



香港中文大學  
The Chinese University of Hong Kong



研究及知識轉移服務處  
Office of Research and  
Knowledge Transfer Services



# KNOWLEDGE TRANSFER ANNUAL REPORT

submitted to University Grants Committee

# 2022/23

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# 1 Executive Summary

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The Chinese University of Hong Kong (CUHK) has been highly successful in promoting knowledge transfer through innovation and entrepreneurship support, intellectual property management and facilitating social innovation, creating substantial impact beyond academia. Our ground-breaking medical discoveries have improved the health and well-being of patients, while innovations in architectural design have brought transformative changes that enhance the quality of life for individuals and communities. In addition, the establishment of green manufacturing and eco-friendly food businesses has significantly contributed to environmental sustainability.

Following CUHK Strategic Plan 2021-2025, we continue to deepen the engagement with mainland China in the areas of innovation and knowledge transfer. To this end, CUHK has established the Hong Kong-Shenzhen Innovation and Technology Research Institute (Futian) and a new Beijing Centre to expand our mainland network and foster scientific research cooperation. CUHK is also actively involved in national scientific research projects, such as the first Hong Kong agricultural research project launched into space, contributing to advancements in germplasm resource preservation and aerospace breeding. These strategic initiatives align with the 'Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area' and the national '14th Five-Year Plan' of the Central Government, and contribute to the development of Hong Kong as an international innovation and technology hub.

CUHK recognizes the importance of intellectual property (IP) and its potential for societal benefit. In the past year, CUHK researchers and inventors have made substantial contributions, including 109 new invention disclosures and the filing of 481 patent applications, with 260 patents granted globally. We also promoted knowledge transfer through 78 licensing agreements with local and overseas companies, generating HK\$71 million in licensing income.

Entrepreneurship is a key element of CUHK's knowledge transfer efforts. We have developed a culture of innovation and entrepreneurship, with a thriving ecosystem supporting ambitious entrepreneurs. This has led to the successful launch of 99 start-ups, attracting external investments totalling approximately HK\$1.4 billion.

CUHK has been actively engaged in social innovation, leveraging its Knowledge Transfer Project Fund (KPF) and Sustainable Knowledge Transfer Project Fund (S-KPF) to drive impactful projects in the community. The University has supported 18 social innovation projects that translate academic knowledge into practical solutions for society. CUHK has also promoted social entrepreneurship within academia, with the S-KPF providing support for the establishment of two new social enterprises, encouraging sustainable and socially responsible business models.

CUHK's outstanding achievements in knowledge transfer are recognized by its top ranking in the Times Higher Education (THE) Impact Rankings 2023. The University excels in several categories, including Quality Education (SDG 4), Decent Work and Economic Growth (SDG 8), and Peace, Justice and Strong Institutions (SDG 16), ranking among the top 5, 22 and 23 universities worldwide respectively.

Through our commitment to driving impact, collaboration, and sustainable development, CUHK will continue to lead in knowledge transfer, making a positive difference in the world and paving the way for a brighter future.

# 2 Driving Innovation and Knowledge Transfer through Institutional Support

## 2.1 Partnerships and Developments

### First Hong Kong Agricultural Research Project to be Launched into Space

Prof. Lam Hon-ming and his team from CUHK sent rhizobia (soybean nitrogen-fixing bacteria) specimens into space on Tianzhou-6 by working with the China Manned Space Agency, China Resources Research Institute of Science and Technology (CRRIST), and Shenzhou Space Biotechnology Group (SBG), thereby becoming the first Hong Kong agricultural research project launched into space. The project will study the impact of the space environment on rhizobia, reveal changes in symbiotic bacteria and identify strains with improved nitrogen-fixing efficiency.



Prof. Lam and his team have helped local farmers in Gansu province grow better soybeans since 2016. They have given them stress-tolerant soybean seeds for free. They are also working with CRRIST and SBG to study induced mutagenesis of soybean seeds in space and find out how to improve agricultural technology. Plus, they want to find new soybean seeds that can do amazing things, like enriching national strategic agricultural resources. Prof. Lam's innovative technology has successfully benefitted farmers in Gansu, with over 136,000 acres of land utilizing his research. The latest advancement, which combines space and agricultural technologies, is poised to significantly extend the reach and impact on sustainability and agricultural economy.

### CUHK and World Wide Fund for Nature ("WWF") Join Forces to Revive Hong Kong's Corals

CUHK and WWF are working together to restore Hong Kong's degraded coral communities. Coral coverage in areas like Too Harbour has declined by 80% since the 1980s due to urban development and marine pollution. The "Reviving Our Corals" initiative aims to reintroduce at least 1,000 coral fragments. The partnership brings together novel coral restoration strategies, including collecting coral egg bundles to increase genetic diversity, which showed promising results in 2022.

### CUHK Hong Kong-Shenzhen Innovation and Technology Research Institute Integrates into Greater Bay Area ("GBA") Development

CUHK celebrated the unveiling of the CUHK Hong Kong-Shenzhen Innovation and Technology Research Institute (FITRI) in the Shenzhen-Hong Kong Innovation and Technology Co-operation Zone. FITRI focuses on cross-border collaborations in robotics, AI, medicine, and medical devices, with projects like the CUHK Shenzhen-Hong Kong Smart Medical Robotics Innovation Platform leading the way. The Institute aims to leverage Hong Kong's research expertise and Shenzhen's commercialization capabilities to strengthen industry connections, research translation, and drive the development of the Greater Bay Area (GBA) in smart healthcare and public health services.



