IN FOCUS

SENG
SCHOOL OF ENGINEERING

UNDER THE SURFACE

HKUST ENGINEERING
| Fall 2015 |
Newsletter No.27

Unveiling the Intelligence of Soil to Mitigate Debris Flow Damage

Dean's Message

2016 promises to be a year of fresh horizons and reflection at the School of Engineering as we look forward to welcoming Prof Tim Kwang Ting Cheng as the new Dean in May and celebrating the University's 25th anniversary.

Dean Cheng, an international expert in VLSI testing and design verification, will concurrently serve as Chair Professor in the Department of Electronic and Computer Engineering and in the Department of Computer Science and Engineering. He gained his PhD from the University of California, Berkeley, and spent five years at AT&T Bell Laboratories ahead of joining the University of California, Santa Barbara, where he has worked for over 20 years.

In my role as Acting Dean since September 2015, I have endeavored to take forward the sterling advances that the School has enjoyed in education, research, and rankings under former Dean Prof Khaled Ben Letaief, now Provost at Hamad bin Khalifa University in Qatar, and to prepare for Dean Cheng's arrival.

Having worked for over 30 years in universities in Mainland China, the UK and Hong Kong, my experience in education, research and in leadership roles has included the three different environments – local, national and overseas – in which the School and HKUST needs to consolidate and expand their presence. To address the issues in these equally challenging arenas, I have focused attention on building further strengths and support for the School's administrative framework to ensure sustainability in the initiatives we have launched and those that are to come.

To maintain and advance the School's remarkable research record, our academics have worked hard and successfully to secure larger-scale collaborative and theme-based funding to tackle major sustainability issues. Mentoring and workshops for younger faculty members have provided assistance in writing grant proposals to set them on their way. In addition, postgraduate research and taught programs are going to be consolidated under one team in the School, streamlining efficiency and providing more focused support for students.

In education, experiential learning and e-learning have been a focus in line with today's learners and a modern engineering mindset that needs to be able to create, innovate, solve problems, work in a team and in different cultural settings to most effectively contribute to society. Hong Kong student applications to universities throughout the city are set to dip in line with demographic trends in coming years and the School will be striving to attract top young minds locally, as well as nationally and internationally, through on-going provision of cutting-edge programs that unleash individual potential and provide holistic preparation for success in current times.

The recent initiative in Aerospace Engineering program, the establishment of the HKUST Robotics Institute and HKUST Big Data Institute are indications of the School's intention to remain at the forefront of evolving trends. Hiring of new faculty will add to our already considerable strength in these three areas. Connections with industry in both research and provision of a pool of graduate talent will strengthen impact.

The year is also special as it marks HKUST's first quarter century. Among the University's celebrations of this milestone, the School is organizing a special seminar, featuring leading academics and key technology industry players, together with an alumni dinner in San Francisco on February 13. The major event is one of four being held around the world during this anniversary year, each hosted by a different School. The United States gathering will be an opportunity to look back with pride and look ahead with anticipation. It has been a bold 25 years for the School of Engineering. From this foundation of excellence, we are shaping up to move even higher in the exhilarating times in front of us.

Prof Tongxi Yu
Acting Dean of Engineering

Rankings Reinforce Global Recognition

2015 proved a notable year for HKUST's global engineering standing, with highly positive worldwide rankings in a variety of renowned surveys. In the *Times Higher Education* (THE) World University Rankings of Top 100 Universities for Engineering and Technology 2015-16, the University was placed at No.16, the highest position for any local university since this subject ranking was established in 2010. HKUST has achieved the No.1 spot in Greater China in this league table for five consecutive years. The rankings were based on five criteria: teaching, research, citations, international outlook and industry income.

Meanwhile, in the QS World University Rankings by Faculty 2015 – Engineering and Technology, HKUST was ranked No.14, rising one place from the previous year to reach an all-time high. The University also retained its No.1 position in Hong Kong in this category for the sixth year in a row. Rankings indicators included academic reputation, student-to-faculty ratio, employer reputation, international faculty ratio, citations per faculty, and international student ratio.

In the Global Employability University Ranking 2015, HKUST continued to shine, being ranked at No.14, its highest place yet. It also marked the third year straight that the University had been ranked No.1 in Greater China. The ranking was based on the views of over 4,500 recruiters from major companies in 21 countries on the ideal attributes for graduates and universities, and the institutions they thought produced the best performers. The survey was organized by Emerging, a French human resources consulting agency, and executed by Trendence, a German market research firm.

* No.1 in Greater China ^ No.1 in Hong Kong

SENG'S Research Excellence Shines

The School of Engineering (SENG) has seen the excellence of its research further recognized through the results of significant assessment and funding exercises carried out recently.

The School received outstanding results in the major Research Assessment Exercise (RAE) 2014, conducted by international experts on behalf of Hong Kong's University Grants Committee (UGC). The RAE aims to assess the research quality of the eight UGC-funded institutions in Hong Kong and to delineate their areas of relative strengths and weaknesses. It covered a six-year period from 2007-13, and involved a criterion-referenced assessment against quality levels defined by international standards, as stated by the UGC. On average, over 73% of the School's research activities were rated world-leading (four stars) or internationally excellent (three stars). With regard to four-star plus three-star results, Civil Engineering, Computer Studies/Science, Electronic Engineering and Mechanical Engineering achieved the best performance among all universities in Hong Kong.

In the highly selective and prestigious Theme-based Research Scheme, under the UGC's Research Grants Council, two of the School's projects were approved in 2015-16. This brings the total to four projects in the five annual rounds announced to date. Overall funding comes to more than HK$110 million. Projects approved under this competitive scheme focus on research of strategic importance to the long-term development of Hong Kong and contribute to advances on grand challenges. They encourage collaboration among different institutions in Hong Kong and multidisciplinary research (see P4-5 and P10 for more on SENG's 2015-16 projects).

Under the Research Grants Council's Earmarked Research Grant, the School saw General Research Fund support rise over 18% to HK$49.18 million in 2015-16, up from HK$41.45 million the previous year. This was the largest amount for this type of funding among engineering schools in Hong Kong, representing 27% of the total share for engineering.

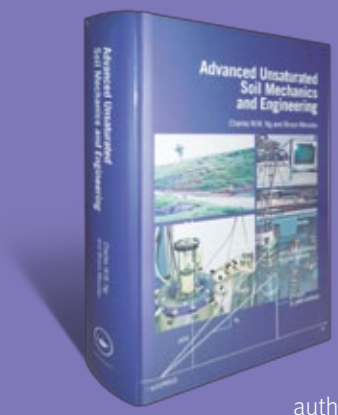
Unearthing the Cleverness

Prof Charles W W Ng has made studying the complexities of soil his life work, creating fresh hope for managing landslides and slope stability through geotechnical, geo-environmental and bio-engineering, and even finding similarities with human behavior

A secondment to a geotechnical engineering team when working at a leading international engineering consultancy firm in the UK in the late 1980s provided the earth-shattering realization for then young graduate structural engineer Charles W W Ng as to his future career path.

Delving deep

"The team was looking into a technical design involving excavation – four stories deep – and next to the River Thames," recalled Prof Ng, who joined the School of Engineering in 1995 and is now Chair Professor of Civil and Environmental Engineering. "When I saw that even a major consultancy was finding this challenging, I knew it must be an area worth researching."



It was a surprise move, particularly for Prof Ng, who had previously envisaged doing an advanced structural engineering at his master's study but switched to reading a PhD focused on geotechnical engineering. As a master's student, he had rated the geotechnical area among the most difficult subject for anyone to do well in. But do well he certainly has, becoming a world authority on unsaturated soil mechanics, slope stability and sustainability, and winning multiple awards east and west for his research, most recently a State Scientific and Technological Progress Award, Second Class, one of the State Council's highest honors.

Research goldmine

"From day one, I have had a curious mind," he said. "This accidental assignment sparked my interest and I discovered a goldmine for research there."

Prof Ng undertook his PhD at the University of Bristol, UK, combining his knowledge of structures and his deepening understanding of soil mechanics to undertake novel research on soil-structure interaction and multi-propped excavation. He then became as a postdoctoral research associate at the University of Cambridge, a world leader in soil mechanics and centrifuge modeling, before being recruited by HKUST to take the field forward in Asia and beyond.

His specialty on his return to Hong Kong became unsaturated soil mechanics, realizing this complex area was still waiting to be explored more widely, locally and globally, and starting one of the first postgraduate courses on the subject in Asia in the late 1990s. Application-wise, an interest in slopes was a natural corollary of living in Hong Kong, with its hilly terrain and buildings perched at all levels. Prof Ng later moved from studying loose-fill slopes (Hong Kong has over 6,000) stabilizing with soil nails to green slopes using plants as stabilizers.

His respect for the natural materials he works with continues to grow: "I have found soils to be extremely clever. Why? If you really know them, you know they have a memory, known technically as the over consolidation ratio. Soil properties are different from man-made materials. Just like humans, they are stress dependent. If you push them lightly, they respond differently from if you push them hard. They are also path dependent, which means they vary depending on their direction of natural geological or applied loading path, similar to humans."

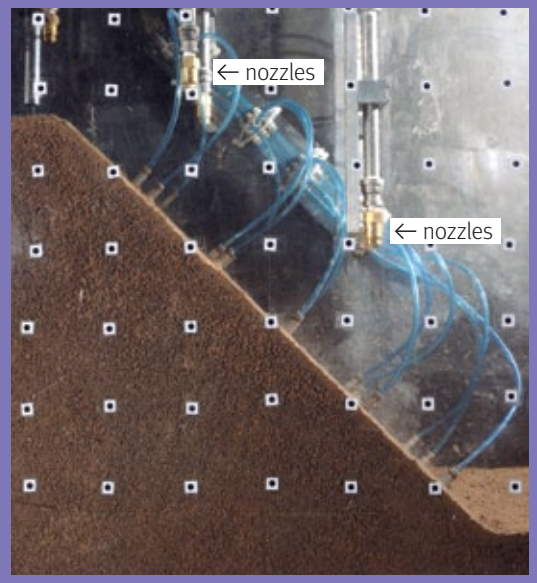
# of Soil

Centrifuge model test setup for a 45-degree vegetated slope

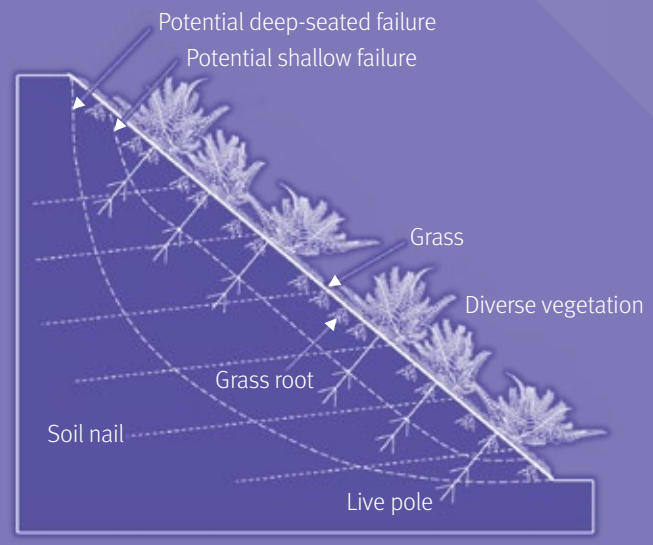
Tap root

Heart-shaped root

Plate-shaped root



Integrated bioengineered (ecologically balanced) live cover for natural slopes



While plants and their roots have been used previously for stability, Prof Ng argues they have not been effectively utilized. "When you also know unsaturated soil mechanics, different reasons for why and how to use plants emerge. The roots are actually far more important for creating suction in the ground. There are two side effects as plants suck water from the soil: the soil will get drier and gain strength; and permeability will be reduced, making it harder for water to get in. Both are beneficial to slope stability," he said. Such findings and their geotechnical and environmental implications have been published in major international journals, including *Géotechnique* and *Canadian Geotechnical Journal*.

Root causes

The topicality and impact of Prof Ng's studies have led to an unprecedented array of multi-million dollar research grants, including three major funding awards from the Research Grants Council in Hong Kong (one Theme-based Research Scheme and two Collaborative Research Fund grants), participation in a Mainland China 973 project, and funding from the National Natural Science Foundation of China. Research projects have ranged from investigating root-soil-water interactions to develop bioengineered live cover systems to preventive methods to deal with environmental hazards from municipal solid waste landfills.

In the large-scale theme-based project, which began in January 2016, he heads an international team looking into debris flow mechanisms and sustainable mitigation of risks in Hong Kong. More extreme weather heralds the potential for disastrous numbers of landslides.

Landmark geotechnical centrifuge facility

Prof Ng served as Director of the University's pioneering and world-leading Geotechnical Centrifuge Facility from establishment in 2001 until early last year. When it came on stream, the HKUST centrifuge was equipped with the first 2D shaking table globally and the world's most advanced four-axis robotic manipulator. It has gone on to assist the University's researchers, other academics, government departments and industry to undertake tests on soil behavior and properties that could not have been carried out in the region otherwise.

One memorable occasion, among many, involved simulating conditions in the field to show why a newly constructed but unoccupied 13-story apartment building collapsed in Shanghai in 2009. The test was successfully carried out with live feed from the HKUST centrifuge to the senior manager concerned in Shanghai, watching via the Internet. "Nerve-wracking but important" is how Prof Ng recalled that day.

