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Knowledge Transfer Annual Report 2015/16

Submitted to
University Grants Committee

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The Hong Kong University of Science and Technology
Clear Water Bay, Kowloon, Hong Kong

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APPENDIX

HIGHLIGHTS OF KNOWLEDGE TRANSFER ACTIVITY FOR 2015-16

In the year of 2015-16, as a roll-over year of the current triennium for Knowledge Transfer (KT), HKUST has made tremendous efforts on variety and intensity of KT activities. It is another fruitful year of active engagement to the industry and the community. The surge of entrepreneurial activities, enthusiasm expressed by students and faculties as well as active interactions with the private sectors are conspicuous achievements of cultivating entrepreneurial culture and eco-system. Continuous efforts have been made to enhance the university-wide KT supporting infrastructure, policies, systems and governance. The table below provides the highlights for selected HKUST knowledge transfer activities in 2015-16.

Invention Disclosures	New Patent Applications Filed & Granted	Cumulative Active Pending Patent Applications and Granted Patents
100	157/162	1026
No. of License Granted	**Licensing Income Generated**	**Collaborative Research Projects & Income Generated**
64	HK$4.9 million	78/HK$154.5 million
Contract Research & Income Generated	**Consultancy Projects & Income Generated**	**Equipment & Facility Service & Income Generated**
148/HK$69.1 million	24/HK$6.9 million	475/HK$3 million
No. of ITF Project Approved & Funding Awarded	**No. of Proof-of-Concept Projects Reviewed & Funded**	**No. of Teams Participating to HKUST One Million Dolar Enreprenurship Competition 2016** [note 1]
30/HK$146 million	16/8	500
No. of Active Start-up or Spinoff Company	**No. of New Startup in the Year** [note 2]	**No. of Performance and Exhibition of Creative Works**
60	14	60
No. of Public Lectures/Events	**No. of student contact hours in short courses or e-learning programmes**	**Income Generated from CPD Courses**
528	24,080 hours	HK$20 million

Note 1: The number includes all the teams from Hong Kong, Beijing, Guangzhou, Shenzhen, and Macau that participated to the HKUST One-Million Dollar Entrepreneurship Competitions 2016, of which over 100 were HKUST teams.

Note 2: The number includes both the new start-ups admitted to the Entrepreneurship Program (EP) or funded by the TSSSU Program during the reporting year. A company admitted to the EP Program and also funded by the TSSSU Program counts only once whichever comes first.

1. FOSTERING THE CULTURE OF RESEARCH EXCELLENCE

HKUST has strengthened its interdisciplinary and collaborative research culture over the years, collaborating across schools and disciplines to broaden and deepen our strengths on various research fronts. In 2015/16, HKUST secured more than HK$154 million in 78 collaborative research projects.

HKUST was awarded two Theme-based Research Scheme projects with funding of HK$33 million for each. One is to develop a new diagnostic paradigm for water supply network monitoring and fault detection, while the second is to gain fundamental understanding of debris flow dynamics and to recommend mitigation measures. Group Research Grants totaling HK$18.72 million were awarded under the RGC Collaborative Research Fund scheme. In one project our life scientists will build a model to identify and analyze error-prone hot spots at the genome level known to be a major factor in aging and human diseases, while in another our civil engineers will develop a framework for assessing the landslide risks in Hong Kong, and recommend mitigating measures to policymakers. An equipment grant of HK$5.67 million for a state-of-the-art mask-making system, a vital piece of equipment that will take HKUST nano-electronic and circuit fabrication technology to a higher level.

Officiating Ceremony for the establishment of two Hong Kong Branches of the Chinese National Engineering Research Centers in HKUST

We were awarded two of five Hong Kong branches of Chinese National Engineering Research Centers (CNERC) by the Ministry of Science and Technology; the CNERC for Tissue Restoration and Reconstruction to further research new luminescent materials for applications in artificial bones and bone repair materials, and the CNERC for Control and Treatment of Heavy Metal Pollution seeking to address sustainability and water security issues. Overall HKUST has secured substantial amounts of funding from ITF. A total of HK$146 million for 30 projects was awarded, up from HK$104.3 million from the previous year. These include HK$35 million given to the two CNERC branches, HK$10.83 million for two projects under the University–Industry Collaboration Program; HK$11.16 million for three projects under the Public Sector Trial Scheme; HK$15.71 million for eleven "Tier 3" projects and HK$66.35 million for ten "Tier 2" projects. The growing amount of ITF funding signifies the increasing commitment of the private sector to engage with HKUST researchers for knowledge generation.

The HKUST-MIT Research Alliance Consortium aims to build the network and mechanism required for R&D collaboration between world class universities and technology companies through conducting industry-driven pre-competitive research. Following successful launch of Data Science & E-Learning Research Cluster and Internet-of-Things (IoT) for Intelligent Buildings and Transportation Cluster, a total of 11 new proposals from the second run for Internet-of-Things (IoT) for Intelligent Buildings and Transportation Cluster were received from local universities and MIT in this year. Three highly recommended proposals were submitted to the Innovation & Technology Commission (ITC). With the fruitful outcomes in 2015/16, the Consortium will continue to strengthen the network for local universities, MIT and leading technology companies and collaborate on future advancement in high-tech research.