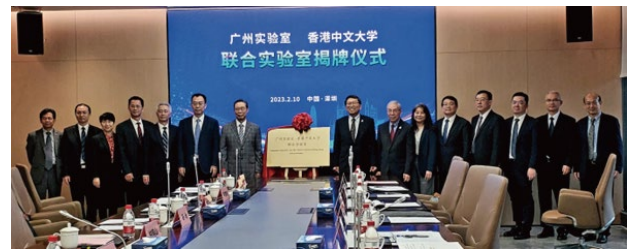


## Science Forum and Lectures

CUHK co-hosted the 2022 Greater Bay Area Science Forum Distinguished Lectures, bringing together distinguished scholars Prof. Bai Chun-li, Prof. Yau Shing-tung, and Prof. Andrew Yao to share their insights on innovation, knowledge transfer, research philosophy and ethics with young scientists in the Greater Bay Area.

## Establishment of Joint Research Laboratory

CUHK and the Guangzhou Laboratory have established a joint research laboratory focused on infectious respiratory diseases, regenerative medicine, immunology and vaccine evaluation. This collaboration aims to advance research in respiratory diseases, protect health and nurture talent in the Greater Bay Area.



## Chinese Academy of Sciences Academics Visit

The 13th Chinese Academy of Sciences Academics Visit Programme invited five distinguished academicians to deliver public lectures on their latest research transfer results, with an audience of around 200 people.

## New CUHK Beijing Centre to Deepen Academia-Industry Collaboration

The new CUHK Beijing Centre was inaugurated in June 2023, which will cultivate innovative professionals, facilitate interdisciplinary science and innovation cooperation, and strengthen collaboration between CUHK and its strategic partners. Collaborating with The National (Zhongguancun) Torch Institute of Science and Technology, the Centre will not only boost research development and academic exchange, but will also promote the transfer and transformation of scientific and technological achievements between the two regions. With the Beijing Centre and the upcoming CUHK Shanghai Centre, along with other facilities in the Guangdong – Hong Kong – Macau Greater Bay Area, CUHK aims to build a comprehensive mainland network to foster interaction and cooperation among government, industries, universities, and research institutions, connecting the nation and the world.



## 2.2 CUHK InnoHK Centres

The six InnoHK Centres at CUHK (CUHK InnoCentres) continue to excel in applied R&D coordination, commercialization of research outcomes and achieving performance targets. CUHK's licensing of cutting-edge technologies developed by these centres shows how it fosters innovation and entrepreneurship. The CUHK InnoCentres have achieved significant milestones, including granting two non-exclusive and two exclusive technology licensing cases. These are the first two exclusive IP licensing cases granted among InnoHK centres.

The technology exclusively licensed from the Centre for Novostics, one of the CUHK InnoCentres, has led to the establishment of a US\$200 million joint venture. The new joint venture 'Insighta' is dedicated to introducing the breakthrough technology: 'FRAGMA', which is a multi-cancer early detection screening technology. With a target price of less than US\$200 per test, it has the potential to transform millions of lives and change the trajectory of cancer prognosis, offering hope where it was once scarce. This is a vivid demonstration of how CUHK InnoCentres can facilitate the establishment of high-tech knowledge-based industry in Hong Kong. It also testifies the commitment of CUHK to cultivate an environment that encourages knowledge transfer, innovation and entrepreneurship via professional support in IP protection and licensing, in order to maximize the impact of inventions to Hong Kong and the world.



In January 2023, another CUHK InnoCentre Microbiota I-Centre (MagIC), The Faculty of Medicine of The Chinese University of Hong Kong (CU Medicine), and Hong Kong Science and Technology Parks Corporation (HKSTP) together hosted the Microbiome Summit 2023. Over 20 top international academic leaders and pharmaceutical industrial partners highlighted the applications of the gut microbiome and discussed the potential of Hong Kong being a hub for the microbiome industry in the Asia-Pacific region.

## 2.3 Establishment of CUHK Investment Company

CUHK Innovation Limited has been successfully registered in Hong Kong, and the team is currently working diligently to prepare for its upcoming launch in September 2023. As a wholly-owned subsidiary of CUHK, the company is dedicated to investing in innovative businesses that bridge the gap between academia and industry. Through strategic partnerships, such as the Memorandum of Understanding with China Prosperity Capital GP Fund, CUHK Innovation Limited is committed to supporting the commercialization of CUHK's spin-off companies and promoting Hong Kong as a global innovation and technology hub. With a strong focus on facilitating the growth of pioneering start-ups that have the potential to transform industries and improve people's lives, the company is poised to make a significant impact in the field of innovation and technology.

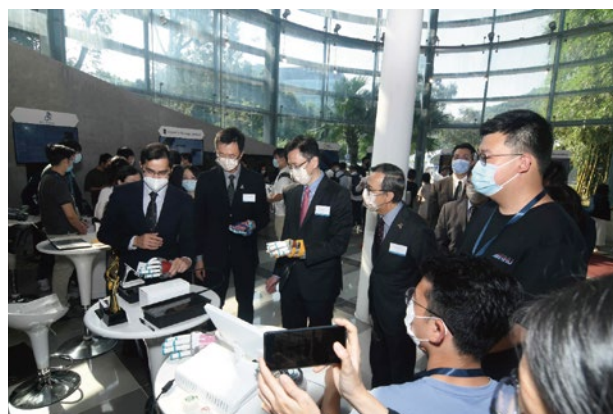


# 3 Developing an Innovative and Entrepreneurial Culture

## 3.1 Fostering Innovation

### CUHK Innovation Day 2022

The 2nd CUHK Innovation Day cum Elevator Pitch Competition in October 2022 showcased outstanding research outcomes from industry-university research. The hybrid event attracted hundreds of participants including researchers, industry partners, policymakers, and stakeholders.