Comparison of model and prototype

Collapsed building in centrifuge test

Collapsed building in the field

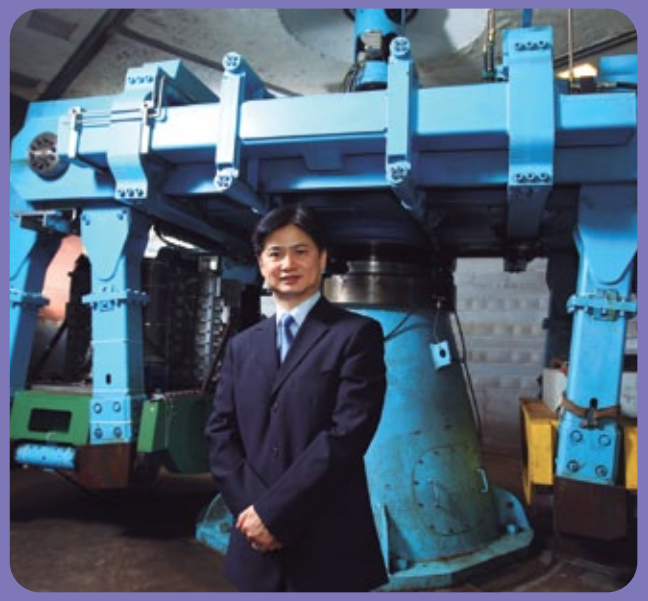
Debris flows on June 7, 2008 blocked the North Lantau Expressway for 16 hours

Photo credit:
Head of Geotechnical Engineering Office and Director of Civil Engineering and Development, HKSAR Government
(from plate 8 of GEO report no. 273)

Married to soil

If soil is like a human being in behavior, the reverse can also be true. Prof Ng, who jokingly refers to himself as “married to soil”, keeps a punishing professional schedule that has seen him publish over 200 SCI international journal articles and some 200 conference papers, and author two reference books. He has also been invited to deliver about 50 keynotes, state-of-the-art reports and special lectures over six continents. He is currently associate editor of the *Canadian Geotechnical Journal*, a leading publication in the field, and chair of the Awards Committee of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). He also chaired the organizing committee for GeGe2015, the first international conference covering both geo-energy and geo-environment and held in December 2015 at HKUST.

In addition to these activities, he is Associate Vice-President (Research and Graduate Studies) for HKUST overall, bringing his own successful experience of research funding and project leadership to strategic planning in University-wide research development and postgraduate education. With his own graduate students, Prof Ng seeks to guide them to achieve what they want to be and to see issues from an all-round perspective. It is an approach that appears to have served his students well. He has graduated 27 PhD and 35 MPhil students, with eight students being admitted to Cambridge for further studies, and others taking up academic positions overseas and in Hong Kong.



Ms & Mr Young Engineers

Postgraduate studies at the School of Engineering are designed to widen horizons. Three Master of Science participants explain how they gained fresh perspectives

Tracy Jingyan Zhou

MSc, Chemical and Biomolecular Engineering (2014)

Taking my postgraduate degree at HKUST was the best investment I have made. Programs are well-designed and include the latest discoveries as well as practical applications for industry.

There are also countless extra-curricular opportunities. In my case, I was nominated by SENG to attend a nine-day winter camp at Peking University. I was then selected to attend the 5th Annual Womensphere Emerging Leaders Global Summit at Columbia University, which brought together women leaders across industries, disciplines, and generations to share their experiences and stories. The trip was really eye-opening as I was also able to visit the New York Stock Exchange on Wall Street and Metropolitan Museum of Art. In June 2014, I joined the “Light on Dreams” service and learning trip, organized by HKUST Connect, a community engagement initiative. I spent a week in Mabian, Sichuan Province, teaching pupils in a rural area and finding out more about the Yi minority group. All of these experiences made my student life colorful and unforgettable.

Building strong industry connections was another benefit. From the alumni-sharing sessions and optional career development course (a big thank you to instructor Ms Keiko Shinohara here!), I met alumnus Mr Michael Leung, Sales Director of Hilti (Hong Kong) Ltd. From his sharing, I got to know Hilti, a construction product and solution supplier. I liked the sound of its caring culture and core values so I applied and, after several rounds of interviews, received an offer ahead of graduation to join its global management development program as an Outperformer Trainee. Since then, I have rotated round different areas of the business in various corporate regional markets. I have worked as a sales representative and in the finance department. Currently, I am in Australia in the marketing department on a regional assignment. Later this year, I will start my international project in Europe.

My suggestion for anyone joining an MSc program at the School of Engineering is: be proactive. Make the most of the numerous opportunities in academia and industry inside and outside campus. Also take part in the activities you are interested in trying. This way you can fruitfully enjoy the all-round student experience available at HKUST.

Anand Sreeram

MSc, Environmental Engineering and Management (2016)
2015 Research Intern, Instituto Nacional Del Carbon, Oviedo, Spain

I first attended HKUST as a chemical engineering undergraduate in 2010. I then worked for one year and decided to return to the School of Engineering to pursue further studies in environmental engineering and management.

Studying engineering is a natural choice for me as I have always been fascinated by science and competent at mathematics. I am particularly drawn to environmental engineering as there is an urgent need to develop strategies and technologies to create sustainable interaction between the natural environment and the technical domain. From a research perspective, I am particularly interested in environmental applications for waste materials, such as wastewater treatment and pollution abatement.

During my master's, I have had the opportunity to join the first cohort of HKUST students undertaking an internship of up to six months with the Spanish National Research Council (CSIC), one of the largest public institutions dedicated to research in Europe. The project I worked on at the Instituto Nacional Del Carbon looked at incorporating adsorbents/ semiconductor composites into traditional cement powder for environmental applications.

It was a very special experience to go to Spain. I was based in Oviedo, a small city in the north, and the time I spent at the Institute proved a tremendous learning experience. I not only worked in a world-class research team with eminent scientists at the forefront of their respective fields, but very importantly I was also able to step out of my comfort zone and live and work in a country where English was not the main language. Spain is a diverse place and I thoroughly enjoyed living there and traveling around to different areas at weekends and other holidays. The internship also provided good insight into what a research career or PhD program would be like, which was really useful experience to gain as a master's student.

I am sure many more students will benefit from this great opportunity in future years. I am now looking forward to graduating and actively considering applying for a PhD program.

Praveen Balaj Balakrishnan

MSc, Mechanical Engineering (2014)
Stamping Feasibility Engineer, Ford India

Having been an automobile enthusiast from a young age and a person fascinated by how machines work and are designed, it wasn't a difficult choice to pick Mechanical Engineering when I went to Anna University in India for my undergraduate studies. My four years of undergraduate education opened up new technologies and gave me fresh insight into the world of cars. For my final year project, I also designed and built a robot that could clean up beaches. This interest in machines then became a passion and I joined Chrysler after graduation as a design and analysis engineer. After working for two years, I decided to take a break and go back to studying to learn about different trends as my field is one involving the latest knowledge, technologies and applications. I applied to many leading universities around the world, with HKUST one of my top choices because of its world-class research facilities and student diversity.

As a participant of the Ford-HKUST Conservation and Environmental Research Grants program, I had to create an alternative air-conditioning system powered by waste exhaust heat from the engine to replace the conventional system in cars and trucks. Being part of this project helped me understand my own strengths and weaknesses. It also gave me wider exposure to the industry as I got to meet Ford's Chief Executive Officer and other senior executives. Following graduation, I accepted an offer from Ford India to become a Stamping Feasibility Engineer. I am currently responsible for developing the Asia Pacific team. In this role, I have had the opportunity to travel to Ford's corporate headquarters in the US to receive training, meet other colleagues and learn from them. I feel the organization has a wonderful work culture, and I am looking forward to building my career at the company.

The Ford-HKUST research grant opening has had a major impact on my life and I hope it can continue to nurture more young engineers at HKUST and help them to spread their wings and pursue their dreams.

Joanne Yan Yu Lai

BEng, Aerospace Engineering (2018)
Recipient of Dean of Engineering Scholarship 2014-15

I was really thrilled to find out I would be one of the first batch of students to be admitted to HKUST's Aerospace Engineering major as it has always been my dream to become a professional in this field. In my first semester, I enrolled in several fundamental courses with other students from the Department of Mechanical and Aerospace Engineering. These were not specific to aerospace and aeronautics but have provided a crucial foundation for my higher-level studies. I am looking forward to tackling subjects such as Aircraft Structure and Aerodynamics in the future, and working hard to strengthen my basic knowledge in preparation for these harder courses.

I have dreamt of being an aircraft maintenance engineer since I was young. It amazes me that such huge planes can fly through the air and carry so many passengers. Learning about the care required to design a machine that combines so many small but essential components is also fascinating. Many people dream of sitting in the pilot's seat, with its extraordinary bird's eye view of the world. However, I am more interested in the technology and mechanics operating behind the scenes, and ensuring the safety of every aircraft and its passengers.

To widen my perspective of the aviation industry, I am currently taking part in the Aircraft Engineer Development Scheme, a project organized by the Hong Kong Institution of Engineers and supported by Hong Kong Aircraft Engineering Co Ltd (HAECO). The scheme has given me valuable insight and experience in numerous ways. These include site visits to aviation-related organizations, such as the Government Flying Service and Cathay Pacific, networking with professionals in the aircraft maintenance field, and facilitating a two-week on-the-job training program at HAECO last summer.

I am also a student member of the Royal Aeronautical Society, which holds monthly evening lectures and invites professionals to speak on more technical topics. While some parts of the discussion involve specialist knowledge, these talks have helped me to deepen my understanding of aviation.

We ♥ Flying

The School of Engineering is rolling forward students' dreams to reach for the skies. Three aerospace enthusiasts reveal how

Michelle (fourth from right, back row) and the "Inspiration" team.
Photo credit: Airport Authority Hong Kong

Michelle Jia Ying Lee

BEng, Mechanical Engineering (2015)
Graduate Engineer, Cathay Pacific

I am passionate about aviation and chose to study Mechanical Engineering, as the subject was then the closest to aerospace engineering available in Hong Kong. In my final year, I was one of a team of five undergraduates that came second in a nationwide light sports aircraft design competition organized by the Aviation Industry Corporation of China (AVIC). Our design,

Mayank Kumar

BEng, Mechanical Engineering (2017)
Engineering Student Ambassador 2014-15

High

Since childhood, the stunning speeds at which aircraft traverse the sky and the heights they achieve have appeared a captivating enigma to me. This puzzle became an inseparable part of my life and I began to see my future centering on aeronautics. With the opportunity to study at HKUST's School of Engineering and the range of fields it opened up, I began to look for the way to achieve my dream. Being part of the Aeronautics Interest Group Model Aircraft Team and taking part in the prestigious American Institute of Aeronautics and Astronautics (AIAA) 2014 Design/Build/Fly Competition in Kansas in the United States proved the perfect opening. I led the sub-team that was responsible for writing the design report and also served as the team's strategy manager.

"Soaring Dragon", was a two-seater amphibious aircraft and we had to compete against over 150 teams of master's and doctoral students.

I also had the opportunity to take part in international competitions such as Airbus Fly Your Ideas and exchange programs to Germany and Beijing, where I attended courses furthering my interest in aerospace. However, it was when I joined a one-year internship at Boeing, Cathay Pacific and Hong Kong Aero Engine Services Limited (HAESL) that I truly confirmed my passion for aviation.

As a Graduate Engineer at Cathay Pacific, I am rotating within the Engineering Department to learn what it takes to ensure the safe operation of over 200 aircraft. Working for an airline makes you feel at the heart of the industry, where you get to decide on the aircraft configuration before manufacturing, plan for the right suppliers, ensure compliance, and much more.

My proudest project to date is being part of B-KOO "Inspiration" – the first homebuilt aircraft certified to fly under Hong Kong registration – which successfully took off from Hong Kong International Airport on November 15, 2015. The kit-built RV-8 single-engine aircraft was designed by Van's Aircraft Inc, and is one of the most popular amateur-built planes.

This project began as one pilot's dream to build a plane locally and fly it around the globe. Along the way, hundreds of secondary students from St Paul's Convent School (also my alma mater) became involved in its construction. Currently, the project team of dedicated pilots and engineers (including HKUST alumni!) is preparing for a series of test flights and the round-the-world trip that will start and end in Hong Kong.

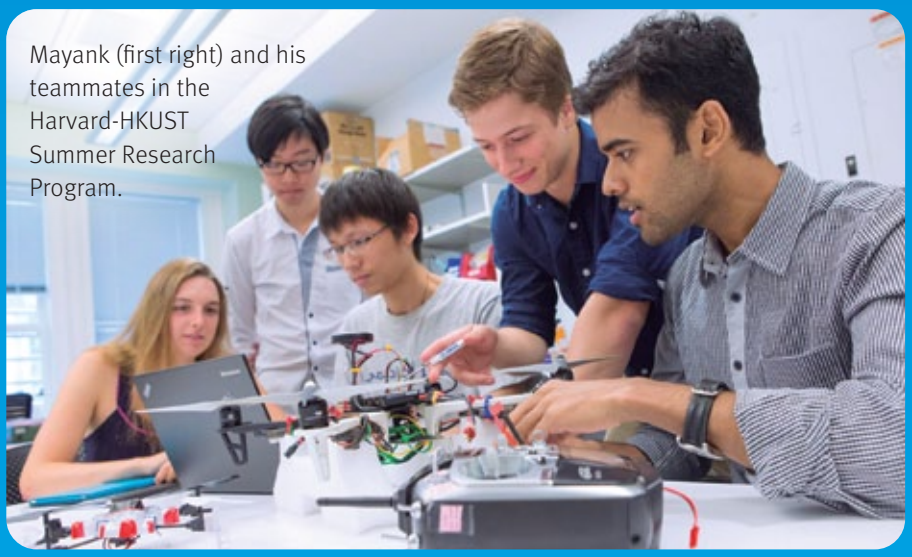
I had never been truly motivated until I started working on planes. There is never a dull moment because there is just so much to learn in this field – the perfect example of doing what you love, and loving what you do.

The competition brought many memorable experiences, which will remain in the team's minds and hearts forever. For me, though, the most outstanding moment was seeing our aircraft actually fly. After long days and sleepless nights spent building it, nothing could be as rewarding as this.

Given the windy conditions on the day of the competition, it was a nerve-wracking time watching our aircraft roll down the runway. While our model had been well tested under normal wind conditions in Hong Kong, we had no idea if it would withstand the Wichita winds. As the power increased, all our hearts skipped a beat. Would it take off?

