

Driving Forward the

# MOBILE GENERATION

HKUST ENGINEERING  
| Fall 2013 |  
Newsletter No.24



The Way  
Ahead for  
Wireless  
Communication



## DEAN'S MESSAGE

Among the many different facets of the School of Engineering life highlighted in this edition of *In Focus*, we report on the work of our dynamic Center for Industry Engagement & Internship (IEI). The Center is the latest addition to propel forward the all-round learning experience we provide for our students. The School has long emphasized our student exchanges, which help to instill confidence and independence, build communication skills and develop awareness of different perspectives. With IEI, we hope to foster greater awareness of the opportunities and requirements of today's working world, in terms of attitude as well as skills.

This is not a one-way street as companies have the chance to get to know our students ahead of graduation, and to learn more about their next generation of employees. We are also keen to introduce students to the wider career pathways they can now take as engineering graduates in emerging areas such as financial logistics, biomedical industries and environmental organizations.

By building such connections early, the School sees both sides can benefit by learning more about the other, helping to smooth the transition between university and work.



Another important step forward to widen the reach of our students and enhance our world-class research capabilities is the exciting addition of Aerospace Engineering to our portfolio of disciplines.

Hong Kong is already a top international aviation hub, with major aircraft maintenance facilities as well as a globally renowned airport for passenger and air cargo services. In addition, there is increasing scope in the Pearl River Delta. Such demand will create many openings for engineers and management trainees, and students are already showing enthusiasm for the field as we have seen from our recently launched Minor in Aeronautical Engineering.

The move into Aerospace Engineering is a major initiative to be rolled out in the next few years. This Fall, the Department of Mechanical Engineering is being renamed the Department of Mechanical and Aerospace Engineering. We will be recruiting an eminent Named Chair Professor and a team of faculty, installing new facilities, and developing postgraduate and undergraduate programs. Our intention is to focus on niche hi-tech areas utilizing our expertise across the School's departments. This will enable us to offer a non-traditional approach that should put our programs among the world's best. It will also offer fascinating new input for interdisciplinary discovery.

Both IEI and the introduction of Aerospace Engineering are examples of how the School is continuously taking enterprising steps to ensure the relevance of our education and research to the region's economic development and the wider society. We live in times where the ability to rapidly respond to change and flexibility are essential for businesses, industries and organizations, including education institutions. At the School of Engineering, we remain not only alert to the need for such capabilities. We actively engage them.

**Prof Khaled Ben Letaief**  
*Dean of Engineering*

# Striving For and Achieving High Performance



It has been another rewarding year for HKUST and the School of Engineering in a variety of widely reported annual rankings released by Quacquarelli Symonds (QS), a leading global provider of higher education information.

In the QS World University Rankings by Faculty 2013 – Engineering & Technology, HKUST was ranked 19th globally, its highest position yet in this league table, and No. 1 in Hong Kong.

In the QS World University Rankings by Subject 2013 – Engineering & Technology, HKUST was ranked within the global top 30 in all five fields in this category, demonstrating the School of Engineering’s ongoing capacity for all-round achievements in the areas it undertakes. The University was No. 1 in Hong Kong in both the Chemical Engineering and Mechanical, Aeronautical & Manufacturing Engineering fields and No. 1 in Greater China in Electrical & Electronic Engineering.

“I was delighted to see such across-the-board recognition globally for the School,” Dean of Engineering Prof Khaled Ben Letaief said. “The rankings help spotlight the School’s high-impact achievements and the terrific motivation of our faculty, students and researchers.”

In addition, HKUST was No. 1 in Asia in the QS University Rankings: Asia 2013 for

the third consecutive year. The rankings exercise examined almost 500 universities, representing one of the most extensive studies of Asian institutions currently conducted. In the QS Top 50 Under 50 2013, which ranked universities established within the last 50 years worldwide, HKUST also secured the No. 1 spot.

**2013 QS World University Rankings by Subject**

<b>No. 12</b>	Computer Science & Information Systems
<b>No. 14</b>	Electrical & Electronic Engineering <sup>*</sup>
<b>No. 17</b>	Civil & Structural Engineering
<b>No. 22</b>	Chemical Engineering <sup>^</sup>
<b>No. 27</b>	Mechanical, Aeronautical & Manufacturing Engineering <sup>^</sup>

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

## Global PhD Students Flock to SENG

The School of Engineering has continued to receive a strong endorsement of its appeal to high-flying research students globally, with the highest number of Hong Kong PhD Fellowship awardees among all local engineering schools in the 2013/14 scheme. This marks the fourth consecutive year the School has been the most popular choice for engineering fields, putting it in the leading position since the scheme began.

For the 2013/14 scheme, 36 awardees in engineering and IT accepted HKUST’s offer of a place, nearly double the number for last year and more than twice the number of the next institution. The scheme was launched by Hong Kong’s Research Grants Council in 2009 to draw top young scholars

**This marks the fourth consecutive year the School has been the most popular choice for engineering fields, putting it in the leading position since the scheme began.**

from around the world to study at local institutions (see also P5-6).

All six of the School’s departments attracted applications, together with the Bioengineering Program and Environmental Engineering Program. The PhD Fellowship students will also add impetus to the School’s internationalization drive. Awardees come from over 19 places, including Bangladesh, China, Czech Republic, Egypt, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Iran, Italy, Korea, Malaysia, Nigeria, Pakistan, Romania, Sri Lanka and Turkey.

“The growing mix of international research students can generate new perspectives and spark fresh concepts and ideas,” said Prof Christopher Chao, Associate Dean of Engineering (Research & Graduate Studies). “It is also good news for Hong Kong’s future development that these talented young people have come to study in the city and establish ties here.”

Overall, 49 PhD Fellowships out of a total of 185 were awarded to HKUST, again the largest number for all institutions.

# Connections to

**Prof Vincent Kin Nang Lau's cutting-edge research on wireless communication and related technologies is helping to reshape the way we communicate with other people and our relationship with machines**

**A** health sensor embedded in your body that is talking to your phone, which is in touch with a health database in order to monitor your condition. The integration of control and communication technology to create intelligent vehicles that can drive themselves as well as talk to each other, enabling smoother traffic flow and eliminating the need for traffic lights. This is the potential world of fifth-generation wireless systems that innovative academics such as Prof Vincent Kin Nang Lau, Electronic and Computer Engineering, are helping to drive forward.

As communication technology moves on from human-to-human interaction (phone calls) and human to machine (emails, downloading videos), such machine-to-machine applications are set to emerge, according to the School of Engineering professor who has contributed to a host of advances in next-generation wireless communication basic research and technologies.

Ongoing curiosity about the area has led Prof Lau to spend more than 15 years exploring and driving knowledge forward, publishing over 200 papers. "Wireless communication is now a very big field

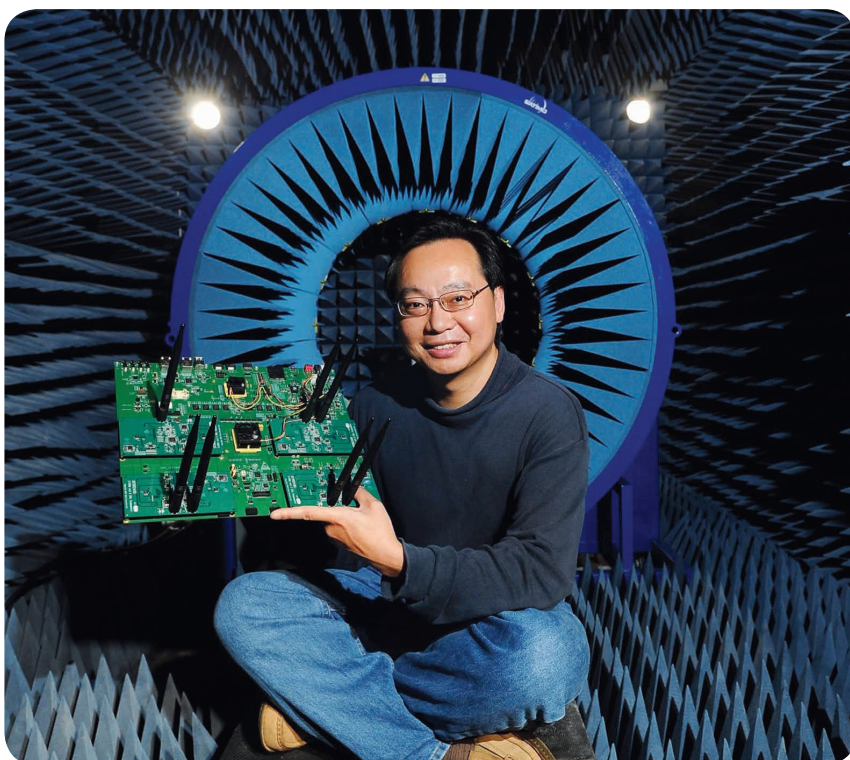
with many components. You can use your mobile phone to watch videos, browse the internet, as well as make calls, requiring many enabling technologies to make this possible and to create low-cost, reliable and high-quality systems. The work I do seeks to address different challenges, including better coverage, expanded capacity, and changing use of mobile phones."

Prof Lau's journey into this high-impact field stemmed from an early interest in fixing his toys and machines as a child. It was practical experiences such as these that saw him become an electronic engineering undergraduate rather than follow his other strong interests in physics and math. "I still remember that when I was a Secondary Three student, I was able to repair my brother's company fax machine and how happy this made me feel," he said.

Two main passions since university days have been communications theory and control theory, which he enjoys for the "beauty" of the concepts behind them. "Communication theory deals with how you deliver information from point to point efficiently, such as wireless communication. Control theory is concerned with how to adjust speed and angle with the precision required to hit a target or launch a spaceship into orbit. These are two different problems but, at an early stage, I felt they were connected at the detailed mathematical level and I've remained very curious about that. Even now I'm always thinking about how these two theories can be related."