The event featured innovative projects, themed talks by CUHK researchers and an Elevator Pitch Competition, providing a platform for CUHK innovators to connect with industry partners and investors, facilitating the technology commercialization and translation of research into societal impact.

## Empowering CUHK Inventors with Key Insights

The Office of Research and Knowledge Transfer Services (ORKTS) of CUHK hosted a series of online webinars that focused on technology start-ups and covered a range of essential topics, including IP law, developing a strong IP strategy, inventorship, publication impact on patents, common inventor mistakes, and risk management. The webinars were explicitly designed for CUHK inventors and aimed to provide them with valuable knowledge and insights on these critical subjects.

## Synergy between CUHK and CUHK-Shenzhen

CUHK-Shenzhen, established in 2014, was a significant milestone in the development of the internationalisation of higher education in the Greater Bay Area. CUHK-Shenzhen, home to nearly 500 faculty members and over 8000 students, is today an important institution of research and innovation in the region. CUHK and CUHK-Shenzhen leverage their respective strengths and build a common innovation platform connecting industry across the Greater Bay Area with both institutions' key research and breakthrough science in areas spanning artificial intelligence, big data, biomedicine, new energy, advanced materials, fintech, future networks, smart cities, pharmaceutical manufacturing and the digital economy.

In February 2023, CUHK, CUHK-Shenzhen and the Shenzhen Municipal Government signed a tripartite agreement to bring cross-border collaborations in education, research and technology transfer to the next level.



## 3.2 Entrepreneurship Ecosystem

CUHK funding programmes support academics, students and local youths to transform their ideas into useful solutions while promoting knowledge transfer and entrepreneurship activities at CUHK.

### Pre-Incubation Centre

CUHK's Pre-Incubation Centre (PI Centre) fosters entrepreneurship and provides resources, workshops and mentoring services for staff, faculty and student entrepreneurs. It also collaborates with HKSTP through the Co-Ideation Programme to offer seed funding. This year, 23 teams were admitted out of 57 applicants.

### Technology Start-up Support Scheme for Universities (TSSSU)

A total of HK\$16 million funding (HK\$8 million for \*TSSSU-O fund; HK\$8 million for #TSSSU+ matching fund) from the Innovation and Technology Commission, 23 CUHK technology start-ups including 16 TSSSU-O teams and 7 TSSSU+ teams, were given awards to launch or continue their start-ups this year. The start-ups include Advanced Manufacturing/Process Development, Biotechnology, Electronics, Energy, Environmental Protection, ICT, Medical Robots, Nanotechnology, Materials Science and Robotics.

These TSSSU companies received mentorship and start-up training through the CUHK entrepreneurship ecosystem. To date, 21 start-ups including Pre-Incubation and TSSSU companies, have received HK\$1.4 billion worth of external investments.

In addition, 27 CUHK teams were admitted to the pre-incubation program and incubation programs organized by the Hong Kong Science and Technology Park and the Cyberport respectively, with the total awarded amount of HK\$37 million.

*\* TSSSU-O is the original component of the Scheme which provides funding support to start-ups to commercialize the R&D results.*

*#TSSSU+ is an enhancement measure to provide dollar-to-dollar matching funds to start-ups which have demonstrated good growth potential through securing investment from the private sector.*

### Investment Networks, Training and Mentorship

A collaboration platform with angel investors and venture capitalists has been built focusing on supporting primarily seed stage to series B stage of CUHK start-ups. Partner investors include Sequoia Ventures, Hillhouse Capital-GL Ventures, Qiming Ventures, Boehringer Ingelheim Venture Fund, Morningside Ventures, and many more.

Through the Pre-Incubation Centre, over 30 events, including workshops, seminars and networking sessions attracted more than 800 participants. Topics covered included business development, marketing, team building, fundraising and legal matters.





## Monthly Consultancy and Mentorship

Mentorship are provided to start-up teams through individual consultation services.. Over 160 meetings were conducted in 2022-23 to provide business advice and assistance in making and developing connections for start-ups.

## Entrepreneurship Education

The CUHK Minor Programme in Entrepreneurship and Innovation (EPIN) fosters an entrepreneurial mindset via an interdisciplinary curriculum and extra-curricular activities. There is a focus on ideation, realization and commercialization. Over the past seven years, EPIN has attracted around 900 course enrolments and seen 44 successful minors.

### A. Partnership with local Innovation and Technology Companies

EPIN follows the principle of “Learning Through Practice” through project-based learning experiences and collaborations with the Project Launcher Programme at HKSTP, where they work on sponsored projects, as well as with Cyberport. Students act as consultants to review and improve start-up business models.

### B. Creativity@CUHK Series

EPIN’s Creativity@CUHK Series offers informal education workshops on topics like music, education and retail, attracting over 80 participants. This included the workshop “Creativity by Wood” in March, when students visited HK Timberbank to learn wood recycling and DIY skills, with guest speaker Mr. Ricci Wong, a CUHK alumnus and founder of HK Timberbank, who shared his entrepreneurial journey from being an architect.