Prof Gyu Boong Jo (left) and Prof Rosie Young, GBS, JP, at the award presentation ceremony

The Croucher Innovation Awards recognizes exceptionally talented young scientists working at an internationally competitive level to support them at a formative stage in their careers. Prof. Gyu Boong Jo of the Department of Physics received the 2016 Croucher Innovation Award and HK$5 million for his outstanding achievements in the quest to realize synthetic quantum systems using ultracold atom.

The growing success in securing funding and the increasing research collaboration with universities, private sectors, and government is testimony to HKUST's ever growing commitment to research and KT activities that would bring significant impacts to the academia, industry and society.

2. Enhancing Knowledge Transfer Supporting Infrastructure

University-wide KT Leadership Enhancement

HKUST has further enhanced the leadership structure overseeing the KT operation by charging the Associate Vice-President for Knowledge Transfer (AVPKT) to supervise both the KT operations covered by the Technology Transfer Centre (TTC), HKUST R and D Corporation (RDC) and Entrepreneurship Centre (EC) in the Clear Water Bay campus, and the University's technology transfer & commercialization platforms in Nansha (Guangzhou), Shenzhen, and Foshan. In continuation of the advising works in the past including forming the Knowledge Transfer & Entrepreneurship Task Force in 2014 and the Task Force on Entrepreneurship Education in March 2015, a new Knowledge Transfer Committee was set up at the University Council level in March 2016 to oversee the overall KT strategy and governance. HKUST has also started to review the University IP and entrepreneurship policies and guidelines to cope with the rapid change in terms of the University's role in innovation and entrepreneurship.

Campus-wide Entrepreneurial Support

HKUST has been actively cultivating an entrepreneurial spirit and flourishing entrepreneurial culture on campus. During the reporting year, entrepreneurial culture-building activities and workshops and specialized trainings have been offered to interested HKUST stakeholders. The establishment of the new entrepreneurship activity center "The BASE" further earmarked student-centric, multi-functional facility designed for promoting the "can-do spirit" on campus.

The BASE - Entrepreneurship

Gap Funding Support - Proof-of-Concept Fund 2016

The Proof-of-Concept Fund (PCF), implemented at HKUST since 2009-10 with the support of the KT Fund, has provided timely gap-funding opportunities to enable pre-commercialization development of promising technologies emerging from the University's research. For 2015-16, 16 PCF applications were received, of which 8 projects were recommended by the PCF Selection Committee composed of industrial experts for a total funding of HK$1.4 million. The University has seen positive outcomes resulting from the PCF Program: 4 PCF projects funded in 2014-15 has formed the basis of 4 startups who have received the TSSSU funding (The Technology Start-up Support Scheme for Universities); another project, "the Mini Pulse Electric Field Water Filtration Technology", has attracted wide interests and several licensing arrangements are being worked out.

Technology Transfer and Commercialization Platforms in Mainland China

Positioned as HKUST's technology transfer & commercialization platform in Mainland, Fok Ying Tung Research Institute (FYTRI) in Nansha launched the International Smart Manufacturing Center in 2016 to serve as an open innovation platform for international collaborative research and technology transfer in the areas of advanced materials, smart manufacturing, and Internet of Things (IoT). It successfully attracted 52 proposals in April 2016. The International Entrepreneurship Platform (IEP) set up this year successfully organized the first Guangzhou One-Million Dollar Entrepreneurship Competition attracting 160 teams. In Shenzhen, based on its past success in executing over 90 research projects, the HKUST Shenzhen Research Institute (SRI) is extending its arena to include Entrepreneurship Competition and startup incubation. The HKUST LED Technology R&D Center at Foshan (LED Center), on the other hand, is migrating toward development of next generation III-V semiconductor device packaging technology.

In view of their achievements with over 170 R&D projects of $HK130 m in 2 years, FYTRI, SRI and LED Center have been all awarded by Guangdong Government as the New Type of Research Institute (新型研發機構) in 2015.

SUPERCOMPUTING SERVICE PLATFORM IN FYTRI

FYTRI launched the Supercomputing Service Platform in June 2016 to provide access to Guangzhou Supercomputing Center (GZSC), which were ranked the world fastest computation speed for six consecutive times before November 2015. This Service Platform, initially open to the researchers at HKUST, is expected to expand its service to other universities in Hong Kong in the near future. Following an information session held successfully on 17 June 2016 that attracted 50 potential users attending the session, 10 requests have been received from HKUST faculty members of various departments. An Advisory Committee has been set up to oversee promotion and service planning, as well as seeking for Hong Kong Government's support. Relevant documentations such as User's Manual and 3-way User Agreement have been created and are ready to use. This Service Platform launched by FYTRI will facilitate leveraging of the world-class computing resources to benefit research activities in Hong Kong.

3. UNDERTAKING TECHNOLOGY TRANSFER ENDEAVORS

INVENTION DISCLOSURE AND IP PROTECTION

HKUST continues the tradition of quality and cost-effective filing and prosecution strategies to assure a high standard of IP protection at HKUST. At the same time, we have initiated a reform on the current Technology Review Process to strengthen and speed up invention submission and review procedures, envisaging better quality control from intake side, as well as a shorter turnaround time for each case. Taking into account of the reported innovations from both Clear Water Bay and the satellite campuses, 100 inventions were disclosed during the period under review and 157 new patent applications have been filed. With 162 newly granted patents, the actual number of active patents and patent applications contained within the University's current IP portfolio is 1026.