Following graduation, Prof Lau worked as a system engineer in the fixed-line network area at Hong Kong Telecom (now PCCW) for three years before heading overseas to fulfill his twin objectives of further study and seeing the world. In 1995, he started a PhD at the University of Cambridge, receiving

**As a believer that discovery often happens by accident rather than design, Prof Lau keenly pursues curiosity-driven research.**



# the Future



the Sir Edward Youde Memorial Fellowship, Rotaract Scholarship and Croucher Foundation Scholarship during his studies and making it possible for him to go.

Prof Lau's focus during his doctorate, which he completed in just two years, was wireless communication, a fast-emerging area in the mid-1990s. He followed this with four years at Bell Labs in the US, where he worked on projects for different business units as well as enjoying the freedom to work on his own research interests. "What I think I learned most from Bell was the way to analyze problems and how to carry that analytical mindset to different projects and problems. This meant I was no longer confined to working on problems in one narrow area any more, and inspired me a lot. Now

I always encourage my students to work on multiple areas, not just one."

He joined HKUST in 2004 and went on to play a key role in the technology transfer with various companies such as Huawei. Later, he founded Huawei-HKUST Joint Research Laboratory, which supports research and development projects in wireless communications, networks, and new areas. At HKUST, he also has happy memories of working as the technology advisor for a team at the Hong Kong Applied Science and Technology Research Institute (ASTRI), helping them to develop Wi-Fi products, and seeing it all spin off to become Altai Technologies, a company that now employs more than 200 engineers and sells its wares around the world.

As a believer that discovery often happens by accident rather than design, Prof Lau keenly pursues curiosity-driven research to explore original avenues of thought, and sees interdisciplinary learning as a way to spark creativity even if it takes many years to become clear how. He is currently excited that the physics knowledge he gained through attending lectures unrelated to his thesis while at Cambridge now appears to have potential use in his wireless communication work.

In another link with PhD days, Prof Lau has recently renewed his connection with the Croucher Foundation when he was awarded a prestigious senior research fellowship earlier this year. "When I received the award, I was able to extend my gratitude to the grandchildren of Mr Croucher and I felt very happy about this," Prof Lau said.

With forecasts of 1,000 times more demand by 2020, there are many challenges ahead in terms of capacity and energy efficiency for the wireless world. The intriguing possibilities heralded by machine-to-machine communication also open up fresh technological frontiers. To Prof Lau, such a world offers hope of a better future and a reason to continue looking for infrastructural improvements and advances in resource management. He recalls discussions over upgrading to third-generation wireless systems a decade earlier. "People asked why, as the current technology and applications didn't seem to require it. But the amazing thing is, once you do upgrade, people will always find new applications to use up the capacity. And I'm always optimistic about the use of technology."

## Man of Many Parts

- BEng (First Class Honors, second in year), University of Hong Kong
- PhD, University of Cambridge, on "Variable Rate Adaptive Channel Coding in Mobile Cellular Systems"
- IEEE Fellow
- Changjiang Chair Professor, Zhejiang University
- Director and Founder, Huawei-HKUST Joint Research Laboratory
- Theoretical research: stochastic optimization for wireless systems, distributive algorithm design, Markov Decision Process (MDP) and stochastic calculus for delay-aware wireless resource control, robust MIMO/OFDMA/SDMA cross-layer optimization with imperfect and limited channel states, cooperative communications and cognitive radio systems, massive MIMO, compressive sensing with applications to wireless communications, combined control and information theory, combined electromagnetic and information theory, among others
- Applied research: 4G LTE, LTE+, 5G cellular networks, next generation Wi-Fi, IEEE 802.22 cognitive radio
- Side interests: digital baseband ASIC architecture and RTL design for wireless communications, digital hardware (FPGA/PCB/embedded controller) design and prototyping



## Kiki Danhui Cheng

Mainland China  
PhD, Bioengineering  
Research area: microbial engineering

Curious about industry and fortunate to be chosen for an internship at Dow Chemical in Suzhou during my third year at Tsinghua University, I spent six weeks in the company's Manufacturing and Engineering Department. It was a great experience in a leading global enterprise but it clarified that a corporate job was not for me immediately after graduation. On returning to Tsinghua, my realization inspired me to join research labs, first in the School of Life Science, then in the Department of Chemical Engineering. My final year project monitored the diversity and dynamic shifts of microbial communities during bioremediation of petroleum-contaminated soil, winning a Tsinghua FYP excellence award and ranking second in a departmental evaluation, all of which encouraged me to continue my research.

### I have met friends from all over the world at HKUST.

Hong Kong appealed as my next move for three main reasons: the top international reputation established by HKUST, the cosmopolitan nature of the city, and the Hong Kong PhD Fellowship Scheme. In 2010, I joined Prof I-Ming Hsing's group in the Bioengineering Program at HKUST School of Engineering as one of Hong Kong's first Fellowship awardees.

One of the most enjoyable aspects of the School of Engineering is the overseas exposure. Indeed, attending the International Congress of Bacteriology and Applied Microbiology in Sapporo, Japan,

in my first year provided the inspiration for my current thesis on engineering photosynthetic bacteria for protein expression and bioelectricity generation. I feel passionate about exploring this area as it enables me to learn how to harness solar energy and make valuable applications from the designs of Nature.

I represented the School in the 1st Annual Global Health Sector Interdisciplinary Case Competition hosted by Boston University in November 2012. This was a great chance to learn about technology transfer.

In addition, I have met friends from all over the world at HKUST, including keen musicians like me.

This year, with the support of Prof Hsing, I applied for the prestigious RGC-Fulbright Junior Research Award and was very happy to become one of the eight Hong Kong recipients. As a result, I will go on exchange to MIT for six months. I'm really grateful to have the opportunity and am looking forward to making additional progress at this top global research institution.

# Miss & Mr Young Engineers

Edwin



Kiki

Three high-powered research postgraduates, all Hong Kong PhD Fellowship Scheme awardees, discuss the rewards of student life at the School of Engineering and the awesome joys of discovery



## Ryan Hong Yee Kow

BEng, Civil and Structural Engineering  
(2013)

Roy To Community Service Awardee

My passion is helping people and this takes many forms: helping new students settle into School of Engineering life by serving as a peer mentor; establishing a community-based organization called Y-Talk.org – we held our first Y-Talk event in April with student speakers at HKUST; and setting up a Student Chapter of the Malaysian Association of Hong Kong for Malaysians studying in Hong Kong like me.

Last summer, I went to Myanmar with my two best friends, spending one month teaching English to secondary school students, university students, and graduates in the northern city of Myitkyina. As we organized the service trip ourselves, we first had to find sponsorship, locate books to take and raise donations. On arrival, we needed to travel from the south of Myanmar to

Myitkyina in the north, a journey that took 10 hours by bus and 24 hours on a 1920s-style train!

My Myanmar visit put my engineering studies in an interesting new light. Before going, I had seen them mainly from a technical perspective and wondered how useful my skills would be in teaching English. Afterwards, I took a wider view, as it was clear that with my engineering mindset, I could understand my students' problems and design ways to assist their learning. Precision, problem solving and finding solutions are all key aspects of being an engineer and can easily be applied to other situations.

I am sure my recent membership of ASEAN Youth Volunteers Network and Engineers Without Borders will expand my

vision further. Indeed, for me, community service has no boundaries. The most important thing is serve wholeheartedly and use engineering to find solutions.



The Roy To Community Service Award recognizes HKUST students who have made an exceptional contribution to community service. Only one undergraduate or postgraduate student is selected for the award each year.

Four School of Engineering students share their views on the difference that helping others has made to their own lives

# We



## Building Homes, Building Understanding



Xiaojun Yu, MPhil, and To Hung Tsui, BEng, both Civil and Environmental Engineering, had rewarding community service experiences overseas in different ways when they became volunteers for the charity Habitat for Humanity and spent several days building houses in Nepal.

"Before this trip, Nepal was just a small country on the map to me. After, it became very special," explained Xiaojun. "I spent my four days there carrying, chopping, weaving and shoveling. We talked to local people, and worked and ate like locals.

"It all had a tremendous impact. I have become better at caring about others, appreciating others' work and, above all, understanding how people's different situation and surroundings affect them," he said. "Even though I am a Civil Engineering postgraduate student, this was my first experience of working on a construction site and I really enjoyed building the house. The feeling of helping others and making their wish come true was wonderful, and there was a smile on every face when we finally dedicated the house to the local village. I have promised myself another visit to Nepal in the future."



## Samantha Wing Man Kong

*BEng, Chemical and Environmental Engineering (2014)*  
**HKUST Alumni Endowment Fund Service Awardee**

The turning point for me was going abroad to high school in Malaysia. During that time, I learned to be independent and became involved in various service activities in order to meet new friends and adapt to my new home. This enhanced my communication skills and interaction with people. I started to become a more outgoing and cheerful person, and curious about different cultures and countries.

Since joining HKUST, I have participated in student activities, serving as a head student ambassador for the University and a peer mentor in the School of Engineering. Joining the Hong Kong Social Enterprise Challenge with two School of Business and Management teammates – and winning! – was another great experience. Given Hong Kong’s aging population, we came up with the idea of Eldpathy (empathy for the elderly). Participants find out what life

is like for people in their 70s by donning a specially designed suit and undertaking a series of challenges that show them the difficulties faced by elderly people. We also provide a platform for participants to join voluntary services to help seniors.

I am not only interested in local issues, but also took part in the G20 Youth Summit in Russia in April, giving me a way to discuss global issues with people from around the world. Short exchanges involving entrepreneurship, leadership, and voluntary services in the US, Singapore, Hangzhou, Beijing and Xi’an have also broadened my outlook.

Through community service, I have learned to be more open-minded and listen to different opinions. Long-lasting friendships can also be developed when people share the same goals and vision to improve the lives of others.



Samantha was one of the first three students honored by the **HKUST Alumni Endowment Fund Service Award**, launched in 2012/13 to recognize students who have demonstrated strong commitment and leadership in volunteer services and have a proven track record in contributing to the community.

