pipes Daylighting Systems are designed to provide superior performance for virtually every daylighting application.

### 3D STEREOSCOPIC ROOM

Come face-to-face with the first ever industry-student initiated 3D stereoscopic project, Licence to Dream. The story combines the SP's commitment to Go Green with the latest technology to create a multi-sensory experience. Set your sights in vivid 3D Stereoscopic animation on our Green Mark Experience Trail, Wind Turbine, Solar Powered Charging Station and other exciting industry projects that inspire big dreams. At InnoV, we are Licensed to Dream!





• **STARTUP@SP**

Get all the answers to starting a business. Go behind the scenes to see real entrepreneurs in action. Hear their startup experiences. Be motivated by their courage and determination that turn their dreams into reality. Have a good business idea? How about getting \$50,000 to kick off? SP collaborates with SPRING Singapore to provide youth with the springboard to entrepreneurship.

• **RECEPTION CUM ALUMNI SHOWCASE (YO!)**

Established in 1954, SP is the first polytechnic in Singapore and with more than 150,000 graduates based locally and around the world. At SP, we prepare our students and equip them with the necessary skills to be work-ready, life-ready and world-ready. Here we showcase some of our alumni in four areas that encapsulates the spirit of InnoVillage which is that of Innovation and Enterprise – Discoverers, Social Innovators, Trail Blazers and Nation Builders.

• **GREEN WALL**

This Green Wall, a feature in sustainable buildings, can effectively reduce the room temperature by up to four degrees. A recent test on the efficiency of this Green Wall revealed encouraging findings. The room temperature in InnoVillage level one was lowered by 3 to 4 oC and resulted in energy savings when the air-conditioners are switched on during office hours. The monitoring was conducted by SP's Centre for Applications in Environmental Technology.

• **PHOTOVOLTAIC PANELS**

Photovoltaic (PV) panels are installed on the rooftops of InnoVillage. This includes a 22-kilo-watt peak PV solar farm and a 5 kilo-watt peak PV thin-film solar farm in two separate root tops. The energy harvested by these PV panels is fed directly to the power grid, thus reducing the energy taken from the utility. Since the power is drawn from the solar system, it reduces CO<sup>2</sup> emission. Coming soon – two units of 1.0 kilo-watt power horizontal axis wind turbine generator with grid tied inverter.

• **JATROPHA PLANTS**

Even the plants are eco-friendly at InnoVillage. Jatropha Curcas is planted along the entrance of InnoVillage. The plant is used to produce non-edible jatropha oil, which is suitable for making candles and soap and as a feedstock for producing biodiesel. When jatropha seeds are crushed, the resulting jatropha oil can be processed to produce a high-quality biodiesel that can be used to power a standard diesel car. The residue can also be processed and used as biomass feedstock to power electricity plants or used as fertilisers.



**AT SINGAPORE POLYTECHNIC,  
IDEAS ARE DRIVEN BY  
INFORMATION, IMAGINATION  
AND INITIATIVE. CRAFTED  
WITH ECONOMIC VIABILITY  
IN MIND AND SHAPED BY  
PRACTICAL CONSIDERATION,  
THIS IS THE PLACE WHERE  
IDEAS OF TODAY SHAPE UP  
AS INNOVATION TOMORROW.**

**INNOV**

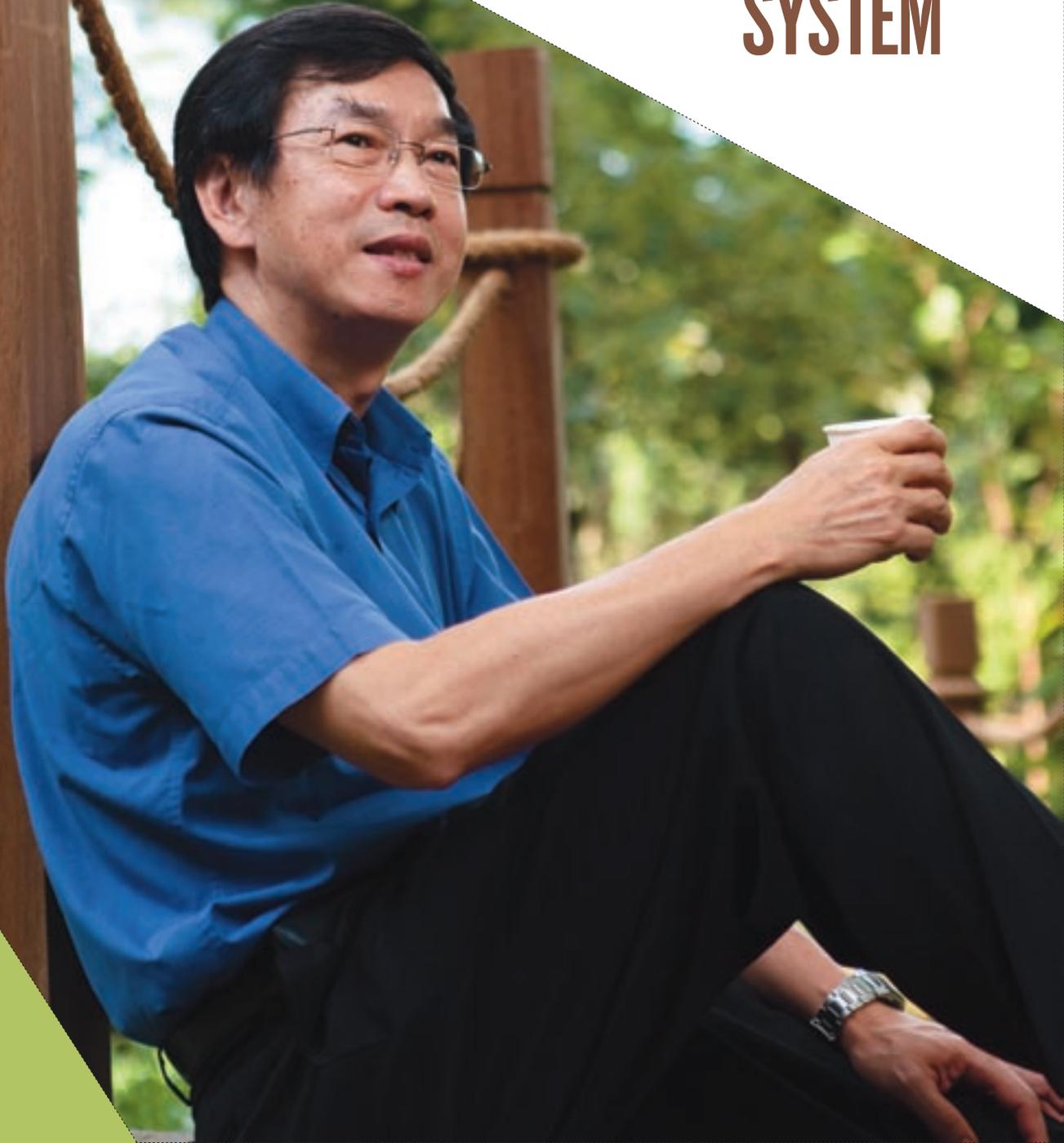


**ATION**

**08**  
INNOVATION + ENTERPRISE

# TRANSFORMING WASTE

WASTE RECOVERY  
SYSTEM



**T**hough some may have the misconception that idea generation should take place in a comfortable, conducive environment and through artistic or creative sources of inspiration, Mr Andrew Kon had his “Eureka” moment under very different circumstances. It was whilst working with a good church friend, Dr Han Meng Siew, at Singapore Vision Farm that he was inspired by... the rows of portable toilets he saw lining the property. However prosaic the source of inspiration, it led to a wonderful idea, the transformation of waste into a useful resource.

**‘ WE SHOULD GIVE  
BACK TO SOCIETY  
AND HELP PEOPLE  
WHO ARE LESS  
FORTUNATE. ’**

**09**  
INNOVATION



waste from the site which was used as a holiday training camp organised for secondary school students. “Our two stage design cuts down energy requirements by minimising aeration, and at the same time generating useful methane gas, based on an anaerobic process,” he pointed out.

The project, in its third year, has moved from establishing infrastructure to the production of manure and the capture of methane. Aimed at the potential market of third world countries where basic infrastructure (for sanitation purposes) is still lacking, Mr Kon hopes to show that technology is not just for the rich but rather for everyone.

Looking to the future, Mr Kon and team have plans to make the device more compact. “In a crisis, if the device is compact, it can be easily shipped to the affected areas, assembled and put to use within a short time,” he shared.

Reflecting on his years of experience, he has the following advice for students and others interested in this field, “To sustain your work, you must be driven by inner strength as you will inevitably meet with technical, administrative and budget difficulties.”

Though ideas along that line were already popular in the scientific community, Mr Kon saw the opportunity to revamp the waste recovery process. “Current waste disposal systems run as aerobic processes and use energy to get rid of waste. From a chemical engineer’s point of view, that is a wasteful process, no pun intended,” he said.

With that in mind, he and the student teams designed and built a prototype two stage digester to handle toilet

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INNOVATION + ENTERPRISE

## HOLLOW FIBRE MEMBRANES VIBRATING SOLUTIONS

**A**sk around and chances are you will find the hottest industry these days is the water industry. With the scarcity of water resources and the growing importance of clean water supplies, water management techniques are now some of the most prized technologies. However, the industry faces some inherent problems.

Hollow fibre membranes, in the form of submerged membrane bioreactors, have been increasingly used for water and wastewater treatment as they are more efficient and cost-effective compared to conventional options. However, one of the biggest challenges in the use of membranes for water and wastewater treatment is fouling. Fouling is the build-up of particulates and biological agents on the surfaces of the membranes, which in turn reduces efficiency of the membrane process. The conventional solution has been to increase aeration on membrane surfaces, which mitigates fouling and improves the performance of the membrane process. The problem is, however, increasing aeration implies higher energy requirements, which in turn translates to higher operating costs for the process.