Three campus-wide seminars were organized to equip researchers with more IP knowledge and skills, namely "Patent-Eligibility of Life Science Innovations: How to Improve the Chance of Patents" discussing the effect of U.S. Supreme Court decisions on the types of life science innovations eligible for patent protection, "How to Invent and Patent Your Invention" providing a comprehensive discussion on the timeline and strategy for patent filing, and "The Critical Role the Scientist Plays in the Commercialization of IP" exploring the role of scientist in increasing the chance of successful IP commercialization. In total around 200 faculty, students and staff have attended the three seminars.

Seminar on "How to Invent and Patent Your Invention"

Seminar on "The Critical Role the Scientist Plays in the Commercialization of IP

CONTRACT RESEARCH, CONSULTANCY & TESTING SERVICES

Through the University's business arm, HKUST R and D Corporation (RDC), HKUST's faculty members and researchers have offered research and consultancy services to the private sector in a wide spectrum of technological areas including biotechnology, traditional Chinese medicine, advanced materials, information technology, wireless communication, civil and geotechnical engineering, aero-space engineering and environmental science. In the year 2015-16, RDC has served 148 contract

research cases worth a combined funding amount of HK$69.1 million. In addition, there were 24 consultancy projects carried out by our faculty members and researchers that counts HK$6.9 million. Also analytical and testing services have been made available to companies in Hong Kong and elsewhere by making use of the University's major equipment and facilities. Rates and accessibility of the equipment and facilities are available to external clients upon request. 475 jobs have been performed by various University research centers and units, bringing to a total cash receipt of $3.0 million.

Licensing and Relevant Activity

HKUST has been exploring channels and opportunities for intellectual property licensing in various jurisdictions including Hong Kong, China, Japan and USA. As of 30 June 2016, RDC is managing a total of 64 active patent and software licensing agreements. The total cash receipt generated through technology licensing by RDC in the reporting year was HK$2.7 million. HKUST is a leading pioneer in Massive Open Online Course (MOOC) and blended learning and has been actively incorporating this innovative pedagogy into traditional teaching. As of June 2016, 15 HKUST MOOC courseware have been offered on Coursera and 8 on edX through licensing arrangements. Over 750,000 learners have registered for the MOOCs offered by HKUST. The HKUST-developed MOOCs have been translated into Russian for offering in Russia and into Arabic for offering in Saudi Arabia through courseware copyright licensing. HKUST was also selected to develop the certain specializations. With all these, the copyright licensing for MOOC courseware has contributed a revenue of HK$2.2 million. In total, the overall licensing income for 2015-16 is HK$4.9 million.

4. Fostering Entrepreneurial Culture and Ecosystem

Entrepreneurship Cultivation Activity

HKUST aims to ignite the campus with sparks of innovations and entrepreneurship. In this reporting year, 4,248 contact hours of mentorship service and 7,989 contact hours of seminar and workshops have been achieved. Various activities were organized, four of which are highlighted below:

Innovation & Entrepreneurship Training Camp 2015: Held on 14-18 July at HKUST campus with attendees from Hong Kong, China, Russia, Taiwan and Macau, this training camp provided practical knowledge on shaping business ideas into executable fundable business plans.

Build Your Own Business (BYOB) Seminars

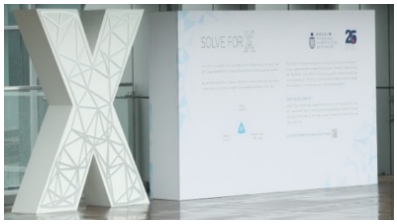
Build Your Own Business (BYOB): This seminar series was organized through the year to share entrepreneurial knowledge and skills. The seminars received good feedbacks that 90% of participants would recommend the event to their peers.

Entrepreneurship Week (E-Week): Two E-weeks were organized in Nov 2015 and April 2016. In total 11 talks, 8 startups exhibitions and promotions were arranged.

Friday Dreamers Workshops: The workshops were implemented in the format of 12 interactive sharing sessions with invited guests. Inspired talks and interactive exhibition were organized to enable students to gain insights how the entrepreneurs overcome the challenges and make their dreams come true.

Google Solve-for-X @ HKUST

HKUST jointly organized with Google the inaugural "Solve for X @ HKUST" on 13 November 2015. This by-invitation only event gathered 100 top-notch thought leaders who share the common vision of utilizing breakthrough technology to solve big global problems facing humanity. Three selected Moonshot projects are: 1) "Non-invasive



"Solve for X @ HKUST" Conference in Hong Kong on 13 Nov 2015

retinal disease treatment via low-energy ultrasound", a technology based on non-invasive, low energy ultrasound to deliver drugs into patient's eyes; 2) "PulseWater", a low-cost mobile device that cleans water using pulse electric field technology; and 3) NanoDeW, a new material that allows sustained removal of moisture without the need for cooling or heating.

ONE-MILLION DOLLAR ENTREPRENEURSHIP COMPETITION 2016

As a forerunner to promote innovation and entrepreneurship, the One-Million Dollar Entrepreneurship Competition has eventually grown from a platform to nurture promising entrepreneurs at HKUST to contests that instill entrepreneurial culture and promotes exchange of ideas among young innovators across the border. The One-Million Dollar Entrepreneurship Competition 2016 was for the first time expanded from the Clear Water Bay campus to Shenzhen, Guangzhou, Beijing and Macau. The Competition motivated over 500 teams from those cities to join the contest. The top three winners of each city will compete in the Grand Final at HKUST FYTRI in Nansha, Guangzhou, on 6 August, 2016.

