THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

# Annual Report on Activities and Advancement of Knowledge Transfer

Supported by earmarked UGC Funding
FY2017-18

Sustainability


Fintech

Healthcare

*31 July 2018*

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# 1. Executive Summary: KT & Entrepreneurship @ PolyU

## 1.1. Review of KT Activities in FY2017-18

This report summarizes key KT activities and developments of PolyU in FY2017-18. Observations and suggestions from UGC in the past have been duly considered for improving related KT developments and practices. The recurrent UGC KT fund also enabled the University to embark on a longer-term roadmap in its latest strategic planning exercise, with refined positioning to create higher impact in various KT and Entrepreneurship activities.

In FY2017-18, income generated from mainstream KT activities, namely, consultancy, contract research under consultancy and licensing[1] amounted to $112.1 million (LY: $110.1 million, +1.8%). The aggregate value of on-going collaborative research projects on hand was $614 million. For entrepreneurship, the new 'Lean Launchpad Programme' launched its pilot cohort in early 2018 aiming to promote KT and commercialization of PolyU's technologies through technology venturing, whereas the University continued to forge regional partnership and collaborations to further support KT and entrepreneurship holistically.

In this fiscal year, the University continued to partner with industry in driving impactful applied R&D and commercialization. Along this line, several new research centres/institutes were established with strong industry support, including the AMTD-FinTech Centre of PolyU Faculty of Business, the PolyU-Monash University-CollinStar Capital Joint Laboratory on Blockchain and Crypto-currency Technologies, and the University Research Facility in Big Data Analytics (UBDA), the first university-wide research facility to offer big data analytics support to PolyU faculties.

## 1.2. Developing Strategic KT and Entrepreneurship

With FY2017-18 being the last year of the current 6-year strategic plan, the University has locked in another long-term strategic development cycle spanning 7 years from 2018 to 2024 with FY2018-19 as the 'gap year' in alignment with UGC's triennium planning cycle. In addition to supporting the two core activities in Learning & Teaching and Research, the domain under "KT, entrepreneurship and wider engagement" is enlisted as a core strategic component supporting University Mission and Vision in a holistic manner.

With increased government advocacy to make use of research deliverables for creating impact through various KT efforts and entrepreneurial ventures, the University has been re-visiting its policies and operations for adding better value and impact through the KT process, making use of new knowledge created in academia to value-added applications to industries and the society at large. The areas of concern involve initiatives to accommodate the emergent paradigm shift in the triple helix system initiated by the Hong Kong SAR government. Such repositioning of innovation and technology policy has already resulted in related action plans for PolyU in FY2017-18, ranging from inducing deeper university-industry partnership with domain platforms to engaging entrepreneur-in-residence in our co-creation space InnoHub. The rapid growth of the start-up communities in Hong Kong and its nearby region also gives rise to ample opportunities for the University to advance technology commercialisation through start-ups, perhaps not so much in trying to breed successful unicorns than to prepare young graduates' lifelong pursuit of personal values using university entrepreneurship education as the first building blocks. It is in such belief that the University has further streamlined its technology license process and expanded its entrepreneurship training lineup to support student endeavours to commercialize research outputs. In the near future, related intellectual property and KT policies will be further enhanced to facilitate faculty and students' participation to commercialize their own inventions through starting their own companies.

[1] Recognized through PolyU's wholly owned subsidiary, PolyU Technology and Consultancy Co. Ltd. (PTeC), contract research income through the Research Office has not been included.

Sections 2 to 4 of this Report provide further information with respect of the University's effort and achievements in the respective areas, with Section 5 and 6 highlighting related performance measures and the actual deployment of the KT Fund.

## 2. Creating Impact for Industry and Society

Underpinned by solid scholarly research, the University has been trying to align the application of its technologies towards areas of strategic developmental interest to the government, as illustrated by selected examples in the rest of this Section.

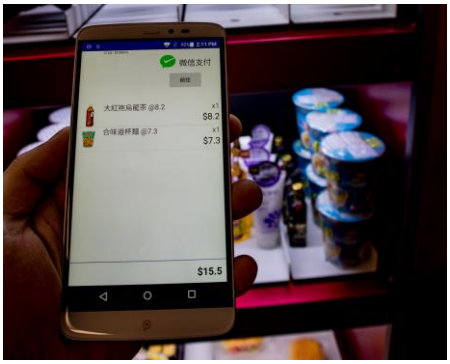
### 2.1 Artificial Intelligence and Fintech Solutions

#### (a) Application of Block Chain for Notarization

Collaborating with Monash University and CollinStar Capital in a 3-year programme, PolyU established the first university-industry joint research laboratory on block chain and cryptocurrency technologies in Hong Kong in March 2018, aiming to enhance the security and privacy of blockchain technology against conventional and quantum computers. The team also worked with Valigo Limited, a fintech consultancy firm to design a blockchain-based system for identity management and notarization, improving digital security by allowing users to selectively share sensitive private information with trusted third parties for specific purposes. The system can effectively reduce the 'know your customer' verification cost for banking and claims processing in the finance and insurance industry.

#### (b) Smart shelves for Future Retailing – Using AI and Machine Learning

Even with the growing trend in online retailing, the online experience cannot completely replace visual and other sensory experiences in shopping in physical stores. To enhance the in-store retail experience, Quantum Cybertech Ltd. engaged PolyU to develop a 'smart shelf' system prototype making use of artificial intelligence, deep learning, computer vision, sensor fusion and big data analytics to automatically keep tabs on product movements. Smart shelves are electronically connected to enable real-time product inventory tracking, allowing lean and just-in-time inventory management behind the retail shelves. It can also gather information regarding buyer personas, bringing benefit to both the customers and the retailers in their shop encounter.




### 2.2 Urban Sustainability and Green Technologies

#### (a) Enhancing Efficiency in Tree Management

The Hong Kong Government strives to improve quality of our living environment through active planting, proper maintenance and preservation of trees in Hong Kong. New technologies are being explored for tree data collection and their health monitoring. Using the latest remote sensing and geomatics technology, PolyU is working with Highways Department to set up a spectral library of common tree species with varying health conditions and to collect tree data via hyperspectral imagery. The approach is a massive improvement from conventional visual inspection that is both labour intensive, somewhat subjective, and often not feasible for trees located in terrains off limit to inspectors' access.

Our researchers are also exploring the application of Smart Sensing Technology (SST) and Geographic Information Systems (GIS) to monitor the stability (e.g. tilt) and health condition of trees. Data collected daily by the sensors are fed to a central system and analysed using Big Data technology to monitor trees on a mass scale, showing the trees' geographical location, their stability and change in tilt angles. The successful application of this technology will facilitate better tree management, improve air quality and enhance public safety. Funded by the Hong Kong Jockey Club Charities Trust, PolyU

led the project with the participation of University of Hong Kong, the Hong Kong University of Science and Technology and Friends of the Earth (Hong Kong).

### (b) Sustainable Road Technologies

Hong Kong's roads are heavily used by more than 0.7 million vehicles over a transport network of 2,100 kilometres. Together with the dense development and difficult terrain, road construction and maintenance impose constant challenges to highway engineers. To reduce the waste problem created by scrap tyres, PolyU's researchers worked closely with Highways Department (HyD) to study the rubberized bituminous pavement materials and the optimal amount of crumb rubber from scrap tyres that can be added to different bituminous pavement materials without jeopardizing their engineering performance for application in Hong Kong's road networks.

'Thin surfacing' is widely recognized overseas as a good alternative for low noise road surfacing. Our researchers evaluated its engineering performance against standard bituminous surfacing materials to come up with a mixture design for Hong Kong.

Our researchers also reviewed traffic noise reduction techniques on concrete road surfaces, assessing the feasibility of diamond grinding techniques for Hong Kong's roads. This study involved literature review of overseas practices, laboratory testing of diamond grinding, with recommendations to Environmental Protection Department (EPD) for possible adoption of certain techniques.

### (c) Improving Waste Sorting Facilities for a Greener Built Environment

In Hong Kong, construction and demolition (C&D) waste are produced in huge quantities. Their disposal inevitably aggravates severe social and environmental challenges due to the acute shortage of landfill and compatible waste disposal facilities. Government has been encouraging the reduction and sorting of waste by imposing various levies and charges, together with active pursuit of waste recycling for beneficial use. Working with Civil Engineering and Development Department (CEDD), our researchers carried out comprehensive efficiency studies for two construction waste sorting facilities in Tseung Kwan O and Tuen Mun, analysing engineering properties of materials sorted; identifying reuse / recyclable outlets for processed materials with quality control; and recommending measures to enhance the efficiency of the sorting operation. The study will enable CEDD to optimise existing sorting operations with recommendation on establishing new recycling plants for two existing sorting facilities to "Promote a Greener Built Environment" advocated by the Construction Industry Council.

## 2.3 Promoting Healthy Living and Wellbeing

### (a) Government Engages Public in Defining Scope of New Hong Kong Rehabilitation Programme Plan

The Labour and Welfare Bureau launched the first stage public consultation exercise in March 2018 to seek public views on formulating a new Hong Kong Rehabilitation Programme Plan (RPP). The RPP sets out the strategic directions as well as the short, medium and long-term measures to address the various service needs of persons with disabilities, covering domains for residential and daycare, community support, employment, barrier-free facilities, transport, healthcare, education, sports and arts. Our researchers were tasked to support the Government to upgrade the current RPP that was set up more than a decade ago back in 2007. The exercise would include four public consultation sessions over 2 years to collect views from the public to generate a new RPP to meet the current needs of the society, aiming for the subjects' full participation in social life, personal development and equal opportunities.