Tilting as it went, the aircraft did get airborne to huge cheers from all the spectators. With every glide and turn made against the gusty wind, the team's hard work seemed to be paying off. Although it was the aircraft in the air, I felt as if it was my own first flight as I had contributed to making it fly.

After such a momentous year with the Model Aircraft Team, I furthered my interest by spending Summer 2015 at Harvard University as part of a design internship during which we built drones to carry local deliveries. I don't know what I am going to do in the future. But one thing is certain. If I get to spend my life with aircraft, I will consider myself successful.



Mayank (first right) and his teammates in the Harvard-HKUST Summer Research Program.

Finding a Smarter Route to

Urban Water Supply Systems

It is one of the givens of modern urban life to be able to turn on a tap and instantly receive water. Yet the systems that bring running water into our homes and workplaces are far from efficient. Indeed, the World Bank has estimated the cost of lost water from supply systems worldwide to be about US$15 billion per year. Building better infrastructure for this critical resource is also a key concern locally, with the Hong Kong government instituting its Total Water Management (2008) and Water Intelligent Network (2015) policies and committing HK$23 billion to rehabilitate and replace the city's water supply infrastructure.

Now a HKUST research team led by Prof Mohamed Ghidaoui, Chair Professor of Civil and Environmental Engineering, is set to contribute innovative solutions to this crucial issue after receiving funding of HK$33.225 million for his "Smart Urban Water Supply Systems (Smart UWSS)" project proposal in the fifth round of the Research Grants Council's Theme-based Research Scheme. The scheme is highly selective and an award indicative of research excellence.

Prof Ghidaoui's research, awarded under the theme of Developing a Sustainable Environment, encompasses a comprehensive program involving theoretical, laboratory and field studies to develop a new diagnostic paradigm for water supply network monitoring and fault detection. The resulting data will be processed with advanced transient-based inverse methods and algorithms to pinpoint and characterize leaks, blockages and weak pipes.

The research team comprises internationally recognized and cross-disciplinary members and will work collaboratively with the Hong Kong government's Water Supplies Department. The findings are expected to enable timely detection of urban water supply system defects and proactive mitigation measures, leading to water conservation and contributing to sustainable living in the city.

A total of five projects out of 28 applications across institutions in Hong Kong were granted funding in this round of the Theme-based Research Scheme. School of Engineering faculty received funding for two. The second project, led by Prof Charles W W Ng, Chair Professor of Civil and Environmental Engineering, also received HK$33.225 million to investigate slope stability and debris flow mechanisms (see P4-5).

Science and Innovation Awards

Two School of Engineering faculty members were honored in the Ministry of Education's 2014 Higher Education Outstanding Scientific Research Output Awards (Science and Technology). These significant national awards recognize leading contributions to scientific discovery and technological innovation carried out in tertiary institutions across China.

Prof Huamin Qu, Computer Science and Engineering, received a Scientific and Technological Progress Award, Second Class, for the project "Modeling, Analysis and Clinical Applications of Medical Image Data" carried out together with academics from Zhejiang University of Technology, Zhejiang University, and software industry collaborator BSOFT Ltd. The project developed analytical and visualization techniques for computed tomography, magnetic resonance imaging and diffusion tensor imaging to help doctors provide rapid, accurate diagnosis and treatment. It included novel visualization methods and a user-friendly interface to assist medics in analyzing patients' lesion sites and organs. The core techniques have been

State Award for Civil Engineering Concrete Solution

Prof Christopher Leung, Civil and Environmental Engineering, received a State Natural Science Award, Second Class, for his project focusing on control of cracking in concrete. The award is among the most prestigious in science and technology in China. His collaborators included members of Zhejiang University, Dalian University of Technology, and Shantou University.

The project, titled "Double-K Fracture Criterion for Crack Propagation in Concrete Structures and Fundamental Research on the Improvement of Crack-Control Performance", set out to analyze the complex cracking process in concrete and find an experimental approach to ascertain the key governing parameters. It then sought to develop practical approaches to control cracking to improve safety and the lifespan of reinforced concrete structures. Cracking can lead to much-reduced durability and, in a worse-case scenario, catastrophic failure. It is a particularly severe problem in large concrete dams, where continuous repairs are often necessary.

The team developed and verified a double-K fracture criterion, employing two separate parameters to describe the initiation and final unstable propagation of a crack in a concrete structure. This was successfully applied to assess the stability of cracks and the structural safety of various large mainland dams, including the Wujiang Dongfeng Arch Dam, Wujiang Suofengying Roller-compacted Gravity Dam, and Three Gorges Dam (second phase).

The researchers also developed cementitious composites with very high ductility and excellent crack control ability. The concept of such composites was first presented in a paper co-authored by Prof Leung in 1992. Since then, many researchers around the world have conducted research on the material. It has also been applied in the construction of coupling beams in buildings and link slabs in continuous bridges, repair of concrete dams and retaining walls, as well as waterproofing.

Only five 2015 State Science and Technology Awards in total were presented to Hong Kong researchers, with three going to HKUST. Other HKUST academics receiving top State honors included Prof Charles W W Ng, Chair Professor of Civil and Environmental Engineering (see P4-5) and School of Science faculty members.

Recognize SENG Excellence

adopted into software systems developed by the industry partner and effectively used in more than 100 hospitals.

In addition, a team led by Prof Qu received the Best Innovation (Innovative Technology) Silver Award at the Hong Kong ICT Awards in 2015. The accolade recognized the team's development of the first visual analytic system to provide in-depth and user-friendly analysis of e-learning behavior for Massive Open Online Courses (MOOCs). The system creates a useful way for instructors to find out more about how learners use MOOC videos so as to improve teaching quality and tailor design and implementation of course materials in line with participants' needs.

Since its launch in 2014, the system has been well received by instructors and MOOC platforms, including leading companies Coursera and edX.

Prof Bing Zeng, Electronic and Computer Engineering, and his collaborators from the University of Electronic Science and Technology of China received a Natural Science Award, Second Class. A School of Science faculty member received a similar award for a separate project.

SENG Gains Two More Named Professorships

Two School of Engineering senior academics were among the four named professors inaugurated at HKUST in April 2015. The prestigious honor of a named professorship recognizes eminent faculty members and the donor who supports the title.

At the ceremony, the second in HKUST's Named Professorship Program, Prof Qiang Yang, Head and Chair Professor, Computer Science and Engineering, was appointed New Bright Professor of Engineering and Prof Xin Zhang, Chair Professor, Mechanical and Aerospace Engineering, became Swire Professor of Aerospace Engineering.

The professorships were the result of donations by long-time HKUST supporters Wong Check She Charitable Foundation and The Swire Group Charitable Trust respectively.

Prof Yang joined HKUST in 2001. His research focuses on frontier work in big data, data mining and artificial intelligence. He was the founding director of Huawei's Noah's Ark Lab, also specializing in big data and artificial intelligence, and program chair for the 2015 International Joint Conference on Artificial Intelligence. Prof Yang is the founding editor-in-chief of *ACM Transactions on Intelligent Systems and Technology* and *IEEE Transactions on Big Data* and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Association for the Advancement of Artificial Intelligence (AAAI), American Association for the Advancement of Science (AAAS) and International Association for Pattern Recognition (IAPR).

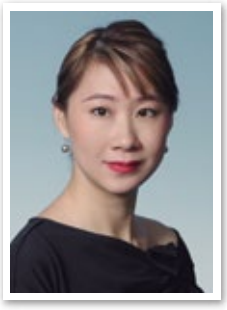
Prof Zhang specializes in aircraft aerodynamics and aeroacoustics and racing car aerodynamics and performance. Reducing aircraft noise is a major part of his research.

President Prof Tony F Chan said that such appointments ensured the University would maintain excellence in education and research by giving due recognition to exceptional faculty. There are now a total of six named professors at the School of Engineering.

ECE Professors Elected IEEE Fellows

Two Electronic and Computer Engineering professors have been elected Fellows of the prestigious Institute of Electrical and Electronics Engineers (IEEE), bringing the total number of IEEE Fellows at HKUST to 35*.

Such Fellowships celebrate extraordinary contributions to the profession in any of IEEE fields following rigorous review. IEEE members total over 400,000 worldwide, encompassing 160 countries. The number of Fellowship recipients each year does not exceed 0.1% of the total voting IEEE membership.



Prof Pascale Fung was recognized by IEEE for her contributions to human-machine interactions. Her research has encompassed multilingual language processing, machine translation and spoken language understanding. She is a founding member of the Human Language Technology Center at HKUST, the first research center of its kind in Greater China. Prof Fung has also been elected Fellow of the International Speech Communication Association and has become Vice President of the Association for Computational Linguistics' Special Interest Group on Linguistic Data and Corpus-Based Approaches to NLP (ACL SIGDAT). SIGDAT has been a pioneer in data-driven methods of natural language processing since the 1990s.

Prof Patrick Yue was recognized by IEEE for his contributions to the advancement of CMOS radio-frequency integrated circuits and device modeling. He is the Founding Director of the Center for Industry Engagement and Internship in the School of Engineering and Director of the HKUST-Qualcomm Joint Innovation and Research Laboratory. He was a co-recipient of the 2003 IEEE International Solid-State Circuits Conference Best Student Paper Award and author of one of the most cited papers yet in the *IEEE Journal of Solid-State Circuits*. Currently, he serves as an editor for the *IEEE Electron Device Letters* and *IEEE Solid-State Circuits Magazine*. Prof Yue has also chaired and organized a number of IEEE international conferences and is an Elected Administrative Committee Member for the IEEE Solid-State Circuits Society.

*as of Dec 2015

Engineering Students Take Internship @CSIC

CSIC headquarters in Madrid, Spain

HKUST's first internship link with the Spanish National Research Council (Consejo Superior de Investigaciones Científicas, CSIC) in Spain was established in 2015, offering Master of Science students research exposure in the largest research network in Spain

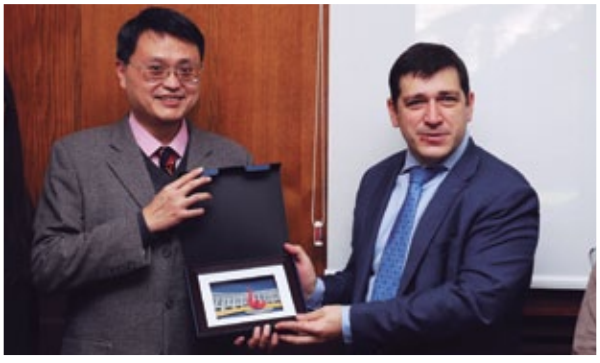
A pilot research internship program was inaugurated in early 2015 between HKUST School of Engineering and the Spanish National Research Council (CSIC) in Spain. With a desire to promote scientific, academic and cultural exchanges between the two institutions, over 70 internship positions were offered from CSIC's 123 state-of-the-art national laboratories. Eight Master of Science (MSc) students from the MSc Programs in Civil Infrastructural Engineering and Management (CIEM), Environmental Engineering and Management (EVEM), Intelligent Building Technology and Management (IBTM), IC Design Engineering (ICDE), Mechanical Engineering (MECH) and Telecommunications (Telecom) took the opportunity to live and work in Spain for six months under this inaugural program.

CSIC is the largest public research institution in Spain and the third largest in Europe, boasting leading research under a wide breadth of fields from the humanities to chemical science. It has eight fields of knowledge and 220 researchers. As national labs with sophisticated equipment, CSIC has deep-seated connections with Spanish universities across the country.

The program saw the students travel to Madrid, Seville, and Oviedo to conduct research in mechanical exoskeletons, cooperative indoor personal localization, and autonomous navigation for quadcopters, among others.

Experiencing the Spanish culture, language, and lifestyle was another highlight of the internship. Research groups selected to host the MSc students were composed of individuals from diverse backgrounds. The cosmopolitan environment was excellent training for the researchers and students in their research or career development.

Students also made a mark on cutting-edge research. Their labs found HKUST's student interns to be excellent and creative researchers making important and meaningful contributions in advancing the field of their study. In many cases, their works have provided invaluable experimental evidence and have driven the direction of the research.



Prof King Lun Yeung, Associate Dean of Engineering (Research and Graduate Studies), HKUST, and Prof Antonio Javier Sánchez Herencia, Deputy Vice-President of Scientific Programming, CSIC

CSIC First Opens its Door to Non-Spanish University

"The School of Engineering is very pleased to have established a strong link between the largest public institution dedicated to research in Spain and Hong Kong University of Science and Technology School of Engineering." Prof King Lun Yeung, Associate Dean of Engineering (Research and Graduate Studies), said.

In 2013-14, he initiated the joint network with Prof Miguel Angel Bañares of CSIC, the former Deputy Vice-President of Scientific Programming. The CSIC network, the third largest in Europe, first opened its door to a non-Spanish academic institution. "We are truly proud of our students being recognized as high quality and welcomed by their research laboratories. The first batch of students were offered 130 research projects to choose from," Prof Yeung added.

"I saw valuable mutual benefits from training of Hong Kong students and transferring knowledge and techniques of what we are using at CSIC that are relevant to HKUST. HKUST is an attractor to high-level people within and around Asia and is an epicenter of knowledge for neighboring Mainland China, Taiwan, India and Malaysia, attracting the best and brightest from the region." Prof Bañares recalled why CSIC first connected with HKUST.

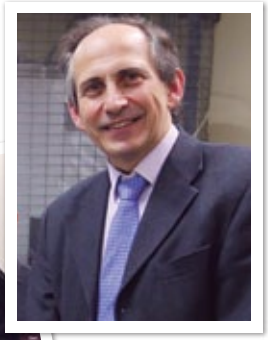
"Students not only benefit from having interaction with our top-tier scientists on research, cultural learning from people from Spain and research group members from other parts of Europe would create intangible value for them to take away." Prof Bañares also offered tips to future students, "We expect students to take more initiative and be more proactive. Never be afraid to ask questions or to propose something, or have coffee with a colleague, discuss the work and come up with new ideas. That's great for everyone."