In the Competition at HKUST campus in Hong Kong, the champion, Sundial Technology, is formed by four HKUST students and advised by Prof Zhiyong Fan from the Department of Electronic and Computer Engineering, developing business on anti-reflection and self-cleaning nano-film for solar panel. NeoForest, the first runner-up, developed a novel air purifier that promises to pump fresh, forest-grade air into an indoor environment. That was achieved by using microalgae which performs photosynthesis that could generate oxygen and clean up carbon dioxide, on top of air pollutants including particulate matter 2.5, formaldehyde, nitrogen oxide and sulphur oxide. The second runner-up, Perfuso, devised a technology that not only reduces the side effects for patients who undergo dialysis, but also halves the time and cost of the treatment and lowers the amount of the bio-waste generated. The team also won the Trade Show Winner Prize.

The 6th Annual One Million Dollar Entrepreneurship Competition at Clear Water Bay

5. EXPANDING HORIZONS FOR KT – INDUSTRIAL ENGAGEMENT

SEMINARS TO INDUSTRIES AND THE GENERAL PUBLIC

HKUST organized various different events open to industries and the private sector as part of the KT endeavors. During the review year, there were 528 public lectures, workshops, and seminars organized. The number of performances and exhibitions of creative works has increased from 51 of last year to 60 of this year. To highlight three events as example, they are the "Big Data – Mobile Technologies for Smart Cities" co-organized with the Cyberport on 7 March 2016 with over 100 guests from local and international industrial communities, the "Risk Management and Business Intelligence Annual Symposium" held on 16 April 2016 providing a platform for professionals to exchange their views on Risk Management (RM) and Business Intelligence (BI) with the speakers from the academic, banking, regulatory, information technology and consultancy sectors and 300 participants in the audience, and the "7th Season of Business Insights Series" bringing the research insights of our faculty members to a wider audience and allowing the community to engage in a dialogue with them.

"Big Data – Mobile Technologies for Smart Cities" co-organized with the Cyberport on 7 March 2016

Industrial Partnership Program of HKUST Robotics Institute

Prof Michael Wang, Director of the Robotics Institute, gave a talk at HKUST Science-for-Lunch

HKUST has launched the Robotics Institute in 2015-16, a major new multidisciplinary research institute to draw on innovations in sensors, devices, systems, networks, neuro-sciences, data analytics, and machine learning to catalyze new research in smart manufacturing, transportation, safety, healthcare, and a broad range of other applications. Since its inception, there have been various activities such as talks, seminars and workshops organized. To fulfill its mission of catalyzing new research and applications that can benefit society, the Robotics Institute is setting up the Industrial Partnership Program (IPP) to facilitate industrial partnership, technology transfer, and entrepreneurship.

Joint Research Grants with Industry to Support Students Innovation

20 Master of Science students from HKUST's School of Engineering were awarded 2015-16 Ford-HKUST Conservation and Environmental Research Grants. The Ford-HKUST Conservation and Environmental Research Grants program is a unique partnership between Ford Motor Company and HKUST to help promote environmental sustainability. The recipients will conduct research projects focusing on green technologies and transportation. Another partner is TCL Corporation who is supporting a similar partnership in the areas of 5G wireless technology, Internet service, and Big Data. Such kind of partnership not only helps students develop empathy to a particular industrial sector, also lead to employment opportunities for graduates. The 2014 Ford-HKUST grant recipient, Mr. Praveen Balaj, now works as a Sheet Metal Formability Engineer at Ford India.

Executive Education

It is worth reporting that School of Business and Management (SBM) has put significant efforts to offer extensive executive education programs that prepare executives for the challenges of today's increasingly globalized business marketplace. 13 open programs with 328 participants and 34 company programs with 1,248 participants were offered. The topics covered range from High Potentials Leadership Consortium Program, Managerial Decision Making and Leadership, Strategic Financial Management for Non-Financial Managers, Leading for Success Consortium Program, Family Business Leading Generations of Excellence, to Big Data Applications in Business. Another impactful program is The HKUST Leadership and Public Policy Executive Education Programs designed for senior executives and those who aspire to become the next generation of leaders. These programs consist of thematic series of small seminars to enable deep and candid discussions, and are based on the combined strengths of HKUST, Oxford, Smith College, and other expertise in the region and around the world. It emphasizes critical thinking, analytical frameworks, comparative and international perspectives, and takes evidence-based approaches to policy issues. Areas covered range from local and global economies to social development, governance, science and technology, and leadership.

6. Developing Industrial Partnership and Collaboration

WeChat-HKUST Joint Lab on Artificial Intelligence (WHAT Lab)

The WHAT Lab was established in Nov 2015 aiming to collaborate across multiple areas of artificial intelligence, namely natural language processing, robotics, computer vision, speech recognition, network science and so on. Located within the Big Data Lab of CYT building, WHAT Lab involves more than 10 faculties from various academic background and 20 postgraduate students.