### (b) A Study on Parenting Practices in Hong Kong

PolyU's researchers were engaged by the former Central Policy Unit to undertake a study on 'Parenting Practices in Hong Kong', involving a territory-wide survey to map out current parenting practices in Hong Kong,

factors affecting parenting decisions, source of parenting stress, impact on parent-child relationships, child development and family functioning. Focus group interviews with parents, desktop study on overseas practices for supporting families and parenting and interviews with stakeholders were also carried out. The report of the study is available on the Family Council's website with policy recommendations for promoting positive values on family formation and childrearing in Hong Kong.

### (c) Developing Guidelines on Good Practice of Using Frying Oil

Frying is a common method for food preparation in local food and catering trades. Yet, over repeated use, undesirable changes in the frying oil may occur, resulting in the formation of harmful substances that could affect the health and safety of the consumers. Initiated by the Food and Environmental Hygiene Department, PolyU researchers commenced a 20-month investigation to develop guidelines on good practice in the use of frying oil. Working with local food traders and food chains, the researchers carried out studies on the safety and quality of cooking oil after repeated use, checking also if migration of harmful substances such as arsenic and lead from food to oil would occur during deep-frying. A set of guidelines would be developed and availed to food traders to promote wholesome and safer food preparation, while at the same time preserving the quality of frying oil over longer time.

## 3. Engaging Partners and Communities

To facilitate impactful knowledge transfer, commercialization and entrepreneurship development, PolyU has been actively engaging industries and communities to cultivate collaborative networks and partnerships. At the same time, both conventional marketing channels as well as the online social media are adopted to disseminate relevant information to targeted market segments.

### 3.1. Partnering with Industries for KT

### (a) Launch of Food Hygiene Standard Certification System

To increase public awareness on food hygiene and raise the standard of the catering industry, PolyU proactively promoted the Food Hygiene Standard Certification System (FHSCS) it developed over the past few years. Accreditation for good use of the system by caterers concerned was designed to encourage the wider adoption of the System through third party training and audit. The launching of the System was commemorated with key stakeholder representatives from the Government, the catering industry, certification bodies, supporting organizations, consultancy firms and academics. The event attracted around 280 press reports on both online and printed media.

### (b) International Invention Expos

PolyU's participation in the 46th International Exhibition of Inventions Geneva in April 2018 was highly rewarding. The University was honoured with 10 prizes in total, including the grand prize (overall championship), 1 grand award, 3 special gold medals, 4 gold medals and 1 special merit award for its 7 inventions featured at the event. The Defocus Incorporated Multiple Segments (DIMS) Spectacle Lens for myopia control, which was invented by PolyU and the research collaborator HOYA Corporation, was recognised with the grand prize of the event. The event generated extensive publicity and international awareness of PolyU's effort and achievement in innovation and technology application.

The University's KT achievements had been communicated and updated through timely dispatch of press releases and posts on social media. Apart from on-site interviews conducted by 7 international media organizations, a press conference on DIMS Spectacle Lens was held in Hong Kong soon after the event, with wide coverage by local newspapers, TV and radio stations, and on numerous online media.

Two major post-event celebratory activities took place in the following months. In May, PolyU staged the Star Tech Salon 2018, featuring a ceremony, sharing by industry partners, a mini exhibition of all the award-winning projects, and a networking reception. With the Secretary for Innovation and Technology and Deputy Swiss Consul-General as honoured guests, the event attracted over 150 guests including Government officials, LegCo members, district councilors, professional and trade association members, alumni entrepreneurs, and representatives from intermediaries. In June, PolyU's award-winning projects, among others, were showcased in a celebratory event at the Government Headquarters. The Chief Executive reception attracted key figures in the industry and trade, with the Swiss Consul-General as the honoured diplomat.

In addition to the Geneva expo, two PolyU innovations won Global Innovation Awards at the 2018 TechConnect World Conference & Expo held in Washington D.C., U.S.A.

### (c) Trade Shows

Throughout the year, PolyU actively participated in numerous trade shows targeted at audiences from specific industries. The University's ICT technologies were showcased at Hong Kong Electronics Fair 2017 (Autumn Edition) and Hong Kong ICT Expo 2018. In the Hong Kong International Medical Devices and Supplies Fair 2018, PolyU's healthcare and rehabilitation technologies were presented to healthcare sector visitors. Our railway monitoring system was featured in Asia Pacific Rail 2018.

PolyU increased its marketing footprint in the Chinese Mainland, including the Greater Bay Area. During the year, the University participated in 7 exhibitions in 5 cities, covering Guangzhou, Kunming, Shanghai, Shenzhen and Suzhou. In Southeast Asia, selected PolyU technologies were marketed at TechInnovation 2017 and Innovfest Unbound 2018 in Singapore, as well as Rail Solutions Asia 2018 in Malaysia.

### (d) Industry-specific Promotion of Technologies

To enhance industry's awareness of PolyU's research expertise and technologies, technology networking seminars, presentations, business matching sessions and lab tours were organized for industrial sectors concerned. Featured technologies included graphene/CNT-embedded nanofibres, high energy rays shielding textiles. To promote PolyU's R&D facilities and capabilities, guided tours to the University Research Facility in 3D Printing (U3DP), Game Lab, and the State Key Lab of Chinese Medicine and Molecular Pharmacology (Shenzhen) were arranged for collaborating industry and business affiliates.

### (e) Networks and Partnership

Continuous efforts were made to connect with industrial communities, creating platforms to promote the University's KT and entrepreneurship activities. Among them are Poly-preneurs, PolyU's alumni entrepreneur community, with over 750 members to date. During the reporting period, a panoply of activities such as the entrepreneurs sharing series (seminars and monthly success stories), thematic campus visits and social functions were staged to strengthen networking among participants and their sense of belonging to the larger PolyU community.

A number of crossover networking activities were organised to bring synergy across different stakeholder communities like the academic staff, Poly-preneurs, business associations, start-ups and industry at large. PolyU also actively promoted the University's innovations and technologies to major trade and industry associations such as The Hong Kong General Chamber of Commerce, Federation of Hong Kong Industries, The Chinese General Chamber of Commerce, and The Chinese Manufacturers' Association of Hong Kong. PolyU's

commitment to university-industry partnership had been rewarded with the "SME Best Partner Award" for the 13th consecutive year by the Hong Kong General Chamber of Small and Medium Business.

### 3.2. Engaging Communities for Knowledge Dissemination and Exchange

#### (a) KT Communication Campaign

To promote PolyU's KT endeavours and accomplishments to the wider community, an intensive communication campaign was staged across print and online media last year. Spanning a period of 15 weeks from June to September in 2017, the campaign ran 15 supplements in Hong Kong Economic Times and 14 YouTube videos about the winning projects of PolyU Distinguished Knowledge Transfer Awards 2017, as well as a specially designed game on social media to draw in more attention from the public. The campaign was well received with more than 280,000 people leaving 488,000 impressions on the Facebook page, echoing PolyU's multifaceted KT strengths and their far-reaching impact.

#### (b) Publicity, Publications and Online Marketing

Various publicity channels were employed to communicate PolyU technologies to target audiences. PolyU's innovations were regularly featured in the University's printed and electronic publications, including "Technology Frontier", "excel@PolyU" and "PolyU Milestones". With exponential growth in on-line media communication space, more resources were allocated to on-line marketing and social media platforms to publicize technology-related news, events, as well as high impact research achievements. Continuous efforts were also made to promote the Tech Portal on the Institute for Entrepreneurship (IfE) website, where users can access hundreds of PolyU's applied technologies and research outcomes.

#### (c) House of Innovation (HoI)

Serving as the University's innovation and technology showroom, HoI is regularly accessible to the public through open days and scheduled tours. The introductory video on PolyU's KT for visitors was updated with up-to-date technologies and research projects.

In the fiscal year, exceptional effort was made to reach out to community associations and centres, as well as arranging visits from PolyU summer programmes for secondary school students, resulting in a significant boost of visitors to celebrate the 80th anniversary of the University. Over 330 scheduled visits were conducted, together with walk-ins, over 10,000 people visited this innovation and technology commercialization showroom.

#### (d) Themed Showcases

PolyU regularly participated in public exhibitions to enhance public awareness of PolyU's innovations and technologies. In the 9-day InnoCarnival 2017, PolyU showcased her RemoteLab platform, energy storage devices, and other award-winning innovations. RemoteLab provided opportunities for visitors to conduct real-time remote experiments and won the public's votes as "My Favourite Booth". At the Golden Age Foundation Expo & Summit 2018, PolyU again demonstrated its commitment to the ageing society through a rich collection of innovations and technologies for the elderly community.

To celebrate her 80th Anniversary, PolyU at the Open Day in December 2017 exhibited her KT process roadmap, starting from collaborative research to commercialization, as well as its entrepreneurial and executive development programmes. The public event also arranged guided tours to HoI and InnoHub, as well as sharing and workshops by PolyU-supported startups.

## 4. Spearheading Regional KT & Entrepreneurship Development

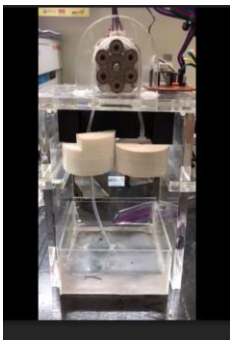
Recognizing the strategic importance on innovations and entrepreneurship development, PolyU has been coming up with new entrepreneurial funding and education programmes of specific purposes for its students and young graduates. With the establishment of PolyU InnoHub in both Hong Kong and Shenzhen in 2017, the University has further expanded its efforts to develop regional partnerships with institutions and intermediaries,

leveraging local and regional resources to support innovations and entrepreneurship for PolyU and its partners, with strategic initiatives to address the calling and opportunities in the region.

## 4.1. Cultivating "Do Well Do Good" Entrepreneurship Practice & Education

### (a) Entrepreneurial Practice with Seed Fund

In FY2017-18, a new batch of 332 startups was supported with seed funding for the implementation and growth of their business. Until 30 June 2018, PolyU had collectively funded more than 240 startups since the inception of the Micro Fund in 2011. Among them, 74% are still actively operating, with some highly regarded in their respective industries, winning more than 150 local and international awards. Collectively, the startups attracted over $250 million funding and incubation support to date.