Students Work in State-of-the-Art Robotics Lab

The Centre for Automatics and Robotics (CAR) is one of the laboratories in which the MSc students worked. Led by Prof Pascual Campoy, the lab aims to provide unmanned aerial vehicles (UAV) with the highest degree of autonomy by exploiting the powerful sensor of vision. Achieving technology transfer on image processing and control techniques to unmanned aerial system (UAS) civil applications is the laboratory's major mission.

Prof Campoy has already developed robust tracking techniques to aid air-to-air refuelling for aircraft as well as improved helipad detection and recognition to aid autonomous landings. For his work in pose estimation of aircraft and trajectory control, his group has won First Prize in the IMAV 2013 international competition, as well as Best Obstacle Avoidance Award and Best Trajectory Controller in IARC14.

Prof Campoy's team has two professors, five senior researchers & PhDs, three PhD students in addition to four master's students, six graduate students, a backup pilot and a project manager. Our students are exposed to a fully internationalized research environment with people from the US, UK, France, Austria, Sweden, Netherlands, Portugal and China.



Student Perspectives:

Hear from MSc students who went on this internship last year!

The Academic Route

Why did you participate in this internship?

"It provided an excellent insight into what a research career or a PhD program would be like." - *Anand Sreeram*

What did this learning experience teach you?

"I had the opportunity to use sophisticated equipment during my research project. I believe it was very beneficial to learn these experimental techniques and material characterization methods. This knowledge is invaluable particularly to young scientists. The research aspects of the internship will certainly assist my future assignments or prospects." - *Anand Sreeram*

What impact did you make to your lab?

"The project that I began in Spain will be continued by other members of the research team. They are confident that they can produce a conference paper or publication soon about this subject." - *Anand Sreeram*

"For example, I explored a novel algorithm for wireless nodes to self-locate their position in a process called cooperative localization. This was an unfamiliar direction for the laboratory. Based on the results that I collected, they decided to proceed in this direction." - *Xufei Zheng*

Career-Orientated

Why did you participate in this internship?

"The MSc program has taught me the theory, and the internship offered me hands-on experience in applying the theory." - *Chunxu Wang*

What did this learning experience teach you?

"I believe the hands-on experience from this internship and exposure to working in a multicultural environment will greatly benefit my future career." - *Yizhi Jiang*

"This internship offered a slow transit point from studying as a student to working. It taught me more about living independently, communication with others, and working as part of a group — skills that will be useful in the workplace." - *Weiyan Jiang*

"It was an opportunity to grow as an individual. I improved my communication and organizational skills through working as a team. I also improved my analytical skills through analyzing my experimental results." - *Run Tian*

"I discovered that I am very interested in this field and I would like to find a job in this area!" - *Tongyu Liu*

(From left, front row) Prof Miguel Angel Bañares, former Deputy Vice-President of Scientific Programming, CSIC; Ms María Colmenares, Coordinator of Postgraduate and Specialization Department, CSIC; Prof King Lun Yeung, Associate Dean of Engineering (Research and Graduate Studies), HKUST; Prof Antonio Javier Sánchez Herencia, Deputy Vice-President of Scientific Programming, CSIC; Prof Pascual Campoy, Director, Computer Vision Group, Center for Automatics and Robotics, Joint Venture Technical University Madrid-UPM and CSIC; Prof Angel Alvarez, Associate Vice-Rector for International Relations with Asia UPM Madrid; (first left, back row) Ms Diana Liu, Head of Communications and External Affairs, School of Engineering, HKUST; (first right, back row) Ms Mandy Sin, Executive Officer of MSc and Professional Programs, School of Engineering, HKUST; and MSc students in the CSIC internship program

Culture

Why did you participate in this internship?

"I wanted the opportunity to experience living and studying overseas while working in the most advanced lab in Spain." - *Weiyan Jiang*

What did this learning experience teach you?

"Universally, the Spanish people work extremely hard and are passionate about their research. They work with quite high efficiency and are happy." - *Weiyan Jiang*

"During my work with researchers coming from across the world, the internationalized environment enabled me to be a better person. For example, I learned to communicate with others better and struck a healthier balance between work and life." - *Weiyan Jiang*

What were some unforgettable experiences?

"I took the opportunity to travel around Europe during my internship. I finally managed to achieve my dream of travelling to Paris!" - *Chunxu Wang*

"This experience taught me the beauty of Spanish culture; I went to the lab by bus like any office worker, went to the bar at the weekend, and watched a game of Real Madrid. I went to the basketball arena to watch a Paul Gasol game, drank coffee with researchers every workday, and heard plenty of Spanish jokes." - *Xufei Zheng*

"The internship in Spain allowed me to sample the delights of Spanish cuisine and wines across the country. For example, I tried paella, gazpacho, and tortilla espanola. I even found the time to travel to different European countries!" - *Run Tian*

"I enjoyed life there. I visited the museums, saw a flamenco show, and tried different food. Summer there has 14 hours of daylight; I have plenty of time to see what I want." - *Run Tian*

Suggestions

What you will need in preparation for this internship? Any advice from previous interns at CSIC?

"Most students found that Spanish was quite an important language to learn prior to the internship. It may come in useful when talking to the landlord, your neighbours, or when ordering food. (Restaurants don't have menus in English.) Certainly, this is more important outside of the two big cities, Madrid and Barcelona." - *Anand Sreeram*

"Some preparation in cooking for oneself is advised as the Spanish tend to dine outside less often. Study Spanish food names is most important and practise cooking." - *Chunxu Wang*

"Make sure to find accommodation with functioning air-conditioning. Summer months in Spain regularly reach the 30 degree range. Ensure travel plans are aligned with the weather also; parts of Spain or Europe may be less pleasant in the summer weather." - *Weiyan Jiang*

"Contact the supervisor early to gain a better idea of what is expected. Consult alumni who took the CSIC internship and seek advice on work and travel plans." - *Tongyu Liu*

"You can find anything in Madrid. Just make sure to pack your spirit of adventure and curiosity!" - *Yizhi Jiang*

CSIC Internship

Find out more...

Check out our facebook page 'School of Engineering, HKUST' for updates

Contact Program Office (sengmsc@ust.hk) for chatting with former CSIC interns on Wechat

Consult Program Manager (852 2358 8987)

Faculty Honors, Awards & Achievements

Prof Amine Bermak, Electronic and Computer Engineering, has received HK$9.8 million from the Hong Kong government's Innovation and Technology Fund for research focused on the development of a wireless multi-sensing platform for smart green buildings. Under the HKUST-MIT Research Alliance Consortium, the project involves Prof C Y Tsui and Prof George Yuan, both Electronic and Computer Engineering, and academics from Massachusetts Institute of Technology and City University of Hong Kong.

Adjunct **Prof Vijay Bhargava**, Electronic and Computer Engineering, received a Canada Council Killam Prize 2015 in recognition of his outstanding career achievements in engineering. Prof Bhargava is an expert in wireless communications. The prize honors outstanding Canadian scholars and scientists actively engaged in research, industry, government agencies or universities.

Prof Mansun Chan, Electronic and Computer Engineering, and his Shenzhen team received a Second Class Award, Natural Science Category, in the 2014 Shenzhen Science and Technology Awards for their project on "DFM and ULTRA Nano-Scale CMOS Model for Integrated Circuit Optimization and Variation Simulation", conducted through the PKU-HKUST Shenzhen-Hong Kong Industry, Education and Research (IER) Base. It is the third time the team has received such an award and the second year in a row.

Prof Kai Chen, Computer Science and Engineering, and his postgraduate students are exploring the building of practical networked systems for data centers and cloud applications. Their recent work on XPath and PIAS was published at the 12th USENIX Symposium on Networked Systems Design and Implementation (NSDI'15), a top system conference. This was a first for papers from a university in Hong Kong.

Prof Lei Chen, Computer Science and Engineering, was awarded the ACM SIGMOD 2015 Test of Time Award, together with Prof Vincent Oria, New Jersey's Science & Technology University, and Prof Tamer Özsu, University of Waterloo. They received the honor for their project "Robust and Fast Similarity Search for Moving Object Trajectories", published at SIGMOD 2005. The ACM SIGMOD Test of Time Award recognizes the best paper from SIGMOD proceedings 10 years prior, based on identifying the paper with the most impact on research, products, and methodology over the intervening decade. Prof Chen was also appointed associate editor-in-chief for *IEEE Transactions on Knowledge and Data Engineering*. The journal covers new developments in knowledge and data engineering, and hardware and software feasibility studies.

A poster by **Prof Vladimir Chigrinov**, **Prof Abhishek Srivastava**, both Electronic and Computer Engineering (ECE), and collaborators from National Chiao Tung University, Taiwan, won the Outstanding Poster Award at the 2014 Taiwan Liquid Crystal Society Conference. The poster focused on the paper titled "A Bistable Negative Lens by Integrating a Polarization Switch of Ferroelectric Liquid Crystals with a Passively Anisotropic Focusing Element". Profs Chigrinov and Srivastava were also awarded a Distinguished Poster Award at the 2015 Society for Information Display (SID) International Symposium together with **Prof Hoi Sing Kwok**, Chair Professor of Electronic and Computer Engineering, and ECE PhD students Ying Ma and Liangyu Shi. The poster was based on the paper titled "Field-Sequential-Color Displays Based on Reflective Electrically Suppressed Helix Ferroelectric Liquid Crystal".

Prof Xijun Hu, Chemical and Biomolecular Engineering, has received funding of HK$1,334,360 from the Environment and Conservation Fund and the Woo Wheelock Green Fund for his project focused on "Development of SBA15-Based Bimetallic Ni-Zr Catalysts for NOx Abatement". The study seeks to develop a continuous catalytic system for NOx treatment through the selective catalytic reduction process, using volatile organic compounds as reducing agents.

Prof Jack Cheng, Civil and Environmental Engineering, was named Young BIMer of the Year by the Hong Kong Construction Industry Council. He is the only person from academia to receive this industry-wide award, presented to people 40 years of age or below in recognition of efforts and achievements in building information modeling (BIM).

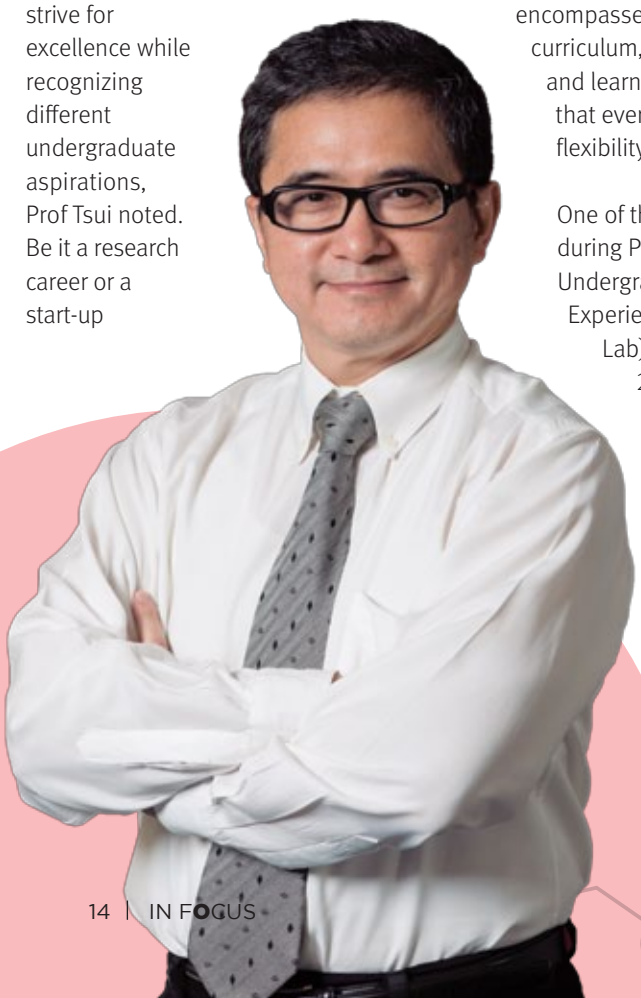
Seize the Day as a SENG Undergraduate

Set aside ideas of pressure-cooker learning. The School of Engineering's diverse and go-ahead engineering education opens up a world of exciting opportunities for active students ready to reach for their dreams, according to Prof Chi Ying Tsui, Associate Dean (Undergraduate Studies)

Times have changed considerably in the student experience at the School of Engineering (SENG) in the two decades that Prof Chi Ying Tsui has called HKUST his home.

Joining the then Department of Electrical and Electronic Engineering (now Electronic and Computer Engineering) in 1994, three years after HKUST was founded, he recalls the days when the education approach was similar to the pressure-cooker style he himself experienced as a master's and PhD student in the US. "Basically, the professors here expected undergraduates to study every day until midnight!"

Today, such traditional learning at the School has made way for a pioneering, option-filled, increasingly individualized engineering education that continues to strive for excellence while recognizing different undergraduate aspirations, Prof Tsui noted. Be it a research career or a start-up company, a role in a multinational or government institution, or putting engineering skills to work in social service or community-based organizations, the aim is for SENG undergraduates to gain a head start in discovering and realizing their personal dreams in Hong Kong or beyond.



Project work, internships, innovative e-learning, fast-track and early research opportunities, participation in local and international competitions, and exchanges overseas are just some of the ways that young engineers at SENG can now build knowledge in their chosen field and learn more about themselves and others inside and outside the classroom. "We understand that individual students have different potential, different ways of learning and different aspirations," said Prof Tsui, who took up the two-year post of Associate Dean in July 2014 and whose role encompasses driving forward the curriculum, student life, and teaching and learning. "We want to make sure that everyone has the chance and flexibility to pursue what they want."