To address these problems, Ms Claire Ng Hui Ting and students in the Chemical Engineering department collaborated with Nanyang Technological University's Singapore Membrane Technology Centre to research alternative means to mitigate fouling. That has resulted in the discovery that applying axial vibrations to hollow fibre membranes could improve



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the fouling mitigation process cost effectively. To this end, a pilot scale axial vibratory membrane bioreactor was constructed and has been running in one of the Singapore Polytechnic laboratories.

“We consider various aspects of the model, such as the amplitude and frequency of the vibrations. By playing with the parameters, we can determine optimal operating conditions,” Ms Ng said. The pilot scale project was showcased at SPINNOVEX 2010, an annual Singapore Polytechnic event that highlights projects of significant R&D or industrial potential. So impressed were potential industry partners that the team was approached with commercialisation proposals in the event that the project is scaled up to industrial scale.

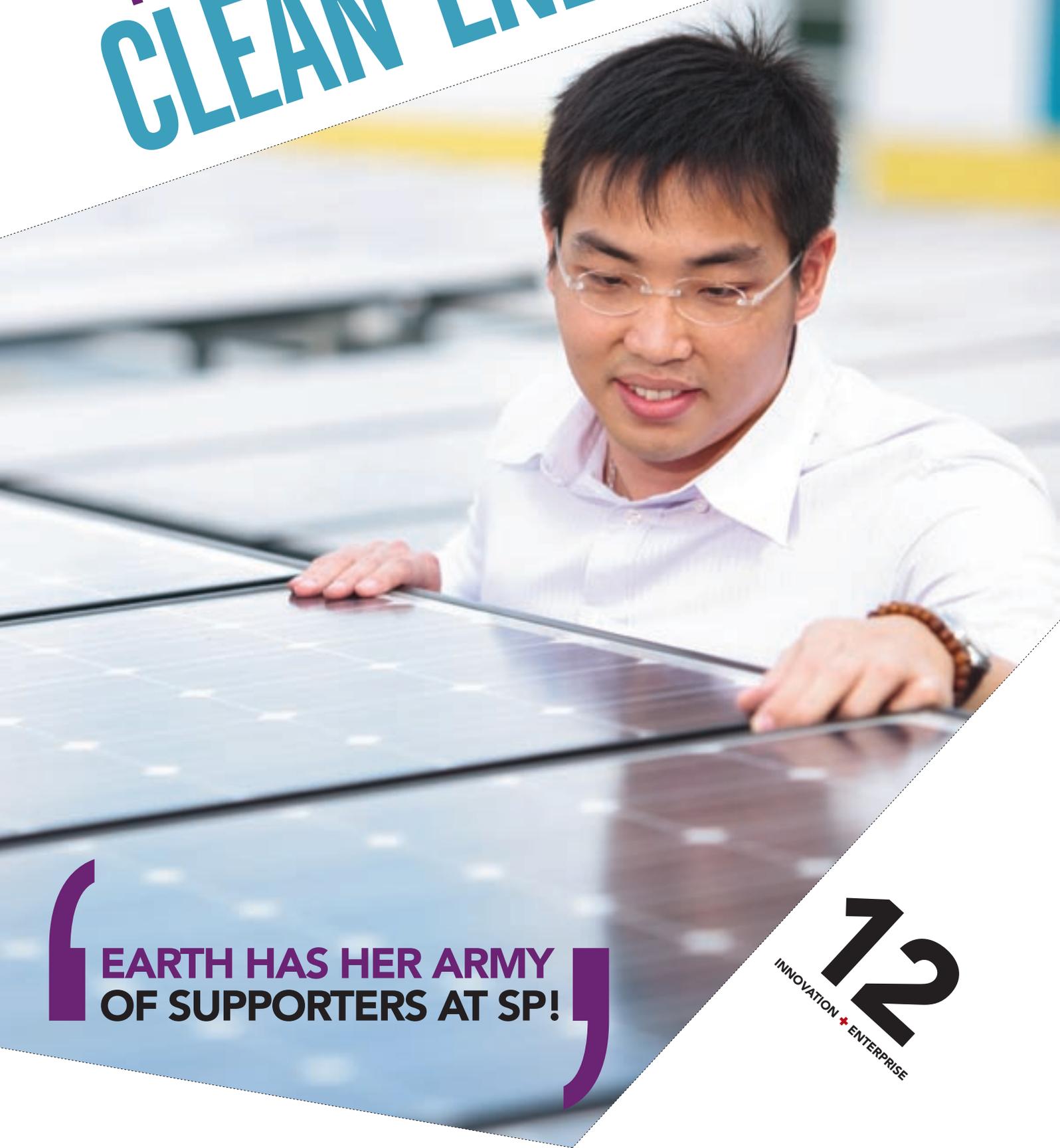
In the works are plans to scale up the existing project for industrial use as well as to extension of present application parameters to include research on the potential of axial vibrations to remove bio-fouling which is an even more serious threat to membrane operations. “Present data shows the potential of axial vibrations in tackling bio-fouling, but we need to make further investigations before deciding on the path forward,” Ms Ng shared.

When asked about how ideas are generated, Ms Ng was candid about the process, “Singapore Polytechnic is more industry oriented, we look at problems faced by the industry and think of ways to overcome those problems.”

She continued, “For example, one of our new projects involves researching novel ways of reverse osmosis that will reduce the costs of desalination. This project was awarded the Innovation Fund by the Ministry of Education.”

Whilst there may be no formula for idea generation, Ms Ng has found that certain habits do promote conditions for creative idea generation. “Talk to different people and get different perspectives. Keep yourself updated on the latest developments. Be very open and receptive to new ideas even if they sound crazy.”

# THE TECHNOLOGY OF CLEAN ENERGY



**EARTH HAS HER ARMY  
OF SUPPORTERS AT SP!**

**12**  
INNOVATION + ENTERPRISE

# PV SYSTEMS AT INNOVILLAGE

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INNOVATION



**A**s we look around us everyday, we are reminded how earth's resources have been plundered and how our way of life is slowly killing the Earth. The quest for resources that will power our lifestyles and yet redeem our environment will be an important one for the next few decades and centuries. Mr Leong Fai Choy, Senior Lecturer at the School of Electrical & Electronic Engineering at Singapore Polytechnic (SP) and his team are taking an important step in this direction.

Under the Clean Energy Research and Testbedding (CERT) programme, sponsored by Economic Development Board (EDB), two Photovoltaic (PV) systems were installed on the roof of Blocks A and B of InnoVillage SP. The project was initiated with the aim of producing clean energy using PV technology to offset the energy consumption of InnoVillage.

The project started off with a site survey to understand site conditions and determine suitable installation locations. After suitable locations at Blocks A and B were identified, the team designed the PV systems and selected the most appropriate PV technology to be used for each location. Truly a cooperative project, whilst the PV modules used in the project were sponsored by EDB, InnoVillage development funds were used for system integration.

However, it was not all smooth sailing for the team. Mr Leong explains some of the obstacles the team faced and overcame. "For optimal energy production, photovoltaic systems should preferably be installed at locations which are free from shading. However, large parts of InnoVillage are shaded by tall trees and areas suitable for PV system installation were limited."

"To overcome this limitation, the team adopted a two prong approach. For the area at Block A which is unshaded, high efficiency HIT (Heterojunction with Intrinsic Thin Layer) PV modules are installed to maximise energy production. For the area at Block B which is shaded during parts of the day, we installed amorphous thin film modules which perform better than conventional crystalline PV modules under shaded conditions," he elaborated.

Not content with merely a successful project, Mr Leong looks forward to taking the project a step further. As he looks to the future, he would like to see "a sun tracker installed for the entire PV system to track the sun movement. By doing so, the energy generation of the PV system will increase."

Earth has her army of supporters at SP!

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INNOVATION + ENTERPRISE

**GREEN  
FUNCTIONAL  
CHEMICALS**

**SCIENCE  
WITH A SOCIAL  
CONSCIENCE**



**SAFE, ENVIRONMENTALLY FRIENDLY AND PRACTICAL. THESE ARE ALL THE ASPECTS THAT I WOULD LOOK OUT FOR WHEN I DECIDE ON THE TYPES OF PROJECTS TO PROCEED WITH.**

**A**fter all the headlines denouncing the toxicity of chemicals in things that surround us in everyday life, much relief should greet the news that Dr Li Ping at the Advanced Materials Technology Centre, Singapore Polytechnic, has been researching and developing green functional chemicals from laboratory to pilot scale and further onto industrial scale. These are chemicals that fulfill industrial and other practical applications but also address safety, environmental and health concerns.

Where many researchers and scientists have criticised for paying less attention to social impact of their research, Dr Li has always integrated social interests and considerations with her scientific research. A scientist who has combined science with social considerations, she has found it easy to garner support from industry partners and the schools, as most of her research has revolved around issues that have wider implications for society as a whole. As part of her research procedure, she methodically vets ideas and projects by assessing their viability, practicality and potential application for industry as well as impact on health and environment before proceeding with them.

Maintaining close and amiable working relations with industry partners is important, as they are not only sources of funding and feedback, but also sources of inspiration for potential projects. In fact, projects, such as those involving Electromagnetic Shielding Coating (EMS) and Green & Multifunctional Coating for Heat, Noise and Fire Barrier, were suggested by industry contacts impressed with earlier projects undertaken by Dr Li. Industry partners are happy to support her projects and the test-bedding of prototypes developed in facilities and manpower as well as market promotion.

What sets these projects apart from similar efforts ongoing in other institutes is the use of nano-technology, which has ensured processes and products are efficient and stable. Comprehensive testing further ensures the products meet industrial requirements. Durability and damage testing have to be conducted as Asia's tropical climate conditions prove to be rather challenging for many types of materials. "Some materials that fare well in American and European cannot withstand the high humidity and high UV exposure that is inevitable in many Asian countries," she shared.

Based on her experience, she has the following advice for those contemplating the move into prototyping applications. "Have an open mind towards research and development and listen to the opinions of industry partners. Good potential applications will be more attractive to industries, which is useful when it comes to securing funding and joint ventures," she pointed out.

Always looking ahead, Dr Li reveals that in the works are plans to develop water based colorants for cement which would eliminate the need for traditional paint that emits VOC.