For the Good Seed Programme supported by the SIE Fund, two cohorts of capacity building training programme were organized, serving more than 200 young social innovators and 10 more social innovation projects added to its portfolio of 35 projects over the last three years.

The new "Student Entrepreneurial Proof-of-Concept Fund" (POC Fund) continued in FY2017-18 to support students' innovation projects. A total of 20 projects were funded for the student teams to develop prototypes and carry out market validation of their concepts. The POC Fund becomes a feeding pipeline for talented student teams and projects for other programmes like Micro Fund.

### (b) Experiential Entrepreneurial Education

**PolyU Lean Launchpad Programme (PolyU LLP)**

As a strategic objective to promote the KT of PolyU's research technologies through entrepreneurial venturing, the PolyU Lean Launchpad Programme (LLP) launched its pilot cohort in February 2018 with focus area on "Fashion and Wearable Technology". The Programme, modeled after the American National Science Foundation (NSF) Innovation Corporation (commonly known as I-Corp) and Lean Launchpad Singapore, aimed to promote and accelerate the go-to-market of PolyU research technologies. PolyU was able to solicit the support of a highly respected pioneer of Lean Launchpad Singapore to jump start the Programme, with local industry practitioners engaged as mentors in collaboration with other partnering bodies like HKSTP, FHKI, HKRITA, etc.


In the pilot cohort, a total of 10 teams with research technologies on smart textile materials and wearable health technology went through the 10-week experiential learning program with marked improvement in their product offering concept. The University will be running the next cohort in early 2019 to facilitate research teams to develop their technology innovation concept into viable applications.

[2] The actual number of funded start-ups in FY2016-17 was 43. Among them ten were existing start-ups seeking for further funding from PolyU's other funding schemes. As such the total number of NEW start-ups supported was 33

**Other Training Programmes**


In the last fiscal year, the University, through IfE, continued to organize different entrepreneurship training programmes and activities with different focuses and learning objectives. In January 2018, PolyU jointly organized a 3-day Techcathon with HKSTP and CityU with around 200 participants from local universities. Other training workshops with specific domain focus like FinTech and Crowdfunding had also been run for students and graduates.

For young yet experienced entrepreneurs, the annual High Potential Entrepreneurial Leadership (HiPEL) Programme commenced its 6th annual training cohort in June 2017, with about 20 participants from Hong Kong and Shanghai. Over the years, the 120+ alumni of the programme formed a close community of practice with regular sharing and exchange along their entrepreneurship journey, supporting each other irrespective of the size and growth prospect of their companies.

## 4.2. Building Vibrant Entrepreneurial Community

### (a) PolyU InnoHub (Hong Kong & Shenzhen)

Since the official opening of InnoHub (Hong Kong) in March 2017, 40 startups and student teams were admitted to the InnoHub over a period of 12 months. Another 13 startup teams were admitted in July 2018. To develop InnoHub as a flagship entrepreneurial community platform, a series of events / activities were organized jointly with partners and collaborators both locally and within the region. They included major players like MIT Innovation Node Hong Kong, Alibaba, New World Group, etc. Details of the events are listed in Appendix 2.

As more physical space is desired to house a larger start-up community to support the University's KT and entrepreneurship development, the University had kicked off the Phase 2 planning of both InnoHub Hong Kong and Shenzhen to quadruple the current space in Hong Kong and an additional 5,000 sq. ft in Shenzhen. The expanded space will support further regional collaborations and community development, mutual soft-landing through our regional partnership network, co-creation activities of students as well as bridging of the entrepreneurial communities of the two cities to accelerate start-up growth to scale.

### (b) Regional Partnership Development

Over the past few years, PolyU was committed to building up a regional partnership network to support its startups for regional outreaching and market explorations. The effort generated positive results with some startups expanding to other markets in Taiwan and ASEAN countries, not to mention the Mainland as the key market for many. In FY2017-18, three outreaching tours were organised, taking 14 startups to regional rallies and market scouting in Taiwan and Singapore.

In addition to outbound tours, many regional visitors came to visit InnoHub, while we reciprocated with exchange visits and participation to other regional events, such as Taiwan Startup Stadium and exchange to Chiao Tung University in October 2017.

### 4.3. Leveraging Greater Bay Area for Strategic KT and Entrepreneurship

With the national initiative to develop the Guangdong-Hong Kong-Macau Greater Bay Area (GBA) as a world-class innovation and technology hub, Hong Kong will play an increasingly strategic role to spearhead regional innovation development with talents, resources and market opportunities from other cities within GBA.

As such, PolyU is actively reaching out to partners in the GBA region to foster its KT, collaborative research and entrepreneurship development. Recently the University entered into a partnership with Shenzhen University to jointly develop a Greater Bay Area International Institute for Innovation (**大灣區國際創新學院**), with an aim to build an open platform to facilitate international and multi-sector collaborations on KT and entrepreneurship through open innovation, education programmes, and related start-up support.


## 5. Performance Measure – Key Performance Indicators

A summary of the key performance indicators for various KT areas are presented in the table below, with figures expressed in HK$'000:

| Performance Indicators | 2016-17 Actual | 2017-18 Actual | 2018-19 Target |
|---|---|---|---|
| **Patenting & Licensing** | | | |
| No. of patents filed | 91 | 131 | 90 |
| No. of patents granted Note 1 | 43 | 52 | 50 |
| Accumulative no. of licenses granted | 129 | 138 | 155 |
| Income generated from IPR Note 2 | $5,610 | $5,214 | $5,000 |
| Expenditure involved in generating income from IPR | $5,964 | $6,122 | $6,000 |
| **Consultancy, Collaborative / Contract Research & Spin-off / JV** | | | |
| No. of collaborative research, income generated and total contract value Note 3 | 327<br>$97,392<br>$524,181 | 346<br>$115,376<br>$613,651 | 350<br>$130,000 |
| No. of contract research, income generated and total contract value Note 4 | 402<br>$83,701<br>$447,428 | 343<br>$78,442<br>$394,643 | 380<br>$85,000 |
| No. of consultancy projects and income generated | 575<br>$53,380 | 735<br>$66,497 | 750<br>$68,000 |
| No. of economically active spin-off companies Notes 5 | 24 | 24 | 33 |
| Net income generated (or net loss arising) from spin-off companies Notes 6 | ($63) | $128 | $150 |
| **Other Knowledge Transfer / Dissemination Activities** | | | |
| No. of equipment and facility service agreements and income | 327<br>$4,512 | 337<br>$5,051 | 350<br>$5,500 |

| Performance Indicators | 2016-17 Actual | 2017-18 Actual | 2018-19 Target |
|---|---|---|---|
| No. of student contact hours for business or CPD needs Notes 7, 8 | 1,153,835 | 1,126,980 | 1,200,000 |
| Income received from CPD courses Note 8 | $260,835 | $286,233 | $290,000 |
| No. of public lectures / symposiums / exhibitions and speeches to community | 686 | 616 | 600 |
| No. of performances and exhibitions of creative work by staff or students | 110 | 126 | 130 |
| No. of staff engaged as members of external advisory bodies | 299 | 349 | 350 |

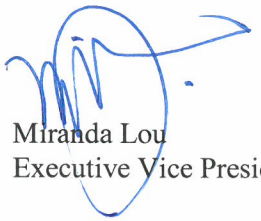
**Notes:**

1. A detailed list of patents granted is presented in Appendix 5.
2. The reported figure includes license income amounted to $163,000 in FY2017-18 and $307,000 in FY2016-17 generated from PolyU supported start-ups which licensed PolyU's IPs. This license income was also included in the "Net income generated (or net loss arising) from spin-off companies" (refer to Note 6 below).
3. Collaborative research income reported is on cash-receipt basis from on-going projects in FY2017-18, with an aggregate project value of $613.7 million. As some of the internally funded projects also involved third parties as collaborators for KT purpose, the number of those projects was counted here but not the income nor project value.
4. Contract research projects are those involving third parties from public, private and NGO sectors. The income reported is on cash-receipt basis from on-going projects in FY2017-18, with an aggregate value of $394.6 million.
5. The figure includes the number of start-ups that license PolyU generated IPs with reported net income as proceeds arising from licensing. Subsidiaries set up as operating vehicles for specific functional purposes, e.g. PTeC, Hotel ICON and PolyU Base in Shenzhen are not included.
6. The reported figure includes (i) license income amounted to $163,000 in FY2017-18 and $307,000 in FY2016-17 generated from PolyU supported start-ups which licensed PolyU's IPs. This license income was also included in the "Income generated from IPR" (refer to Note 2 above), and (ii) loss arising from disposal of shareholding from a spin-off company in Dec 2017.
7. The student contact hours are defined to be the number of enrollments multiplied by the number of contact/course hours.
8. The CPD courses are now defined to include award-bearing and credit-bearing programmes (both in and outside Hong Kong) for learners already in work who are undertaking the course for purposes of professional development / upskilling / workforce development, in addition to short term non-credit-bearing training programmes.
9. Additional KPIs on other related KT activities are presented in Appendix 4.

## 6. Closing Remarks and The Way Forward

FY2017-18 has been a year of anticipation for the University to anchor pilot programs of strategic fit with regional partners either through open innovation or translational research. The recent positioning of Hong Kong as an international technology hub for the Guangdong-Hong Kong-Macau Greater Bay Area brings in new dimensions for the higher education sector to play pivotal roles in fueling regional innovation in the wake of renewed innovation and technology policy support by the Hong Kong SAR government. FY2018-19 will be a year of rapid renewal in policy and action to embrace the paradigm shift brought about by GBA initiatives. While the University's contribution to KT has mostly been manifested through contracted research, consultancy and licensing, the collaborative initiatives with regional stakeholders in KT management and entrepreneurship co-creation have brought in early fruits of success, gaining recognition in both China and overseas. As PolyU commences its new strategic plan, dedicated resources will be channeled towards achieving short-term development goals and long-term objectives per the KT, Entrepreneurship, and Wider Engagement action plans.