# Community Service

For To Hung, the trip helped to change his worldview. “Prior to going to Nepal, my community service had been locally based. Now I think I will join more activities outside Hong Kong. I also value what I have in Hong Kong much more.”

The two students were supported by the School of Engineering’s Center for Global & Community Engagement, which encourages students to engage in community service in different parts of the world.



# Top National Honors for Research Breakthroughs



**T**wo School of Engineering professors have gained top national recognition for breakthrough research that is set to have significant impact on the fields of energy efficiency and wireless communications.

Prof Tianshou Zhao, Mechanical and Aerospace Engineering, and Prof Qian Zhang, Computer Science and Engineering, received State Natural Science Awards (Second Class) for their outstanding contributions to their respective fields. State Science and Technology Awards are conferred by the State Council on outstanding individuals and institutions who make significant contributions to the development of science and technology. They are awarded under various categories and regarded as China's most prestigious honor in these fields.

Prof Zhao and his research collaborators from Xi'an Jiaotong University were cited for investigations into multi-scale and multi-physics field coupled fluid flow and heat/mass transfer in complex systems. The team has collaborated on the research over the past decade. Through using a unique research methodology and strategy involving the integration of experimental observation, theoretical investigation, and computational modeling, the team has been able to make important contributions to the field. The main breakthrough is the construction of a framework to describe such flow and transfer processes by creating and using microscopic, mesoscopic and macroscopic theoretical and numerical approaches. This will be important in improving energy efficiency and reducing greenhouse gas emissions in energy conversion systems.

Prof Zhang and her partners from Tsinghua University conducted research for 10 years on fundamental issues related to wireless multimedia communication. Their work on models for joint wireless multimedia communication and performance optimization revealed the interaction between the structured nature of multimedia information and dynamic characters of error distribution in wireless networks, among other significant contributions. Researchers also made a major breakthrough in efficient video communications under discontinuous transmission conditions and effectively increasing bandwidth efficiency. This should assist design of future wireless video, mobile multimedia systems as well as next-generation wireless networks.

In addition, Prof Zhang received a Natural Science Award (First Class) from Hubei Province. The award recognized Prof Zhang and her collaborators from Huazhong University of Science and Technology and Peking University for their low-energy consuming broadband wireless communication research and technology.

## Green Slope Project Receives HK\$8 Million Funding

**A** research team led by Profs Charles W W Ng, Y H Wang and Limin Zhang, Civil and Environmental Engineering, and Prof Qian Zhang, Computer Science and Engineering, has been awarded its second three-year consecutive

Collaborative Research Fund (CRF) grant from the Research Grants Council.

This multi-disciplinary research project, called "Green Slope Engineering: Bioengineered, Live Cover Systems for Man-Made Fill Slopes and Landfill Capillary Barriers in Hong Kong",

received HK\$8 million for a study starting from July 2013, the largest amount for an engineering-based project in the 2012/13 funding exercise.

Hong Kong has thousands of man-made fill slopes that require upgrading, with the Hong Kong government's Geotechnical Engineering Office spending tens of millions of dollars each year to carry out such work. Moreover, capping design for landfills does not consider the use of vegetation for minimizing rainfall

# SENG Academics' Leading Role in Discovery Recognized

Pioneering School of Engineering academics and their research teams have won three major national honors in the Ministry of Education's Awards for Research Excellence in Natural Sciences 2012, endorsing the contribution that the School's researchers are making to development in Hong Kong and Mainland China. The awards recognize outstanding research projects being carried out at tertiary institutions throughout China.

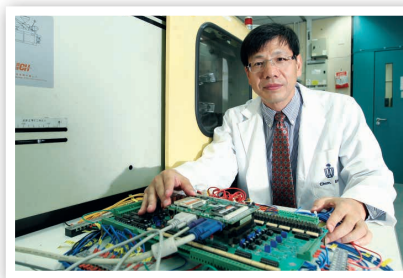


## Prof Christopher Leung

**Civil and Environmental Engineering**  
Research Excellence in Natural Sciences (First Class)

The development of high-toughness fiber-reinforced cementitious composites has been a major focus of research for Prof Christopher Leung since 1992. During this time, Prof Leung has worked with collaborators from Zhejiang University, Tongji University, Shantou University and Dalian University of Technology on numerous studies, leading to exciting advances. The materials developed have shown excellent tensile ductility and crack control, while their high-energy absorption capability has enabled them to be used in earthquake-resistant structures. Both materials and corresponding testing/design approaches have good potential for major infrastructure projects in China and other developing countries.

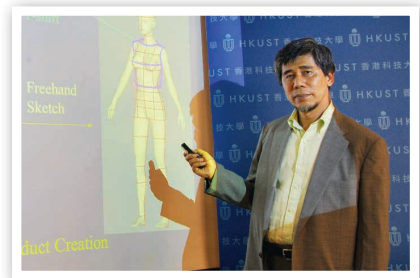
infiltration and gas emission integrally. Vegetation is just used for aesthetic purposes. The research will explore root-soil-water interactions to create an innovative, reliability-based preliminary design framework for developing a sustainable, integrated bioengineered live cover for slopes and landfills in Hong Kong, using vegetation as part of engineered stabilization measures in the design of slope stability. The live cover seeks to be self-regenerative, sustainable and almost maintenance free.



## Prof Furong Gao

**Chemical and Biomolecular Engineering**  
Research Excellence in Natural Sciences (First Class)

Prof Furong Gao was recognized for his major discoveries in batch process control systems. Prof Gao has been investigating this area since 1995, together with Zhejiang University researchers (previously PhD students and researchers at HKUST). Breakthroughs have encompassed process control and monitoring, quality prediction, process optimization and new quality measurement technology, with results set to underpin the transformation and upgrading of manufacturing industries.

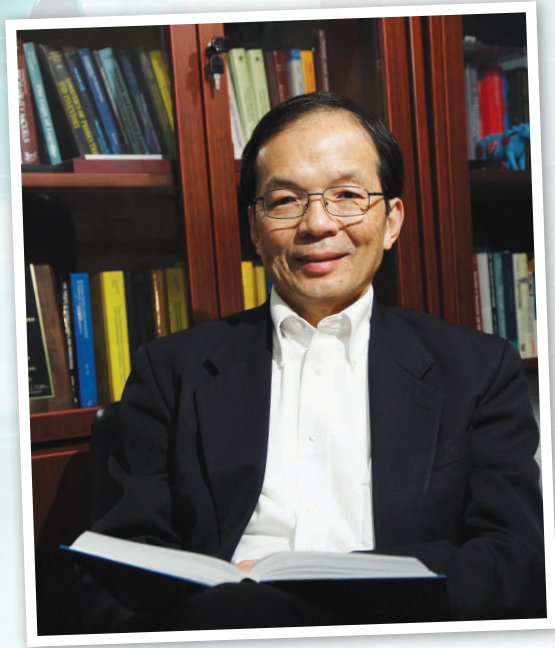


## Prof Matthew Yuen

**Mechanical and Aerospace Engineering**  
Research Excellence in Natural Sciences (Second Class)

With primary funding support provided by the Hong Kong government's Innovation and Technology Commission, Prof Matthew Yuen and his PhD students have gone on to successfully develop 3D computer simulation technology featuring 3D parametric human body modeling, material draping, and simulated garment fitting, among other functions. The outcomes have been widely translated into benefits for industry, with fashion design and garment-makers trained in the system by Hong Kong's Clothing Industry Training Authority. The research team's publications on the technologies have also been widely cited.





# Faculty Award-Winners Demonstrate Joys of Discovery

**T**hree outstanding faculty members have had their achievements recognized through the School of Engineering Research Excellence Awards 2013. The annual honors highlight academics who are at different stages of their careers and their contributions to their respective fields. Criteria for the awards include originality of research output; impact on society and the field; research training provision for students; and leadership in national and international collaborative partnerships.

This year's Distinguished Research Excellence Award, the most prestigious accolade, was awarded to Prof Chung Yee Lee, Chair Professor of Industrial Engineering and Logistics Management and Cheong Ying Chan Professor of Engineering. Prof Lee's accomplishments include the first global shop floor scheduling system for the semiconductor industry, business process management and cross-border research. "I'm delighted

that I have been able to propel the field forward and add to efficiency and industry optimization," he said. "To do what you truly want to do and also to make a difference to society as a whole is both a privilege and a wonderful way to spend a career."

Prof Lee has been ranked No. 6 worldwide in the h-index, which measures the productivity and impact of scholarly articles, and No. 9 for total publications, according to an *International Journal of Production Economics* article. The analysis looked at 20 core production and operations management journals over the past 50 years.

Highly respected in his field, Prof Lee is a Fellow of the Institute of Industrial Engineers in the US, and the founding and current Director of the Logistics and Supply Chain Management Institute at HKUST. In 2011, the "Transforming Hong Kong's Ocean Container Transport

Logistics Network" project led by Prof Lee was one of just six proposals out of almost 90 to gain funding in the first round of the Research Grants Council's Theme-based Research Scheme. The project received HK\$13.292 million.

Research Excellence Awards went to Prof Irene M C Lo, Professor of Civil and Environmental Engineering, and Prof Dimitris Papadias, Professor of Computer Science and Engineering.

Prof Lo has spent more than two decades exploring solutions that can tackle different forms of soil and groundwater pollution. Her work has led to many articles in leading journals and several significant international honors, including the ASCE Samuel Arnold Greeley Award. Prof Lo has also made major contributions to soil and sediment decontamination and has been involved in the Kai Tak Development project, Denmark groundwater remediation and the

**To do what you truly want to do and also to make a difference to society as a whole is both a privilege and a wonderful way to spend a career.**

*Prof Chung Yee Lee*



# PhD Research Excellence Showcased

Shenzhen River clean-up. “Being able to assist in large-scale environmental projects locally and internationally is challenging but also really exciting,” she said. “I feel that helping to revitalize waterways and land is a very tangible way to improve people’s lives.”