# COLLABORATIVE PARTNERSHIP

## SP LIVE WELL COLLABORATIVE – SINGAPORE

The question of how academia and business can be brought together in fruitful collaborative partnership has been a challenge to many in both fields for years. The University of Cincinnati's solution was the Live Well Collaborative, a connective effort between academia and industry that aims to be an innovation incubator for firms.

Singapore Polytechnic (SP) is proud to present the first Live Well Collaborative site in Asia Pacific: the Live Well Collaborative – Singapore (LWC-S). LWC-S is an extension of the Live Well Collaborative in Cincinnati (LWC-C), which uses design to reframe the thinking on products and services for the 50+ consumers. LWC-S will help enhance Singapore's and SP's competitiveness and SP's reputation as a global innovation centre in Asia.

LWC-S encourages teams from different disciplines to participate and use design thinking processes to approach individual projects. The four primary phases of Problem Identification, Understanding the Users, Concept & Visualization and Refining Concepts are used as part of the innovative process.

Whilst grants and support funds from Economic Development Board (EDB), P&G and SP formed the initial capital to start LWC-S, LWC-S will be a sustainable, non-profit business model with revenue generated from memberships and studio fees of commissioned research member companies.

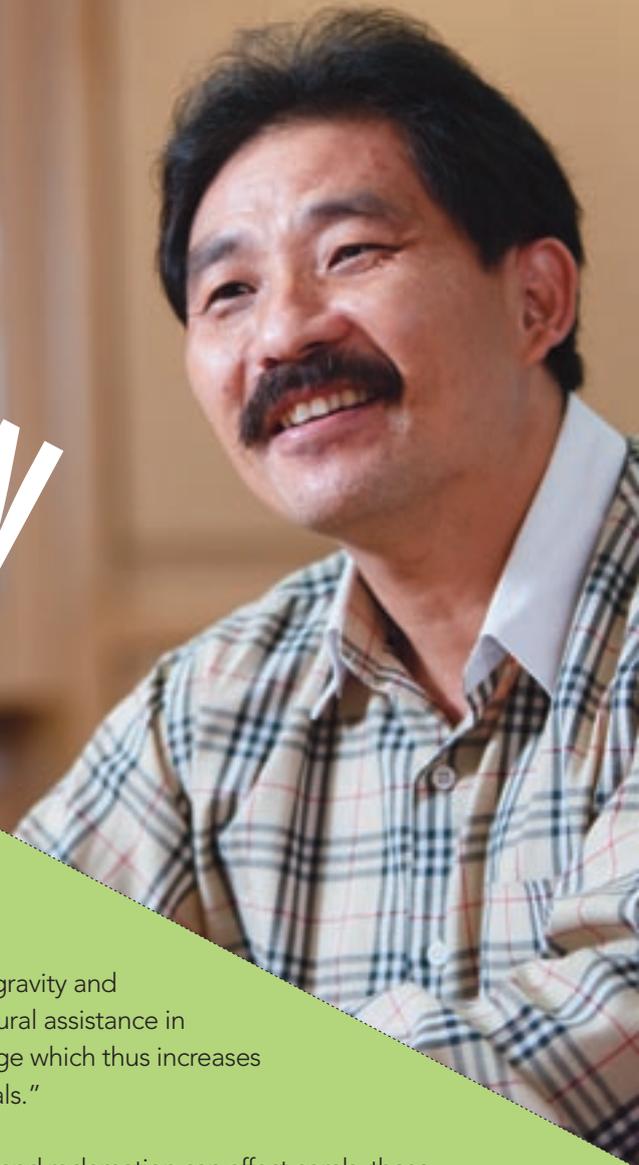
Mr Goh Siak Koon, Executive Director of LWC-S reflected on some aspects of the collaborative venture. "I would say the right team is essential and LWC-S is blessed to have a great start up team consisting of the varied support systems of SP, such as management support, finance, legal and various multi-disciplined staff support."

On the innovative process, Mr Goh ventured that, "Well considered concepts will lead to well considered prototypes in that concepts come first but a good prototyping capability is a necessary link in the process."

His advice for those who are interested in taking part in the innovative process? "Make sure you have done all you can to ensure the concepts are the best, considering the teams involved, data used, facilities, research and so on. Prototyping and commercialisation will then follow."

# 17 INNOVATION SEACILS

# THE UNSEEN FLORA



Sometimes, innovative ideas are created in reaction to that which threatens our way of life. The encroaching mud along Singapore's shorelines was the threat that Seacils sought to address. Artificial reef gardens, named Seacils by the creators, provide a substrate for creating underwater gardens on silty mud. Compliant with the International Maritime Organisation's OSPAR Guidelines on Artificial Reefs, Seacils are environmentally friendly, transportable under water and are distinctive not only because of their size but also because they are angled instead of resting on the seabed.

Captain Frederick Francis, leader of the R&D team that created Seacils, explains, "The biggest killer of corals is sedimentation.

Our Seacils are not just environmentally friendly but more importantly,

our Seacils are angled so that gravity and the current flow provides a natural assistance in reducing sedimentation damage which thus increases the survival chances of the corals."

He continued, "As Singapore's land reclamation can affect corals, these marine flora need to be translocated or get buried. However, taking them out from their normal habitat is a risk. With Seacils, their survival chances are increased as they have a substrate that is easy for them to adapt to."

In fact, the misdirected criticism coming from certain quarters has been the greatest obstacle in the development of Seacils so far. A source of heartache to the two lead designers, Captain Francis and Mr Charles Rowe, such criticism has led to less recognition being given to this project than it deserves. However, Captain Francis and team have brushed off the unhappiness.

He counts among his resources dedicated volunteer groups, such as Holtz family from The Tanglin Club, and key personnel such as Mr Charles Rowe, Ms Amy Tan and Mr I Seng Hu. "In terms of funding, we have been lucky as Singapore Polytechnic and the Tote Board have all been generous. However, we have been prudent and returned unused funds," he shared.

His advice for those interested in such work is simple: Learn from practical but careful trial and error. "When you have a prototype, you will discover its limitations and that is when you can overcome these problems."

# MUSIC SMART PEN WHERE MOZART MEETS JAVA



share it with friends in the pipeline. When asked if this could cause unintentional breaches of copyright laws or intellectual property disputes, Mr Ang pointed out that, "The onus is on the creator to be careful about the sharing of his or her music."

Another application developed for the smartpen is the Ear Training kit.



One tends to think of wizened elders sitting by the piano or scruffy youngsters strumming electric guitars when one hears the word 'composer'. One thing they have in common is being tied to their instruments of choice. That is on the way out if the Livescribe Pulse smartpen has its way.

The Livescribe Pulse smartpen comes with a Java SDK which enables one to write a Java programme to extend its functions. The capability to notate music is made possible by executing the Java programme which the pen's micro-processor can understand. Of course, special 'micro-dot' paper is also needed so that the smartpen can recognise the pre-defined regions in the paper to make sense of the music notes.

The result of an internal commission by the Deputy Principal of Singapore Polytechnic, who has a strong interest in the use of technology to enhance teaching and learning, the pen is revolutionary in many ways. "The idea of a pen as an interactive music composition tool has not been done before and it has great potential as an application," said Mr James Ang, Senior Lecturer at the School of Digital Media and Infocomm Technology (DMIT) and team leader for the project.

The prototype can playback notes and chord progressions like a digital sequencing software, with the ability to upload the music and

Combined, the two applications make writing and learning music more accessible.

As the pen is still in prototype stage, there are still problems that need to be worked out. For example, a working interface issue is the inability of the pen to erase the notes. However, as there are plans to use student focus groups to test out the pen and to make improvements on the features based on the feedback from the large user base, the music industry can look forward to a much better version of the pen when it is finally launched later in the year.



# GAMER'S BUDDY

## OPTICAL IMAGE RECOGNITION FOR TRADING CARDS

**A**s most gamers know, even the best are stumped at times, what do you do when you have no idea what the next move should be? Singapore Polytechnic has the answer. Best described as a gamer's potential buddy, the project, jointly developed by Dr Cai Zhi Qiang and Mr Lim Buey Kiang, was commissioned by 2 Evolved Pte Ltd, an online gaming company, impressed by other industry projects that the Digital Signal Processing Centre (DSPC) had undertaken.

The basic process involves the online gamer capturing a gaming card image via his webcam and transmitting the image to a server. The optical image recognition (OIR) engine, developed by the researchers and installed on the server, recognises the card image automatically and outputs the standard card image. The server subsequently provides hints or necessary help to the gamer depending on the card image.

The advantage the project has over existing rivals is that it works with existing hardware and does not require the purchase of additional hardware. Naturally, there have been problems that the researchers have had to overcome. As the system is partly reliant on the webcam owned by the gamer, the resolution and clarity of the image captured would vary according to the webcam used and lighting conditions under which the webcam was operating. To overcome these problems, Dr Cai's team undertook innumerable experiments in which the lighting conditions and distances between the card and webcam were varied, in an effort to come up with viable solutions.