With scholarly excellence and application impact in mind, the University will continue to build on its respective platforms to drive cross-sector collaborations to create synergistic value with industry, institutions, professional and social communities. Such value in partnership has always been part of PolyU's heritage; the University and its management will certainly uphold this value in the next strategic development cycle to fulfill our role in education, knowledge transfer and creating impact for the society, making KT a natural element of our third mission dear to our hearts.



Miranda Lou
Executive Vice President

# Appendix 1 – Impact Case History

## Case 1: Defocus Incorporated Multiple Segments (DIMS) Spectacle Lens for Myopia Control

### 1. Summary

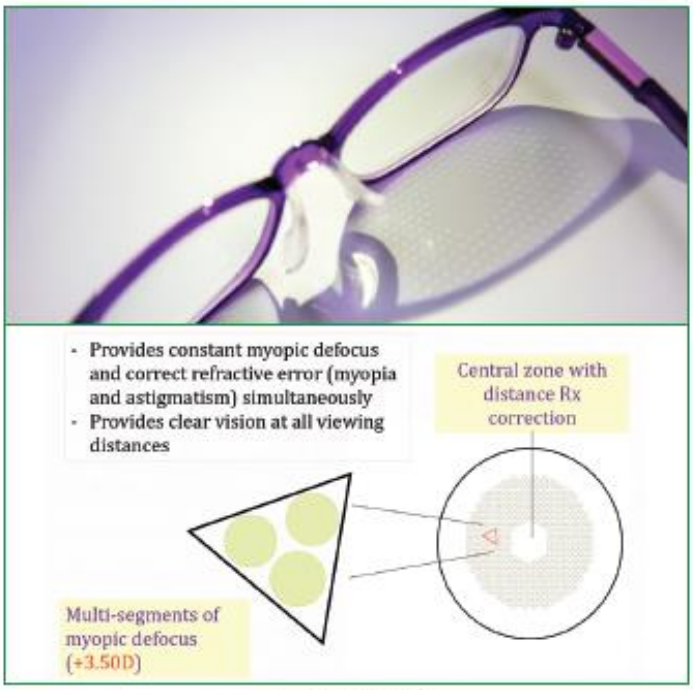
Myopia, also known as short-sightedness, is the most common vision problem for our eyes. It happens when the eyeball grows too big and its axial length becomes elongated. The images thus focus in front of the retina instead of on the retina, resulting in blurred vision. Myopia is highly prevalent among populations in many parts of Asia particularly amongst schoolchildren. About 70-80% of young adults living in Eastern Asian regions such as Japan, Taiwan, Hong Kong and Singapore have myopia. The prevalence of myopia in Caucasian population is about 30-40% with an upward trend. High myopia can cause retinal complications. The most serious ones could result in retinal detachment, causing permanent visual impairment or even blindness.

The Defocus Incorporated Multiple Segments (DIMS) Spectacle Lens invented by Professor Carly Lam, Professor of the School of Optometry of PolyU, Professor To Chi-ho, Henry G. Leong Professor in Elderly Vision Health and Head of the School of Optometry of PolyU and research collaborator HOYA Corporation were found to have effectively slowed down or even completely halted myopic progress in children. Making use of a central optical zone for correcting refractive error (i.e. myopia and astigmatism) and multi-segments of constant myopic defocus around it, the DIMS lens makes use of the natural homeostatic mechanism whereby the eyeball adapts and shapes to receive focused images as it does for normal vision, scientifically known as "emmetropization". In doing so, the lens provides clear vision and myopic defocus simultaneously for the wearer at all viewing distances. In a recent clinical trial, DIMS lens slowed down myopia progression in children by 60%, with 21% of the subjects experiencing no increase in myopia at all.

With its innovativeness and potential societal impact, DIMS lens won the overall Grand Prize, Grand Award and Gold Medal with the Congratulations of Jury at the 46th International Exhibition of Inventions of Geneva in 2018.

Prof. Carly Lam and Prof. To Chi-ho decorated with the Grand Prize Champion Cup of 46th International Exhibition of Inventions of Geneva in 2018


Prof. Carly Lam and Prof. To Chi-ho demonstrating the effect of myopia control spectacles with DIMS lens




DIMS 鏡片的設計
Design of DIMS lens

Co-developed with the support of HOYA, the DIMS lens technology is licensed to HOYA Corporation for its commercialization worldwide. Already available in Hong Kong, the products will be promoted in all major markets around the world, providing an effective non-invasive solution for myopic children.

## 2. Underpinning Research

Myopia control is currently possible through optical or pharmaceutical approaches (such as atropine). The optical approach – being less invasive – is preferable, thus its development has been the research focus of the School of Optometry.

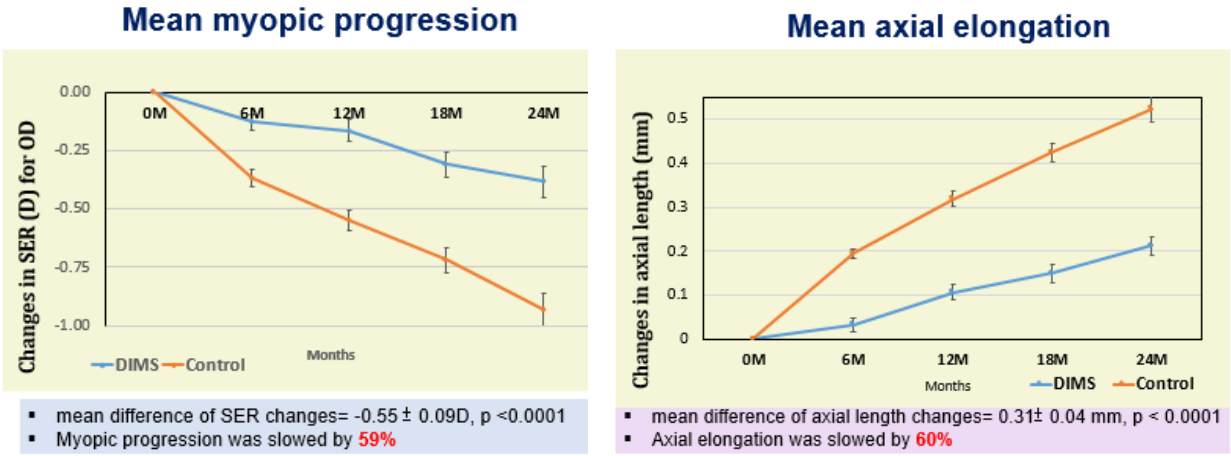
For many years, the research team led by Professor Lam and Professor To studied myopic defocusing as a mechanism for myopia control.

This concept was first proved in animal studies, where it was found that the avian (chick) eye can integrate two simultaneous defocus in a dose-dependent manner and myopia defocus could effectively reverse myopic eye growth even in the presence of other optical inputs. This finding supported the notion that myopic defocus might be introduced in usual optical corrections to prevent myopia development in human. Further work on animals' models including studies of guinea pigs and rhesus monkeys have also demonstrated that such approach is also effective in inhibiting myopic eye growth.

In 2004, the team invented the Defocus Incorporated Soft Contact (DISC) Lens for myopia control. The lens is a multi-zone bifocal soft contact lens which simultaneously provides clear vision and constant myopic defocus. Relevant clinical trials showed that the DISC contact lens could effectively slow down myopia progression by about 50% for local school children aged from 8 to 13 years old. As a precursor to DIMS, the DISC lens also won a Grand Award at the 39th International Exhibition of Inventions of Geneva back in 2011.

To extend the impact of myopic defocus technology, Professors Lam and To went on to design a spectacle lens using a different topological configuration, as spectacles are much easier for day-to-day wear and care compared to contact lens, especially for young children. By using minute multiple segments within the lens area to introduce myopic defocus, the ultimate design successfully overcame the challenge of maintaining myopic defocus in all directions of gaze for spectacle use that showed no difference in its appearance from those used for conventional vision correction. In a randomized controlled trial starting 2014, the results showed that the lens slowed down myopia progression in school children by 60% over two years compared to the single vision

lens control, with 21.5% showing no progression of myopia at all. Such effectiveness was among the highest of all optical designs available in the market. More importantly, the children in the treatment group indicated that the DIMS spectacle lens could provide comfortable, good vision at short and long distances, providing same vision correction functions and good perception of depth same as single vision spectacle lens.




## 3. References to the Research

***Selected publications relating to PolyU's research and development on myopia are listed as follows:***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j) Tse DY, Lam CS, Guggenheim JA, Lam C, Li KK, Liu Q, To CH. Simultaneous defocus integration during refractive development. Invest Ophthalmol Vis Sci 2007;48(12):5352-9.

***Conference Presentation***

Lam CS, Tang WC, Lee RP, Chun RK, To CH. Myopic control with novel multi-segment of myopic defocus (MSMD) spectacle lens: A randomized clinical trial. The 16th International Myopia Conference; 14-17 September 2017; Birmingham.

***Clinical Trial Registration***

https://clinicaltrials.gov/ct2/show/NCT02206217

***Details of Key Research Grants***

Industrial fund from HOYA Corporation. Myopia Control for Young Children with Myopic Defocus Incorporated Spectacles Lens (PI: Carly Lam), 5/2014 to ongoing.

***Patents***

1. Chinese patent "Eyeglasses" (patent no.104678572B). Date of grant: 27 April 2018

2. US patent application "Spectacle Lens" (patent application no. 20170131567A1). Patent pending; published on 11 May 2017

***Major Award***

Grand Prize, Grand Award and Gold Medal with Jury's Commendation at the 46th International Exhibition of Inventions of Geneva, 2018.