One of the most recent new options during Prof Tsui's tenure is the Undergraduate Student-initiated Experiential Learning Lab (USEL Lab), launched in October 2015. Here, students from Year 1 to Year 4 can spark a project proposal, find a faculty member willing to supervise it, gain School approval and seed funding, and then test their ideas in the 24-hour lab. The initiative has met with considerable enthusiasm, with six projects already underway.

Teaching innovations are also being introduced, in particular the idea of "flipped classrooms", whereby students watch lectures on video ahead of class and during class time work in small groups to critically analyze and solve problems based on their viewing. "For today's Internet generation, learning modes need to be tailored to help students with their studies," Prof Tsui said.

As the School's education approach has evolved, so Prof Tsui sees the need for a change in how students view their time at university. "How to motivate undergraduates to pursue their own path – not just passively wait for their degree – is one of my key jobs," he said. "There is so much more that can be gained in addition to a degree during students' four years at SENG."

The popular exchange program, with 45% of students now participating, the student ambassador program, which outreaches to schools and the community, and social service projects utilizing engineering skills are successful examples of out-of-class activities with life-changing potential. More high school initiatives and outreach are also being planned to draw in active student learners and foster awareness of engineering's significant role in building a knowledge-based society, Prof Tsui said.

Generating a sense of belonging through the building of traditions is another important task. Over its 10-year history, the award-winning 80-strong interdisciplinary Robotics Team has drawn alumni back to assist current students because they enjoy taking part in this tradition (see P20). Prof Tsui is now seeking to replicate this in other School activities. Indeed, he knows at first-hand the value of such belonging.

"Many of the departmental colleagues that joined HKUST with me are still here, and I feel like we have watched each other develop and grow," Prof Tsui said. "I turned down other offers in the US and Hong Kong to join HKUST and I have no regrets. That's what I hope for our students. That after their years here, and as alumni, they feel it has really been worthwhile to have attended the School."

Research and Postgraduate Springboard to Success

A framework of personalized support and diversity of opportunity are the hallmark of Prof King Lun Yeung's tenure as Associate Dean (Research and Graduate Studies)

The past 18 months have been a time of fresh testing grounds and fruitful results for Prof King Lun Yeung. Not in his usual capacity as a pioneering researcher and educator in chemical engineering in the Department of Chemical and Biomolecular Engineering and Division of Environment but as the School of Engineering's Associate Dean (Research and Graduate Studies).

As an environmental health expert, Prof Yeung is acutely aware of the need for the appropriate conditions to nurture a flourishing milieu. This, together with in-depth discussions with then Dean of Engineering Prof Khaled Ben Letaief at the start of his two-year term as Associate Dean in July 2014, has given rise to a more personalized, focused support system for the School's faculty and postgraduates that is already bringing positive gains.

Among the initiatives overseen by Prof Yeung is the systematic provision of greater assistance for proposal writing and grant applications in line with grant-givers' move away from an emphasis on research vision to research impact. On-going since August 2014, this comprises sharing of grant-writing experience, internal mentorship by experienced faculty members who have successfully secured major grants, and technical writing assistance.

Since then, the School has seen higher application numbers overall, a 10% rise in the success rate for Hong Kong's Research Grants Council General Research Fund proposals in 2014-15 over the previous year, plus the awarding of two major collaborative Theme-based Research Scheme grants.

Links between younger SENG faculty and those in other university engineering departments in Hong Kong are also being encouraged through workshops and symposia as another way of widening understanding, and building professional and personal friendships that can sow the seeds for large collaborative and theme-based grants.

On the graduate studies front, professional development courses adding know-how that cannot be learnt in a lab, such as communication skills, ethical values and intellectual property protection, have been joined by a broadening of research learning opportunities and greater student diversity at all levels – doctoral (PhD), master of philosophy (MPhil) and master of science (MSc).

South America, North America and Europe have all been a focus for student recruitment, with 39 nationalities among SENG postgraduates in 2015-16. Hong Kong students have been targeted to encourage more to continue study at higher levels to build the knowledge economy. Prof Yeung is also pursuing dual degree arrangements with institutions outside Asia to add to those already established within the region. A dual PhD with the University of Waterloo commenced in 2015. More programs are under planning.

The benefits of broader cultural horizons are clear, he said. "Once you open up a person's mind, you don't open it up in one particular way but to all possibilities."

The response from students to such an approach has been gratifying. From the first cohort of 17 students enrolled in the enterprising interdisciplinary MPhil in Technology Leadership and Entrepreneurship (target ratio: one-third each from Hong Kong, Mainland China and overseas), five companies have emerged. In the second cohort, one student turned down a place at Harvard and another delayed entering Cambridge University to join.

"Students appreciate HKUST's east-west bridging role as well as the efforts the School makes to make everyone feel at home," Prof Yeung said. "Hong Kong is also very well situated for moving technologies from lab to market. Hong Kong has the value chain while Mainland China has the manufacturing chain, so everything is close by. That is rare and very dynamic. Even Silicon Valley cannot duplicate it."

To be continued on P27

Faculty Honors, Awards & Achievements

Prof Joseph H W Lee, Vice-President for Research and Graduate Studies and Chair Professor, Civil and Environmental Engineering, has been awarded Honorary Membership of the International Association for Hydro-Environment Engineering and Research (IAHR). Honorary Membership is the most prestigious honor conferred by the IAHR Council. Prof Lee is the first recipient from Hong Kong and only the second from Greater China among the 30 international recipients since the award was first presented in 1983. There were three awardees in 2015, including Prof Lee.

Prof Bo Li, Computer Science and Engineering, was selected as a co-winner of the inaugural IEEE INFOCOM Test-of-Time Paper Award, together with his former PhD students, Prof Jiangchuan Liu and Mr Xinyan Zhang, and a professor from Chinese University of Hong Kong. They received the award for their paper titled "CoolStreaming/DONet: a Data-Driven Overlay Network for Peer-to-Peer Live Media Streaming", published at IEEE INFOCOM 2005. It has been cited over 2,030 times, according to Google Scholar. The IEEE INFOCOM Test-of-Time Paper Award recognizes the most frequently cited and widely recognized papers published in the past 10-12 years at INFOCOM proceedings.

Prof Zexiang Li, Electronic and Computer Engineering, was appointed to the HKSAR Commission on Strategic Development. The Commission advises the Chief Executive on Hong Kong's long-term and overall development needs and goals, with reference to issues, direction and strategy of social, economic and political developments.

Prof Richard So, Industrial Engineering and Logistics Management, has received the title of Chartered Ergonomist & Human Factors Specialist from the Chartered Institute of Ergonomics & Human Factors in recognition of his contribution to the field of ergonomics.

Prof Fugee Tsung, Industrial Engineering and Logistics Management, has been appointed editor-in-chief of the *Journal of Quality Technology* (JQT) from 2016-18. In 2015, he served as editor-elect. Prof Tsung is the first member outside the US to be elected editor-in-chief. Founded in 1969, JQT is the flagship journal of the American Society for Quality, and is consistently ranked as one of the most cited journals in the areas of industrial engineering, management science, and statistics.

Prof Qiang Yang, Chair Professor of Computer Science and Engineering, was appointed editor-in-chief of *IEEE Transactions on Big Data*. The journal provides cross-disciplinary innovative research ideas and applications results including novel theory, algorithms, and applications.

Prof Ke Yi and his PhD student Lu Wang, both Computer Science and Engineering, received the Best Demonstration Award at SIGMOD 2015 for their system demonstration "STORM: Spatio-Temporal Online Reasoning and Management of Large Spatio-Temporal Data". The demonstration was a joint work with Prof Feifei Li from the University of Utah and his students.

Prof Qian Zhang, Computer Science and Engineering, and her PhD students Zeyu Wang and Zhice Yang received the Best Video Award and Best Paper Award Runner-up at ACM MobiSys 2015. The paper, "Mobile Devices Can Afford: Light-Weight Indoor Positioning with Visible Light", was co-written with Jiansong Zhang, Microsoft Research Asia, and Chenyu Huang, Wuhan University. ACM MobiSys is a major international conference for mobile systems, applications, and services areas.

‘Full Stack Web Development’ MOOC Launched

A HKUST Massive Open Online Course (MOOC) entitled “Full Stack Web Development Specialization” was launched in September 2015, taught by Department of Computer Science and Engineering faculty. The course is hosted on the Coursera platform, the world’s largest open online course provider, and is accessible to all who would like to take it*.

The course, led by Prof Jogesh Muppala and Prof David Rossiter, helps students to learn the latest knowledge and skills about web development. It covers Javascript-based front-end and serverside technologies, including NodeJS and AngularJS. Know-how related to mobile devices is a particular feature of the course, covering both Cordova and the Ionic framework, Prof Muppala said.

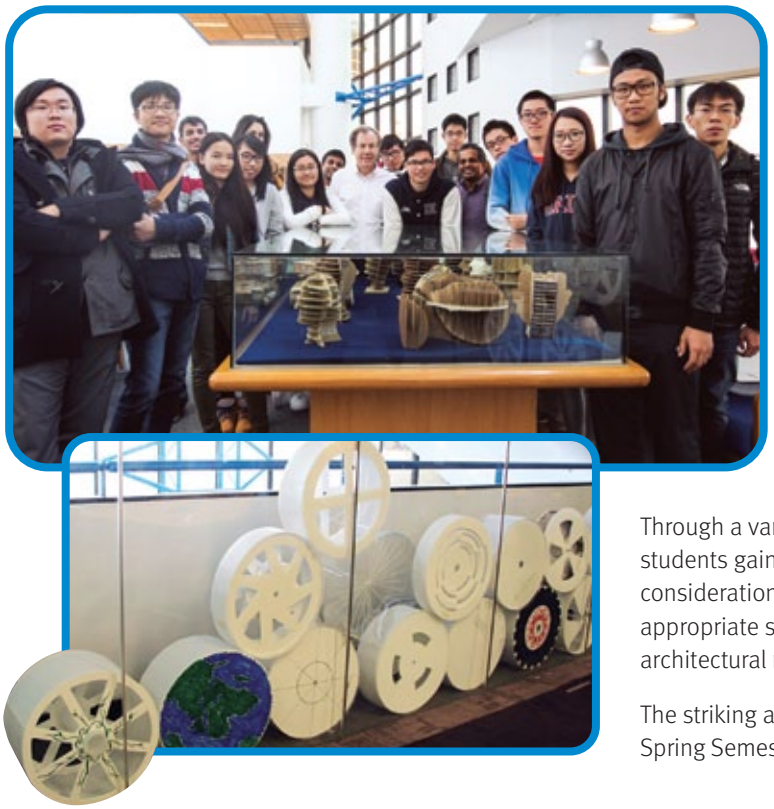
Full stack web developers are in high demand in the job market. Coursera recently put out an international call for proposals for a specialized course in this area, and HKUST was one of two universities chosen to provide one.

Prof Ting Chuen Pong, Senior Advisor to the Executive Vice-President and Provost (Teaching Innovation and e-Learning), said he was delighted that HKUST had been selected: “HKUST has become a regional leader in e-learning through the development of innovative approaches for offering MOOCs and blended learning courses on campus,” he said.

President and Co-Founder of Coursera Ms Daphne Koller also noted HKUST’s contribution to the development of MOOCs, stating that HKUST had been an innovative partner for Coursera from early times. She expected that the Full Stack Web Development Specialization course would reach learners worldwide, “who hope to advance their careers in this high demand field, many of whom would never have had access to HKUST’s high quality instruction”.

*https://www.coursera.org/specializations/full-stack?utm_medium=listingPage

Students Learn How to Make Prototypes



Students from the Schools of Engineering, Science and Business have equipped themselves with the creative and practical skills to turn ideas into reality through the Department of Industrial Engineering and Logistics Management’s innovative Design Studio course, focused on building prototypes.

During the Winter Semester 2015, Prof Ravindra Goonetilleke, Associate Head and Professor of IELM, and Prof Uwe Reischl, Department of Community and Environmental Health, Boise State University, US, taught students how to make aesthetically pleasing models using inexpensive materials and fast assembly methods while at the same time refining and improving their ideas.

Through a variety of practical workshops held over three weeks, students gained a good understanding of the basic principles and considerations involved in building prototypes, including selecting appropriate scales, working to time frames, and making use of various architectural model-building materials.

The striking artwork created by the students went on display in the Spring Semester at HKUST Library.

Keynote Highlights Fuel Cells in Quest for **Cleaner Energy**

Prof Tianshou Zhao, Chair Professor of Mechanical and Aerospace Engineering, gave a thought-provoking keynote lecture, titled "Innovating Energy Technologies through an Interdisciplinary Approach", as the recipient of the School of Engineering's Distinguished Research Excellence Award 2014. Prof Zhao, who is also the Director of the HKUST Energy Institute and a Senior Fellow of the HKUST Jockey Club Institute for Advanced Study, is a world-leading researcher in clean energy generation and energy storage devices.

The School's excellence award recognizes an eminent faculty member with outstanding research achievements of global and local impact. It is the School's highest award and the invitation to give a public keynote lecture forms a significant part of the accolade.

In his keynote, Prof Zhao highlighted the complexity of adjusting our established patterns of energy production, and the crucial need for us to do so through the adoption of renewables. He introduced his findings on fuel cell technologies and redox flow battery storage research, achieved through an innovative interdisciplinary approach combining thermofluids science and electrochemistry. Issues and practicalities related to these fuel cells and advanced batteries were explored and collaborative ways of moving forward emphasized.

During his 20 years at HKUST, Prof Zhao has made further global contributions in multi-scale multiphase heat and mass transport with electrochemical reactions, and computational modeling. He is a recipient of two State Natural Science Awards, the ASME Fellowship Award, and a Croucher Senior Research Fellowship Award. He was named a Highly Cited Researcher in Engineering by Thomson Reuters in both 2014 and 2015.

The keynote attracted an audience of 150, including academics of other institutions, government representatives, industry members, faculty members and students.