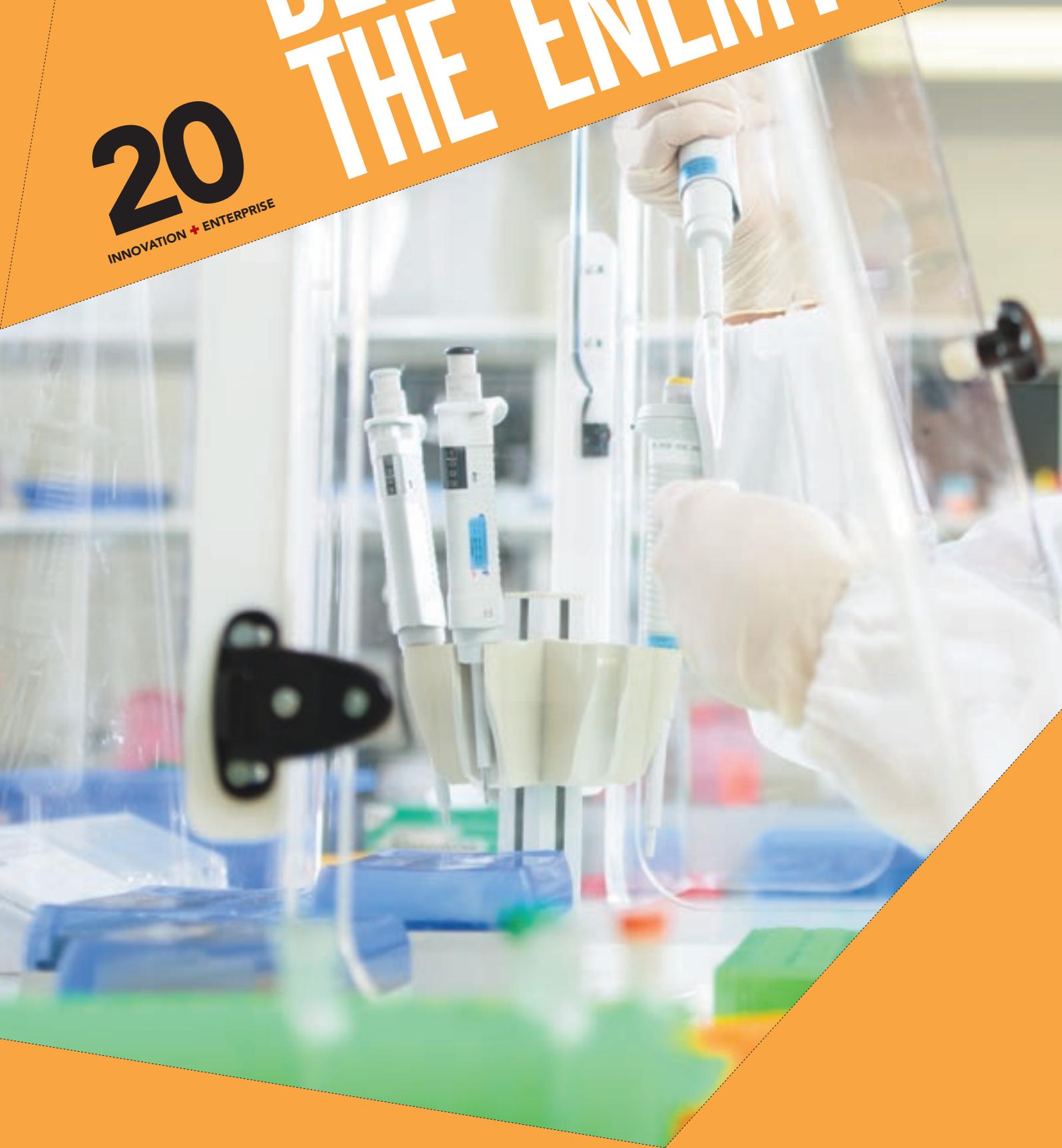
Dr Cai had this to share with those considering making that leap to prototyping, "Whilst the theory may be very good, the practical implementation may throw up aspects that were not apparent. For example, the tradeoff between image capture quality and performance speed must be considered when prototypes are constructed as aspects of practical applications must be taken into account. The necessary tweaks of the algorithms involved must be implemented for optimum performance."

On condition of confidentiality, Dr Cai has revealed that there are other projects in the pipeline that involve similar theories and technology. Innovation never gets to rest in Singapore Polytechnic!

# DETECTING THE ENEMY

20

INNOVATION + ENTERPRISE



## MULTIPLEX PCR TEST KIT

ONE MUST BE BRAVE ENOUGH TO COME UP WITH SOLUTIONS. DO NOT BE AFRAID THAT THE IDEAS ARE SILLY OR SOUND STUPID. YOU NEVER KNOW UNLESS YOU TAKE THAT STEP TO EXPLORE.

21  
INNOVATION



In a world where some of mankind's deadliest enemies are microscopic, the ability to detect and neutralise the enemy is an important advantage in the war against disease. From this perspective, Dr Tan Eng Lee, Lecturer with the School of Chemical and Life Sciences, and his final year project group are some of our best allies in the perpetual war against the disease.

Aware that dengue infections are one of the most common

infectious diseases in the tropics and that the majority of deaths that result from dengue infection are from Dengue Shock Syndrome (DSS) and Dengue Hemorrhagic Fever (DHF), the team was inspired to think of ways to tackle the problem. As there are no effective antiviral drugs or vaccines available at present and all the treatments are symptom-based, the team noted that there is an urgent need for rapid diagnosis of dengue infections to allow for earlier and better clinical intervention.

Their solution? A test designed to amplify, detect and differentiate the four serotypes of dengue viruses using multiplex real-time TaqMan reverse transcription (RT) polymerase chain reaction (PCR) in a single tube reaction. This invention allows rapid and specific clinical results to be generated within three hours. In turn, this enables rapid and effective clinical laboratory testing for better patient management.

The biggest challenge they faced was attempting to differentiate 4 types of viruses in a single tube reaction. The challenge was further

complicated by the fact that the four dengue serotypes are genetically quite similar. However, the team rose to the challenge in true Singapore Polytechnic spirit.

Of course, all this was only possible as Singapore Polytechnic provided a conducive environment with state-of-the-art facilities such as PCR rooms and real time PCR platform.

The intrepid researcher has this advice for those looking to tread the same path of success, "Be daring to innovate and be patient." Elaborating on that point, he pointed out that, "One must be brave enough to come up with solutions. Do not be afraid that the ideas are silly or sound stupid. You never know unless you take that step to explore. The 'silly or stupid' idea could be the best solution to that problem! However, you must also be patient, as it might take a long time to meet the objectives."

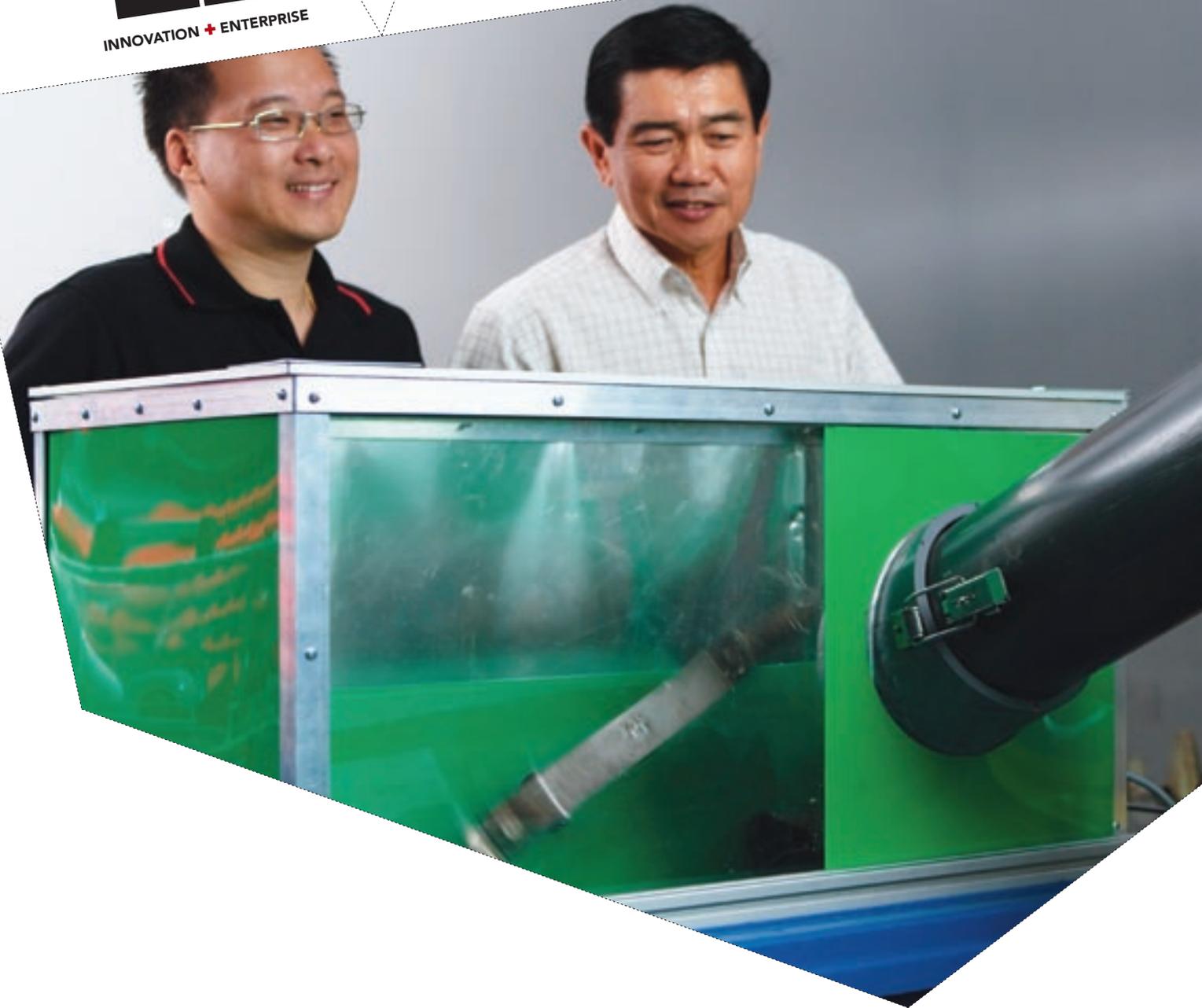
Looking to the future, Dr Tan hopes to develop a specific drug or vaccine to combat dengue infections. A hope echoed by many of the disease's victims.



WASTE GLASS RECYCLING  
**SHARDS OF ENVIRONMENTAL CONSCIOUSNESS**

**22**

INNOVATION + ENTERPRISE



Ever wonder what happens to the glass bottles you chucked out with the trash without separately recycling them? Chances are they all end up at the incineration plant and then at the landfill at Pulau Semakau as glass cannot be turned into ash in Singapore's incineration plants. That is something Dr Ng Khee Yang, Mr Loke Keng Wai and Mr Gerald Teo from Centre for Applications in Environmental Technology (CAET) and their partners at P&R Resource Management Pte Ltd hope to change.