### C. Post-COVID CUHK Data Hack

EPIN collaborated with CUHK departments to organize a Hackathon on “Post-COVID-19 Opportunities” in February, sponsored by Amazon Web Services and Esports. Over 60 students and staff worked for 48 hours to provide Health, Ageing, Leisure, Retail, Tourism, Media, Culture, Entertainment and Finance solutions, with top honours going to the teams: CUHKGPT, Coding Mind, and Waken.

### D. From Classroom to Workplace

EPIN offers internship opportunities through collaborations with Cyberport, HKSTP, CUHK Alumni Entrepreneurs Association and CUHK-funded start-ups. Students gain experience, earn course credits and take part in pre-internship workshops.



### 3.3 Expanding the CUHK Entrepreneurship Community and Network

The national development strategy for GBA presents an array of promising opportunities for start-ups in Hong Kong. CUHK has established collaborations with prestigious organizations across mainland China and Asia to foster the growth of ambitious CUHK teams in the region and beyond. This year, CUHK is proud to support Pre-Incubation or TSSSU teams through partnerships with renowned institutions such as Gungho Space in Foshan and the CUHK Shenzhen Research Institute (SZRI). Furthermore, discussions are currently underway to explore potential collaborations with organizations in Jiangsu, Chongqing, and Guangzhou Baiyun. Notably, Gungho Space and SZRI have successfully facilitated the entry of nine Pre-Incubation or TSSSU teams into the mainland Chinese market. Regular online talks were held to enrich the teams' knowledge of GBA policies and business prospects.

CUHK also actively explore collaboration opportunities with incubators and accelerators for Pre-Incubation or TSSSU teams to expand their business in Asia. This includes collaborations with the Singapore Management University and 500 Global.

#### Entrepreneur Day

The annual CUHK Entrepreneur Day (E-Day) is a platform for students, alumni, entrepreneurs and the public to learn about the latest start-up initiatives. E-Day 2022 featured online showcases, talks, workshops and the CUHK Entrepreneurship Competition, while the physical section included project exhibitions. Precision Cut Limited, a TSSSU team, won the championship.



#### CUHK Entrepreneurs Alliance Happy Hour

The CUHK Entrepreneurs Alliance (CUEA) aims to drive entrepreneurship growth. CUEA Happy Hour Entrepreneurial Talks, organized by CUEA members, feature alumni with successful entrepreneurship experiences and cover topics such as NFTs, intergenerational entrepreneurship, gerontechnology, metaverse vs. Web 3.0, and commercialising AI.

#### Flea market@InnoPort and InnoBuddies@InnoPort

To promote entrepreneurship among undergraduate students, a pop-up flea market was organized for student-owned businesses to showcase their products. There was also a promotional campaign called "Entrepreneurship Support Week" that provided funding opportunities and competitions, while a membership scheme called "InnoBuddies & InnoPeers" offered access to a co-working space. Over 300 students joined in.



### 3.4 Innovation and Entrepreneurship Competitions

Organizing entrepreneurship competitions on campus provides a platform for students to showcase their ideas, promote entrepreneurship, and get support from investors and sponsors.



The 16th Vice-Chancellor’s Cup of Student Entrepreneurship (VCCE) held in March showcased ideas from 24 teams. Mind+ won the championship with its AI-based analysis of optical coherence tomography images. Chinese Writing Wizard and Legal Expression secured the first and second runner-up positions, respectively, with Depths receiving the Best Presentation Award for its AI-powered search engine.

The Professor Charles K. Kao Student Creativity Awards (PCKKSCA) is co-organized by Office of Research and Knowledge Transfer Services (ORKTS) and Centre for Entrepreneurship (CfE) of CUHK. The students’ research is infused with creativity, and those who are awarded represent the University at the National College Students’ Extracurricular Academic Science and Technology Contest.



At the eighth Hong Kong University Student Innovation and Entrepreneurship Competition, CUHK students received 16 awards, including first prize for “Enhance Biosynthesis of Alpha Farnesene via Phase Separated Multienzyme Compartmentalisation.” Winners will represent Hong Kong in nationwide competitions.

The 13th National Challenge Cup China University Student Innovation and Entrepreneurship Competition is organized by HKNCGA and is the largest platform for Chinese youth entrepreneurship, attracting over 3,000 schools and 1.4 million students. CUHK teams won 1 gold, 1 silver, and 2 bronze in the competition.



The 9th Hong Kong University Student Innovation and Entrepreneurship Competition received a record 385 projects, and CUHK students excelled with 21 awards, including the Grand Prize in both the Innovation and Entrepreneurship categories.

The “Hong Kong Techathon 2023” saw professionals pitch new business ideas and seek seed funding and incubation support. CUHK students excelled, with four teams winning awards in categories such as ArtTech & EdTech, Healthcare & GeronTech, and Smart Cities & Sustainability, showcasing their innovative solutions in scene augmentation, wearable robots, AI-powered education tools and digital receipt management.



# 4 Technology Transfer and Commercialization

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## 4.1 Highlights of Intellectual Properties (IP) Management Output and Achievement

IP protection and commercialization play an important role in supporting and enriching the University's innovation ecosystem. This year CUHK has implemented more initiatives in IP management and continued to focus its efforts and resources to fuel innovation and IP commercialization. In 2022-2023, CUHK inventors made 109 new invention disclosures, while a total of 481 and 260 patent applications have been filed and granted, respectively in different jurisdictions around the world. The University also granted 78 IP licenses to local and overseas companies, bringing in licensing income of HK\$71 million this year.