## 4. Impact and Benefits

Myopia is not just an inconvenience in day-to-day living; serious progression could have healthcare implications. While it can be corrected by glasses, contact lenses or surgery, early intervention to control its progression would benefit the subjects for the rest of their lives.

As one of the most common eye disorders for the modern society, myopia has dramatically increased in prevalence throughout the years, starting at younger ages than ever before. It is estimated that myopia affects approximately one in three individuals globally. The epidemic of myopia in the aging myopic population would give rise to additional burden to the already stressed public healthcare services.

The DIMS spectacles lens provides a proven and an effective means for slowing myopic progression in children so as to address the above mentioned issues and to benefit the society at large. As an advancement from myopia-controlling contact lens, the DIMS lens for spectacles is even more effective than other intervention measures such as atropine or orthokeratology. It provides young children with the best vision correction strategy to slow their myopia progression. Success in myopia control at the early childhood up to mid adolescence is very important, as the rate of myopia progression is the fastest for this age group. Effective control would reduce the chance of developing high myopia in adulthood, reducing risk of sight-threatening ocular diseases such as glaucoma, retinal detachment, myopic maculopathy, myopia retinopathy and premature cataracts.

## 5. References to the Corroboration of Impact or Benefit

***Media Coverage***

The breakthrough in slowing myopic progression has attracted extensive media attention both locally and internationally. Selected coverage includes:

1. Media coverage on DIMS lens winning the overall Grand Prize at the International Exhibition of Inventions Geneva

| Date | Media | Topic | URL |
|---|---|---|---|
| 14 – 15 Apr 2018 | The HKSAR Government Press Releases | Hong Kong harvests top awards at the International Exhibition of Inventions Geneva | https://goo.gl/ezWMtT |
| | News.gov.hk | HK wins top invention prize | https://goo.gl/Yo3vtR |
| | China Daily – Hong Kong | HK PolyU wins top invention prize | http://trsurl.com/s/6KV |
| | World Journal | 理大「神發明」！戴這種眼鏡 可延緩近視、不再加深 | http://trsurl.com/s/6KT |
| | Sing Pao Daily News | 理大奪 9 獎揚威國際發明展 抑近視眼鏡片奪全場總冠軍 | https://goo.gl/zyDwBb |
| | Hong Kong Commercial Daily | 理大神奇鏡片奪國際發明展總冠軍 | https://goo.gl/wmsLjM |
| | Ta Kung Pao | 理大神奇鏡片揚威日內瓦發明展 | https://goo.gl/DQd3te |
| | Wen Wei Po | 理大「神奇鏡片」 「四眼童」福音 | https://goo.gl/3KaxJc |

2. Other media coverage on DIMS lens

| Date | Media | Topic | URL |
|---|---|---|---|
| 19 Apr 2018 | Optometry Today | Innovative Spectacles Slow Myopia Progression by 60% | https://goo.gl/yVqRXi |
| 19 Apr 2018 | The Standard | Good looks in award-winning lens | https://goo.gl/VKTHBA |
| 24 Apr 2018 | Healio | Hong Kong Polytechnic develops spectacle lens to slow, halt myopia | https://goo.gl/hTzub7 |
| 30 Apr 2018 | Healthline | More Children Are Becoming Nearsighted... These New Glasses Might Help | https://goo.gl/iBngbH |
| 1 May 2018 | Asian Scientist | Lens shown to reduce myopia in children | https://goo.gl/qHC96d |
| 13 Jun 2018 | Insight | New lens able to slow and sometimes stop myopia | https://goo.gl/hKuqvs |
| Jun 2018 | Innovation Hong Kong by Innovation and Technology Bureau | International Exhibition of Inventions Geneva | https://goo.gl/xHrprA |
| 17 Jun 2018 | China Review News | 香港學童八成近視 理大減慢近視鏡片下月面市 | https://goo.gl/Q9bS9Z |
| 4 Jul 2018 | Optometry Today | How a moment of inspiration on public transport led to a breakthrough in myopia control | https://goo.gl/UnQdXz |

# Case 2: The First Greater Bay Area Biotechnology and Translational Medicine International Collaboration in the United States China Guangdong - Hong Kong - Macau Greater Bay Area

## 1. Summary

PolyU has spared no efforts in trail-blazing the advancement in the innovation and technology development of translational medicine spanning from biotechnology, life sciences, new drug and medical device development for real-life utilization with its vast experience in translating research for application. In the past few years, PolyU has established the Respiratory Virus Research Foundation, together with The University of Hong Kong (HKU), to support respiratory viral infection research and corresponding translational research in Hong Kong. Also, PolyU joined hands with the government of Banan District of Chongqing City in forming the Chongqing Banan – PolyU Institute of Translational Medicine to develop medication and diagnostics devices by leveraging clinical and research strengths from both parties. In 2018, PolyU came into alliance with Fraunhofer-Gesellschaft and the Karlsruhe Institute of Technology in fostering application-oriented research with a synergistic approach, aspiring to deliver significant breakthroughs in chronic diseases, immunomodulation, traditional Chinese medicine, translational medicine and so forth in areas of life sciences and engineering.

In February 2018, PolyU joined forces with Sun Yat-sen University (SYSU), Shenzhen University (SZU) and Macau University of Science and Technology (MUST) in the Greater Bay Area (GBA) together with The State University of New York at Buffalo (SUNY Buffalo) and Roswell Park Comprehensive Cancer Center (RPCCC) to initiate in The First Greater Bay Area Biotechnology and Translational Medicine International Collaboration to jointly advance biotechnology development. It established closer collaboration and ties among partnering institutions with proven track record in biotechnology and life sciences related research, and in the translation of research into deliverables and commercialization. It aimed at leveraging one another's strengths to spearhead translational research in biotechnology, driving a new wave of world-class developments, and riding on the opportunities provided by the GBA development for advancing applied research in biotechnology focusing on drug development, diagnostics, therapeutics, medical devices and so forth from a cross-disciplinary perspective.

## 2. Underpinning Research

Over the years, PolyU has built up solid strengths in biotechnology, particularly in drug development. PolyU was engaged in the first and the only three new drugs developed in Hong Kong, which succeeded in getting Investigational New Drug (IND) application approval of US Food and Drug Administration (FDA).

Prof. Thomas Leung and Dr Thomas Lo of the Department of Applied Biology and Chemical Technology (ABCT) and their team were supported by the University-Industry Collaboration Programme (UIPC) of Innovation and Technology Fund (ITF) with HK$1,563,000 in the project “Development of Recombinant Human Augmenter of Liver Regeneration (ALR) for Treatment of Liver Diseases” (UIM/110). A new drug that works through the depletion of the amino acid arginine based on a natural human enzyme "BCT-100" for liver cancer was then developed and gave new hopes to liver cancer patients. “BCT-100” proudly became Hong Kong's first IND granted by the FDA. Further to “BCT-100”, Prof. Leung and his team continued to developed “BCA-PEG20”, another potential highly stable anti-cancer agent with potent anti-cancer activities. The technology was then licensed to a US-based company, which was poised as a successful case of commercializing PolyU’s innovation in drug development.

Furthering the success of “BCA-PEG20”, another ABCT professor, Prof. Larry Chow, and his team also succeeded in securing HK$3,990,000 funding support from ITF through UICP in the project “Optimizing Orally Delivered Combination Chemotherapy as a Novel Approach to Treating Cancer” (UIM/274). It looked into flavonoid dimer’s inhibition of multidrug resistance (MDR) in cancer cells and develop oral versions of cancer drugs, enabling oral delivery as an alternative to intravenous injection with optimized effects on cancer treatment with chemotherapy. US FDA granted its approval to proceed into human clinical trials with the combination of oral topotecan and a proprietary P-glycoprotein (P-gp) inhibitor HM30181A developed by PolyU’s industry collaborator.

The success of PolyU's in drug development research with industry collaboration and government support acted as significant credentials for PolyU to become one of the key players in the GBA biotechnology and translational medicine platform. On the other hand, PolyU's prior collaborations in biotechnology with the participating institutions as "big health" with SYSU; joint research on drug delivery with the SZU; joint genomics research with MUST; and bioinformatics research with SUNY Buffalo further convinced one another to elevate the partnership to the next level and contributed to the formulation of the platform in the end.

## 3. References to the Research


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b) Cheng, P.N.M.; Lam, T.L.; Lam, W.M.; Tsui, S.M.; Cheng, A.W.M.; Lo, W.H. and Leung, Y.C. Pegylated human recombinant arginase (hrArg-peg5,000mw) inhibits the in vitro and in vivo proliferation of human hepatocellular carcinoma through arginine depletion; Relationship to urea cycle enzymes, especially ornithine transcarbamylase. Cancer Research, 67, 309-317 (2007), 67(1):309-17

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i) Chan KF, Zhao Y, Chow TW, Yan CS, Ma DL, Burkett BA, Wong IL, Chow LM, Chan TH. Flavonoid Dimers as Bivalent Modulators for P-Glycoprotein-Based Multidrug Resistance: Structure-Activity Relationships. Chem Med Chem 2009; 4(4):594-614

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## 4. Impact and Benefits

Advancing biotechnology and life sciences has been set out as one of the key contributors in building up China's competitive advantages in the international arena as stated in the National Scientific and Technological Innovation Planning for the 13th Five-Year Plan. It is also one of the major focused areas for development in GBA. While in Hong Kong, biotechnology is poised as one of Hong Kong's areas of strength in innovation and technology alongside artificial intelligence, smart city and fintech. The establishment of the platform strategically addresses and fully taps the opportunities at national, regional as well as local level.