Exploring Different **Career Paths**

The variety of career options open to School of Engineering research postgraduates was the focus of an informative sharing session in March 2015, in which three guest speakers from different fields discussed opportunities for employment in and outside academia. The RPg Lunch Conversation on Exploring Different Career Paths was organized by the Center for Engineering Education Innovation (E^2I) as part of the Center's professional development program for postgraduates.

Speaking at the session were Ms Anna Champion, Founding Member of the South East Asian Association of Graduate Employers, Ir Chi Chiu Chan, Senior Vice President (now President) of the Hong Kong Institution of Engineers, and Prof Raymond Wong, Director of the School's Computer Engineering Program. The three presenters shared their career development experience and advised students on how to choose a career direction, prepare for job interviews and workplace requirements, as well as adapt to different work environments and cultures.

Winning Ways with Words

In April, School of Engineering research postgraduate students entered into a concise war of words as finalists in the 2015 SENG Three Minute Thesis (3MT®) Competition battled to best present their ideas and research discoveries in just 180 seconds.

The exciting contest challenged contestants to explain their research projects to other students and a judging panel comprising SENG faculty and communication professionals, enabling participants to practice communicating the significance of their work in a succinct but compelling way to non-specialists as well as specialists.

The skill is seen as highly beneficial to researchers who will later need to apply for funding or participate in public forums and speak convincingly in a short time span about the importance of their work to non-experts in their field. More than 200 universities from 19 countries and regions around the world have held 3MT® competitions since it was originated by the University of Queensland, including the University of Cambridge, University of Massachusetts and University of British Columbia.

Chemical and Biomolecular Engineering PhD student Ping Geng won both the overall championship and the People's Choice award, an honor voted on by the student audience. Second and third places went to PhD students Miao Yu, Bioengineering Graduate Program, and Belsy Yuen, Mechanical and Aerospace Engineering.

During the event, the finalists, judging panel, and audience also shared their experience of giving presentations and exchanged ideas on how to improve research presentation skills.

Top Discoverers of the Future Recognized

Three recent PhD graduates have received the School of Engineering PhD Research Excellence Awards 2014-15 for their outstanding work while at HKUST. The honorees were Dr Feng Xuan, Chemical and Biomolecular Engineering, a member of Prof I-Ming Hsing's research group, Dr Yanjiao Chen, Computer Science and Engineering, who worked in Prof Qian Zhang's team, and Dr Shu Yang, Electronic and Computer Engineering, part of Prof Kevin Chen's research group.

Dr Xuan, now a postdoctoral researcher at the Wyss Institute for Biologically Inspired Engineering at Harvard University, developed a series of strategies to realize "immobilization-free" electrochemical nucleic acid sensing with high sensitivity and selectivity while at HKUST. This work led to several high-impact publications, with his work cited 130 times in the past three years. His research team received two General Research Fund grants totaling HK$2 million based on his PhD thesis work and he has filed two patents, demonstrating the commercial potential of his work.

The focus of Dr Chen's work was the interdisciplinary field combining wireless networks and microeconomics. She investigated non-cooperative, competitive interactions among different parties in wireless networks through game theory and optimization models and solutions. Dr Chen has published more than 20 papers in IEEE journals and conferences, and at present is a member of the iQua Research Group at the University of Toronto.

Dr Yang's research explored next-generation energy-efficient power conversion systems. She developed a technology to provide enhanced wide bandgap gallium nitride semiconductor device stability and reliability, and authored and co-authored more than 40 papers. She is currently a Visiting Assistant Professor in the Department of Electronic and Computer Engineering at HKUST.

Robotics Team Rolls On to Further Success

The HKUST Robotics Team enjoyed a bumper year in 2015, with its various teams receiving a host of awards in local and international contests.

The Remotely Operated Vehicle (ROV) team won the championship in the Explorer Class at the 10th Hong Kong/Asia Regional IET/MATE Underwater Robot Challenge and went on to surpass its previous achievements by receiving four awards at the MATE International ROV Competition in Canada, including third place overall in the Explorer Class. The team of students from the Schools of Engineering, Science and Business were in competition with over 30 teams from 10 countries and regions. The 2015 challenge focused on ROVs' role in arctic science and the offshore oil and gas industries, with teams required to build a robot that could accomplish 25 industrial ROV tasks in extreme underwater environments. The team also received a second class award in the 14th National Challenge Cup. The biennial competition is considered one of the premier competitions in China for top young innovative minds across the country.

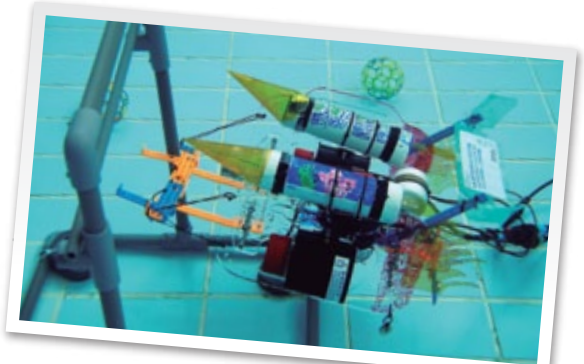
In the Robocon Hong Kong contest, HKUST won the championship for the fifth consecutive year. The University's "Fiery Dragon" team was named champion while its "War Dragon" team was third runner-up. The theme was "Robominton" with every team developing two robots, one wired, one wireless, to compete in a game of badminton against an opposing team's robots. HKUST went on to represent Hong Kong in the international ABU Robocon in Indonesia, securing the first runner-up place.

Meanwhile, the Smart Car team steered its way to three honors at the 10th National Undergraduate Students "Freescale Cup" Intelligent Car Competition (South China Region), namely two third class awards in the camera section and a certificate of merit in the electro-magnetic section. The competition encourages students to apply circuit design and mechanics, embedded software programming, and control theories to create smart model cars that can race on a complex track.

You Can Make a Robot Too!

In a broadly inclusive and pioneering Hong Kong community robotics initiative, 27 HKUST students served as teachers and mentors to primary and secondary students and those with special education needs in a two-day workshop on the basic skills of robot-making. The activity, co-organized by the School of Engineering's Center for Global & Community Engagement (GCE) together with other HKUST Schools and the Interdisciplinary Programs Office, attracted 18 teams of participants, who later competed in an underwater robot-building contest.

The contest was won by Our Lady of the Rosary College girls' school, with a team from Hong Kong & Kowloon Chiu Chow Public Association Secondary School, including one member with a hearing impairment and another with learning disabilities, gaining the first runner-up place. Other award-winners included Ebenezer School, Pui Ching Middle School, Yan Oi Tong Tin Ka Ping Secondary School and GT (Ellen Yeung) College.



"This event not only offered contestants a stimulating learning experience," Prof Tim Woo, Director of the GCE, noted. "It also gave our University's students an opportunity to serve the community." (See also P30).

Next-Generation Fitness Device

Takes Personal Training to Fresh Peaks

Three MPhil Program in Technology Leadership and Entrepreneurship students have designed an award-winning sensor-embedded smart sleeve that provides next-generation, virtually assisted fitness training any time any place. Originally called FITKICK and now rebranded as Koach, the product developed by Phillip Wing Hong Chan, Jitesh Chhabria and Derek Wing Hang Yip tracks full body movement to analyze user forms and techniques in real-time.

Koach sleeves have their own micro-processor and memory, which allow users to track and record their performance without carrying their smart phones. Data are collected and analyzed within the sleeves, and synced to a mobile app after a workout through Bluetooth. Qualitative feedback on posture and form is available. It also supports multiple activities, including body-weight training, yoga, running and cycling.

The MPhil trio's initial device won the championship at HKUST's Healthcare Designathon Competition in December 2014. The innovators later became one of the eight teams across Asia selected to join the AIA Accelerator program, where they received mentorship and support from a leading start-up incubator and industry experts, among other opportunities. In 2015, they won the championship and HKSTP Technopreneur Gold Award at the YDC E-Challenge, Gold Award at the JEC Outstanding Engineering Project Awards, and also became a Kairos Society K50 company.

The web app, which will also be compatible with other fitness tracking products, allows users to find, plan, and track their workouts using the thousands of workout videos freely available online. The beta version is due for release at the end of February. The wearable device is scheduled for launch later this year, with the team of three now joined by electronics engineer Michael Siu, software developer Ming Tsang, both School of Engineering students, and fashion designer Chailie Ho who is contributing to the apparel designs.

Phillip Chan, 2014 BEng Electronic Engineering, also received a Merit Award in the Tertiary Student Project category at the Asia Pacific ICT Alliance Awards 2014 for his Wearable Gesture Input Device, which allows people to control computers remotely.

HKUST ACM Student Chapters Established

Two student chapters connected to the renowned Association for Computing Machinery (ACM) were established at the University in 2015, with the support of the Department of Computer Science and Engineering.

The HKUST ACM Student Chapter seeks to enhance student participation in the Association and to create early opportunities for building a network among professionals, including researchers, professors, and alumni. It also offers opportunities for students and professionals to exchange ideas and for students to attend activities and utilize services provided by the Association.

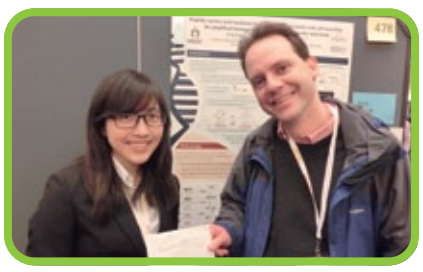
In addition, an ACM-W Student Chapter, which supports, celebrates, and advocates for women in computing was launched. It is the first such chapter in Greater China. ACM-W provides a range of programs and services to ACM members and works in the larger community to advance the contributions of technical women. The HKUST ACM-W Student Chapter, which is part of the HKUST ACM Student Chapter, offers a support network for female students.

Student Honors, Awards & Achievements

A tri-wheel robot called Rockollector, created by Mechanical and Aerospace Engineering undergraduates **Kin Lap Chung** (2015 graduate), **Ho Wang Chung**, **Tze Kin Fan**, **Chun Ting Ng** (2015 graduate), **Koon Nam Wong** and **Siu Hong Wu** (2015 graduate) received the Most Innovative Design Award at the Fourth Greater China Region Design Competition in Guangzhou in March 2015. Students were asked to design and build a vehicle that was able to pick up rocks and deposit them at a designated spot within a given time limit. The contest was hosted by the Institution of Mechanical Engineers (Hong Kong Branch).

Civil and Environmental Engineering PhD student **Yichuan Deng**, supervised by Prof Jack Cheng, received the Best Paper Award at the 27th KKHTCNN Symposium on Civil Engineering in Shanghai. The paper was titled "Integrating BIM and GIS for Urban Planning Purposes Considering Acoustics". The symposium forms part of an academic collaboration between Korea Advanced Institute of Science and Technology (KAIST), Kyoto University (KU), Hong Kong University of Science and Technology (HKUST), Tongji University (TJU) in China, Chulalongkorn University (CU) in Thailand, National Taiwan University (NTU) and National University of Singapore (NUS).

PhD student **Tsz Wing Fan**, Chemical and Biomolecular Engineering, won the Best Poster Prize at Symposium JJ at the 2015 Spring Meeting of the Materials Research Society in San Francisco. Tsz Wing's poster focused on "Peptide nucleic acid mediated dendritic growth of nucleic acid self-assembly for amplified homogeneous electrochemical nucleic acid assay" and was chosen from more than 50 entries.



PhD candidate **Ping Geng** received the Chan-Tak-Kei & Wong-Kwai-Ying Best Postgraduate Award 2015. The honor was established by alumna Dr Joan Chan, Chemical and Biomolecular Engineering, in her parents' names. Ping joined Prof Guohua Chen's research group in 2010, working on solutions to tackle the membrane fouling issue during membrane separation. To date, she has filed a US patent for the unique system she designed and has presented two conference papers. She received the Best Poster Award at the 65th Annual Meeting of the International Society of Electrochemistry in Switzerland. She was also the Champion and People's Choice award-winner in the Three Minute Thesis Competition, held by the School.

Long He, 2010 BEng Logistics Management and Engineering, won first prize in the Best Student Paper Award at the Sixth Production and Operations Management Society (POMS)-Hong Kong International Conference for his paper "Service Region Design for Urban Electric Vehicle Sharing Systems". PhD candidate **Zhenghua Long**, Industrial Engineering and Logistics Management, received second prize for his paper "Virtual Allocation Policies for Many-Server Queues with Abandonment". Zhenghua graduated in 2015.

Undergraduates **Leviero** and **Andrianto Lie**, Computer Science and Engineering, won the HKUST President's Cup for their final year project "Turn Any Computer Screen into a Gesture-Assisted Touch Screen Using a Leap Motion Controller". An interdisciplinary team of seven second-year students received the Gold Award for the "Real-Time Display of Machine Status" project. Team members were **Zhiyu Chen**, Finance, **Yunpeng Cui**, Economics, **Yangyang Duan**, Life Science, **I-Hsuan Kao**, Physics, **Mengyuan Li**, Civil and Environmental Engineering, **Xinzhu Liu**, Dual Degree Program in Technology and Management, and **Yuchen Liu**, Electronic and Computer Engineering. The Silver Award went to **Haoning Tang**, Electronic and Computer Engineering, for the project "Grid Optimization of Large-Area OLED Lighting Panel Electrode". Leviero and Andrianto graduated in 2015 and the other students remain undergraduates.

Student Honors, Awards & Achievements

Four papers by Electronic and Computer Engineering PhD students, doctoral graduates, and professors were presented at the IEEE International Solid-State Circuits Conference (ISSCC), also known as "Chip Olympiad" and held in San Francisco in February 2015. Papers comprised "Wireless Power Transfer System Using Primary Equalizer for Coupling- and Load-Range Extension in Bio-Implant Applications" by **Xing Li**; "A 123-Phase DC-DC Converter-Ring with Fast-DVS for Microprocessors" by **Yan Lu** and **Junmin Jiang**; "A 2-/3-Phase Fully-Integrated Switched-Capacitor DC-DC Converter in Bulk-CMOS for Energy-Efficient Digital Circuits with 14% Efficiency Improvement" by Junmin, Yan and **Cheng Huang**; and "A 70.5-to-85.5GHz 65nm Phase-Locked Loop with Passive Scaling of Loop Filter" by **Zhiqiang Huang**.