In 2021, to assist more CUHK researchers in securing IP protection before publication of their research findings, "Fast-track Provisional Patent Fund" was launched and has significantly shortened the filing timeline. In light of the positive feedback, the University has established three New Patent Funding Schemes to further boost IP protection initiatives in a more innovative way this year. The three Schemes, which have been devised with both short- and long-term strategic goals, would include (1) Patent Fund for Provisional Patent Application; (2) Patent Fund for General Research Fund (GRF), and Collaborative Research Fund (CRF), particularly the Young Collaborative Research Grant; and (3) Patent Fund for Areas of Excellence Scheme (AoE), Theme-based Research Scheme (TRS), and Strategic Topics Grant (STG). Each Scheme aims to provide customized support to a diversified groups of inventors and innovations at their different development stages.

While Scheme 1 is open to all CUHK academic staff and aims to enhance University-wide IP awareness, Scheme 2 has been established specifically for inventors who are awardees of selected grants (e.g., GRF). More importantly, to inspire young inventors at the early stage of their research work, the Scheme would provide support to young researchers who often experience funding constraints at the beginning of their career. The Scheme is also expected to broaden IP protection for both basic and applied research, and encourage grant application from researchers whose projects have strong potential to grow for further excellence. Different from Scheme 1 and 2, Scheme 3 focuses on addressing the IP needs of CUHK academics who have achieved research excellence in their field. The Scheme would secure IP protection for large-scale projects led by CUHK researchers in areas that are of strategic importance to the long-term innovation development and economic growth of the city.

## 4.2 Research Contracts and Agreements

The provision of professional and efficient contract support for research collaboration projects is crucial for facilitating knowledge transfer between different entities. Through these contracts, researchers can collaborate with industry partners, academic institutions, and other organizations to share knowledge, resources, and expertise. This can lead to the creation of new ideas, technologies, and innovations that can benefit society as a whole.

By concluding 901 research contracts of various types with a combined value of over HK\$289 million, the University has demonstrated its commitment to fostering research collaborations and knowledge transfer. These contracts cover a wide range of research areas from across faculties, enabling researchers to work across disciplinary boundaries and apply their expertise to new fields. The contracts also cover different types of collaborations, including material transfer, collaboration research, clinical trials, and research services, reflecting the diverse needs of the research community.

Overall, the University's support for research contracts and collaboration projects is critical for promoting knowledge transfer and advancing research. It enables researchers to collaborate and share their knowledge and expertise to tackle complex problems and create innovative solutions that benefit society.

## 4.3 Innovation and Technology Creating Impact Beyond Academia

### CUHK Performs the World's First Robot-assisted Bronchoscopic Microwave Ablation of Lung Metastases

Malignant cancers from organs often metastasise to the lung. Conventional surgical resection of lung metastases can cause surgical access trauma and the unwanted removal of healthy lung tissue. Since October 2022, three patients with six lung metastases have been successfully treated with ablation. This novel procedure allows physicians to accurately access peripheral areas of the lung and perform non-invasive lung sparing microwave ablation of lung metastases. It is now in clinical trial, and aims to enrol up to 145 patients worldwide.



Patients suffering from lung metastases have often had previous surgery or are undergoing chemotherapy for their advanced stage cancer. They may already be physically and psychologically weakened from the side effects. Surgical resection is the main treatment modality for lung metastases, but it is associated with access trauma and loss of healthy lung tissue.

### Innovative Products to Improve the Quality of Life for Disadvantaged Groups

The Jockey Club Community Care and STEM in Action Project, organized by CUHK's Centre for Learning Sciences and Technologies, has yielded remarkable outcomes over the past three years. With the expert guidance of mentors from the Faculty of Engineering at CUHK, students from six secondary schools have ingeniously developed 21 pioneering products that have the potential to transform the lives of disadvantaged groups. These innovative and creative products, showcased at the Learning and Teaching Expo 2022, have been thoughtfully designed to meet the diverse needs of underprivileged communities, addressing critical aspects of daily life such as transportation, personal care and communication.



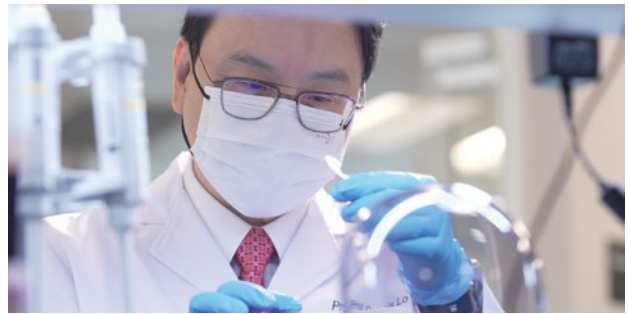
### Realize a Building with the Community

The Pingtan Children's Library (the Library), designed by Prof. Peter W. Ferretto and his team at Condition\_Lab, is a unique timber structure in a Dong Minority village in Pingtan, Hunan Province. It follows the traditional Dong architectural style and has interwoven spiral staircases that serve as both circulation and seating. This project continues the team's Gaobu Book House, which demonstrated the ability of architecture to revitalize rural communities while preserving cultural heritage. The Library won the World Interior of the Year Award and Best Use of Natural Light Prize at the 2022 World Architecture Festival.