The waste glass collection system they are designing has a whole host of benefits for the environment, ranging from reducing the burden on incineration plants and limited landfill space to reducing the demand for raw material, such as virgin sand, to make glass products. "Our system also aims to make the entire process safer for workers," Dr Ng explained.

The improvement over current glass recycling systems is the fact that

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INNOVATION

**WE NEED A TEAM, WE NEED PATIENCE, PERSEVERANCE AND RESILIENCE TO OVERCOME ALL THE DIFFICULTIES. AND WE ARE NOT DONE YET.**



glass products are crushed during the collection process, which enables more glass to be collected for recycling. Apart from the National Environment Agency (NEA)'s grant to P&R Resource Management Pte Ltd under its "Innovation for Environmental Sustainability" Fund that covered the cost of the developmental work, Singapore Polytechnic also threw its support behind the project and at least two groups of students were attached to the team. Speaking on the challenges of the project, Dr Ng pointed out that, "The real challenge of this project lies in developing a simple,

efficient, safe and cost-effective glass waste collection system that can be integrated into a fleet of collection vehicles."

"It is easy to come out with many ideas, but it is not easy to make the ideas work alongside a budget constraint. And this is the exciting and challenging part of the R&D work," he elaborated.

Reflecting on the journey thus far, Dr Ng has the following advice for those interested in R&D, "Look for an interested industry partner, put together a team of capable people, translate the idea into a working prototype, testbed it for reliability, file a patent if that is deemed necessary, and put it onto the market."

"We need a team, we need patience, perseverance and resilience to overcome all the difficulties. And we are not done yet."

**UNREAL@SP**  
**BRINGING REAL**  
**INTO UNREAL**



**SUCH REAL-TIME INTERACTIVE 3D MODELS CAN BE USED IN A VARIETY OF BUSINESS DOMAINS SUCH AS INTERIOR DESIGN, HOME RENOVATION, FURNITURE, FASHION, HANDBAG AND SHOE RETAIL AND VISUAL MERCHANDISING.**

researcher soon discovered that possibilities were limitless. "Such real-time interactive 3D models can be used in a variety of business domains such as interior design, home renovation, furniture, fashion, handbag and shoe retail and visual merchandising. It can also be used to make web sites more interactive and fun to the user."

However, the process of creation was arduous and the team went through hours of painstaking work to create the end product. Dr Leong credits the team's Technical Lead and Technical Artist, Daniel Yeo and Jon Tan for much of the work.

Much credit was also given to the Games Resource Centre@Singapore Polytechnic (GRC@SP) which was set up by Singapore Polytechnic and Epic Games China, with support from the Infocomm Development Authority of Singapore (IDA) as part of its programme to support the development of games and the use of game-technologies by local SMEs. Unreal SP was itself developed using the resources of GRC@SP.

"The most significant impetus was the availability of technical support through the use of the Unreal Engine," admits Dr Leong. Not forgetting his industry partner, he

pointed out that Epic Games China supported the project development out of their Shanghai office.

Reflecting on some of the obstacles the team had encountered, Dr Leong remembers conducting "crash courses" for some final year project students attached to the team, to help get them up to speed.

On his wish list is an extension of the virtual model from the exterior to interiors of key buildings.

What is interesting about this is that we didn't start from the CAD or other 3D model. So long as you can photograph the building, we can start to model the building. Some other spots we may do in the future include the SPGG building and sports complex. If we have enough photos of a demolished building, we can probably resurrect a building that has long been demolished as well.

"The next generation game engines will help make your ideas come true in a fun, interactive, and visually immersive way." Dr Leong throws a challenge to businesses and other researchers, "You too can innovate with games!"

**G**amers and fans of 3D technology need no introduction to the wonders of virtual reality. Dr Peter Leong, Centre Director of the Interactive and Digital Media Centre (IDMC) and his team have brought Singapore Polytechnic into the virtual world. Recognising that many iconic buildings and structures on campus may be torn down to make way for new campus development, Dr Leong decided to preserve part of campus history as an interactive 3D virtual model.

Realising the models could be used as settings for games, an interactive virtual guide to the campus, and a showcase of iconic spots on SP, he decided to explore the functional possibilities offered by such models. The enthusiastic



**ENTER**

**SINGAPORE POLYTECHNIC  
TRANSFORMS INTEREST INTO  
BUSINESSES THAT MAKE  
DOLLARS AND SENSE. ARMED  
WITH ALL THE FAVOURABLE  
ELEMENTS, FLEDGLINGS ARE  
LAUNCHED INTO THE REAL  
WORLD. HERE IS WHERE  
PASSION TAKES FLIGHT AND  
DREAMS BECOME REALITY.**

**PRISE**



## LIVING IN PERFECT HARMONY CHESTNUT IN ICE-CREAM

**W**hen clients and researchers have the same “never say never” spirit, a novel product is the result. When Food Services brought the concept to the Food Innovation & Resource Centre (FIRC), Yuly Mirawati was uncertain if the idea, kuri (chestnut) ice-cream, could materialise. However, she and her team decided to give it a go nonetheless.

One of the biggest challenges was the ingredient factor, as the desired result was a balanced composition of ingredients combined with a nice mouth feel. “We had to source for ingredients which were compatible with the base. By applying a funneling process, we had to go through numerous trial and error experiments and keep rebalancing the formula. It was really a balancing act,” the genial researcher joked.

Through a long experimentation process, Yuly finally came up with the right combination. “It was a nerve

wrecking process but we enjoyed it because we learnt that certain ingredients cannot be used in certain processing phases. For example, the form of vitamin C used was one that did not impart too much acidity to the product,” she explained.

After each trial, Yuly and her team of food technologists had in-house sensory evaluation. Only when the team was satisfied, was the product presented to the client. Based on the feedback given by the client, further improvements were made.

“For the project to be successful, both the clients and the researchers have to work together. So the relationship must be maintained at a satisfactory level,” Yuly shared. Looking back on the project, Yuly had this to say, “At first, we were worried because adding such a high level of solid (chestnut) into a functional ice cream was unheard of however, we chose to face the challenge squarely rather than just accepting that as an obstacle.”

“When you have the knowledge, training and passion for it, you can ultimately deliver a good result.”



# THE PATISSIER FROZEN PERFECTION



details of the project, “The main novel ingredient used was trehalose. Trehalose fits the client’s requirements as it originates from natural sources. In fact, it not only protects the molecular structure of the product but also enhances the taste.”

the taste and texture that they have built their reputation upon.

With those considerations in mind, The Patisserie approached the Food Innovation & Resource Centre (FIRC), a partnership venture between SPRING Singapore and Singapore Polytechnic, for help.

When Deborah Wong first heard of the commission request, she found it an interesting challenge. “The client wanted a product that was free of additives, that would fit their “natural” style. However, certain ingredients are needed to maintain the freshness of the product and its stability,” she admitted.

After a series of brainstorming sessions and exploratory trials, a holistic approach was employed with a combination of novel ingredients, process and packaging. Deborah generously shared some

Processing and packaging were also vital links in the chain. The cakes were “engineered” to have small ice crystals to maintain the texture and structure. “Small ice crystals are unlikely to be detected by the mouth and do not have the same effect on taste and texture as the bigger crystals,” she said.

As the cakes are in barrier packs, the moisture of the cake is maintained whilst minimising any damage in the course of transportation.

Unsurprisingly, focus group studies and test panels have confirmed the superior quality of the cakes. Some were so surprised that they questioned if preservatives or additives were added and were amazed when the reply was “no”.

“Never give up, persevere and the challenge will be overcome.”

**W**hen we think of frozen products, the word perfection rarely comes to mind. That is what makes Deborah Wong’s innovation for The Patisserie all the more unique.

Having built a reputation as a purveyor of premium cakes and noted growing demand, The Patisserie wanted to explore the possibilities of producing frozen versions that did not compromise

# THINKING OUT OF THE BOX



**T**he partners behind ThinkersBox really practise what they preach. The desire to think out of the box and not go down the path of a “regular job” was what led to the birth of ThinkersBox.

As the first group to apply for funding in Singapore Polytechnic, they had little to benchmark themselves against. The idea of before and after school care for students eventually got them the grant.

However, reality intervened and Felicia Hoo and Eric Tan found themselves having to be flexible and adapting their business model. In doing so, they eventually found their niche market.

“One of the biggest obstacles then and now is our age and the relative youth of the company. Convincing parents and principals has been a real task at times,” confided Felicia.

However, ThinkersBox has several advantages, not the least of which is their track record from 2007. Their sterling performance at Unity Primary has shown that their method of cognitive development has allowed the children to have better memory, absorption abilities and learning skills, thus enabling them to be better learners. In fact, the feedback has been better than expected.

“We assess the child for individual strengths and weaknesses and develop a personalised profile. Based on that, we work on enhancing skills that will allow them to become better learners,” the pair shared.

What really stands out is their ability to not just pinpoint the problem but to provide a solution for it. That is perhaps the real selling point of their enterprise.

In the works are plans to expand the target age group from the current 5-12 year olds to adolescents and even adults. “Everyone needs to know their strengths and weaknesses and be able to address them effectively in order to decide on the field of study one should undertake or the job one should aim for,” Felicia said.

“Being mentally prepared for whatever that may come your way is vital for anyone who wishes to become an entrepreneur,” Felicia shared.

Nodding in agreement was Eric who added that, “Be ready to embrace failure though our society does not have much tolerance for that. It is a process of learning.”



# MUSIC EXPRESSIONS

**W**hen Jerry Chen and Adriel Chan got together to set up Express In Music, they had never envisioned getting to where they are today. A web portal that connects musicians and clients seeking personalised music, Express In Music was awarded the YES! Startup grant of \$20,000, which enabled them to take their business to another level.

There was a time when failure almost broke Jerry. Inspired to join numerous business plan competitions, he did not expect the first seven to turn out to be demoralising experiences. Just as he was about to give up, Mr Lim Peng Hun, Deputy Principal (Technology and Industry), used the example of local brand, Breadtalk, to encourage him. "If Breadtalk were to enter a business plan competition, they would almost definitely not get past the quarter finals. But look at how successful they are now," Mr Lim said.