Prof Papadias specializes in spatial and spatio-temporal databases. He has successfully applied spatial database techniques to other areas, in particular skyline computing. “The School has really supported my vision and encouraged me to go the extra step that enables you to make significant breakthroughs,” Prof Papadias explained. “This keeps me energized to move ahead.” Other areas of his research include indexing schemes, processing algorithms and spatio-temporal data warehouses. He has been widely cited and published, and his professional activities include being program chair of SIGMOD 2013, the world’s leading conference on databases.



Dean of Engineering Prof Khaled Ben Letaief said that the awardees’ achievements exemplify the School’s drive and impact. “Our faculty members’ research excellence is an invaluable asset to the engineering community and sharpens the competitive edge of our School,” he noted.

Three PhD graduates have had their remarkable accomplishments brought to wider attention as winners of the School of Engineering PhD Research Excellence Awards 2012/13.

After much deliberation by the Engineering Research Committee, comprising one faculty member from each of the School’s six departments, Dr Xiaolei Wang, Civil and Environmental Engineering, Dr Nan Cao, Computer Science and Engineering, and Dr Qixing Wu, Mechanical and Aerospace Engineering, were selected to receive the awards. Dr Wang and Dr Cao are 2012 graduates while Dr Wu graduated in 2011.



Dr Wang’s research centers on the development of sustainable transportation systems, covering issues such as road space rationing, tradable travel credits, speed limits and parking management. As a PhD student, she had several articles published in international journals. These include three in *Transportation Research Part B*, the field’s leading journal, two of which were elected among the top 25 hottest articles in 2011 and 2012.

Information visualization and explorative visual analysis are the primary interests of Dr Cao, with a special focus on heterogeneous multidimensional data, including social media. Prior to joining the School in 2009, Dr Cao worked at IBM China Research Lab, contributing to two IBM research achievements and more than 10 US patents. The independent-

mindful and highly original researcher also set a record in the Department of Computer Science and Engineering by completing his PhD degree in just 2.5 years.



Dr Wu took part in four projects supported by the RGC General Research Fund and one by the Innovation and Technology Fund while studying for his PhD. He specializes in energy and fuel, including direct methanol fuel cells. He has published 16 peer-reviewed journal papers, eight as first author, and serves as a reviewer for *International Journal of Hydrogen Energy* and *Applied Thermal Engineering*, among others.

At the awards presentation ceremony in May, Dr Wu also gave a talk to current students on how to become a successful and happy researcher. His tips included the importance of building a good relationship between student and supervisor and how to alleviate stress. The School is encouraging sharing sessions among research postgraduates to provide more interaction outside the lab and to broaden the research student experience.

The three award-winners are now pursuing academic and research careers in the US and Mainland China.





## PhD Education Joint Venture with University of Toronto

**A**cademic and research collaboration between HKUST and the University of Toronto will be stepped up in the future, with the signing of a new agreement in April that will promote a joint venture in PhD education and enable PhD students studying in the field of engineering in either institution to go on academic exchange to the partner university.

Dean of Engineering Prof Khaled Ben Letaief said the strategic alliance would promote

and enhance engineering teaching, learning and research, signaling the two universities' common goal to take engineering development to the next level. The joint venture in PhD education would provide an exciting and diversified learning experience for School of Engineering doctoral candidates, he noted.

The University of Toronto is a leading global university that was ranked No. 17 in the QS World University Rankings in 2013 and No. 20 in the *Times Higher Education*

World University Rankings in 2013-2014. The School of Engineering already has active ties with the Canadian institution, with several University of Toronto alumni among current faculty members.

Other major international partners working with the School include Massachusetts Institute of Technology and Princeton in the US, École Polytechnique Fédérale de Lausanne in Switzerland, Tsinghua University in Mainland China, and the Korea Advanced Institute of Science and Technology in Korea.



## Fresh Light on Solar Panels

**P**rof Zhiyong Fan, Electronic and Computer Engineering, and his research team have developed new flexible nanostructures for thin film solar cells, which can significantly improve energy conversion efficiency and lead to the manufacturing of solar panels that are lighter, more efficient, and versatile.

The breakthrough technology can supply power for portable electronic devices and generate electricity for large-scale photovoltaic plants, lowering costs by more than 65%. This is significant as solar photovoltaic technology currently suffers from high-cost energy conversion and

relatively low efficiency despite being one of the most important clean energy technologies today.

The commercial potential of Prof Fan's technology was highlighted when it became the subject of a winning student entrepreneurship competition entry by a School of Business and Management MBA team. The Solaris student team of three worked closely with Prof Fan and his researchers to develop a business plan that would turn the invention into a thriving enterprise and widen solar energy use in society. The team went on to win the

CEIBS-Beijing Benz INNOVATEChina 2013 Entrepreneurship Challenge in March.

The following month, Prof Fan's technology helped Solaris to secure the Best Trade Show Award in the New Venture Championship at the University of Oregon. The team was also awarded the first prize and elevator pitch prize in the HKUST 2013 One Million Dollar Entrepreneurship Competition, held in May.



# Collaborative Education

## Adds to SENG Student Experience

Groundbreaking studies on the development of teamwork skills and peer learning at the School of Engineering are providing insight into effective, engaging pedagogies



The School of Engineering's pioneering Center for Engineering Education Innovation (E<sup>2</sup>I) has been involved throughout the planning for the move from a three-year to a four-year degree and delivery of the new undergraduate curriculum, applying education research to develop pedagogy and assessment approaches that support student-centric learning and outcome-based education. "Our goal is to build a community that is conducive for teaching and learning," said Prof Neil Mickleborough, Director of E<sup>2</sup>I.

To date, E<sup>2</sup>I's research on undergraduate engineering education has focused on teamwork development through cooperative learning, and the use of rubrics as assessment tools. Current engineering courses often involve team projects but teamwork skills may not be developed through these activities. This is partly due to the lack of training to allow students to work effectively in a collaborative environment, leading to one or two students doing most of the group's work, or individual components just being pieced together.

In an earlier study, E<sup>2</sup>I researchers investigated the systematic development of teamwork skills in a cohort of engineering students throughout their three-year undergraduate education. Currently, the E<sup>2</sup>I

team is involved in an ongoing study of peer learning from different peer groups.

In the former study, E<sup>2</sup>I researchers found that student awareness of teamwork, for example the need to resolve conflict, improved significantly after systematic development through: explicit instruction, opportunities to practice, and constructive feedback. Students also responded to conflict resolution using a confrontational approach, an unexpected result as similar studies reported participants from Asian regions typically favor cooperative methods such as smoothing and compromising. But E<sup>2</sup>I researchers believe the high level of trust and the good relationships between team members likely made it easier for students to discuss conflicts openly and productively.

This research on the systematic development of teamwork skills was spearheaded by E<sup>2</sup>I's founding director, the late Prof Edmond Ko, and scholarly work on cooperative learning continues to be one of the Center's main research areas.

"Our approach to applying engineering education research is to first develop a course and simultaneously monitor it to conduct research. We then revise the course based on the research findings," Prof Mickleborough said.

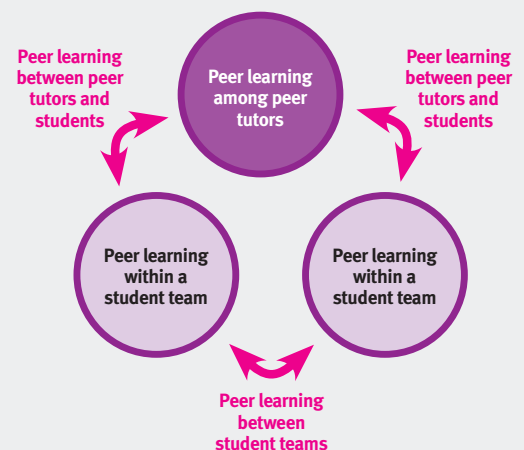
E<sup>2</sup>I's research on peer learning is primarily conducted through the "Engineering Solutions to Grand Challenges of the 21st Century" undergraduate course. A key finding from this work is that a multi-level approach to peer learning is effective in developing engaging pedagogies.

In this course, students work in teams to evaluate and develop a potential solution to a "grand challenge" posed by experts. In addition to the course instructor, the teams are supported by trained peer tutors and reference librarians. Students have said they appreciated the cooperative problem solving environment and the chance to learn from peers at different levels.

"This education process allows peer tutors to be the 'teacher'," Prof Mickleborough said. "Students in effect take charge of learning – which is in line with lifelong learning – an important component of the HKUST education philosophy.

"This format at the undergraduate level is unique and has not been successfully completed elsewhere in other institutions. The timely feedback that students receive from course instructors, peer tutors, and reference librarians contributes greatly to the learning opportunities in this course."

E<sup>2</sup>I's recent work shows elements that can facilitate effective learning experiences, and may be applicable to the design of courses that incorporate professional skills training. The Center takes an iterative approach to engineering education research and curriculum development. "We assess everything that we do and the innovative components are researched," Prof Mickleborough said. "Issues are solved with monitoring and research."



# Named Professorships

## Recognize Leading Minds

**F**our of the School of Engineering's leading academics have been included in HKUST's landmark Named Professorship Program launched to honor eminent faculty and recognize donor supporters of the University. A total of 13 professorships were conferred at an inauguration ceremony in February, with five more established to recruit further top caliber academics from around the world.

The partnership for excellence covers an array of areas including engineering, nanotechnology, aerospace, science, business, social science, and others.

Members of the community have been enthusiastic in their response to the program, providing generous support for the setting up of endowments for the named professorships.

The School's honorees for recently established professorships are Prof Chung Yee Lee, Industrial Engineering and Logistics Management, who was named Cheong Ying Chan Professor of Engineering, Prof Tongyi Zhang, Mechanical and Aerospace Engineering, appointed as Fang Professor of Engineering, and Prof Matthew McKay

who became the Hari Harilela Associate Professor of Electronic and Computer Engineering.