## Award Recognising CUHK Scientists' Life-saving Technology

Prof. Dennis Lo Yuk-ming from CUHK Faculty of Medicine has won the prestigious Lasker-DeBakey Clinical Medical Research Award for his ground-breaking discovery of cell-free foetal DNA in maternal blood and non-invasive prenatal testing for Down syndrome. His research has revolutionized prenatal diagnostics, saving millions of women from unnecessary risk. The Lasker Awards are one of America's top biomedical research prizes, and Prof. Lo is the fifth Chinese recipient in the award's history.



## New Milestone for Therapy Creation

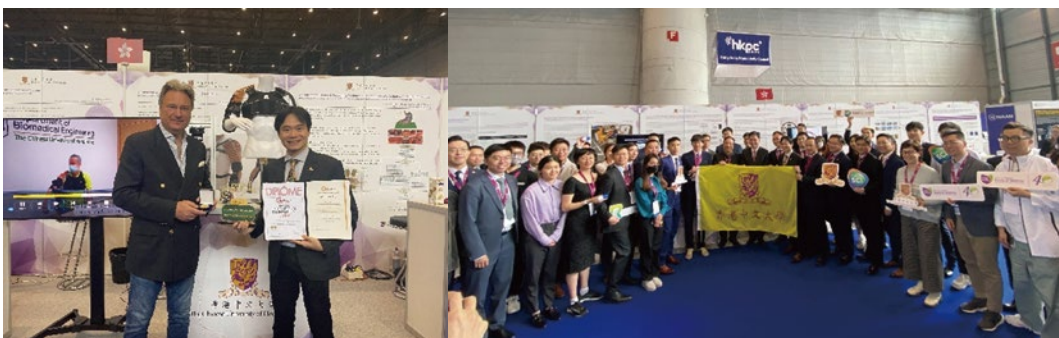
The opening of the Advanced Therapy Products (ATP) Good Manufacturing Practice (GMP) Centre, founded by the Hong Kong Institute of Biotechnology (HKIB) and CUHK, marks an important milestone in the development of Hong Kong's biotechnology ecosystem.



Both cell and gene therapies are essential to biomedical research and can potentially cure genetic diseases. They work by modifying genes in specific cells that are then inserted into the body and can treat previously untreatable diseases. However, manufacturing products takes time and money and requires a clean production environment. Due to the limited number of such facilities, establishing the new centre will expedite the advancement of life-saving cancer therapies, regenerative medicine, and other biomedical technologies. This Centre will act as a breeding ground for biotechnology innovation and facilitate knowledge transfer, bringing significant benefits to patients in Hong Kong and beyond.

*Please refer to Annex 1 for other CUHK innovations creating impact beyond academia.*

## 4.4 Industry Liaison Activities, Exhibitions and Business Matching Meetings



## International Invention Exhibition

In April 2023, CUHK researchers won 26 awards at the International Exhibition of Inventions Geneva, supported by the World Intellectual Property Organization and the Swiss Federal Government. The awards included gold, silver and bronze medals, as well as special prizes. The winning projects encompassed a range of fields and were developed through collaborations with prestigious research institutions and university-supported start-up companies.

## Middle East Invention Fair

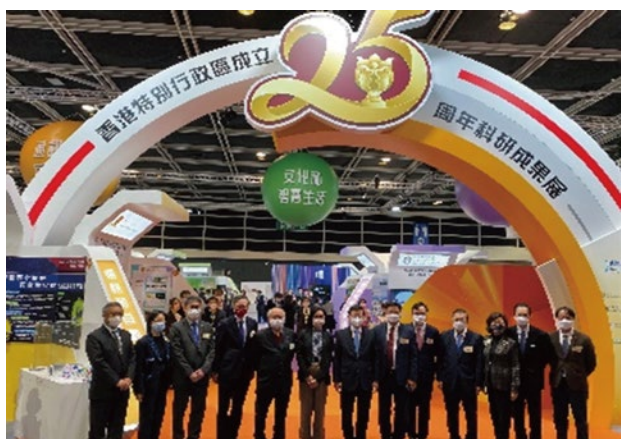
The 13th IIFME – International Invention Fair of the Middle East – was organized with organizations such as the International Federation of Inventors' Associations (IFIA), World Intellectual Property Organization (WIPO), UNESCO and the International Exhibition of Inventions of Geneva. In total, 34 countries and 192 inventions were involved. Researchers from CUHK won 7 awards, including 5 gold medals, demonstrating the University's success in translating research into real outcomes at this international event supported by the Kuwait Science Club.

## SmartHK



Amid the resumption of Mainland activities, CUHK start-ups supported SmartHK, an event organized by HKTDC and Guangdong Provincial Department of Commerce, as part of the Guangdong-Hong Kong Cooperation Week, with around 2,000 business elites in attendance, fostering cooperation between Hong Kong and the Greater Bay Area, including 5 CUHK start-ups.

## InnoTech Expo 2022



InnoTech Expo 2022, organized by Our Hong Kong Foundation, showcased 50 mainland exhibits in aerospace, land and ocean exploration, along with 25 local scientific research outcomes, bringing in over 120,000 visitors and promoting scientific research to inspire young people.

Among the 25 exhibition teams, CUHK was invited to share four of its newest research initiatives and showcase various award-winning technologies with the public in "Health and Medical Sciences," "Communication and Automation" and "Environmental and Food Sciences," accordingly.