In addition, **Lin Cheng** won a Predoctoral Achievement Award while Junmin received a Student Travel Grant Award, both given by the IEEE Solid-State Circuits Society. Zhiqiang, Junmin and Xing received Analog Devices ISSCC Outstanding Student Designer Awards. Yan and Cheng graduated in 2014, and Xing in 2015. Junmin, Zhiqiang and Lin remain PhD students.

Civil and Environmental Engineering PhD candidate **Duruo Huang**, supervised by Prof Gang Wang, received the Best Student Presentation Award from the Hong Kong Society of Theoretical and Applied Mechanics at the Society's 19th Annual Conference in March 2015.

Mechanical and Aerospace Engineering PhD student **Feng Ni** and Electronic and Computer Engineering undergraduate **Chun Sing Poon** received the Global Youth Innovator Award for their Smart Ruler project at the first 2015 International Contest of Applications in Nano-Micro Technologies (iCAN) Consumer Electronics Show in Las Vegas in January 2015. Fifteen international teams took part. The Smart Ruler offers a new application for multiple Micro-Electro-Mechanical Systems (MEMS) sensors integrated with a low-cost microcontroller unit chip and signal processing program to help children learn mathematics.

In addition, engineering undergraduates **Alexander Yu Tse** and **Chen Tang**, both Mechanical and Aerospace Engineering, and Chun Sing Poon, Electronic and Computer Engineering, won second prize at iCAN 2015 in Alaska in June 2015 for their project, Air Hand. The device could perform handling and manipulation of different objects without complicated controls.

MSc student **Jiayi Qiu**, Mechanical and Aerospace Engineering, received the Star of Hope Award in the 2014-15 You Bring Charm to the World Awards for his research on sustainable building design. The annual awards were initiated by Phoenix TV in 2006 and recognize the achievements of Chinese people from all over the world. Eleven awards were presented, with Jiayi, who graduated in 2015, among the youngest winners.

Civil and Environmental Engineering undergraduate **Pui San So**, supervised by Prof Charles W W Ng, won the Association of Geotechnical and Geoenvironmental Specialists (Hong Kong) Final Year Projects Competition 2015 for his "Effects of Arbuscular Mycorrhizal Fungi (AMF) on Hydraulic and Mechanical Properties of Vegetated Soil" project. He is now an MPhil student in the same department.

Undergraduate **Ambi Cheuk Ho Yuen**, Electronic and Computer Engineering, won the Gold Prize at the international session of the Capstone Design Fair of Engineering Education Festa 2014, held in South Korea. His award-winning project, "Sally, Multi-Purpose Micro Swarm Robotics System", performs basic collective functions, including aggregation, dispersion and pattern formation, and can be used to assist in rescues, entertainment and swarm behavior research. More than 300 projects were exhibited. Ambi is now an MPhil student in the same department.

Hackathon Reaches Out Beyond HKUST

The first university Hackathon led by students successfully took place at HKUST in Spring 2015. Over 220 students and alumni in 47 teams from different local universities took part in Hackathon@HKUST, an intensive 24-hour coding competition.

Participants in the Hackathon had to identify a particular problem and a solution related to one of the three themes of charity, entrepreneurship and women consumers. They then worked in teams to build a relevant software or hardware prototype application within the timeframe and present their solution to a panel of judges comprising industry experts, start-up founders, and academics.

To help participants prepare, a series of workshops, talks, and information sessions took place ahead of the competition. Industry professionals and specialists provided mentorship during the contest. Following the event, a post-Hackathon Tech Show was organized at HKUST to showcase the prototypes.

A total of 17 awards were presented to 12 teams or individuals, with the RoundUp, Chariful and Everhelp teams proving multi-award winners. The three teams created a donation website based on online transactions, charity-focused game app, and app to help people use fragmented moments of time for charitable activities respectively.

The contest was co-organized by HKUST students and Tencent Foundation, along with other HKUST units and alumni associations and the start-up community. It was the second year that the Hackathon had been held but the first to be open to participants beyond HKUST. The project received the President's 1-HKUST Student Life Award in 2015 in recognition of its contribution to fostering a greater sense of belonging and engaging students from different backgrounds at HKUST.

MSc Students Drive Greener Future through
Ford-HKUST Conservation Program

Twenty Master of Science (MSc) students from the School of Engineering have become the latest recipients of the enterprising Ford-Hong Kong University of Science and Technology Conservation and Environmental Research Grants program.

The unique program between Ford Motor Company and the University promotes environmental research focused on green technologies and transportation. Research projects being undertaken by the 2015-16 recipients include battery efficiency for next-generation vehicles, smart car windows to conserve energy, and personalized ventilation in vehicles.

The program, established in 2013, has benefited 42 of the School's MSc students to date. As in previous years, Ford contributed HK$500,000 for the graduate research grants, which was matched by HKUST for a total grants pool of HK$1 million.

Prof King Lun Yeung, Associate Dean of Engineering (Research and Graduate Studies), said partnerships with Ford and other industry leaders were "testaments of our continuing efforts to build international connections and provide a collaborative learning environment".

In mid-2015, 2014-15 recipients visited Ford Motor Company's regional headquarters in Bangkok, Thailand, to present their Grant research findings to Ford executives, toured company manufacturing facilities in Rayong and learnt about advanced automotive technologies.

Mr David Westerman, Managing Director, Asia Pacific Emerging Markets, Ford Motor Company, said: "The Grants program demonstrates our shared commitment to building a better world through original ideas and new technologies."

Toy Competition Revs Up Design Creativity

The My Toy Design Competition 2014-15, co-hosted by the Department of Industrial Engineering and Logistics Management, Federation of Hong Kong Industries, Hong Kong Toys Council and The Toys Manufacturers' Association of Hong Kong Limited, encouraged further design, creativity and innovation among young people, attracting more than 600 entries from over 1,000 Hong Kong participants.

The competition, first held in 2012-13, seeks to nurture students' creativity and discover talented designers. Two categories of entries were available in the second contest, Traditional Toys and Toys with Smart Device Apps, with over HK$2 million in funding secured from different sources, including the CreateSmart Initiative, established under the Hong Kong government's Create Hong Kong agency, and local toy companies and associations.

Thirty-eight finalists in the Student Group (secondary schools and tertiary institutions) and 24 in the newly added Designer Group were chosen by a judging panel comprising design professionals, academics, industry specialists and toy users.

An award ceremony was held on May 29, 2015, with Mrs Janet Chu, Assistant Head of Create Hong Kong, as the guest of honor. HKUST undergraduates Tak Hei Wong and Tin Lam Yeung, Electronic and Computer Engineering, received the bronze award in the Smart Device Apps category for Spiderbot, a robot that behaves like a spider and a car. The toy is controlled via Bluetooth through smartphone Android apps using voice input and buttons. Two School of Business and Management undergraduates also received the bronze award in the Traditional category for their Big Money card game. A total of 13 awards were presented.

Materializing the Potential of 3D Printing

The second HKUST-USC forum on 3D Printing: Research and Practice, jointly organized by the Department of Industrial Engineering and Logistics Management (IELM), and Viterbi School of Engineering, University of Southern California (USC), brought together eight panelists from academia and industry for a thought-provoking discussion on recent trends and developments in the field.

Industry panelists comprised: Dr Xiaoshu Xu, Founder and CEO of Hunan Farsoon High-tech Company, who gave an overview of 3D printing developments; Mr Andrew Chiu, Managing Director of 3DP Technology Ltd, who looked at recent trends and gave his own perspective on the future of 3D printing in Hong Kong; Dr Jing Zhang, Founder and CEO of SprintRay Inc, who spoke on his research and the latest 3D printing technology; and Mr Tsz King Leung, US Product Design Company, who discussed designing and building an individual 3D printer.

Four academics from three different universities then provided insights into cutting-edge research on 3D printing, including statistical quality control methodology. Participants comprised: Prof Fugee Tsung, then Head of the IELM Department, HKUST; Prof Qiang Huang, Gordon S Marshall Early Career Chair in Engineering, and Prof Yong Chen, both Daniel J Epstein Department of Industrial and Systems Engineering, USC; and Prof Yonghua Chen, Department of Mechanical Engineering, University of Hong Kong.

The second HKUST-USC forum took place in December 2014, following the success of the first HKUST-USC forum in January 2014. Both were supported by HKUST's Sponsorship Scheme for Targeted Strategic Partnerships. A video of the second forum is available at http://goo.gl/UFHetV.

Flying Start for **Aero Day**

HKUST's first Aero Day, jointly organized by the Department of Mechanical and Aerospace Engineering and the HKUST Student Branch of the American Institute of Aeronautics and Astronautics (AIAA), successfully took place on campus in February 2015.

Aero Day explored developments in the aviation industry locally and internationally, with exhibitions and presentations by airlines, maintenance and repair organizations, original equipment manufacturers, government agencies, and professional organizations. It introduced aerospace and aeronautical engineering to first-year students to assist with their choice of major and showcased career opportunities in the industry to more senior students. One of the highlights was the flight simulator experience set up by HKUST Aeronautics Interest Group.

Welcome speeches were delivered at the opening ceremony by Executive Vice-President and Provost Prof Wei Shyy, then Dean of Engineering Prof Khaled Ben Letaief, and Head of Mechanical and Aerospace Engineering Prof Christopher Chao.

The event concluded with an AIAA Distinguished Lecture by Dr Susan Ying, AIAA Fellow and VP-International for the AIAA Board of Directors, who spoke on the "ABC of Commercial Aviation: Technology Insertion Rewards and Challenges".

The move into Aerospace Engineering has been a major School of Engineering initiative in recent years. Developments include the renaming of the Department of Mechanical Engineering to the Department of Mechanical and Aerospace Engineering, recruitment of new faculty in aeronautical engineering, launch of the Aerospace Engineering Major Program and Aeronautical Engineering Minor Program, and the establishment of the Aeronautics Interest Group and HKUST Student Branch of AIAA.

Showing High School Students the Impact of **Simple Technology on Healthcare**

A workshop for local high school students, focused on improving global health through sustainable technology, was jointly organized by the Student Innovation for Global Health Technology (SIGHT) Program and School of Engineering in April 2015.

The SIGHT Program offers an enterprising undergraduate education platform that creates healthcare solutions for global problems using simple technology. The program was launched by the Division of Biomedical Engineering and involves students from various disciplines. It is led by Prof Ying Chau, Biomedical Engineering and also Chemical and Biomolecular Engineering.

At the workshop, a discussion on global health issues was followed by a mobile clinic simulation game illustrating the daily problems facing SIGHT's non-governmental organization partner One-2-One in delivering mobile clinical services in Cambodia. Workshop participants were introduced to the Electronic Health Record (EHR) system specifically developed by a SIGHT student team to facilitate One-2-One's operations, and then invited to become the first users of the system ahead of deployment.

The EHR system was created to replace traditional paper records, making life much more convenient for One-2-One and patients in Cambodia, noted alumnus Lance, 2015 BEng Computer Science, a coding team member. Participation in the project gave him a great sense of achievement, he said.

The workshop usefully raised awareness among school students on how life could be improved by technology, issues related to global health, and the importance of taking part in community service. Participants comprised 22 students and three teachers from seven local secondary schools.

The EHR team and a second SIGHT team, creators of a portable drug dispensary box, delivered their products to Cambodia in June 2015. Both were well received.

Second App to Help Hearing-Impaired Children Wins Web Accessibility Gold Award

An Android app to help hearing-impaired children with their Cantonese pronunciation, jointly developed by Electronic & Computer Engineering and Computer Science & Engineering researchers, received a Gold Award in the Web Accessibility Recognition Scheme 2015.

The team was led by Prof Tim Woo, Prof Albert Wong and research assistant Kobe Lam, Electronic and Computer Engineering, together with Prof Brian Mak and 2015 PhD graduate Dongpeng Chen, Computer Science and Engineering. It was the second time in a row that the team had gained the gold prize. In 2014, the team won the Gold Award for an Android auditory training app for hearing-impaired children.

The recognition scheme, co-organized by the Office of the Government Chief Information Officer and the Equal Opportunities Commission, recognizes enterprises and organizations that adopt website and mobile app designs facilitating access to all, including those with disabilities.

The auditory and articulation app "聰鳴語音工具箱" and auditory training app "精靈小耳朵粵語語音辨別訓練"are available at Google Play.

SENG Summer Camp

Draws Overseas and Mainland Elite Students

Over 60 top overseas and Mainland students enjoyed a week-long visit to the School of Engineering in July 2015. The SENG Summer Camp for Elite Students, co-organized by the School, departments and programs, was arranged to provide top-caliber undergraduate and master's students with greater insight into the School's research postgraduate programs and to increase diversity of the student body.

Camp activities included leadership training sessions, introductory talks on HKUST postgraduate programs, campus tours, industry visits, interactive sessions with postgraduate students, and off-campus sight-seeing to give participants first-hand knowledge of the School and Hong Kong.

Students from Mainland China and overseas countries, including Brazil, India, Iran, Japan, Mexico, Turkey and Venezuela, took part. Those attending came from top institutions, such as Peking University and Fudan University in Mainland China, Kobe University in Japan, University of Sao Paulo in Brazil, and Bogazici University in Turkey, among others.

Continued from P15

One particularly proud moment for Prof Yeung was the agreement for MSc students to undertake research at the Spanish National Research Council (CSIC)'s network of 100-plus laboratories. It marked the first time that the CSIC network had opened its doors to a non-Spanish university. The first cohort of eight SENG students (see also P6-7) worked across Spain on projects ranging from exo-skeleton research for faster healing to indoor GPS for automated systems. "To show how much they appreciated our students, more than 100 proposal applications were submitted for SENG students to choose from," Prof Yeung said. Other countries are now also interested in discussing similar arrangements.