In addition, Prof Hoi Sing Kwok, Electronic and Computer Engineering, is the Dr William M W Mong Professor of Nanotechnology, one of the existing named professorships.

The University has received donations for five more named professorships to strengthen and expand different areas, including the New Bright Professorship in Engineering and the Swire Professorship in Aerospace Engineering. Four



## Faculty Honors, Awards & Achievements



Vice-President for Research and Graduate Studies **Prof Joseph H W Lee**, Civil and Environmental Engineering, has received the 2013 Karl Emil Hilgard Hydraulic

Prize from the American Society of Civil Engineers (ASCE) for his paper "Mixing of a Rosette Jet Group in a Crossflow". The award recognizes his distinguished work on environmental water resources and the problem of flowing water. This was the first time that the prize went to Hong Kong-produced research since it was instituted in 1939. The paper was co-authored by Prof Lee's former PhD student Adrian CH Lai and postdoctoral fellow Dr Daeyoung Yu.

Associate Dean of Engineering (Undergraduate Studies) **Prof Hong K Lo**, Civil and Environmental Engineering, has been elected Convener of the International Scientific Committee of the Conference on Advanced Systems for Public Transport (CASPT). CASPT is the most prestigious conference series in public transportation, with a history of close to 40 years. Prof Lo successfully brought the conference series to Hong Kong in 2009, the first time it had been held in Asia.

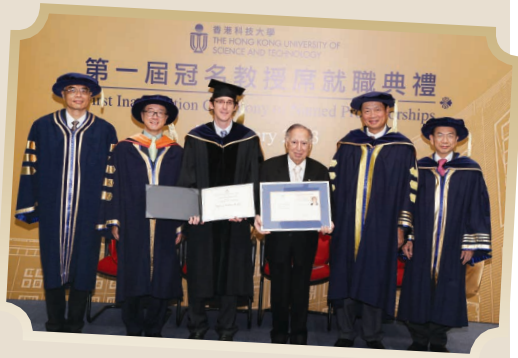


**Prof Xiangtong Qi**, Industrial Engineering and Logistics Management, received an Award for Research Excellence in Social Sciences (Second Class) from the Ministry of Education for his paper on "Price Competition, Cost and Demand Disruptions and Coordination of a Supply Chain with One Manufacturer and Two Competing Retailers". The paper was co-written with Prof Tiaojun Xiao, Nanjing University, and published in *Omega, The International Journal of Management Science*, Issue 5, 2008.





# Prestigious Fellowships



professorships were also set up especially for the HKUST Institute for Advanced Study.

President Prof Tony F Chan noted that the accomplishments of the named professors in their respective fields were recognized at the forefront of international scholarship, helping the University to develop into a world-class research institution. He also expressed his gratitude to community donors for their wholehearted support.



**S**chool of Engineering academics have been elected fellows of various prestigious professional organizations, demonstrating the faculty team's global standing and contribution to their respective fields.

Prof Qiang Yang, Computer Science and Engineering, has become a 2013 Association for the Advancement of Artificial Intelligence (AAAI) Fellow. This is the highest honor in the AI community and Prof Yang is the first to achieve such recognition in Greater China. He was recognized for significant contributions to AI planning, data mining and case-based reasoning.

Six faculty members from the Department of Electronic and Computer Engineering have been made Fellows of the Hong Kong Institution of Engineers (HKIE), which promotes the advancement of engineering and facilitates the exchange of knowledge and ideas. They are Dean

of Engineering Prof Khaled Ben Letaief, Associate Dean Prof Roger Cheng, Head of Department Prof Ross Murch, Prof Oscar Au, Prof Vincent Lau and Prof Danny Tsang.

Prof Murch has also been elected a Fellow of the Institution of Engineering and Technology (IET). The IET is a world-leading professional organization, sharing and advancing knowledge to promote science, engineering and technology, and has more than 150,000 members worldwide in 127 countries.

Prof Au has been elected Chair of the Asia-Pacific Signal and Information Processing Association (APSIPA) Image, Video, and Multimedia Technical Committee. APSIPA is an emerging association aimed at promoting research and education activities in signal and information processing.

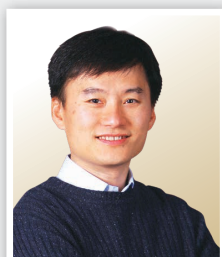


**Prof Hoi Sing Kwok**, Electronic and Computer Engineering, was awarded the 2013 Society for Information Display (SID) Slottow-Owaki Prize. He was honored for the creation of the Center for Display Research at HKUST, which has trained and educated many people in the field in Asia.



**Prof Francesco Ciucci**, Mechanical and Aerospace Engineering, and his collaborators from MIT Ideation Laboratory received the *Journal of Laboratory Automation (JALA)* Ten Award 2013. The JALA Ten is an annual editorial feature that highlights 10 top technological breakthroughs from all types of research organizations. Prof Ciucci's team was recognized for a new game-theoretic approach for the determination of Pareto optima in engineering design in the article "An Information-Passing Strategy for Achieving Pareto Optimality in the Design of Complex Systems", published in *Research in Engineering Design*.

**Prof Weichuan Yu**, Electronic and Computer Engineering, won the Biomedical Wellness Pioneer Award at the 2013 SPIE Defense, Security, and Sensing meeting in Baltimore, US, in recognition of his pioneering contribution to biomedical computing. A total of six awards were given out at the meeting. The event attracted more than 6,000 registered attendees and nearly 500 companies.



**Prof Gary Chan**, Computer Science and Engineering, and his team gained a merit award in the research and development category of the Asia Pacific ICT Alliance (APICTA) Awards 2012 for their innovative multi-hop wireless network for pervasive Wi-Fi access, which greatly improves wireless data transmission efficiency and coverage.



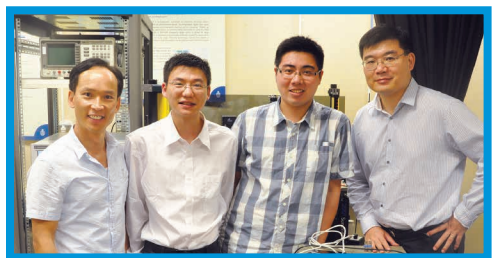
# Student & Researcher Honors, Awards & Achievements



Bioengineering PhD student **Chandra Jinata**, a Hong Kong PhD Fellowship Scheme student from Indonesia, was chosen by the Indonesia Government as one of five representatives to attend the G20 Youth Summit (Y20) in Russia in June. The premier global gathering brings together young leaders representing G20 countries to discuss major international issues, promote cross-cultural understanding and build networking. Chandra was chosen after a fierce three-round interview process, competing against more than 200 other applicants from his home country.

Computer Science and Engineering postgraduates and alumni gained two best paper awards at IEEE Globecom, the premier conference of the IEEE Communications Society. Only 15 Best Paper Awards were granted out of 2,560 paper submissions. The conference encompasses the entire range of communications technologies. The winning papers were: “FCM: Frequency Domain Cooperative Sensing and Multi-Channel Contention for CRAHNs” by PhD students **Lu Wang** and **Jiang Xiao**, alumnus **Kaishun Wu**, and Prof Mounir Hamdi; and “deStress: Mobile and Remote Stress Monitoring, Alleviation, and Management Platform” by alumni **Jin Zhang** and **Dawei Chen**, Prof Qian Zhang, and an industry collaborator.

**A team of 10 Year 2 Mechanical and Aerospace Engineering students** won the Championship in the 2nd Greater China Region Design Competition, organized by the Institution of Mechanical Engineers. The event was held at South China University of Technology in Guangzhou. Teams were asked to design and build a model car propelled by the gravitational potential energy of one liter of water placed at a vertical height of one meter. In the contest test runs, the HKUST prototype covered the most distance. Members of the team also delivered an excellent presentation, impressing the judges with their technical knowledge.



In a distinguished achievement, papers by Electronic and Computer Engineering postgraduates secured the top two spots in the Charitat Award at the 25th International Symposium on Power Semiconductor Devices and ICs (ISPSD). The gathering was held in Japan in May. The papers were **Qimeng Jiang**'s “High-Voltage Enhancement/Depletion-Mode AlGaN/GaN HEMTs on Modified SOI Substrates” in first place and **Lulu Peng**'s “A Novel 3D TSV Transformer Technology for Digital Isolator Gate Driver Applications” in second place. The students are supervised by Prof Kevin Chen and Prof Johnny Sin respectively.



Computer Science and Engineering undergraduates **Ho Pan Chan** (Dual Degree) and **Umair Ali Syed** and their School of Business and Management teammates developed the Sensbeat music app, which was chosen as one of the “Top 5 Innovative Apps” at the Global Mobile Internet Conference (GMIC) Beijing, Asia's largest and most influential mobile industry event. The team also reached the final of Start-Up@Singapore, a flagship National University of Singapore entrepreneurship competition. When someone is listening to music, Sensbeat recognizes the track and enables the song, artist, and location of the listener to instantly be displayed on Facebook. Information on the app can be found at [www.sensbeat.com](http://www.sensbeat.com).

PhD student **Ting Lei**, Electronic and Computer Engineering, received the Best Student Paper Award (Champion) in the 13th IEEE Photonics Society (Hong Kong Chapter) Postgraduate Conference. His winning paper was entitled “Microparticle Fractionation Using Optical Lattices from Silicon-on-Insulator Multimode Interferometer Waveguides”, co-authored with PhD student Jiawei Wang and Prof Andrew Poon. The conference involved 25 oral presentations by postgraduate students from five local institutions.



PhD candidate **Yongxin Tong**, Computer Science and Engineering, was awarded a Microsoft Research Asia Fellowship 2012. Each of the 10 awardees has an opportunity to complete an internship at Microsoft Research Asia in Beijing. PhD candidates from 45 academic research institutions were nominated in 2012. Yongxin's research goal is to effectively discover and manage the hidden correlation and rules over massive uncertain data.