## Asian Summit on Global Health 2023

The third Asia Summit on Global Health (ASGH) organized by HKSAR Government and HKTDC is Asia's premier event on health innovation and investment, themed "Reimagining the Future of Healthcare". It brings together stakeholders globally to explore opportunities in the dynamic healthcare sector, with 10 CUHK start-ups taking part as exhibitors alongside over 140 healthcare-related innovative technology enterprises.

## Others

CUHK took part in local and international events such as InnoCarnival 2022, International ICT Expo, Hong Kong International Medical and Healthcare Fair 2022, BIP Asia Forum, BIOHK 2022, InnoEx 2023 and Hong Kong International Medical and Healthcare Fair 2023. It presented its innovative projects and sought collaborations with government departments and industries.

# 5 Social Innovation and Community Engagement

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## 5.1 Social Innovation and Impact Creation

As a socially responsible institution, we actively promote social innovation through initiatives like the Knowledge Transfer Project Fund (KPF) and Sustainable Knowledge Transfer Project Fund (S-KPF). These programmes facilitate the translation of academic knowledge into solutions for community projects, thereby supporting researchers, students and the wider community. The Hong Kong Social Enterprise Challenge (HKSEC) showcases our commitment to a thriving social innovation ecosystem by empowering youth to address social issues through creative entrepreneurship.

### Funding Support of Knowledge Transfer Project

The Knowledge Transfer Project Fund (KPF) has supported numerous community impact projects since 2009, benefiting over 1 million people, with ongoing collaborations with the Social Innovation and Entrepreneurship Development Fund (SIE Fund) and the University Grants Committee (UGC) to support additional projects in 2022-2023. For further information on KPF-supported projects, please refer to Annex 9.

### Social Impact Academy@ORKTS: Enabling Academics to Transfer Research Knowledge into Socially Impactful Solutions

The Social Impact Academy@ORKTS equips academics with the necessary skills and knowledge to create solutions for social needs. It offers webinars on topics like public engagement, governance for social enterprises and media interview techniques, plus workshops on social business skills, and coaching programs.



### Cross-Sectoral Knowledge Exchange and Collaboration Between CUHK Professors and Young Social Entrepreneurs

To foster collaboration and knowledge exchanges, a networking event was organized to bring together CUHK professor-led teams and youth-led Hong Kong Social Enterprise Challenge (HKSEC) teams. The event explored collaboration opportunities, with inspiring discussions centred around Innovative Elderly Care, Education for the Disadvantaged and Mental Health and Wellness. The aim is to create a better future through cross-sectoral collaboration.





## Publicity

A comprehensive publicity strategy focuses on promoting awareness of CUHK's impactful projects and social enterprises in healthcare, education, reduced inequality, countryside cultural conservation and coral restoration, thereby generating positive feedback from all kinds of stakeholders in the community.



## Highlighted KPF Projects:

### Capacity Building for Advance Care Planning

(PI: Prof. Helen Chan Yue-lai, The Nethersole School of Nursing)

In the Chinese community, discussing end-of-life (EOL) care is often considered taboo, which can deprive patients and their families of the much-needed right to self-determination regarding their own care. Prof. Chan's project supports the HKSAR Government's efforts to formulate new legislation on advance directives, providing insights, resources and training to promote timely and fair access to Advance Care Planning (ACP) end-of-life care. The project aims to equip health and social care providers with knowledge and skills, including the development of a comprehensive manual, demonstration videos and an evidence-based e-Learning programme.



### Plastic-free Grocery: Wet Market Film Screening X Cross-cultural Environmental Communication

(PI: Prof. Wu Ka-ming, Centre for Social Innovation Studies)

Prof. Wu's project aims to reduce the use of single-use plastic bags in wet markets, focusing on behaviour change through public persuasion. The project involves university students sharing knowledge with domestic helpers and elderly shoppers, using Design Thinking. The project aims to develop a new approach for plastic waste reduction in Hong Kong and beyond.



## 5.2 Social Entrepreneurship

Engaging in social entrepreneurship is a way for CUHK members to create a positive social impact in a sustainable manner. A number of schemes and programs set out to do this within the CUHK community.

### Sustainable Knowledge Transfer Project Fund (S-KPF)

The Sustainable Knowledge Transfer Project Fund (S-KPF) is the first funding scheme of its kind in Hong Kong for academics to transfer their academic knowledge and launch social enterprises. Two-year seed funding, incubation services, training and support are provided so they can become self-sustaining organizations and get support from external investment or other funding resources. For further information on S-KPF social enterprises, please refer to Annex 10.

#### Highlighted S-KPF Project:

### Physical Literacy Academy for Children and Youth Limited (PLACY)

(PI: Prof. Raymond Sum, Department of Sports Science and Physical Education)

According to Hong Kong's 2018 report card, only 30% of children achieved international norms for cardio-respiratory fitness, while less than 10% of children participated in at least 60 minutes of moderate to vigorous physical activity (MVPA) a day. While academic achievements have been more valued in our education system over others, lack of physical activity among children might lead to long-term negative impacts on their health and increase the healthcare burden of society.



PLACY, a social enterprise under S-KPF scheme, aims to promote inclusive sports through providing a broad range of programs in physical literacy, physical fitness, as well as sports talent assessments services for children and youth in Hong Kong, regardless of their physical abilities, cultural and socio-economic background. The assessments provide comprehensive and objective measurements for the participants to understand their health conditions and enhance their own sports performance and techniques. Referral of talented individuals would be provided to connect them with various sports associations for further development to offer potential career in sports for talented youth from underprivileged background.