That spirit of perseverance and adaptability has remained with him till this day. When he discovered that the original idea for the business was too restrictive, he readily adapted Express In Music's business model to that of brand marketing through music and song.

"I often tell my clients that the jingle must not be average. The impression must be made for the branding to be effective," he shared.

Pursuing the viral soft sell technique, the company is known for its strong presence on the social media scene. That incidentally goes well with its new branch of business, artiste management. "I hope to help elevate the music scene in Asia by giving opportunities to Asian musicians, in particular, to gain recognition," he said earnestly.

He attributes a lot of credit to his alma mater for the success of the business as it stands. "Apart from giving us technical help such as the provision of office space in the form of the incubator, the directors and principal have helped us to network," he gushed.

**EXPRESS  
IN MUSIC**

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ENTERPRISE



# DESIGNWORKS

# INTEGRATING DESIGN INTO BUSINESS

Looking for ways to innovate your business? Gain deeper and broadening understanding of your customers, clients and stakeholders? And add new customer-centric product or service offerings? Singapore Polytechnic (SP) has just the solution in the form of DesignWorks Singapore. Set up as part of SP's efforts at nurturing creativity, innovation and enterprises and in response to the Economic Strategies Committee 2010, which highlighted the value of design thinking for enterprises and the workforce, DesignWorks is a design-based education and innovation centre run as a collaboration with Rotman DesignWorks, Rotman School of Management, University of Toronto.

By conducting the Business Design Enterprise Programme for Singapore enterprises, DesignWorks Singapore will help

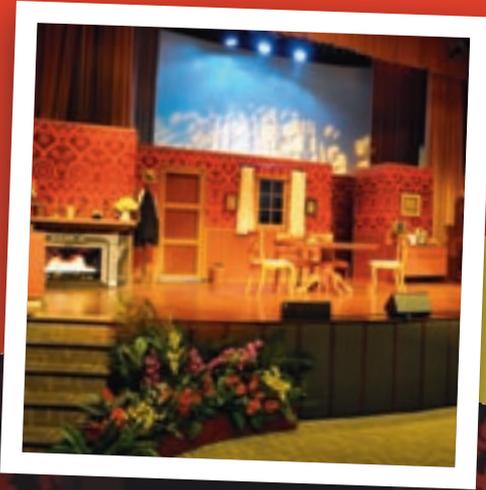
enterprises conceive, develop and launch customer-centric business innovations. Through the course, teams from participating enterprises will gain firsthand experience of DesignWorks' end-to-end methodology for driving business innovation, resulting in new insights, perspectives and possibilities for their organisation. Other customised services are also offered to meet the specific needs of Singapore enterprises, such as multi-day workshops, consultancy and student projects.

SP is working closely with DesignWorks' partner, Rotman DesignWorks, with a total of 24 academic staff from various Schools in SP undergoing intensive training by Rotman. At the end of the training, these staff members will be certified to integrate Business Design into students' curriculum in their respective Schools, as well as work with enterprises. All this was carried out with the end goal of developing a new breed of SP graduates equipped with Business Design skills and thinking

that would make them highly employable.

Ms Debbie Ng, Centre Director of DesignWorks Singapore, had the following advice for those considering prototyping or commercialisation. "Adopt an open mindset. Challenge yourself by asking what is the real problem or the basis for innovation. Begin by empathising with the end user and uncovering their real needs," she said.

Whilst some Singapore enterprises have already benefited from the Business Design Enterprise Programme, such as TeckWah Industrial Corporation Limited, Jason Marine Group Limited, Suki Sushi Group Pte Ltd and Ascensia Education Group, Ms Ng hopes, "More people will recognise the benefits of design thinking and therefore queue up to take part in our programme and offerings!"



# THE MONKEY'S PAW CREATIVE SYNERGY



In recent years, the impact of multimedia on the performing arts has been indisputable. The incorporation of multimedia elements into performance arts often leads to unexpected synergies as Simone Khoo, lecturer at the School of Communication, Arts and Social Sciences (CASS), found out when she staged Singapore Polytechnic's wildly successful run of a play adaptation of W.W. Jacobs' *The Monkey's Paw*, with help from the School of Digital Media and Infocomm Technology (DMIT).

Ms Khoo admits that most productions do not require the use of multimedia. However, due to the theme of the play and the sophisticated nature of contemporary audiences, the challenge was to send chills down the spine of jaded viewers.

The integration of multimedia effects into a live play gave rise to a new set of challenges: how to match the effects with the timing of actor's lines and movements. To accomplish this, mini movies had to be created and programmed for instant activation at the push of a button! Ms Khoo readily admits that due to her exacting demands, their DMIT collaborators faced additional challenges. "To allow for gradual lighting changes that affected parts like the 'live' fireplace and window, numerous mini movies had to be made. Things turned out a lot more complicated than we expected," she recalled between bouts of laughter.

"The incorporation of technology was not without its drawbacks. For example, we experienced problems right up to the night before the actual run," she continued.

Fortunately, it all paid off when the run commenced. Filled to maximum capacity for several performances, the multimedia and performance arts combination proved to be a real winner.

Ms Khoo revealed that the most memorable moments were those when colleagues and students were "creeped out" by the unexpectedly scary effects. "Success could only have come about because of the collaborative efforts of everyone involved, from our CASS Director to colleagues to students and even those from other faculties like DMIT. Some colleagues helped to make it part of the curriculum by asking students to think of a marketing campaign for the performances."

Success is indeed a synergistic collaborative effort at SP.

**THE PRAGMATIC SIDE OF  
ENTREPRENEURSHIP**



**A** key factor in the success of some entrepreneurs is the pragmatic attitude they adopt towards business. William Seow and his business partner, Rio Goh Khi Hao, are examples of such entrepreneurs. Having no entrepreneurial background and no prior experience running a business, they started off with the simple idea of targetting the needs of ordinary people.

In fact, both were still students when the business started informally in February 2008 with cleaning done by the partners on their weekends. Realising that they had no unique selling point, they decided to start by pricing their services at a competitive level to grab marketshare. As the business expanded, helpers were hired and eventually another cleaning business was acquired. Over time, the business blossomed and became formally known as Wipes It Pte Ltd earlier this year.

Seeing the need to be innovative, they decided to rethink their business direction. That decision eventually led to the move into eco-cleaning in 2009, which was timely

as eco-awareness had just become more widespread in Singapore at the time. As it was hard to find suppliers selling eco-friendly cleaning products in Singapore, they decided to import eco-cleaning solutions from Australia. And they have never looked back since. By going eco-friendly, they were able to come up with cost-savings, which were passed onto their clients, a fact that did not go unappreciated. More importantly, the health and safety concerns associated with the use of conventional cleaning products were greatly reduced by the introduction of eco-friendly solutions.

Realising that their housekeepers are at the frontline of the business, Wipes It Pte Ltd has put in much effort into training the staff and educating them in the benefits of the eco-friendly cleaning agents used by the company. In turn, these housekeepers are able to explain to the clients the benefits of these products. By maintaining a good triangular relationship between the company, housekeepers and clients, the company has ensured operations are mostly smooth. In the pipeline are plans to reinvent the company's image and introduce a bigger range of eco-friendly products.

Looking back on the path of entrepreneurship thus far, William credits much of the success to the efforts of his partner, Rio, who has been key in handling day-to-day operations, this has allowed him to focus on strategy. His advice for entrepreneurs-to-be? "You can explore new ideas and avenues of business. However, the key is to stay focussed," he shared.

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ENTERPRISE

SUNDAYS

## SPORTING YOUR SUNDAY BEST

All too often we hear complaints about the casual style of Singaporeans, but often the reaction to that is one of apathy or resignation. Larry Lam, having heard such criticism ad nauseam, decided to do something. That was how Sundays was born. "The basic concept revolves around men's wear for the weekend. Singaporean men are particularly underserved in this area. Sundays hopes to address the problem," he shared.

Starting is never easy, as Larry himself admits, there are many out there who have great ideas but the crux of the matter lies

in the availability of funds. When he got wind of the joint initiative between Parco Singapore and Textile and Fashion Federation (Singapore) which had strong support from SPRING Singapore, he sprung into action. The Business Advisory Committee of Singapore Polytechnic provided feedback on his business plan and model, helping to make it more polished and sustainable, this proved invaluable as it secured him the funding that launched Sundays.

Apart from leveraging on the knowledge imparted by his mother, an experienced seamstress, Larry also made full use of the knowledge that he had gleaned from his diplomas in Civil and Structural Engineering and Creative Media Design. "All designers are like engineers in some ways, how one assembles "tools" like machines and fabrics and puts everything together is very much an engineering process. The real problem is how to make it all look aesthetically pleasing," he pointed out.

"The Social Sciences part of my training helps by allowing me to be more intuitive about what people want and identify target groups for my business. Because I saw the demand that was not being fulfilled, so I was able to find the niche for my business," he shared.

Sundays stands out from the rest of the local apparel market not just because it targets casual menswear exclusively, but also because many products are handmade. Keeping the balance between wearability and innovation is perhaps the trickiest part of the business, Larry concedes. "We would like to explore new cuts, fabrics and silhouettes but produce items that are still wearable in the context of our local climate and activities," he said. This entrepreneur has several collaborative projects and plans to launch a webstore which has kept him busy without cramping his creativity.

Based on his personal experience, he has this to say to entrepreneurs-to-be, "Think before you leap, but once you have the ideas and conviction, then be brave and stick with them."



# PLAYING SERIOUS GAMES

The founding partners of I Heart BoardGames are rare specimens of the entrepreneur species who have managed to transform passion and interest into a viable business.

Initially, Andrew Chia and Marjorie Van Der Straaten (Marge) started I Heart BoardGames in mid 2009. Thanks to some useful advice from the Business Advisory Committee in Singapore Polytechnic, they started designing their own games from September 2009 and expanded their business to include workshops that combined education with entertainment. Offering alternative edutainment, they are aimed at the education industry with emphasis on alternative ways of learning that are all the rage these days.