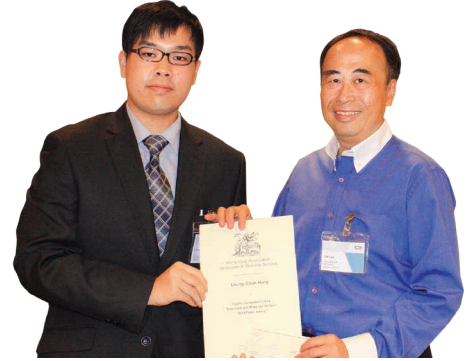




Computer Science and Engineering PhD candidate **Guoli Ye** received a Best Student Paper Award at the 8th International Symposium on Chinese Spoken Language Processing (ISCSLP-2012). The paper was entitled “Speaker-Ensemble Hidden Markov Modeling for Automatic Speech Recognition”, co-authored by Prof Brian Mak.

The paper “FMD: Fine-Grained Device-Free Motion Detection” by PhD students **Jiang Xiao** and **Lu Wang**, alumnus **Kaishun Wu**, former Research Assistant **Youwen Yi**, and Prof Lionel Ni, all Computer Science and Engineering, was awarded the Best Paper Award at the 18th IEEE International Conference on Parallel and Distributed Systems (ICPADS) 2012 out of nearly 300 entries.

The paper “Automatic Patch Generation Learned from Human-Written Patches” by postdoctoral fellow **Dr Dongsun Kim**, PhD student **Jaechang Nam**, MPhil student **Jaewoo Song**, and Prof Sunghun Kim, all Computer Science and Engineering, received a SIGSOFT Distinguished Paper Award at the International Conference on Software Engineering (ICSE) 2013 in San Francisco. ICSE is the premier conference for software engineering.



PhD student **Chun Hang Leung**, Civil and Environmental Engineering, received the Best Paper Award for the Structural and Materials category in the Papers Competition 2012, organized by the Institution of Civil Engineers Hong Kong Association (ICE HKA) Graduates & Students Division. The paper centered on “Inelastic Behavior of RC Beam-Column Joints under Seismic Loading”.



## Triple Success in President's Cup

**S**tudents from the School of Engineering demonstrated their enterprising approach to technology and presentation skills by taking all three awards in the President's Cup 2013 for the second consecutive year. The annual contest at HKUST aims to boost creativity and communication capabilities among undergraduates.

A Chemical and Biomolecular Engineering team comprising San Hung Choi, Yee Man

Choi, Kwong Mun Kwok and Chui Hung Yau won the President's Cup, the top prize, for their innovative project on micro-mini pulsed electric field technology for point-of-use disinfection of tap water. The team was supervised by Prof King Lun Yeung.

The Gold Award went to Chun Pan Ho, Hong Yee Kow and Zijian Wang, three Civil and Environmental Engineering students supervised by Prof Charles W W Ng, for

their research on environmentally friendly green slope engineering.

Another Chemical and Biomolecular Engineering team took the Silver Award. Ka Hei Ho, Yuen Man Ip, Siu Man Ng, Ping Hei Shing and Andrea Villaroman, supervised by Prof Ying Chau, collected the third prize for their work on endothelial cell-adhesive injectable hydrogel as an endovascular embolizing agent.



# HKUST Becomes First Hong Kong Partner for Ford Conservation Grants Program



**A** global sustainability program run by Ford Motor Company, a major US automaker, has chosen to establish its first partnership in Hong Kong with HKUST to support the development of future leaders and innovators in conservation science and technology.

The Ford-HKUST Conservation and Environmental Research Grants program will assist taught postgraduate students in the School of Engineering to develop their research capabilities through academic grants in the fields of environmental and conservation science, and conservation engineering. Up to 20 projects will be supported in 2013-14.

Speaking at the launch ceremony in June, Mr David Westerman, Regional Manager, Asia Pacific, Ford Export & Growth Operations, said the program would seek to drive creativity, innovation and foster industry-shaping research. Ford will donate HK\$500,000, which will be matched by HKUST to create a total fund of HK\$1 million.

The Ford Conservation and Environmental Grants program have been awarded globally for over 30 years covering more than 60 countries around the world.

“We chose to partner with HKUST, a renowned university and a leader in innovative engineering education,” Mr Westerman added. “The research grants support the University’s engineering projects encompassing environmental sustainability with a focus on green motoring and transportation.”

Prof Christopher Chao, Associate Dean of Engineering (Research & Graduate Studies), said: “We believe the grant program will not only broaden our students’ learning experience but also further our endeavor to build innovative solutions to the global issues of environmental conservation and sustainability.” More than 800 students are currently enrolled on the School’s 10 Master of Science programs.



**The research grants support the University’s engineering projects encompassing environmental sustainability with a focus on green motoring and transportation.**

*Mr David Westerman*



## Pedal Power Accelerates Sustainable Business Operations

**A**n electricity-generating exercise bike has been designed and produced through a partnership between the School of Engineering and DHL Express, an international express company, to provide a new source of sustainable renewable energy and enhance eco-friendly business operations.

Over the past year, the School has provided the expertise, insight and technical knowledge to co-develop six Power Bikes that can generate electricity. The energy can then be stored in a reusable external

battery and used to recharge DHL couriers’ electronic hand-held scanners. It also enables DHL staff to keep fit and helps to reduce the company’s carbon footprint.

The Power Bikes are based on a modified spinning exercise bicycle with a power generator attached. Hundreds of members of staff have already participated in the bike project, contributing power to thousands of shipments, according to Mr Ken Lee, Head of Commercial, Asia Pacific and Managing Director, Hong Kong and Macau, DHL Express. The Power Bikes are

# HK\$5 Million Donation Boosts Biodevice Research to Assist Stroke Victims



**G**roundbreaking HKUST applied engineering research to improve stroke treatment received a substantial boost in May following a generous HK\$5 million donation from Dr Simon Kwok and Dr Eleanor Kwok. The inventions are being developed in collaboration with leading neurosurgeons and seek to create biodevices to assist with endoluminal diseases. Strokes are one of the leading causes of death among Hong Kong people.

The researchers have used blood flow dynamics and vessel wall models and analyses developed at the University, laying a solid foundation for the design of new stents and flow diverting devices made of memory metal. The research is in the laboratory phase but the team has already generated encouraging results, including devices for advanced clot retrieval and focal dissolution to treat ischemic strokes. The HKUST research team comprises Dr John Kwok, Division of Biomedical Engineering, and Prof David Lam and Prof Matthew Yuen, Mechanical and Aerospace Engineering.

Breakthrough devices made of bioabsorbable materials, which treat and help the body to restore the treated blood vessels, have also been developed.



Laboratory studies have shown that the new bioabsorbable coils and blood flow diverting device reduced brain aneurysm pressure and the risk of bursting. Later, these devices will be absorbed, allowing natural healing to take place.

Dr Simon Kwok said that he and his wife were keen to help those in need to experience the joy of a healthy life through supporting innovative technology. “I wish the research team even greater success in this groundbreaking undertaking, which is

sure to enhance the standards of local medical technology,” he said.

HKUST President Prof Tony F Chan noted that the donation would assist interdisciplinary cooperation and boost industry collaboration in order to provide innovative technology and devices to improve people’s lives.

The research is also establishing a fresh collaborative platform for medical practitioners and engineering academics to extend medical technology frontiers.

being piloted in Hong Kong, with other DHL offices already showing interest in the program.

Prof Roger Cheng, Associate Dean of Engineering (Undergraduate Studies), said that HKUST had been pleased to contribute to such sustainable innovation that showed the School of Engineering’s ability to apply technology to real-life problems and commitment to working together with industry.

DHL is an ongoing School of Engineering supporter, providing around HK\$900,000 in sponsorship for different aspects of the School’s work over the past three years, including transportation of student robotic machines for competitions overseas (see also P29), a scholarship, and student enrichment activities.





## Transportation Conference Draws Global Response

The Department of Industrial Engineering and Logistics Management (IELM) and Department of Civil and Environmental Engineering (CIVL) successfully co-organized the 17th International Conference of Hong Kong Society for Transportation Studies (HKSTS) together with HKSTS, in December 2012. The conference was chaired by Prof Hong K Lo, CIVL, and co-chaired by Prof Ho Yin Mak, IELM.

The three-day conference, regarded as one of the region's most significant gatherings in the field, focused on the theme of "Transportation and Logistics Management". Topics ranged from logistics and supply chain management to transportation planning and travel behavior. The event attracted more than 250 paper submissions from 35 countries, of which 140 were selected for presentation.

Mr Shing Mu Yau, Under Secretary for Transport and Housing, HKSAR Government, gave the keynote speech, which discussed the latest developments in the logistics and transportation sectors in Hong Kong. In addition, seven internationally renowned scholars delivered plenary speeches.

## IELM Competition Fosters Enterprising Toy Design

The links between engineering and creativity, innovation and entrepreneurship were fruitfully highlighted in the first My Toy Design Competition, hosted by the Department of Industrial Engineering and Logistics Management (IELM). The contest, originated by IELM Associate Head Prof Ravindra Goonetilleke, attracted an overwhelming response, with 140 teams from local secondary schools and tertiary institutions participating. The initiative was also enthusiastically supported by industry.

In the first round of the competition, each team's toy design proposal was assessed by a judging panel, comprising international toy professionals and designers, and 23 teams eventually selected to take part in the final. To assist finalists and encourage the public to learn more about the toy business, a four-day workshop was held at HKUST in March, with top industrialists and professionals involved in innovative design and toy manufacturing sharing their experience. At the final evaluation in May, each team was given 15 minutes to present their concept and explain the design of their toy.

Entries were assessed on play value, creativity, marketability and aesthetics, with the eventual Gold, Silver and Bronze award-winners all from the Hong Kong Design Institute. Two Special Awards were also given to two teams of students from Sha Tin Government Secondary School, who showed thoughtfulness and empathy in designing toys for visually impaired children.