All of the partnering institutions in the platform are reputed in research and development in biotechnology in their respective regions. SUNY Buffalo is renowned for one of the top of its kind in the US for its School of Pharmacy and Pharmaceutical Sciences. RPCCC is the only facility in Upstate New York to hold this honor of "comprehensive cancer center" with its particular strengths in the areas of tumor immunology, cancer genetics and genomics, biophysical oncology as well as cancer prevention. SYSU takes a leading position of the country in the scale of medical area with a large pool of key research teams and key laboratories of the medical schools as well as 10 affiliated hospitals and enjoys top-ranked position nationally. The School of Medicine of SZU facilitates the optimizing of Shenzhen's medical service and scientific research with its robust development of the translational medicine research. Under the Faculty of Health Sciences Centre of Excellence for Professional Medical Development, MUST provides laparoscopic and endoscopic skills training, quality medical courses, standardized patient training, mock hospital to develop Macau as a regional high-tech medical training and conference hub. Riding on the strengths of each partner from the Guangdong – Hong Kong – Macau GBA, the collaborative platform is expected to generate immense impact towards the development of the GBA into an international biotechnology hub.

The establishment of the collaborative platform on biotechnology as a whole brings along innovations in the areas of cancer, genomics and translational medicine, diagnostics, therapeutics and medical devices as well as other related areas in biotechnology. The partners' understanding of the regulatory procedures in their own countries will help expedite the translation of innovative technologies into applications benefiting Hong Kong, GBA and the globe.

Moreover, the collaboration enables the optimization of benefits and impacts through synergy. It elevates the significance of GBA's biotechnology and life sciences, which radiates from Greater China to the world through engaging heavy-weight international partners such as RPCCC. The partnership enhances GBA's international recognition and status as well as availability of resources in both nominal and technical terms. Furthermore, with a variety of expertise and technological competence pooled together with the establishment of the platform, it further adds fuels to the development of cross-disciplinary research in biotechnology. The invigorated synergy further boosts the pace of translation of research into technology for application that contributes to significant improvement of the welfare of the community at large. The platform is expected to yield fruitful research and technology output of great breadth and depth for further advancement in biotechnology in Hong Kong, GBA and the world.


## 5. References to the Corroboration of Impact or Benefit

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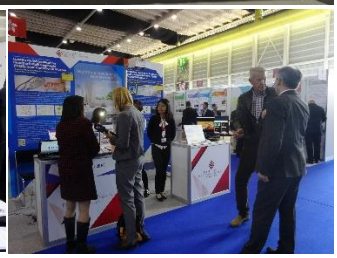
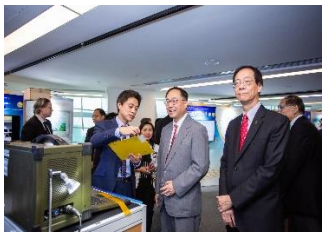
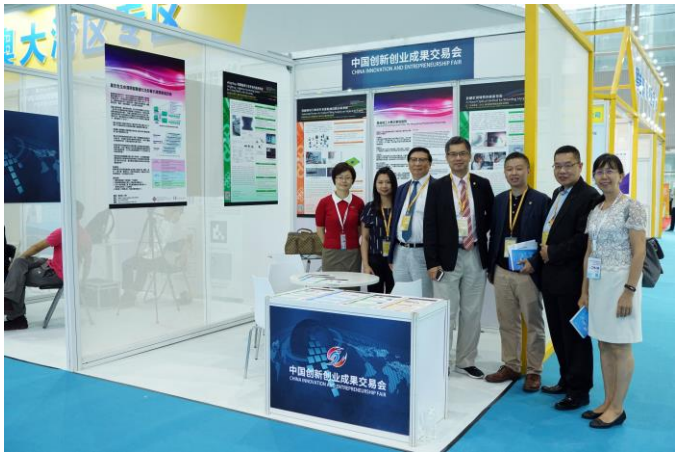
## Appendix 2 – Technology Marketing and Networking Activities

### (a) Highlights of Special Events

| Date | Event | Photo |
|---|---|---|
| Sep 2017 | **Technology Networking Seminar - Technological Breakthroughs in Health Protection**<br><br>The technology networking seminar featured PolyU-developed graphene/CNT-embedded nanofibres and high energy rays shielding textiles for enhancing health protection, followed by business matching discussions. |   |
| Sep 2017 | **Food Hygiene Standard Certification System (FHSCS) for Catering Industry - Launching Ceremony and Press Conference**<br>The launching of FHSCS developed by PolyU was commemorated with a launching ceremony attended by key stakeholder representatives from the Government, the catering industry, certification bodies, supporting organizations, consultancy firms and academics; attracting around 280 press reports on both online and printed media. |  |
| Oct 2017 | **InnoCarnival 2017**<br>In the 9-day exhibition, PolyU showcased her RemoteLab platform, energy storage devices, and other award-winning innovations. RemoteLab provided opportunities for visitors to conduct real-time remote experiments, winning the public's votes as "My Favourite Booth". |    |

| Date | Event | Photo |
|---|---|---|
| Nov 2017 | **China Hi-Tech Fair 2017**<br>PolyU enhanced its marketing footprint in the Chinese Mainland, and in particular, the Greater Bay Area. In this fair in Shenzhen, the PolyU pavilion under the "Star Tech" theme featured award-winning technologies that had won awards at prestigious invention events, as well as PolyU Shenzhen Base services. |  |
| Dec 2017 | **PolyU 80th Anniversary Open Day - Knowledge Transfer and Entrepreneurship Showcase**<br>In the showcase, PolyU exhibited her KT process roadmap, starting from collaborative research to commercialization, as well as its entrepreneurial and executive development programmes. The public event also arranged guided tours to HoI and InnoHub, as well as sharing and workshops by PolyU-supported startups. |  <br>  <br>  <br>  |
| Dec 2017 | **Guangdong International Applied Science & Technology Trade Expo (2017 廣東國際應用科技交易博覽會暨粵港澳大灣區創新與投資展)**<br>In this trade expo in Guangzhou, PolyU showcased her extensive research strengths and KT expertise, demonstrating her commitment to be a contributor to the Greater Bay Area development. |  |

| Date | Event | Photo |
|---|---|---|
| Jan 2018 | **Golden Age Foundation Expo & Summit 2018**<br>In the Golden Age Foundation Expo & Summit 2018, PolyU exhibited her commitment to the ageing society through a rich collection of innovations and technologies for the elderly community. |  |
| Apr 2018 | **The 46th International Exhibition of Inventions of Geneva**<br>PolyU was honoured with totally 10 prizes, including the grand prize (overall championship), for its 7 inventions featured in the event this year. Her award-winning projects, among others, were showcased in a celebratory event at the Government Headquarters later. The Chief Executive reception attracted key figures in the industry and trade, with the Swiss Consul-General as the honoured diplomat. |  <br>  <br>  |
| May 2018 | **Hong Kong International Medical Devices and Supplies Fair 2018**<br>In the Hong Kong International Medical Devices and Supplies Fair 2018, PolyU's healthcare and rehabilitation innovations and technologies were presented to healthcare sector visitors, VIPs and the media. |  |

| Date | Event | Photo |
|---|---|---|
| May 2018 | **Star Tech Salon 2018**<br>The celebratory event featured a ceremony, sharing by industry partners, a mini exhibition of all the award-winning projects at the Geneva expo, and a networking reception. With the Secretary for Innovation and Technology and Deputy Swiss Consul-General as the honoured guests, the event attracted over 150 guests including Government officials, LegCo members, district councilors, professional and trade association members, alumni entrepreneurs, and representatives from intermediaries. |  <br>   |
| Jun 2018 | **2018 China Innovation and Entrepreneurship Fair (2018 中國創新創業成果交易會)**<br>PolyU's innovative technologies and multidisciplinary applied research breakthroughs were showcased at this increasingly important event in Guangzhou, attracting Chinese state officials and industrialists at the same time. This is yet another example of PolyU's stepped-up efforts in promoting KT in the Chinese Mainland. |  |

**(b) Major Exhibitions and Tradeshows Participated**

| Exhibitions / Tradeshows Participated | Date | Location | Disciplines / Items Promoted |
|---|---|---|---|
| 1. Food Expo 2017 | Aug 2017 | Hong Kong, PRC | Food safety technologies, food testing, etc. |
| 2. TechInnovation 2017 | Sep 2017 | Singapore | Biosensor for virus detection, cooling fiber, rapid detection of formaldehyde, electrical current sensors, thermal-comfort platform |
| 3. Hong Kong Electronics Fair 2017 (Autumn Edition) | Oct 2017 | Hong Kong, PRC | IoT systems, and computing technologies, etc. |
| 4. InnoCarnival 2017 | Oct 2017 | Hong Kong, PRC | RemoteLab platform, and energy storage devices, etc. |
| 5. China International Industry Fair (中國國際工業博覽會 - 工業自動化展) | Nov 2017 | Shanghai, PRC | Energy storage technology for electric vehicles, and multisensory apparatus |
| 6. China Hi-Tech Fair 2017 (中國國際高新技術成果交易會) | Nov 2017 | Shenzhen, PRC | Scar-Care pad, biofeedback system, biosensor for virus detection, nanofiber, UAV's communication relay system, green particleboard, cooling fiber, and services of PolyU Shenzhen Base, etc. |
| 7. Guangdong International Applied Science & Technology Trade Expo (2017 廣東國際應用科技交易博覽會暨粵港澳大灣區創新與投資展) | Dec 2017 | Guangzhou, PRC | Rapid detection of formaldehyde in food, textile technologies , etc. |
| 8. Golden Age Foundation Expo & Summit 2018 | Jan 2018 | Hong Kong, PRC | Technologies for the elderly |
| 9. Asia Pacific Rail 2018 | Mar 2018 | Hong Kong, PRC | Railway condition monitoring technologies |
| 10. 46th International Exhibition of Inventions Geneva | Apr 2018 | Geneva, Switzerland | Spectacle lens for myopia control, 3D imaging system, textile energy harvesters, smart sensing network coating, automated system for surface pitting analysis of engine, monitoring system for elderly, optical equipment, etc. |
| 11. ICT Expo 2018 | Apr 2018 | Hong Kong, PRC | Game Lab, mobile apps for 3D human modelling and IoT system |
| 12. Rail Solutions Asia | May 2018 | Kuala Lumpur, Malaysia | Railway condition monitoring technologies |
| 13. Hong Kong International Medical Devices and Supplies Fair | May 2018 | Hong Kong, PRC | Ultrasound imaging technologies, rapid detection technologies for Chinese medicines and drugs, etc. |
| 14. HKTDC Entrepreneur Day | May 2018 | Hong Kong, PRC | PolyU supported startups |