Officiating guests at the plaque unveiling ceremony for WHAT Lab

Collaboration with Aviation Industry Corporation of China (AVIC)

HKUST and AVIC jointly established the "Advanced Aircraft Noise Technology Center" (AANTC) on 8 July 2015. Prof. Tony Chan and the Deputy General Manager of AVIC Mr. Zhang Xinguo officiated the opening ceremony held at HKUST. AANTC aims to establish a world-class aviation acoustic technology research capability with the three main research directions, namely “low-noise technology” to improve the noise aircraft performance by using noise assessment, materials and simulation technologies; the “low noise operation” that takes the measures in safe and effective transport management mode to reduce aircraft noise; and the “low-noise perception” aiming to understand perceived annoyance factor for more effective low noise operation.

Platform Research Project with Industrial Partners

In the reporting year, there were multiply large scale platform research projects funded by ITF funds that have deep engagement with industrial partners of diverse background. To highlight three of them, the first one is the ITF platform research project entitled “Big Data Platform for Smart Transportation Applications with Heterogeneous Data Sources” by partnering with a multinational corporation that is the global leader in mass transportation; the second one entitled “People-Aware Smart City: A People-Centered Integration, Mining and Decision Framework”, another ITF platform project, is partnering with a listed Chinese company which is the one of the largest integrated IT service provider; and the third one is entitled “A Big Data Architecture and Machine Learning Initiative for Real-time Landslide Monitoring and Early Warning System in Hong Kong” by partnering with a local construction company, and the Hong Kong Geotechnical Engineering Office (GEO).

Collaboration in the Area of IC Design

The HKUST's IC Design Village team has developed energy-efficient DC-DC converter, LDO, LED-driver and GaNFET prototypes, and pilots such IP with the industrial partner with one of the top-3 IC design corporations in China to scale out the applicability. Both sides further the co-operation through the project – Integrated Power Management IC - for the next-generation Multiple Global Navigation Satellite System (GNSS) technology. Such partnership helps build up quality IC design process, train up IC R&D workforce in Hong Kong, and develop industrial applicability for university research outputs.

Partnership with the Global Association of Risk Professionals

The HKUST School of Business and Management (SBM) has entered into an academic partnership with the Global Association of Risk Professionals (GARP). The partnership entails that the HKUST Master of Science Program in Investment Management aligns with industry-recognized standards, and thus provides better opportunity for students to become globally qualified risk management professionals. By teaching 70% of the knowledge required for the Financial Risk Manager (FRM) designation exam, the HKUST Master of Science Program in Investment Management is structured to meet the growing demand for specialized finance professions including risk management. With part-time and full-time study modes, the Program has also formed academic partnerships with professional associations such as the Chartered Alternatives Investment Analysts (CAIA) and the Chartered Financial Analysts (CFA).

7. Efforts Towards Community Engagement

Partnership with Hong Kong Federation of Youth Groups to Nurture Young Talents

HKUST has launched the "Innovating Today, Imagining Tomorrow" Mentorship Program in collaboration with The Hong Kong Federation of Youth Groups (HKFYG) to serve the local community and nurture future leaders. The mentorship program is one of the many community engagement events to mark the University's 25th Anniversary. A total of 26 faculty members from all five Schools participated in the mentorship program and each student was assigned to one HKUST faculty member as mentor who will share their experience and offer advice on personal growth and academic pursuit.

70 Form 4-5 students participate in the "Innovating Today, Imagining Tomorrow" Mentorship Program

Helping Family Businesses to Succeed across Generations

The Tanoto Center for Asian Family Business and Entrepreneurship Studies of HKUST School of Business and Management (SBM) has held its first open enrolment program with a focus on the succession issues of ethnic Chinese family businesses. The three-day bilingual program, held in November 2015, was attended by 16 founders and next generation members of family businesses in Hong Kong, China, Malaysia and South Korea, spanning from the first to fifth generations. The program instructors shared research findings on how Chinese family businesses retain control beyond three generations and how they differ from other ethnic groups. They also spoke on the challenges faced by outsiders working in family businesses, and the roles of family governance, family offices, trusts and foundations in preserving family wealth, harmony and legacy.

Student Innovation for Global Health Technology (SIGHT) Program

SIGHT in the media

SIGHT is an undergraduate education platform that transforms passion and creativity of students into innovative solutions for health care problems around the world. SIGHT integrates course work, team project, and overseas study trip to provide learning experience that transcends the borders of disciplines, geography, and culture. Recent SIGHT projects include "A mobile electronic health record system for mobile clinics in Cambodia", "A joystick keyboard for patients with myopathy", "A sustainable way to bring clean water to the rural areas of Guizhou", and "A mobile app to screen for diabetic retinopathy in Indonesia".

A Landslide Warning System for Province Road 303 in Sichuan

Province Road 303 is the largest of the 156 reconstruction projects sponsored by the Hong Kong Government in support of reconstruction in the Sichuan Earthquake stricken areas. The HKUST team from the Department of Civil & Environmental Engineering firstly evaluated the landslide risks along the road and assisted the risk-based decision of the new highway alignment, and then installed a landslide warning system along the 45 km highway from Wolong to Yingxiu in 2015.