Over 100 distinguished guests and students attended the award presentation ceremony at HKUST in June. An exhibition showcasing the winning and finalist entries was held after the ceremony.



## Android App Contest Sparks Computer Science Interest



More than 200 students and teachers from 40 secondary schools had the valuable opportunity to boost their computer science and presentation skills by taking part in the innovative Android Application Design Contest, co-organized by the Department of Computer Science and Engineering and

Hong Kong Federation of Education Workers.

The annual contest seeks to raise students' interest in computer science and teamwork through designing Android apps. A series of workshops at HKUST is included to teach students about the relevant hardware, software, and programming language.

In the competition final in February, around 100 participants from 20 schools gave a brief account of their product to judges and the five best teams were selected to demonstrate their apps and give detailed presentations. Entries included apps related to mosquito repellent, artificial intelligence, and Chinese medicine.

The champion award went to the "Little Painter" app by a team from Christian Alliance S C Chan Memorial College. This app also received the Best User Interface Award and the Best Presentation Award. Little Painter is designed to help children to paint pictures. Eleven awards were presented in total.



## HKUST-Stanford Joint Course Fosters Global Vision

The innovative “Global Manufacturing” joint course, initiated in 1995, matches highly motivated Industrial Engineering and Logistics Management students from the School of Engineering solving authentic business problems with peers from Stanford University’s Department of Management Science and Engineering.

The course has inspired a new cadre of manufacturing engineers and initiated constructive contributions to several companies, which have responded through upgrades and reorganization. Prof Fugee Tsung and Prof Emily Au engage students by offering opportunities to experience different facets of industry perspective with challenging situations presenting contrasting solutions. Negotiation and communication skills, invaluable traits for



today’s business practice, are honed to persuade team members to adopt specific solutions. Focused and selective case studies encourage lateral thinking, in-depth discussion and an appreciation of the global stage. Tomorrow’s leaders are nurtured in a challenging and intellectual environment.

Students are divided into four diverse teams, each operating with a leading partner enterprise to conduct research and analysis on company specific challenges. Apart from hands-on experience in applying theoretical knowledge to practical problem

solving, students master effective teamwork and the ability to network with various levels of management. Research includes key areas of production, retail, logistics and supply chain management.

Businesses this year focused on travel, garments, software and IT. HKUST students received inclusive sponsorship and met their Stanford peers in January where collectively they researched current challenges. Stanford students returned later to HKUST, with solutions presented to company executives of the four partner organizations.

## Sporty ECE

Electronic and Computer Engineering (ECE) faculty and students have shown their top teamwork capabilities and healthy attitude toward life with a number of firsts in sporting events. The ECE Football Team won the Championship in the HKUST Intramural Football Competition 2012-13, and ECE Sports Team was Second Runner-up in the overall sports competition. In the testing 100km Oxfam Trailwalker charity event, ECE@HKUST came first in the education sector with a time of 28 hours and 27 minutes, and ECE2@HKUST finished sixth in 33 hours and 32 minutes.

Meanwhile, 170 students attended a seminar in April where Prof James She, Prof Bert Shi and Prof C Y Tsui discussed the use of ECE technologies in sports, such as motion analysis tools and goal-line technology, and how to integrate data collected from such devices through mobile platform and social media.



## Boosting Research Students’ Professional Skills

The Professional Development Committee, which provides opportunities for research postgraduate students to enhance their professional skills, celebrated its first anniversary in the Spring.

Set up by the School of Engineering’s forward-looking Center for Engineering Education Innovation, the committee has arranged courses and industrial visits, including leadership training workshops for visiting students from Chu Kochen Honors College, Zhejiang University, and an industrial visit to Cathay Pacific Airways Limited. Research postgraduates from the Czech Republic, Finland, Germany, Hong Kong, Mainland China, Nigeria, and Sri Lanka have served on the committee, offering input on postgraduate education and professional development.

The School is also offering a new Professional Development Course for research students in the Fall, which will include research ethics, entrepreneurship, and communication.



# Volunteering to Make a Difference



**F**or successful businessman and award-winning community service contributor Wayne Pui Por Chau, who graduated with a BEng in Computer Science, voluntary work has been an amazing route to making a difference, not only to those he helped, but also to himself and through his example to friends and classmates.

Arriving in Hong Kong as a child immigrant from Mainland China, Wayne faced numerous challenges in settling down in Hong Kong. He could not understand

Cantonese. His family had very little money and the school he attended was not prestigious. However, through the support and encouragement of one of his teachers, Wayne started to undertake different types of voluntary service. He found it changed his life. “When I was doing such work, I had lots of opportunity to practice my Cantonese, and slowly this built my confidence.”

He proved equally inspiring at HKUST, where he sat in on business classes as well as undertaking his computer science degree, worked part-time, gave tutorials to young children, studied for an English diploma, scrutinized the financial markets daily, and continued with his voluntary activities. “The busier, the better,” Wayne said. “I like contributing.”

After meeting his wife through voluntary work, their shared interests led them to set up The Outstanding Givers charity organization with other founders. The charity encourages all-round development

among young people through voluntary work and social development projects. Wayne is also a co-founder of five other charity organizations, including the Youth Arch Foundation, which supports student awards, and Zhong Hua Construction Foundation, established after the 2008 Sichuan earthquake. Wayne was named a 2010 Hong Kong Spirit Ambassador and recently received a Hong Kong Volunteer Award. He is currently actively involved in over 10 non-profit organizations and charity projects.

Wayne is a firm believer in parent-children voluntary work and has encouraged his daughter to participate in activities along with him. She has also donated half of her *laissez* money at Chinese New Year and has her own Facebook page with over 11,000 fans. He hopes to promote more such family volunteering in Hong Kong. Other plans for the future include encouraging social development work through social media and helping children in need.

In talking about the mindset to achieve no matter what your initial circumstances are, Wayne said: “Genuinely use your heart and you can do it. Don’t worry if the chance is low. If you don’t try, you will not succeed. If you do try, at least you have the chance of success.”

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## Alumni Honors, Awards & Achievements

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**Ir Dr Johnny Cheuk**, 1999 BEng in Civil and Structural Engineering and 2001 MPhil in Civil Engineering, received the Young Engineer of the Year Award 2013 from the Hong Kong Institution of Engineers. Dr Cheuk is an associate of AECOM, handling a wide spectrum of geotechnical projects. He gained a PhD in Geotechnical Engineering from the University of Cambridge in 2005, has published over 50 technical articles and has been honored with many international awards.



Playnote Ltd, a company founded by graduate **Eric Yung**, 1997 BEng in Electronic Engineering and 2000 MPhil in Electrical and Electronic Engineering, received the Grand Award (Start-up Company Category) and the Merit Award (e-Learning Category) for its Auralbook product in the Asia Pacific ICT Alliance (APICTA) Awards 2012 in Brunei in December. The results were among the best for enterprises from Hong Kong, which in total gained 12 awards out of 157 entries. This represented the highest amount of accolades for any of the 16 economies taking part. The APICTA international awards program aims to increase awareness of information and communications technology in the community and assist in bridging the digital divide.



# New Appointments

## Concurrent



### Prof Ting Chuen Pong

Appointed Senior Advisor to the Executive Vice-President and Provost (Teaching Innovation and E-learning)

Professor, Computer Science and Engineering

## Administrative



### Prof Siu Wing Cheng

Appointed Acting Head of Department of Computer Science and Engineering

Professor, Computer Science and Engineering

## Faculty Member

### Prof Ching W Tang

Chair Professor, jointly by Institute for Advanced Study, Electronic & Computer Engineering and Chemistry  
PhD – Cornell University

## Adjunct Faculty

### Prof Joy Laskar

Professor, Electronic and Computer Engineering  
PhD – University of Illinois at Urbana-Champaign

### Prof Ming Hung Wong

Professor, Civil and Environmental Engineering  
PhD – Durham University

### Prof Howard Yang

Professor, Electronic and Computer Engineering  
PhD – Oregon State University

## Visiting Faculty

### Prof Timothy Chan

Professor, Computer Science and Engineering  
PhD – The University of British Columbia

### Prof Chia Ren Chu

Professor, Civil and Environmental Engineering  
PhD – Cornell University

### Prof Charles Kwan

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

### Prof Kenneth Lau

Associate Professor, Chemical and Biomolecular Engineering  
PhD – Massachusetts Institute of Technology

### Prof Raymond Louie

Assistant Professor, Electronic and Computer Engineering  
PhD – The University of Sydney

### Prof Rafael Luque

Professor, Chemical and Biomolecular Engineering  
PhD – Universidad de Córdoba

### Prof Manohar Madan

Professor, Industrial Engineering and Logistics Management  
PhD – The University of Tennessee

### Prof Arun Mujumdar

Professor, Chemical and Biomolecular Engineering  
PhD – McGill University

### Prof Tommy Tong

Visiting Scholar, Electronic and Computer Engineering  
PhD – University of Southern California

### Prof Liang Wu

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

### Prof Pui Kuen Yeung

Professor, Mechanical and Aerospace Engineering  
PhD – Cornell University

# In Remembrance

We are deeply saddened to report that Prof Raymond Ka Man Cheung, Industrial Engineering and Logistics Management (IELM), passed away in July after a long illness bravely borne. An alumnus of Pui Ching Primary and Middle School, York University and Princeton University, Prof Cheung was a first-rate scholar and pioneering educator. Joining HKUST in 1996 as a promising young academic, he laid the foundation for logistics research and education in Hong Kong, and was instrumental in introducing the logistics management component to the School of Engineering's IELM Department. Over his career, he received numerous honors, including the George B Dantzig Dissertation Award, and *IIE Transactions'* Best Paper in Logistics and Scheduling and 2003 Publications of the Year. Prof Cheung also played a pivotal role in establishing HKUST's bachelor program in logistics management and the Master of Technology Management (MTM) Global Logistics Management Program, two highly acclaimed programs that have nurtured talents for the industry and society at large. He will be greatly missed.