For Prof Yeung, his time as Associate Dean has been both tough, in terms of negotiating and overseeing such arrangements in addition to his own research and teaching, and highly rewarding. "The goal has been to increase SENG academics' research opportunities and progress, and to enable our postgraduate students to excel whether they choose academia, their own business, or other fields of work. It has been challenging but also fulfilling to see the results."

Book on SENG Alumni and Students

Gives Inspiration to Young Engineers

Samantha Wing Man Kong, 2014 BEng Chemical and Environmental Engineering, has published a book of stories about School of Engineering graduates and students to inspire secondary school students to take up engineering.

The book, titled "誰説Engineering是水泡科" ("Who Says Engineering is Second Best") and published in Chinese in 2015, features 46 people from different engineering disciplines, who dispel myths about the field and expand on the opportunities it offers. Alumni appearing in the book work in education, engineering companies, government, or have started their own businesses. They explain why they took up engineering and talk about university life as well as discussing work experiences.

Samantha has self-funded publication, with all proceeds from sales being donated to HKUST as a thank you for her all-round education at the University. During her undergraduate days,

Samantha successfully pursued numerous activities in addition to her degree. These included co-founding social enterprise Eldpathy, going on exchange to Stanford, attending the G20 Youth Summit in St Petersburg, Russia, becoming the University's Head Student Ambassador, and gaining community recognition as a Hong Kong Top 10 Outstanding Youth and Social Service Award recipient. She has also undertaken a United Nations internship in New York and, in February 2015, was one of four young people chosen to talk with Mr Jack Ma, Founder of Alibaba, on the characteristics of successful entrepreneurs. She is now working as a Graduate Environmental Engineer for an international consultancy and recently received the Trainee of the Year Award by the Hong Kong Institution of Engineers.

IELM Department Celebrates Togetherness

Over 100 Industrial Engineering and Logistics Management (IELM) faculty members, staff, alumni and current students gathered at HKUST on March 7, 2015 for the IELM Alumni Dinner cum Annual Gala 2015.

Prof Chi Ying Tsui, Associate Dean of Engineering (Undergraduate Studies), joined the special occasion, providing an update for alumni on the latest School of Engineering and HKUST developments, as well as future plans and alumni activities for the University's 25th anniversary in 2016.

Following this, Prof Fugee Tsung, then Head of IELM Department, gave a welcome speech to alumni and industry guests. He also took the opportunity to express his gratitude to Prof Mitchell Tseng, Founding Head, and Prof Neville Lee, Founding Associate Head, of the IELM Department, for their immense work on behalf of the department over many years. Individual plaques were presented to both academics to recognize their contributions. Other highlights included group photos, a magic show and singing by IELM students, and a lucky draw.

Alumni Honors, Awards & Achievements

Prof Jiangchuan Liu, 2003 PhD Computer Science, has been awarded a prestigious E.W.R. Steacie Memorial Fellowship by the Natural Sciences and Engineering Research Council of Canada (NSERC). The Fellowships aim at enhancing the career development of outstanding Canadian university academics, with an international reputation for original research. Jiangchuan is currently a University Professor at Simon Fraser University. He will spend two years investigating how massive media content can be efficiently generated, processed, and distributed through crowdsourcing and among consumers via the latest social, mobile, and cloud computing and communication platforms.

Mechanical and Aerospace Engineering alumni **Dr Xiaowu Zhang**, 1999 PhD, and **Dr Jeffery Lo**, 2008 PhD, have received the 2015 IEEE Components, Packaging and Manufacturing Technology (CPMT) Society's Exceptional Technical Achievement Award and Outstanding Young Engineer Award respectively. Dr Zhang received his award for 2.5D/3D IC integration, focusing primarily on micro bump solder joint reliability, process development and stress sensor technology. Dr Lo was recognized for his contributions to LED packaging development, component reliability assessment, and industry and professional support.

Renewing Bonds at **Happy Hour Gatherings**

Two alumni happy hour gatherings were organized in March and June 2015 providing opportunities for graduates to catch up with professors and fellow classmates, learn about the School's latest news, and share work experiences and personal development.

The first get-together, held at Hong Kong Science Park, brought together Computer Engineering, Computer Science and Engineering, and Electronic and Computer Engineering alumni. The second took place at Festival Walk in Kowloon Tong and encompassed Chemical and Biomolecular Engineering, Civil and Environmental Engineering, Industrial Engineering and Logistics Management, and Mechanical and Aerospace Engineering alumni.

On both occasions, the School's Associate Deans, Department Heads as well as other faculty members participated, providing a warm welcome to all alumni. The success of the events will see similar activities organized in the future.

Family Fun Day Proves a Winner for All Ages

The School of Engineering Alumni Family Fun Day was held on campus in April 2015, with over 120 engineering alumni, faculty, and their families joining the happy occasion and more than 430 people attending in total.

The day enabled alumni to reminisce with fellow classmates and professors, share recent news and enjoy a relaxed and fun-filled afternoon in nice weather with their families at their alma mater. Meanwhile, a variety of games and activities kept youngsters busy, including an Imagination Playground play system and educational building kit Rigamajig (小小工程師), which allowed children to build robots, cars, and spaceships using planks, wheels, pulleys, nuts and bolts and learn about engineering through play. Alumni welcomed the idea of further family events.

Dual Degree Reunion
and Career Advisory Sessions Strengthen Ties

Over 120 alumni and current students met up with friends and had the opportunity to expand networks at the Dual Degree Program in Technology and Management Annual Reunion in March 2015. All attendees were warmly welcomed by Dual Degree Program Co-director Prof Chi Ming Chan and Director of Interdisciplinary Programs Office Prof King L Chow.

Two insightful advisory sessions run by alumni speakers were also held in Spring and Fall 2015 terms respectively.

The Dual Degree Program in Technology and Management Alumni Association held the first session at HKUST Business School Central, where alumni from the Class of 2010 to Class of 2014 shared their different work experiences since graduation. In the second session held in Fall, dual degree alumni focused on students' frequently pondered question of whether to choose business or engineering as a career path. The event took place in the Interdisciplinary Programs Office Learning Commons.

These gatherings provided a great opportunity for alumni and students to get to know and inspire each other through lively discussions.

The Family Man

Through inspirational attention to "middle" students, alumnus and faculty member Prof Tim Woo is deepening affiliation to engineering

Family means a lot to alumnus Prof Tim Woo, and the School of Engineering is fortunate to have been adopted as such by the beloved award-winning educator since 1992.

The Electronic and Computer Engineering (ECE) faculty member and Founding Director of the Center for Global & Community Engagement began his 20-year plus relationship with the School as a member of the first cohort of students after HKUST was established in 1991. Joining in Year 2 after graduating from a sub-degree program, Hong Kong-born Prof Woo went on to take his bachelor, master's and doctorate in ECE.

The sense of belonging at that time was intense, he recalled, as all at the University were new and students and teachers worked tremendously hard as a team to put the School and HKUST on the map, locally and internationally.

Since becoming a faculty member in 2005, Prof Woo himself has carved a special niche in future alumni's hearts through his dedication and ability to reach out to the majority group of "middle" undergraduates, who are not planning to join academia or take up research as a career. He encourages such learners – "left to themselves in many education approaches while high-flyers and stragglers both receive special attention" – to participate in hands-on practical teamwork in coursework, and co-curricular activities offered through the Center, which was launched in 2011. As a result, they can gain confidence in their engineering skills and ability to contribute – all precursors for post-graduation career achievement – as well as build greater attachment to the School.

"These are the students who will most visibly represent HKUST culture in the workplace and we must take care of them," said Prof Woo. "They won't develop a sense of belonging after they graduate. It must be during their studies here."

Under his direction, the Center helps engineering students apply their knowledge and learn about the world through participation in local and international contests and technology problem-solving community service. Creating a platform for student chapters of professional organizations, enabling undergraduates to establish early connections with the engineering fraternity, is another goal.

The sharing of challenges and a "can-do" spirit, learning new perspectives from working with others in different fields, building friendships, and the joy of finding solutions that can make a difference to people's lives are key lessons he seeks to impart rather than focusing solely on success. When he came on board as supervisor of the HKUST Robotics Team in 2010, he told students that his aim was not primarily to go for championships. "I was looking to establish a family, where people felt happy to work together. At the time, only a few agreed with me."

Once such commitment is shown, though, visible results are never far behind, be it winning competitions, embedding cognitive therapy for the elderly in a digital photo frame or holding robot-building workshops for the visually impaired. In total, students have gained more than 130 awards since 2007 under his supervision, with over 70 won by the Robotics Team in the past five years. Furthermore, if students realize that the School cares about them, they will return this care as alumni by coming back to help others, Prof Woo noted.

Prof Woo's work has recently brought him the prestigious and highly competitive University Grants Committee Teaching Award 2015, encompassing all Hong Kong's UGC-funded institutions, and the Michael G Gale Medal for Distinguished Teaching, a HKUST-wide award that celebrates one outstanding educator annually. He sees such recognition as a useful way to create interest among other faculty and the wider teaching community and to share his approach to engineering education.

His wish to help others was initially shaped by his parents, who were not materially well off yet always willing to lend a hand to assist their many relatives and friends, and later as a high school community service volunteer. Now he too is a father, he wants to serve as a role model to his own family. "When my son heard about my awards, he only asked one question: 'You won't stop teaching those who cannot see to build robots, will you?'" Prof Woo assured him he would not.

New Appointments

as of Sept 2015

Concurrent

Prof Enboa Wu
Appointed Associate Vice-President for Knowledge Transfer, Dean of HKUST Fok Ying Tung Graduate School, and Professor of Engineering Practice, Electronic and Computer Engineering

Administrative

Prof Tongxi Yu
Appointed Acting Dean of Engineering
Visiting Professor, Mechanical and Aerospace Engineering

Prof Hong Kam Lo
Appointed Head of Department of Civil and Environmental Engineering
Chair Professor, Civil and Environmental Engineering

Prof Bertram Shi
Appointed Head of Department of Electronic and Computer Engineering
Professor, Electronic and Computer Engineering

Faculty Members

Prof Cecia Chan
Lecturer, Computer Science and Engineering
PhD – The Chinese University of Hong Kong

Prof Sherry Xian Chen
Assistant Professor, Mechanical and Aerospace Engineering
PhD – University of Minnesota

Prof Ngok Lam
Lecturer, Computer Science and Engineering
PhD – McGill University

Prof Rhea Liem
Assistant Professor, Mechanical and Aerospace Engineering
PhD – University of Toronto

Prof Xiaojuan Ma
Assistant Professor, Computer Science and Engineering
PhD – Princeton University

Prof Jin Qi
Assistant Professor, Industrial Engineering and Logistics Management
PhD – National University of Singapore

Prof Wei Wang
Assistant Professor, Computer Science and Engineering
PhD – University of Toronto

Research Faculty

Prof Marco Antonelli
Research Assistant Professor, Electronic and Computer Engineering
PhD – Universitat Jaume I

Prof Clarence Choi
Research Assistant Professor, Civil and Environmental Engineering
PhD – The Hong Kong University of Science and Technology

Prof Qiang Li
Research Assistant Professor, Electronic and Computer Engineering
PhD – The Hong Kong University of Science and Technology

Prof Jianbo Xu
Research Assistant Professor, Mechanical and Aerospace Engineering
PhD – Chinese Academy of Sciences

Prof Qingbin Zheng
Research Assistant Professor, Mechanical and Aerospace Engineering
PhD – The Hong Kong University of Science and Technology

Prof Wei Zhou
Research Assistant Professor, Electronic and Computer Engineering
PhD – The Hong Kong University of Science and Technology

Adjunct Faculty

Prof Aaron Buchwald
Professor, Electronic and Computer Engineering
PhD – University of California, Los Angeles

Prof Corbett Rowell
Associate Professor, Electronic and Computer Engineering
PhD – The University of Hong Kong

Visiting Faculty

Prof Frank Park
Professor, Electronic and Computer Engineering
PhD – Harvard University

Graduate Commons

Creates Interdisciplinary Hub for Ideas

The Graduate Commons, which opened in February 2015, is proving a popular location for postgraduate students across all schools to advance their perspectives, exchange research ideas and develop collaborative projects. The Commons, located on the fifth floor of the main Academic Building, provides a hub of creation for postgraduates to meet together in an informal setting. It is also fully furnished with the latest audio-visual devices.

Associate Dean of Engineering (Research and Graduate Studies) Prof King Lun Yeung said he was delighted that postgraduate students now had such a facility available to them for interdisciplinary sharing. "The area serves as solid physical support to the holistic educational experience we are committed to providing for our students," he said.

The establishment of the Commons would help a collaborative and multidisciplinary environment to grow, which would assist students in developing all-round perspectives, he added.

Vice-President for Research and Graduate Studies Prof Joseph Lee said that the Commons would further assist the University's drive to connect up postgraduate students.

Among the guests invited to the opening ceremony was Ms Chelsia Lau, Chief Designer, Shanghai Strategic Concepts Group at Ford Motor Company. Senior University administrators and HKUST Jockey Club Institute for Advanced Study professors also attended. At the event, Ms Lau spoke on trends and challenges for the automobile industry and expectations for future employees.

Engineering innovation on show at the opening included computer graphics and electronic music compositions by two Computer Science and Engineering PhD students and a hand-gesture device by a Technology Leadership and Entrepreneurship Program MPhil student.

Don't be the Missing Link...

Alumni relationships are invaluable assets to the School and alumni. To foster the growth of our alumni network, please keep us informed of your recent news and send us your updated contact information via email to seng@ust.hk.

Stay connected and keep in touch!

Editors: Diana Liu, Dorothy Yip
Contributing Editor: Sally Course
Address: School of Engineering
The Hong Kong University of Science and Technology
Clear Water Bay, Kowloon, Hong Kong
Phone and Fax: (852)2358 5917/(852)2358 1458
Email: seng@ust.hk
Website: www.seng.ust.hk
Facebook: www.facebook.com/SENG.HKUST