The YES! Startup grant of \$50,000 gave a real boost to their business as they were able to go into full production of their flagship game *Weird Tales*. Based on the concept of a story-telling daisy-chain, the game is designed to encourage contribution from all players and to maximise players' creativity in weaving disparate elements into a cohesive story. The

creators, having cited H.P. Lovecraft as a major source of inspiration, has inspired expectations of the creative space the game encourages in its players. Not content with a flagship game, Marge revealed that in the works is a war game based on a battle fought in Singapore.

However, the road to entrepreneurship was not always that smooth. Andrew pointed out "Game testing took six months and even now there are still kinks that need to be worked out". Marge concluded that one of the major problems for game designers was knowing when to stop tinkering and let go.

Despite the obstacles and problems faced, both Andrew and Marge were certain that the business was something they wanted to do. "The chance to explore and challenge ourselves is the main attraction. In fact, that was what motivated us to commercialise the idea and embark on this business", Marge shared.

Their advice for others considering a similar move? "Be open to the opinions of others. Many people will give you advice, it might spark ideas for a market niche you may not have considered," offered Marge.

"Weird Tales" is available for purchase from 1 December 2010.



## AN ENTREPRENEUR AT HEART STIRRING HEARTS

Perhaps entrepreneurship really does start at a young age. Ereen Toh's earliest memories of running a business was of a game she played as a child that allowed her to run a virtual shop.

What inspired her to combine design and business was her desire to show that hobbies could make practical business sense as well. "It is great to be able to make one's dream come true. However, it is only possible if you can make the product commercially viable," the down-to-earth businesswoman declared.

Having looked at the existing card market, she saw the niche sector that she could market her products to. "We want to bring unique, handmade cards to consumers," she pointed out.

Despite the enthusiasm, it was not all plain sailing for Ereen when she started out in November 2006. Holding down a full-time job and running Stirring Hearts on a part-time basis meant sacrificing weekends, leisure time and sleep. However, perseverance paid off and Stirring Hearts became increasingly popular.

Winning the Singapore Polytechnic Alumni Enterprise Challenge 2009 was a form of affirmation.

Looking back on the journey thus far, she sees the struggle of the early years as a valuable learning experience. It certainly helped that she managed to secure the YES! Startups \$50,000 grant in March. Ereen shared that "We can now invest in marketing strategies and production techniques to keep card designs innovative."

Elaborating on the edge that Stirring Hearts has over rivals, she said, "Our cards are very crafty and appeal to people who are looking for unique cards or value handmade items that convey that added sense of sincerity."

The challenge in the foreseeable future seems to be the scaling up of operations. With the wealth of experience she has gained, she has the following advice for entrepreneurs-to-be, "You need to have a concrete action plan and not just gung-ho spirit. For the modern entrepreneur, you also need to network effectively."

# ROMANCE II THE SCENT OF SUCCESS



**POSSIBLY THE ONLY LOCAL STUDENT FORMULATIONS THAT HAVE BEEN COMMERCIALISED, ROMANCE II SINGAPORE IS NOW AVAILABLE IN MOST LOCAL DEPARTMENT STORES.**



**A**lways thought that fragrances were all foreign products? That has become a fallacy thanks to the efforts of Jessie Tong Yoke Ling and her group of students who created the original Romance Singapore and the latest Romance II Singapore fragrances.

The surprising success of Romance Singapore, created as a commemorative gift for Romancing Singapore 2004, led Star Asia Pte Ltd's Frederick Cassin to commission Singapore Polytechnic's School of Chemical and Life Sciences to create a successor. Ms Tong admits that it was not an easy

task to undertake and decided to kick off the project by asking the students to start by thinking of a heart where the main profile is singular but branches out into fragrances for male and female users.

Through a laborious process of trial and error and after extensive surveys conducted internally and among the general public, nine fragrances were shortlisted. These fragrances were submitted to Star Asia who provided feedback that led to the final selection. "Only by doing mass surveys, where 200-300 participants were involved in the trials, were we able to eliminate subjective bias. We taste the acceptance level for top, middle and base notes in addition to skin tests and time trials," shared Ms Tong.

In fact, the product was tested alongside commercial products already on the market, where the latter served as benchmarks, to ascertain the level of acceptance for the final product. Though cost was not that much of a concern, the group tried to steer clear of commercial bases to control costs and to ensure that the students' creativity was unhampered. That resulted in a set of fragrances

that could be used separately or mixed as the notes could be easily blended, characteristics that fit the theme of romance perfectly.

Looking back, Ms Tong is as much surprised at the speed of the project as she is by the enthusiasm of the students. "You have to have passion. When you have passion for whatever you are doing, you will see it through no matter what the obstacles are or how hard the task is," she pointed out.

She also credits the success of Romance II Singapore and other projects to the good working relationship the school has with industry partners. In the works are plans to start a student chapter with the Singapore Society of Cosmetic Scientists and potential sponsorship deals with various organisations.

Possibly the only local student formulations that have been commercialised, Romance II Singapore is now available in most local department stores.

The Diploma in Perfumery and Cosmetic Science is the only diploma offered by an institute of higher learning in Singapore and is open to students at Singapore Polytechnic.



# ACADEMIA MEETS REAL WORLD

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INNOVATION + ENTERPRISE

## THE STUDENT AGENCY

**A**ll too often schools are criticised for being too far removed from the rigours of the real world. The School of Design at Singapore Polytechnic has an answer for these critics. The Student Agency, initiated by Noor Azhar Mohamed, a lecturer at the School of Design, teaching the Diploma in Visual Communication and Media Design (DVMD) course (formerly Diploma in Creative Media Design), aims to produce suave designers and designpreneurs who are world-ready, with global networking skills to take on key roles in creating change for a more sustainable life.

“This will hopefully lessen the culture shock before they enter the working world,” the humorous lecturer joked. Founder, Advisor and Creative Director, Azhar has transformed his years of experience in the industry into invaluable lessons for his students. Naturally, there have been sacrifices, particularly of time on his part as the full-time lecturer took on the agency as a separate part of his work on

campus. However, he sees the sacrifice as a part of life. “I love the adrenaline of the creative industry and was afraid to lose it after going into the education industry, this agency is as much a way for me to maintain that adrenaline rush as it is a first level reality check for our students. There’s nothing like experiencing rejection from clients first hand or learning to think on your feet when you are put on the spot during presentations,” he explained.

Space was an issue in the initial years as the Student Agency started off almost as an underground agency. However, perseverance paid off and the students found themselves handling not merely internal projects but pitted against commercial design agencies for projects. An early project involved packaging and design for Anything, a locally manufactured soft drink. The track record was so impressive that, after due process on the part of the school, the Student Agency has now moved to new facilities at The InnoV.

“We are now able to apportion space for different agency functions and students are able to see the flow of work more clearly.”

**YOU CAN SEE THE DIFFERENCE IN THE STUDENTS WHO WERE PART OF THE AGENCY, THEY HAVE DIFFERENT ATTITUDES, SPEAK A DIFFERENT VISUAL LANGUAGE AND ARE A DIFFERENT BREED.**



Looking towards the future, Azhar hopes to make the agency, now in its third year, a part of the curriculum for the diploma in the future. "That would be a litmus test for the school as it would provide life training for the students."

The students are given trust, which is rarely the case for internship programmes at other agencies, and are the ones holding the fort for projects taken on by the agency. Azhar cautions that it is not all smooth-sailing to manage projects, as students have to learn on the job, and learn from their mistakes as well.

As it stands, students have won creative awards and the design industry has started to recognise the agency in its own right. The only one amongst polytechnics with its own agency, it has been a source of inspiration. Indeed, the success of the agency has inspired the establishment and formalisation of at least two other agencies in the polytechnic.



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Grateful alumni members have also given back to the agency. Several have returned to work at the agency as freelance creative consultants and project executives whilst playing mentors to the student members.

Noor Azhar has the following advice for anyone thinking of becoming the next big thing in the creative industry, "Be hungry for great work. Love breaking conventions. And be disciplined."

"You can see the difference in the students who were part of the agency, they have different attitudes, speak a different visual language and are a different breed."

# MOTION SIMULATOR COCKPIT SYSTEM INTEGRATIVE SUCCESS

The success story of the Motion Simulator Cockpit System developed by Liew Hui Sing, lecturer at the School of Mechanical and Aeronautical Engineering, and his team of students and colleagues is yet again proof of the creative and collaborative effort that goes into R&D at Singapore Polytechnic.

Noticing that it was hard to justify a motion platform for most commercial simulation training due to the high acquisition and maintenance cost, Mr Liew was inspired to develop an interchangeable (roll on/roll off) cockpit system simulator. To counter the problem of cost, he decided to concentrate on sourcing for common components that are applicable across different classes and types of simulators meant for different modes of transport and models. He went on to develop a common interface to reuse as many components as possible. This had the effect of ensuring new simulators can be constructed at a fraction of the time and cost of a single purpose motion simulator.

Some of the challenges the team faced were related to decisions on which components could be re-used and incorporation of new components when new cockpit systems were introduced. The ease of the Roll On Roll Off process, the key feature of the system, had to be taken into consideration in terms of design and accessibility. The first test

came with the model of a F-16 single seater cockpit that was successfully showcased during SPInnovex 2010. This model validated the Roll-In, Roll-Out cockpit concept which has been extended to new models being built by the team. Valuable lessons learnt from the first test are now applied to the new models being built. In the works are plans to integrate the system with current first person off-the shelf computer games.

Looking back on the path taken, Mr Liew marvels at the obstacles the team has overcome, "The major difficulties were integrating the different fields of Engineering (Aeronautical, Mechanical, Electrical and Electronics and Software programming) into a complete operational product. Getting students from different fields of engineering to work together as a team and with external third party contractors was also a challenge."

"However, we overcame all the obstacles with the guidance, support, leadership, management and resources that Singapore Polytechnic put at our disposal," he pointed out.