*The Professor Raymond Cheung Memorial Scholarship has been established in memory of Prof Cheung. The scholarship recognizes outstanding IELM undergraduates majoring in Logistics and Engineering Management.*



# A Creative Place to Call Home

In a landmark move for the School of Engineering, the Engineering Commons was inaugurated in April, creating a new identity for the School and a central hub for students to engage in ideas sharing, collaborative learning, and mentoring.

Located at the entrance to the School, the Commons comprises three main areas and forms the backbone of a multi-dimensional learning community, a key objective of the School's revamped education approach. The Commons is intended for all engineering students, but it is expected that first-year undergraduate students will find the areas particularly useful, ahead of their selection of a major and a department.

One area features the School's pioneering Center for Engineering Education Innovation (E<sup>2</sup>I), set up to enhance teaching and learning of students and faculty by drawing on and contributing to the latest findings in engineering education research. The School's student advisory services are

located at the Center, with a team of professional advisors based there full-time.

Next to the advising office is an academic interaction zone. Flexible furniture arrangements enable the area to serve as a gathering place for students for project planning, group meetings, peer mentoring, tutoring and assisted learning, or simply a quiet space to work individually. The zone has already become a popular meeting place.

In the central foyer area, multi-purpose 360-degree projection displays function as state-of-the-art communicators, demonstrating the integration of the virtual and physical worlds that is expected to play an increasingly large part in the future. The platform provides up-to-date information to members of the School as well as real-time applications such as e-polling with instant display of poll results. The eMessage Board allows greetings to be sent via the "SENGer" app developed by School of Engineering students.



The third area comprises a showcase of the inventions and achievements of the School's six departments to highlight the cutting-edge nature of research and development by faculty members. This section incorporates a quiet area for meetings, with flexible partitions fitted with glass panels that can be used like a notepad for writing down ideas sparked by discussions that take place there.

Speaking at the grand opening ceremony, President Prof Tony F Chan said that the Engineering Commons reflected the quality and innovation in education and research for which the School of Engineering was renowned.

Dean of Engineering Prof Khaled Ben Letaief said that the cool Commons area provided superb physical support for the School's "total learning experience". He expected the Commons would give inspiration to students and a greater sense of belonging by providing a location where different members of the School community can gather together.



# Joining Together Toward Commons' Goal



Chinese painting and calligraphy on screen.

Another innovative feature of the Engineering Commons is the PicknPoll e-polling system, designed by alumni Angus Kai Chit Luk and Cheuk Sum Wong, 2012 and 2013 BEng in Computer Science respectively. The ingenious and fun interactive system allows regular online opinion polls on different topics to be undertaken, with results instantly displayed on central foyer display screens.

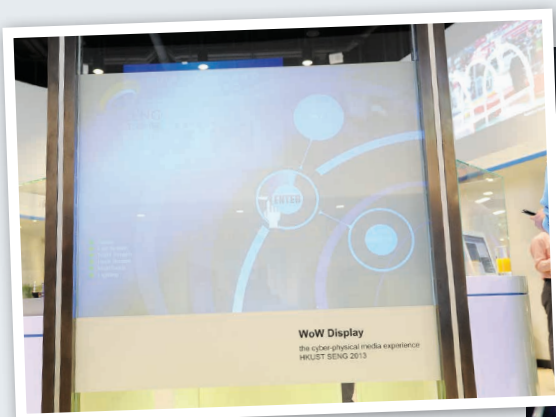
To provide a new social communication platform for HKUST students, faculty and staff, particularly the engineering community, five current Dual Degree Program in Technology and Management students created the eMessage Board. Ki Hong Chan, Ho Yin Chow, Sze Long Ho, Kwok Shiu Wong and Ka Cheuk Yung set out to provide more opportunities for the University community to exchange ideas and access the latest School news and events. Using the students' specially designed "SENGer" app, users can post messages and photos as well as leave comments via the web, Android and iOS devices. Their words and pictures are then displayed on the Engineering Commons central foyer screens.

In keeping with its goal to bring people together, the Engineering Commons has been set up with the help of faculty, students and alumni, highlighting its role as a hub of creation for all members of the School. Academics from the School of Engineering's six departments have been involved in creating the foyer displays that demonstrate the exciting developments and discoveries in different engineering fields, enable people to relate to the work associated with the disciplines, and highlight the significant role of engineers in generating change.

There is also an example of the pioneering work of the School's HKUST-NIE Social Media Lab in the form of the WoW display, providing state-of-the-art touch-based communication technology. The lab focuses on research and design of next-generation social media systems, networks and applications. The WoW display, developed by Prof James She and

his students, demonstrates how images taken by a mobile device (equipped with the lab's specially designed app) can be "flipped" to the WoW display through a simple hand gesture and from the WoW display to one of the overhead screens in the central foyer area. Videos can also be flipped.

The technology was highlighted at the grand opening of the Engineering Commons, with a demonstration of the WoW display and later through the memorable appearance of a virtual Chinese dragon on the panoramic screens. The virtual dragon was created by alumnus Cheuk Lam Chan, 2011 BEng in Mechanical Engineering. The "dragon dance" closed with an uplifting Chinese calligraphic message "Technology Builds A Great Nation" (科技興邦), originated and written in Moxi digital ink by alumnus Nelson Chu, 2007 PhD in Computer Science. Nelson is the creator of the Moxi software package that can simulate



# GRAND OPENING

OF THE ENGINEERING COMMONS | April 2013



# Early Experience of the Working World



**G**reater ties between students and industry are being sought to generate more insight on both sides through the School's front-running Center for Industry Engagement & Internship (IEI). The initiative includes wider understanding of career opportunities for engineering graduates in fields and sectors not previously targeted by the School's students, such as jobs in the financial industry.

IEI was set up in Fall 2012 as part of the School's emphasis on holistic learning. One major enrichment objective is to boost internship opportunities. In 2011, 32% of engineering students at the School undertook an internship. The goal of IEI is to increase this to 50% by 2015. The Center has participated in the Project "ETHICS" internship program,

organized by Virtus Foundation Ltd and offering internships in Hong Kong and Mainland China research institutions and enterprises to Hong Kong university undergraduates, and the Cyberport Hong Kong-Shanghai ICT Internship Program.

The Center also promotes mentorship through experience-sharing with industry experts, and organizes trips to companies outside Hong Kong. Earlier this year, IEI arranged for students to visit several major companies in Silicon Valley in the US.

An exchange program with Harvard School of Engineering and Applied Sciences is due to be launched later this

year, with students from each institution spending time at the partner campus. In addition, a job search Android and iPhone app called Mobile IEI has been designed by the Center to streamline the latest job offerings and recruitment information for School of Engineering students.

Prof Patrick Yue, Founding Director of the Center, said that IEI leveraged the School of Engineering's international reputation and the faculty's extensive industrial connections to promote internship and recruitment. "We believe that early exposure to the professional world will broaden students' horizons and enrich their university education."

## Engaging Global Industry Leaders



**I**n April, IEI's inaugural industrial forum entitled "Empowering Our Engineering Talents for Globalized Technology Industries" was held on campus, enabling industry leaders to engage directly with students. Multinational company executives at the event included Ms Umran Beba, President of Asia Pacific Region, PepsiCo; Ir Dr Andrew K C Chan, Deputy Chairman, Arup Group; Mr Christopher Gibbs, Engineering Director, Cathay Pacific Airways Ltd; and Mr Henry Kwong Hang Leung, Executive Director and Chief Operating Officer, Gold Peak Batteries International Ltd.

Among the top pieces of advice provided by forum speakers were for students to be flexible and willing, to work at developing their communication skills, and to make the most of all the broadening experiences available in their university life. President Prof Tony F Chan also shared his insights into how academic institutions cultivate students to meet the needs of global societies. An open forum following the speeches generated thought-provoking discussion among students, faculty and speakers.

Over 250 participants attended, including more than 50 representatives from industry.





# Robotics on a Roll!

It has been a terrific spring and summer for the HKUST Robotics Team.



## MATE International ROV Competition Washington, US

- Champion, Technical Report and Poster Display sections; No. 4, Explorer Class (University Level) out of 24 international teams
- Champion Award, Explorer Class in the IET/MATE Hong Kong Underwater Robot Challenge 2013, enabling the team to advance to the US competition

Thanks go to DHL Express for providing logistics consultation and sponsoring the air express transportation of HKUST's underwater robot, and to RS Components for sponsoring the electronic components and equipment. DHL Express has sponsored the transportation for all three years that the team has competed, ensuring the safe and timely delivery of the robot to the US through its professional support.

## Hong Kong IET Young Professionals Exhibition & Competition (YPEC2013)

- Overall Champion, competing against winners from all sections, including postgraduate and industrial
- Championship, Undergraduate Section against 29 other teams



## Robocon 2013 Hong Kong Contest

- Two HKUST Robotics teams swept four out of six awards: Championship, First Runner-up, Best Engineering Award, and Best Artistic Design Award. The team went on to represent Hong Kong at the regional contest in Vietnam.

## ABU Asia-Pacific Robot Contest 2013

Danang, Vietnam

- Best Engineering Award



## The 8th Freescale Smart Car Competition (South China Region)

Wuhan, China

- Three HKUST Robotics teams gained two Third Class Awards and a Certificate of Merit

## Lasting Impression

The benefits of the Robotics Team experience were highlighted by Dingzeyu Li, BEng Computer Engineering (2013), who has been awarded a scholarship to undertake a PhD in Computer Science at Columbia University. Talking about student life at HKUST, he said: "The time spent in Robotics Team was the most unforgettable. We discussed, argued, settled our differences then worked together toward a single goal. That is the kind of experience you never forget."

Robotics Team members are supervised by Prof Tim Woo, Director of the Center for Global & Community Engagement and Associate Professor of Engineering Education.



## 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](mailto:seng@ust.hk).

## Stay connected and keep in touch!



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