| Exhibitions / Tradeshows Participated | Date | Location | Disciplines / Items Promoted |
|---|---|---|---|
| 15. World Innovation and Entrepreneurship Expo (WIEE) 2018 | May 2018 | Shanghai, PRC | Anti-cancer drug, rapid detection of formaldehyde, contact lens for myopia control, etc. |
| 16. InnovFest Unbound 2018 | Jun 2018 | Singapore | Railway, green energy, mobile apps for 3D human modeling, etc. |
| 17. China-South Asian Expo | Jun 2018 | Kunming, PRC | Spectacle lens for myopia control |
| 18. InnovFest Suzhou 2018 | Jun 2018 | Suzhou, PRC | Smart sensing network coating, and contact lens for myopia control |
| 19. China Innovation and Entrepreneurship Fair (2018 中國創新創業成果交易會) | Jun 2018 | Guangzhou, PRC | Contact lens for myopia control, automated system for surface pitting analysis of jet engine, energy saving technologies, etc. |

## Appendix 3 – PolyU InnoHub / Entrepreneurship Activities

In FY2017-18, a total of close to 30 activities were organised by PolyU InnoHub or jointly with local and regional partners and collaborators[3]:

| Event | Date | Partnering Organization(s) |
|---|---|---|
| 1. MIT-China Innovation and Entrepreneurship Forum (MIT CHIEF) | Jul 2017 | MIT Innovation Node Hong Kong |
| 2. Fireside Chat on Education Technology | Jul 2017 | RISE Conference and UnLearn |
| 3. Create@AliCloud | Jul 2017 | AliCloud & Alibaba Entrepreneur Fund |
| 4. InnoHub Summer Happy Hour | Aug 2017 | CEO Club, Poly-preneurs |
| 5. PolyU Orientation Day | Sept 2017 | -- |
| 6. PolyU Startups Business Matching Session | Sept 2017 | CEO Club, HK Brand Corporate Association, HK Electronic Industries Association |
| 7. Networking Mixer with Taiwan Startups | Oct 2017 | HKSTP, Taiwan Startup Stadium, National Chiao Tung University (Taiwan) |
| 8. Wicked Wednesday – InnoHub Community Night | Since Oct 2017 | Monthly Community Event with sharing talks / seminars |
| 9. "From MailTime to Measurable Data Token – ICO Journey for Tech Startups" Seminar | Nov 2017 | MailTime (CEF Awardee) |
| 10. Startup Salad Hong Kong | Nov 2017 | Startup Salad |
| 11. Jumpstarter 2017 Exhibition | Nov 2017 | Alibaba Entrepreneur Fund |
| 12. Startup Career Fair and Talks | Nov 2017 | PolyU Office of Career Advancement & Placement Service |
| 13. Hong Kong Techcathon 2018 Pre-Event Networking | Nov 2017 | HKSTP, CityU |
| 14. R&D Tax incentives for startups in Canada: A comparison of startup landscapes between Canada and Hong Kong | Dec 2017 | -- |
| 15. PolyU 80th Anniversary Open Day – Startup Sharing and Workshops | Dec 2017 | -- |
| 16. HKPC InnoSpace Visit | Dec 2017 | HKPC |
| 17. Hong Kong Techathon 2018 | Jan 2018 | HKSTP, CityU |
| 18. TravelTech Startup Sharing | Feb 2018 | WHub |
| 19. Crowdfunding Strategy Training Workshops | Feb – Mar 2018 | -- |
| 20. FinTech & Blockchain Seminar | Mar 2018 | IFTA |
| 21. FinTech Training | Mar – Apr 2018 | -- |
| 22. InnoHub Shenzhen Spring Gathering | Mar 2018 | -- |
| 23. New World x PolyU Startup Meet-up | Apr 2018 | New World Group |
| 24. New World x AWS x PolyU Startup Meet-up | May 2018 | New World Group, Amazon Web Service (AWS) |
| 25. Foodathon | Jun 2018 | Melee Ltd., Salon Media Lab, Future Food Institute |
| 26. PolyU Entrepreneurship Parade | Jun 2018 | -- |
| 27. Startup Weekend PolyU | Jun 2018 | Techstar |

[3] Excluding training programmes and regional outreaching events / activities like delegation visits to Singapore (Slush Singapore in September 2017 and Innovfest Unbound in June 2018) and Taiwan (Meet Taipei in November 2018)

## Appendix 4 - Additional Measures for Related KT Activities

| Performance Indicators | 2016-17 Actual | 2017-18 Actual | 2018-19 Target |
|---|---|---|---|
| **Marketing & Outreaching** | | | |
| Outreach to industry [Note 1] -<br>• No. of Exhibitions / Conference and Forum attended [Note 2]<br>• No. of people [Note 3] reached ('000) | <br>40<br><br>1,106 | <br>44<br><br>1,220 | <br>40<br><br>1,100 |
| No. of innovations / technologies being promoted / marketed | 165 | 150 | 150 |
| **Innovation and Entrepreneurial Activities Enabling KT** | | | |
| Accumulative no. of start-up ventures supported / created by students, graduates or staff [Note 4] | 209 | 242 | 280 |
| Survival / sustainable rate of supported start-up ventures [Note 5] | 75% (1 year)<br>65% (2 years)<br>58% (3 years) | 74% (1 year)<br>69% (2 years)<br>61% (3 years) | 70% (1 years)<br>60% (2 years)<br>50% (3 years) |
| Accumulative no. of PolyU innovations / technologies / knowledge transferred through start-ups by students / alumni / staff [Note 6] | 32 | 38 | 48 |
| • No. of Entrepreneurship Fund applications [Note 7]<br>• No. of students, alumni and staff involved [Note 8]<br>• No. of new start-ups / entrepreneurial projects supported [Note 9] | 218<br>511<br>40 | 283<br>558<br>33 | 280<br>550<br>45 |

**Notes:**

1. The reported figures covers events organized / attended by the Institute for Entrepreneurship only.
2. The target reflects only major public exhibitions, symposia, and competitions in both Hong Kong, mainland and overseas, excluding seminars, workshops and featured media reporting for specific technologies, commercialization and start-ups endeavours.
3. Includes both people from industry and the general public.
4. The reported figure includes all award recipients of Micro Fund, China Entrepreneurship Fund (CEF) Schemes, TIF, TLF and Good Seed schemes. The figure for FY2016/17 was restated to take out two startup projects recommended for funding but eventually pulled out.
5. Sustainability rate is defined as: number of start-ups (supported for more than 1 / 2 / 3 years) still actively operating as of 30 June 2018, divided by the total number of funded start-ups supported as of 30 June 2017 / 2016 / 2015 respectively.
6. The figure for FY2016/17 was restated to take out one repeated case. The figure for FY2017/18 is relatively less than the target as the expected licenses of PolyU technologies out of Lean Launchpad Programme did not happen in FY2017/18 as the programme was just completed in end June 2018.
7. The reported figure includes all applications under Micro Fund, China Entrepreneurship Fund (CEF) Schemes, TIF, TLF and Good Seed schemes.
8. It also includes non-PolyU participants from the Good Seed Programme
9. The actual number of funded start-ups in FY2017/18 was 43. Among them ten were existing start-ups seeking for further funding from PolyU's other funding schemes. As such, the total number of NEW start-ups supported was 33.

## Appendix 5 – List of Patents Granted in FY2017-18

| | |
|---|---|
| 1. A Three-dimensional (3D) Ultrasound Imaging System for assessing scoliosis | Canada |
| 2. 一種用于痕量氣態污染物采樣測量的旋風切割與加熱除水裝置 | China |
| 3. 一種在砷化鎵基片上製備鈦酸鍶鋇介薄膜的化學方法 | China |
| 4. 一種識別正交調制信號的調制格式的方法及裝置<br>(Co-owned with Huawei) | China |
| 5. 一種結合感知功能與機械輔助的康復系統 | China |
| 6. 一種基於金屬催化偶聯反應食品中甲醛的檢測方法及其試劑盒 | China |
| 7. 一種棉織物非水染色工藝方法及反膠束包封的活性染料流 | China |
| 8. 一種基于移動設備虛擬化環境的數據存儲方法及裝置 | China |
| 9. 一種基于 GNSS 觀測量的定位方法和系統 | China |
| 10. 一種通關口岸排隊時間的實時估算方法及裝置 | China |
| 11. 三維測量方法與儀器 | China |
| 12. 內聯閉式水力發電機 | China |
| 13. 交互式外骨胳膝關節機器系統 | China |
| 14. 采用足壓感應技術的輔助假下肢對綫及步態分析系統 | China |
| 15. 具有分段變形模量及强力的柔性材料設計原理及製作方法 | China |
| 16. 使用語言查詢的文本分析系統和方法 | China |
| 17. 高位阻芳基硼酸酯類化合物的製備方法 | China |
| 18. 乳房假體及胸罩填充體 | China |
| 19. 眼鏡片 | China |
| 20. 超薄大尺寸直下式背光模塊 | China |
| 21. 磁負剛度阻尼器 | China |
| 22. 電磁直綫驅動器 | China |
| 23. 電噴霧電離裝置及方法 | China |
| 24. 雙軸電機及雙軸驅動方法 | China |
| 25. 蠶絲絲膠含率快速檢測系統及檢測方法 | China |
| 26. Recovering system for training user to move hands | European Procedure (Patents) |
| 27. - 32. (-)-Epigallocatechin Gallate Derivatives for Inhibiting Proteasome | European Procedure (Patents) |
| | Germany |
| | France |
| | Italy |
| | Spain |
| | United Kingdom |
| 33. Alkyne-, Azide- and Triazole-containing Flavonoids as Modulators for Multidrug Resistance in Cancers | Hong Kong |
| 34. 抗振裝置<br>Anti-Vibration Device | Hong Kong |
| 35. A One-size-fits-all Personal Flotation Device<br>一種適合眾人使用的救生衣 | Hong Kong |
| 36. 基于 X 型结构的仿腿型隔振装置 | Hong Kong |
| 37. 基于 X 型结构的多自由度非线性被动隔振装置 | Hong Kong |
| 38. 基于仿腿型结构的非线性刚度阻尼装置 | Hong Kong |
| 39. 履帶車輛懸架隔振裝置<br>Vibration-Isolating device for suspension of tracked vehicle | Hong Kong |
| 40. 隔振裝置<br>Vibration-isolating device | Hong Kong |