High on his wish list is putting the motion platform to more innovative uses, such as a control console for remotely operated vehicles. Reflecting on the leap he made from conceptualising to prototyping, Mr Liew put it across very plainly, "You must have a clear goal that you can communicate to all the stakeholders in R&D. If you want to get the support that will give you the

resources to do a good job, you have to show that you have the gumption to carry it through to the bitter end."

Spend some time with the industries to learn their problems. You must have a great idea and also most importantly believe in it and go about doing it. Sometimes the industries may initially not be receptive, but you have to make your case based on innovation, ease of use, and most important of all, cost effectiveness.

**43**  
ENTERPRISE



**SOMETIMES THE INDUSTRIES MAY INITIALLY NOT BE RECEPTIVE, BUT YOU HAVE TO MAKE YOUR CASE BASED ON INNOVATION, EASE OF USE, AND MOST IMPORTANT OF ALL, COST EFFECTIVENESS.**



# SHAKING SENSE

## MOBILE TREMORLATOR

**44**  
INNOVATION + ENTERPRISE

**D**espite being part of the Pacific Ring of Fire, Singapore has, thankfully, never experienced volcanic or seismic activity in modern times. However, due to the occurrence of major earthquakes in neighbouring countries over the last few decades tremors have been felt by residents in high-rise buildings which have caused some alarm. Part of the panic amongst the public is due to not knowing how to respond correctly to the tremors. Therefore there has been an urgent need

to educate the public on the correct measures to adopt when a tremor is felt.

Based on this concept, officers from the Public Education Department, Singapore Civil Defence Force (SCDF) approached School of Architecture and the Built Environment (ABE) with the request to come up with a device which could simulate tremors for effective public education on earthquake induced tremors. Coincidentally, at the time, a portable Earthquake Simulator, conceived by Singapore Polytechnic and manufactured by ST Kinetics, had been used by students and staff from the Civil Engineering course at the school for quite some time.

After lengthy brainstorming sessions by staff members, the Tremorlator idea was conceived. The Tremorlator revolved around the construction of a real-size room, furnishing and fixing it onto the portable Earthquake Simulator. As the Earthquake Simulator can simulate real-time tremors, residents sitting inside the room will be able to experience simulated tremors. To achieve the educational purpose, educators standing beside the Tremorlator should brief the residents on how to correctly respond to the tremors.



The team, led by Dr Tao Nengfu, Senior Lecturer at the school, is rightly proud of the Mobile Tremorlator system, which, in fact, is the first of its kind in Singapore. Although there is a similar Japanese product, its system, however, is only able to simulate simple harmonic vibration and not able to replay simulated or captured earthquake ground motions. Therefore the Mobile Tremorlator system proves superior as it can provide residents with “live” experience of earth tremors and thus has better public education effect.

Not satisfied with that achievement, the team collected feedback from public education sessions where the Mobile Tremorlator was deployed and upgraded it.

Despite the short time frame given to the project, team members managed to work on product development after daily academic work and still met the launch deadline.

Looking back on the journey they had embarked on in 2008, Dr Tao credits the team’s success to the strong support received from the management of School of ABE.

His advice for those aspiring to achieve similar success? “Work closely with industry partners and make sure you are mentally prepared to see things through with strong determination and will,” he commented.

His wish list for the Mobile Tremorlator system? A two-dimensional-earthquake-simulator, which will simulate earth tremors in two directions and allow residents to have more realistic feeling of simulated earth tremors. The quest for perfection never ends at SP.

**THE MOBILE TREMORLATOR SYSTEM PROVES SUPERIOR AS IT CAN PROVIDE RESIDENTS WITH “LIVE” EXPERIENCE OF EARTH TREMORS AND THUS HAS BETTER PUBLIC EDUCATION EFFECT.**

# 46

INNOVATION + ENTERPRISE



# MIROSOT



## TECHNOLOGY AND THE BEAUTIFUL GAME

**THE COMBINED  
INTELLECTUAL  
AND PHYSICAL  
RESOURCES  
ARE MOST  
SIGNIFICANT  
FOR ANY  
PROJECT TO  
SUCCEED.**

**F**or tech geeks who are also fanatic fans of the Beautiful Game, MIROSOT is a dream come true, one that combines their two loves, soccer and technology. MIROSOT, the acronym for Micro Robot Soccer Tournament, is a robotic soccer match played between two teams of robots.

With the launch of the Micro-Robot World Cup Soccer Tournament in 1996, a new interdisciplinary research area emerged, where scientists and technologists from diverse fields such as robotics, intelligent control, communication, computer technology, sensor technology, image processing, mechatronics, artificial life etc, work together to make the multi-robot system a reality. The MIROSOT project team in Advanced Robotics and Intelligent Control Centre (ARICC) was

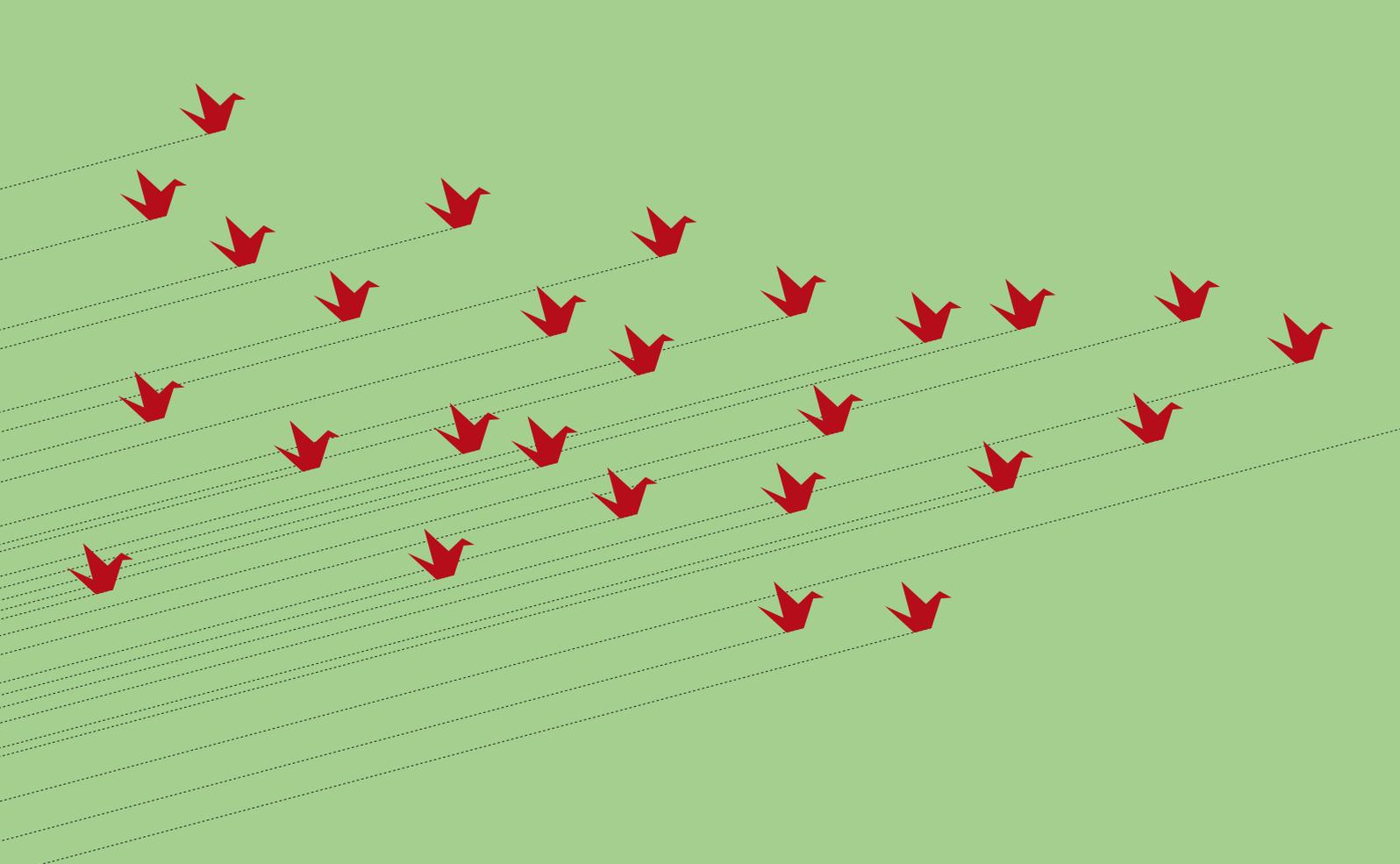
set up in 1997 and the Singapore Polytechnic team has been participating in this robot competition ever since. Currently helmed by Mr Lee Hock Aun and Mr Lim Yuen Siong, the outstanding performance of the team over the years is testament to the work and commitment of the members.

There are three main parts to the design specifications of the project: the robots, the vision system and the Artificial Intelligence system. What really stands out in all of this is the fully autonomous nature of the system as it operates without human operators or intervention. In fact, the central concept MIROSOT revolves around is that of multiple robots that need to collaborate in a real time soccer game environment to achieve specific objectives like scoring a goal or defending a goal.

The multidisciplinary nature of the project meant that there was potential for commercial development of the robots. Having found a company that was interested in marketing the robot soccer system, the team has managed to sell over 200 robots and the MIROSOT system to many buyers, both locally and internationally.

Reflecting on the success of the team, Mr Lee sees the leap from idea to prototype being dependent on good designs and the further leap to commercialisation being dependent on good marketing.

"The success of this project is the result of the effort from many staff and students who have contributed to various aspects of the project over the past ten years or more," he commented.



# EPILOGUE

**AS YOUR JOURNEY THROUGH SINGAPORE POLYTECHNIC'S INNOVATIVE AND ENTERPRISING PATHWAYS ENDS, YOU MAY LOOK FORWARD TO THE LIGHT THAT PROJECTS THE WAY FORWARD. BE IT ENVIRONMENTAL CONCERNS, SOCIAL NEEDS OR PROFIT ORIENTED ENTERPRISE, WHATEVER THE PROBLEM OR QUESTION YOU MAY ENCOUNTER, SP HAS THE TALENT THAT OFFERS YOU THE SOLUTION.**



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