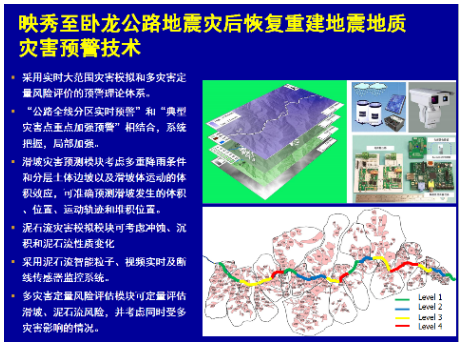


Illustration of Province Road 303 and the landslide warning system

"FORCE FOR CHANGE: INVENTIONS FOR THE COMMUNITY"

Group Photo of Disney-HKUST Grant Project Event

The Walt Disney Company (HK) and HKUST have jointly established the "Disney-HKUST Grant for Technology and Well-being". Student teams were given the mission in September 2015 to develop projects that improve the lives of people with physical disabilities, support local productivity, or promote health and wellness in affordable ways. They were also tasked to work within their resources and co-design with alumni mentors in giving their creations eye-catching and futuristic looks. The three distinguished projects were highlighted on 3 May 2016, which are the "Real-time Sign Language Translation Device" inspired by the hand of C3PO from "Star Wars", the "Gaze and Mind Controlled Robot Car" resembling to the Sandcrawler vehicle, and the "Airship UAV Crop Doctor" themed after the charismatic and mischievous astromech droid, R2D2.

FACULTY OPINIONS - ARTICLE CONTRIBUTIONS TO MEDIA

A total of 50 articles have been contributed to a dedicated column (解牛集) in Hong Kong Economic Journal by our faculty in School of Business and Management (SBM), which carry expert opinions related to a broad range of topics, including global investment market, macroeconomic issues, corporate governance, innovation and technology development, etc. A total of 25 research papers have been summarized and translated into Chinese for distribution to about 1,200 subscribers. All of them have been re-published either on SCMP Education Post online or the Global Network for Advanced Management, an education alliance formed by 28 business schools around the world. About another 120 articles or commentaries written by faculty and media reports with our faculty comments quoted after interviews were tracked during the reporting period, which showcase the expert knowledge and research of our faculty and research centers.

HKUST HOSTS FIRST ASIAN PHYSICS OLYMPIAD IN HONG KONG

Officiating guests of the 17th Asian Physics Olympiad

HKUST hosted the 17th annual Asian Physics Olympiad (APhO) for the first time in Hong Kong in May 2016. About 200 secondary school students from 26 Asian countries and regions competed in APhO 2016 – the largest scale since APhO was founded in 2000. HKUST has been dedicated to nurturing science and technology talents and commissioned by the Hong Kong Academy of Gifted Education to provide a series of enhancement courses in physics to student contestants who represent Hong Kong to take part in APhO and IPhO – nurturing 73 Gold, Silver and Bronze medalists in the two prestigious physics competitions.

THE INTIMACY OF CREATIVITY 2016 FESTIVAL

The Intimacy of Creativity 2016 World Premiere Concert – Hong Kong Philharmonic Orchestra; Bright Sheng, artistic director and conductor

School of Humanities & Social Science (SHSS) presented The Intimacy of Creativity 2016 Festival featuring a season-long collaboration with the renowned Hong Kong Philharmonic Orchestra, joined by guest artists and composer fellows, and artistic director Prof Bright Sheng. Events included a Five Year Retrospective Concert at the Hong Kong City Hall Theatre and a World Premiere Concert at the Hong Kong Culture Centre with a combined attendance of over 2100. The HKUST Music

Alive concert series presented 5 concerts featuring internationally and locally-renowned artists to an audience of over 1800 HKUST staff and students and the general public.

The Chinese Creative Writing Program

The Chinese Creative Writing Program, directed by Senior Visiting Fellow and famous literary critic Prof. Liu Zaifu and Prof. Liu Jianmei was launched in 2013 jointly by the Institute for Advanced Study (IAS) and the School of Humanities and Social Science (SHSS). Open to the public, these public talks and international conferences have attracted over 4000 audiences since 2013. It was designed to galvanize a selected group of the world's top intellectuals – in this case, writers – to nurture HKUST's gifted students and to excite public interest throughout Hong Kong in the dynamism of contemporary Chinese creative writing. The program has organized public talks that featured Sin Wai Kin Visiting Professor Yan Lianke, the winner of Franz Kafka Literary Prize in 2014, as well as renowned writers-in-residence at HKUST such as Mr. Yu Hua, Mr. Su Tong, Ms. Shu Ting, Ms. Chi Zijian, Mr. Li Er, and Nobel Literary Laureate Mr. Gao Xingjian. The Division of Humanities offers a popular public lecture series in which faculty introduce their work to Hong Kong. These lectures are jointly organized with the Hong Kong Museum of History in their Tsim Sha Tsui East lecture theatre for the public twice a month. During the period between 1 July 2015 and 30 June 2016, 18 Public Humanities Lectures were offered with a total attendance of 847.

8. Creation and Incubation of Startup Company

HKUST Entrepreneurship Program

The HKUST Entrepreneurship Program (EP), which has been in operation since 1999 to assist faculty members, alumni and students in the establishment of technology-based start-up companies, has helped the formation of 58 technology startup companies in the Clear Water Bay campus, of which 35 are currently economically active. Among the 35 active companies, the 10 newest EP companies (Refer to the Appendix B) are currently stationing inside the Clear Water Bay incubation premises, while the rest of 25 (Refer to the Appendix C) have graduated and moved away from the campus incubation premises.