| | |
|---|---|
| 41. Methods and catalysts for green biodiesel production from unrefined low grade feedstock | Singapore |
| 42. Method and system for retarding the progression of myopia | United States of America |
| 43. Methods and viewing systems for inhibiting ocular refractive disorders from progressing | United States of America |
| 44. Method of producing dye-sensitized solar cell and an electrode of a dye-sensitized solar cell | United States of America |
| 45. A system and method for generating an electromagnetic field model | United States of America |
| 46. Prodrug of green tea epigallocatchin-3-gallate (Pro-EGCG) for use in the treatment of endometriosis | United States of America |
| 47. Decoder architecture for cyclically-coupled quasi-cyclic low-density parity-check codes | United States of America |
| 48. A method and device for contactless biometrics identification | United States of America |
| 49. Methods and catalysts for green biodiesel production from unrefined low grade feedstock | United States of America |
| 50. Pyrimidines for treatment of bacterial infections | United States of America |
| 51. Resistance-voltage transformation system for sensors in dynamic strain measurement and structural health monitoring | United States of America |
| 52. Photothermal spectroscopy with hollow-core optical fiber | United States of America |

## Appendix 6 – Highlighted Cases of Funded Start-ups

**Innoplay Limited**
**(Micro Fund 2016 Awardee & Tech Launchpad Fund 2017-18 Awardee)**

Background:
Innoplay developed PANO360, a supplemental tool for smartphones, GoPro, DSLRs, selfie sticks and webcams to capture stable panoramic images and time lapse videos. Equipped with wireless access, application algorithms, Bluetooth technology, real time stitching and compression technology, the PANO360 offers promising results for high quality photos and videos.

Current Stage:
PANO360 was launched in 2017 and distributed by global leading photographic retailers. The start-up raised another round of funding at around HKD13 million later the same year. Innoplay is currently developing new photographic tools with a vision of enabling everyone to take professional photos with great ease.

Awards:
- Hong Kong ICT Awards 2017 - Best ICT Startup (Software & Apps) Award - Certificate of Merit

INNOPLAY LIMITED
DESIGN & INNOVATION

**Easiread Limited**
**(Tech Incubation Fund 2017-18 Awardee)**

Background:
Aiming to improve reading fluency for those with dyslexia, Easiread is a prototype typography system (Chrome extension) with pre-set functions enabling personalised reading settings on online text so that the users with reading difficulties can read independently and efficiently.

Current Stage:
The team has gained the spotlight under massive coverage by various media and they are promoting the system to local schools and associations via educational talks. At a later stage, Easiread targets to expand the system to various website structure, support more languages and include features like Optical Character Recognition (OCR) for printed books.

Awards:
- HKX-Tech Best of Best Final Year Project 2017

Easiread

**Vision Science and Technology Company Limited (Tech Incubation Fund 2016-17, Tech Launchpad Fund 2017-18 & 2018-19 Awardee)**

Background:
Vision Science and Technology Company Limited (VST) aims to commercialise Defocus Incorporated Soft Contact (DISC) lens technology developed by School of Optometry of PolyU for myopia control.

VST adopts a tailor-made professional fitting approach through optometrists to manufacture and offer DISC lenses to fit individual customers. The DISC lenses are manufactured with silicon hydrogel, a highly oxygen permeable material approved by US Food and Drug Administration. It is also one of the most oxygen permeable materials for contact lenses. Clinical trials results suggested that DISC lens can reduce myopia progression up to 60%, and are particularly beneficial for school children aged 6-18 who are in fast myopic progression period by reducing their risks of developing high myopia.

Current Stage:
Clinical trials are running in over 10 optometry centres in Hong Kong. The team is currently developing Defocusing lens with other contact lens materials (RGP materials). Since its incorporation in 2016, VST has secured over HK$2.8 million of investment and gained extensive media coverage.


**Acquaintance Enterprises Limited (Tech Launchpad Fund 2017-18 Awardee)**

Background:
Logflows (previously called 36Link) is a one-stop Software as a Service (SaaS) solution to digitize the traditional B2B trucking industry by offering powerful efficiency tools including order management, workflow management, A.I. dispatcher, reporting dashboard, auto-billing & reconciliation, e-tender and more. The platform will guide the daily works of the logistics company staff, drivers and even management.

Current Stage:
The team has completed the 2nd phase development of Logflows and launched mobile applications for drivers, shippers & trucking companies. Over 100 logistics companies subscribed to the Logflows platform and the numbers are growing every day. The team is now aggressively expanding to other South East Asian counties like Malaysia, Thailand and Singapore.

Since its incorporation in 2015, the company has secured over HK$3.2 million of investment.

Awards:
- Google EYE Programme Top 6 Team

## Appendix 7 – Awards won by PolyU Supported Start-ups

| Startups / Startup Founders | Awards |
|---|---|
| AlikeAudience (TLF 2016 awardee) | 阿里巴巴諸神之戰全球創客大賽香港區冠軍 |
| WEDO Global<br>(Micro Fund 2012 awardee) | Hong Kong Service Award 2017 (Co-founder Mr Bosco Ng) |
| Pokeguide (Micro Fund 2016 awardee) | 阿里巴巴諸神之戰全球創客大賽香港區季軍 |
| Pokeguide (Micro Fund 2016 awardee) | Gold Award, HK ICT Award 2018 – Smart Mobility (Smart Tourism) |
| Mosi Mosi (Good Seed 2017 grantee, Micro Fund 2018 awardee) | Grand Champion, HK Social Enterprise Challenge 2017 |
| Green Price (Good Seed 2016 grantee, Micro Fund 2017 awardee) | Grand Champion, HK Social Enterprise Challenge 2017 |
| Cloudbreakr<br>(Tech Incubation Fund 2015 awardee) | Merit, HK ICT Startup Award 2018 – Software & Application Service |
| Sense+ (Tecathon 2018 winning team) | Silver Award, HKICT Award 2018 – Student Innovation (Tertiary or above) Award |
| Marketemy (Micro Fund 2017 awardee) | Next Step Challenge Top 5 Award |
| | HKEIA Innovation & Technology Project Competition Award Merit |
| | Student Project Management Award 2017 Best Project (by Project Management Institute Hong Kong Chapter) |
| | Student Project Management Award 2017 Best Project Manager (by Project Management Institute Hong Kong Chapter) |
| Vox Technology<br>(Tech Incubation Fund 2017 awardee) | Elevator Pitch 2017 (by HKSTP) First Runner Up |
| Wheelman (Good Seed 2016 grantee) | Merit, HK ICT Award 2018 – Smart People (Smart Inclusion) |
| LED 模組暨超精密加工<br>(CEF 2016 awardee) | 第五届中國江蘇創新創業大賽三等獎 |
| 工業善品之旅 (CEF 2015 awardee) | 中國財經峰會 2017 最佳商業模式獎 |
| | 2017 網易中國創業家大賽 - 上海賽區十强 |
| | 2017 國際創新創業大賽 - 上海賽區優勝獎 |
| | 第五届環球旅游金獎－環球最佳旅遊創新人物（黃自强） |
| 深圳市增生性疤痕康復研究中心<br>(CEF 2016 awardee) | 高交會創客賽最佳科技成果獎 |
| 安雷科技有限責任公司<br>(CEF 2016 awardee) | 第六届清華 i-Space 深港澳台青年創業交流營優勝獎 |
| 智能潛水面鏡-盛高創新<br>(CEF 2017 awardee) | 中國“互聯網+”大學生創新創業大賽全國銀獎 |
| 六足移動機器人<br>(CEF 2016 awardee) | 第六届中國創新大賽港澳台賽企業組優勝獎 |
| | 2017 松湖杯創新大賽百强項目獎 |
| Esight Technology Company Limited<br>(TIF 2017 awardee) | 第六屆中國創新創業大賽先進製造行業總決賽 優秀企業獎 2017 |
| | 廣州南沙香港科大百萬獎金（國際）創業大賽 冠軍 |
| | 前海深港澳青年創新創業大賽總決賽企業組二等獎 2017 |
| | “創響中國，賽創未來”深圳賽冠軍 |
| | “青創杯”第四屆廣州青年創新創業大賽二等獎 |
| | “創匯穀杯”南沙新區創新創業大賽冠軍 |
| | “鹽商杯”第四屆“創青春”中國青年創新創業大賽商工組全國賽決賽優勝獎 |