The Program is in the process of expanding the eligibility to the start-ups located in the HKUST's Mainland platforms in Nanshan (Guangzhou) and Shenzhen. The first two start-ups admitted into the Program are Guangzhou Mesh Info Technology Ltd. and Guangzhou Caizhi New Material Ltd, who station in the HKUST FYTRI campus in Nansha. The Program for pre-incubation in the premises of the HKUST Shenzhen Research Institute (SRI) will be officially launched in late 2016. Nevertheless SRI has already hosted 15 startup companies that are relevant to HKUST (Refer to the Appendix D). Without double-counting those who have already been included in the Appendices B and C, it adds 11 more companies to the list of total number of the HKUST affiliated economically active companies.

The Program has also established joint incubation with Hong Kong Science and Technology Park (HKSTP), through which HKUST's EP companies will enjoy the Aid Package funding provided to HKSTP's incubatees, whether they are located in HKSTP's Incubation Centre or HKUST's designated incubation premises.

Technology Start-up Support Scheme for Universities (TSSSU)

The TSSSU Program launched in 2014 by the Innovation and Technology Commission provides an annual funding of up to HK$4 million, initially for three years, to each university to support students and faculties' technology startups. It has provided a critical funding support in the entire technology transfer value-chain that translates new research outcomes into business opportunities and support the growth of economy. In HKUST's case, it offers in

TSSSU 2015/16 Start-up Awardees attended the Signing Ceremony on 4 June 2015

particular logical extensions of the gap funding like Proof-of-Concept Fund to the next stage - building business startups around the works emerging from PCF projects. In the reporting year, TSSSU program has successfully attracted 50 applications, which doubled the application number of the past year. The vetting committee consisted of industrial experts from different background recommended 10 fundable start-ups, which makes the total numbers of HKUST affiliated TSSSU funded start-ups to 21 (Refer to the Appendix E).

Altogether, the total number of the HKUST affiliated economically active companies has reached 60 in 2015-16, including both those located in the Clear Water Bay campus or Mainland campuses (FYTRI in Nansha and SRI in Shenzhen) and those funded by TSSSU Program.

9. LOOKING FORWARD

Looking forward, HKUST is keen on expanding and enhancing the culture of HKUST to embrace and support innovation and entrepreneurship for public benefit. HKUST will further advance a globally engaging and locally contributing KT infrastructure for intellectual property (IP) management, industrial collaboration, technology transfer and commercialization, and entrepreneurship at HKUST, and foster an inspiring, engaging and vibrant entrepreneurial environment through comprehensive education offerings and activities. We aim to develop an innovation and entrepreneurship ecosystem to catalyze technology commercialization and start-up formation, and be more prepared to help the social and economic development of the society.

APPENDIX A – KEY PERFORMANCE INDICATORS

Performance Indicator		2014/15 (Achieved)		2015/16 (Achieved)	
Number of patents filed in the year		198		157 [Note 1]	
Number of patents granted in the year		93		162 [Note 2]	
Number of licenses granted		54		64	
	1. Exclusive license	27		31	
	2. Non-exclusive license	27		33	
	3. Option	0		0	
Income (on cash basis) generated from intellectual property rights		$5.3		$4.9M [Note 4]	
Expenditure involved in generating income from intellectual property rights [Note 3]		$6.3M		$6.2M	
Number of economically active spin-off and startup companies (with breakdown by type)		47 (29 spin-off, 18 start-up)		60 [Note 6]	
	Companies with institutional ownership and using IP from HKUST	17		11	
	Companies with institutional ownership but not using IP from HKUST	30		24	
	Companies with no institutional ownership but using IP from HKUST	N.A.		12	
	Companies with no institutional ownership and not using IP from HKUST but set up by HKUST alumni	N.A.		13	
Number of collaborative researches, and income thereby generated		84	$163.0M	78	$154.5M
Note 5	With local collaborating organizations	49	$105.8M	58	$141.1M
	With Mainland collaborating organizations	45	$70.7M	45	$77.5M

[Note 1] CDCF Table 65: The number of patents filed is 157 and the number of inventions involved is 139 in the 2015/16 period. Starting from 2013/14, the number reported also including patents filed by satellite campus.
[Note 2] CDCF Table 66: The number of patents granted is 162 and the number of inventions involved is 84 in the 2015/16 period. Starting from 2013/14, the number reported also including patents granted by satellite campus.
[Note 3] The expenditure involved was used to support new patent applications for the reporting year and as well as the patent related expenses for all active patent applications and maintenance fees in the HKUST patent portfolio.
[Note 4] It includes both licensing incomes from patent via RDC and copyright of courseware via the University.
[Note 5] These figures do not add up as some projects may involve a combination of local, Mainland, and/or overseas collaborating organizations.
[Note 6] The number of economically active spin-off and startup companies has included the economically active spin-off and startup companies under the HKUST Entrepreneurship Program, including both located in the main campus and satellite campuses (FYTRI in Nansha and SRI in Shenzhen), and those funded by TSSSU (Technology Start-up Support Scheme for University) Program. Company admitted to both the EP Program and TSSSU Program or having offices in more than one location only counts once.

Performance Indicator	2014/15 (Achieved)		2015/16 (Achieved)	
With overseas collaborating organizations	48	$85.4M	46	$90.8M
Number of contract researches (other than those included in "collaborative researches" above), and income thereby generated	165	$48.9M	148	$69.1M [Note 7]
Local (Hong Kong)	103	$26.7M	96	$45.7M
China	46	$17.9M	42	$19.2M
International (excluding China)	16	$4.3M	10	$4.2M
Number of consultancies, and income thereby generated	35	$9.4M	24	$6.9M [Note 8]
Number of equipment and facilities service agreements, and income thereby generated	495	$2.2M	475	$3.0M
Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD needs	26,288 hours		24,080 hours	
Income received from Continuing Professional Development (CPD) courses	$18.3M		$20.0M	
Number of public lectures / symposiums / exhibitions and speeches to a community audience	240		528	
Number of performances and exhibitions of creative works by staff or students [Note 9]	51		60	
Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	392		402	

[Note 7] The total number of new contract and contract value for contract researches agreements signed in the 2015/16 period is 97 and HK$56.9 million.
[Note 8] The total number of new contract and contract value for consultancy agreements signed in the 2015/16 period is 6 and HK$1.2 million.
[Note 9] The numbers reported only include events held at museums and galleries owned by HKUST (as per the Common Data Collection Format (CDCF) requirements).

APPENDIX B – ACTIVE STARTUP COMPANIES OF HKUST ENTREPRENEURSHIP PROGRAM

Admitted Year	Company Name
2015-2016	1. Free Flow Technology Limited
	2. Guangzhou Mesh Info Technology Limited
	3. Hong Kong Innovative Display Technology Limited
	4. Magnum Research Limited
	5. Mannay Biotechnology (Hong Kong) Company Limited
	6. 廣州材智新材料科技有限公司
2014-2015	1. AuVi Entertainment Inc. Limited
	2. Everest Innovation Technology Limited
	3. iVo Technologies Limited
2013-2014	1. Sane Form Limited

APPENDIX C – ACTIVE SPIN-OFF COMPANIES OF HKUST ENTREPRENEURSHIP PROGRAM

Graduation Year	Company Name
2015-2016	1. CWB Tech Limited
	2. eTron Electronic Materials (Hong Kong) Co. Limited
	3. Guangdong Hiway Integrated Circuit Technology (HK) Limited
	4. Wah Kin Holdings Limited
2014-2015	1. BioRx Limited
	2. Congruence Technology Limited
	3. HKG Technologies Limited
	4. NEOID Limited
2012-2013	1. SupBuyer.Com (HK) IT Company Limited
2011-2012	1. iFlight Technology Company Limited
2010-2011	1. Fustec Company Limited
	2. Gene-vinate Limited
2008-2009	1. Advanced Packaging Technology Limited (renamed as Advanced Photoelectronic Technology in Jan 2009)
	2. Googel Technology (Hong Kong) Limited
	3. Himax Display, Inc
	4. PharmacoGenetics Limited
2007-2008	1. Blue Solve Limited
2006-2007	1. Acron International Technology Limited
	2. Bio-Click Technologies Limited
	3. MoFinity Limited
	4. TIM EDPlatform Limited
2005-2006	1. Perception Digital Limited (renamed as HongDa Financial Holding Ltd in June 2016)
2004-2005	1. Brilliant Concept Technologies Limited (renamed as Brilliant Concept International Group Limited in Mar 2013)
2001-2002	1. Radica Systems Limited
	2. SinoCDN Limited

APPENDIX D – ACTIVE START-UP COMPANIES HOSTED BY THE HKUST SHENZHEN RESEARCH INSTITUTE (SRI)

Company Name
1. AUVI Entertainment *
2. Beken
3. Biom Technology
4. DJI Innovation*
5. Euraka Bio
6. Future Factory
7. Gold Mofang
8. Googel Technology*
9. HiHex
10. Huake Technology
11. Kaka Bio
12. MUC Technology
13. Perception Digital*
14. Velda Soft
15. Yunzhou-Technology

* Note: These companies have also been included in the List of Appendices B or C.

APPENDIX E – TECHNOLOGY START-UP SUPPORT SCHEME FOR UNIVERSITIES (TSSSU) FUNDED COMPANIES BETWEEN 2014/15 – 2016/17

Year	Company Name
2016-2017	1.AIEgen Biotech Co., Limited
	2.beNovelty Limited
	3.CoilEasy Technologies Limited
	4.Compathnion Technology Limited
	5.DelTron Intelligence Technology Limited
	6.Mindvivid Limited
	7.MultiMedia Big Data Analytics Limited
	8.NovaMatrix Limited
	9.Pear Limited
	10. SeaSafe Limited
2015-2016	1. Acoustic Metamaterials Company Limited
	2. eTron Electronic Materials (Hong Kong) Co. Limited
	3. Everest Innovation Technology Limited
	4. Free Flow Technology Limited
	5. Hong Kong Innovative Display Technology Limited
	6. Jetcomm Technologies Limited
	7. NanoBioImaging Limited
	8. Sonikure Technology Limited
	9. Yfisoft Limited
2014-2015	1. Acoustic Metamaterials Company Limited
	2. Ananflow Technology Limited
	3. Everest Innovation Technology Limited
	4. Hong Kong Innovative Display Technology Limited
	5. iVo Technologies Company Limited
	6. NanoBioImaging Limited
	7. Yfisoft Limited