To achieve its goals, PLACY has established strong partnerships with various sports and physical fitness associations in Hong Kong to launch four levels of professional certification courses for assessment. PLACY engaged with 40 professional assessors and provided assessment services to 450 students in 2022. Coming large-scale events in collaboration with leading corporations in Hong Kong to promote active lifestyle and sports literacy among the general public are also planned.

### I-CARE Social Enterprise Start-up Scheme

Since its launch in 2015-16, the I-CARE Social Enterprise Start-up Scheme has supported students and recent graduates in their social enterprises. In 2022-23, 11 teams entered the mentorship program, receiving guidance from business elites who are also senior alumni of CUHK. After presenting their business plans, three teams were selected and awarded HK\$100,000 each in seed funding. The training sessions attracted around 100 students and alumni.



## Hong Kong Social Enterprise Challenge (HKSEC)

Launched in 2007, the Hong Kong Social Enterprise Challenge (HKSEC) helps tertiary students and recent graduates develop practical solutions for social issues through creative entrepreneurship. Supported by Home and Youth Affairs Bureau and Intellectual Property Department of HKSAR Government, United Nations Development Program and Citi Foundation, HKSEC provides seed funding, mentorship and publicity support to award-winning teams. This year, 465 participants and 156 teams saw two CUHK teams achieve First Runner-up titles.



First Runner-Ups at HKSEC 2022-23 are Environmental Sustainability Guardian Limited and Meat the Next.

Environmental Sustainability Guardian Limited is a green manufacturing enterprise with eco-friendly products adopting self-invented silica capsule technology.

Meat the Next specializes in food technology and high-quality New Generation Food to bring about diet change, promote health, combat climate change, and alleviate the food crisis.



## 5.3 Community Engagement

Cubic Zine is a quarterly digital newsletter featuring social innovators at CUHK, including S-KPF (Sustainable Knowledge Transfer Project Fund)/KPF (Knowledge Transfer Project Fund) project leaders. Since its launch in 2019, over 15,000 CUHK recipients and 800 external parties worldwide have viewed Cubic Zine. In mid-2022, short video highlights were added for social media, boosting subscriber numbers.



In October 2022, we compiled cover stories and published a book named "Social Innovation by CUHK Scholars" 《「學人」搞社創》with Joint Publisher (三聯書店(香港)).

An exciting book launch event was held in January 2023. Prof. Maria Tam Siumi (Associate Director, Centre for Urban History, Culture and Media, Institute of Future Cities), Dr. Tong Shiu-sing (Senior Lecturer, Department of Physics) and Prof. Apple Chui Pui-yi (Research Assistant Professor, School of Life Sciences) shared their research and social innovation knowledge. They discussed how CUHK scholars can transform academic theories into practical applications through "knowledge transfer." The books are available at bookstores.



The Publishing 3.0 HK Smart E-book Hub Promotion Scheme invited ORKTS and the Joint Publisher to promote the government's "Art Tech" – an online "E-book Publishing Conversion Platform." By using text-to-speech AI (Artificial Intelligence) technology, the book "Social Innovation by CUHK Scholars" 《「學人」搞社創》 has been translated into English, Chinese Mandarin, and audio e-book format. They are now available in the "smart e-book hub."

# 6 Looking Forward

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As a leading academic institution in Hong Kong, CUHK is committed to advancing knowledge transfer and playing an important role in promoting the city's position as a national and international hub for innovation and technology. We have been extending the reach and significance of our research impact and take great pride in being at the forefront of cutting-edge research and development. Unwaveringly leveraging our research capabilities to drive innovation and entrepreneurship enables us to create impactful solutions to address society's grand challenges.

With the vast opportunities presented by the Guangdong-Hong Kong-Macao Greater Bay Area and national developments, CUHK has been actively participated in these exciting frontier explorations. We will continue to expand our collaborations with industry partners, government agencies, renowned research institutions and other stakeholders to enhance our innovation-driven culture for promoting social and economic development.

CUHK will remain a leader in strengthening Hong Kong's entrepreneurship ecosystem. We provide mentorship, networking opportunities, funding, and other resources to help aspiring entrepreneurs bring their ideas to fruition. Our world-class facilities and infrastructure will continue to support researchers, start-ups, and technology companies to grow and succeed.

In the coming years, our knowledge transfer strategy will stay focus on creating impactful outcomes to benefit society. CUHK will contribute to the advancement of various industries by nurturing top-notch talent in science and technology.

We are excited about future opportunities and remain steadfast in instigating positive change through our research, innovation, and entrepreneurship initiatives.



Professor Sham Mai-har  
Pro-Vice-Chancellor / Vice-President (Research)

### Knowledge Transfer Cases with Impact

SDG Goals achieved



## A. Flow battery enabling renewables and microgrids

Principal Investigator: Prof. Lu Yi-chun

Department & Faculty: Department of Mechanical and Automation Engineering, Faculty of Engineering

### Summary:

Lithium-ion batteries are widely used, but are prone to overheat and are expensive to produce. Moreover, they require toxic chemicals to extract. This research has led to the development of a new water-based electrolyte system that offers a safer, cheaper, and more environmentally friendly alternative to traditional lithium-ion batteries. By eliminating the need for toxic chemicals in the production process, this water-based electrolyte system significantly reduces the environmental impact of battery manufacturing. Its improved safety and reduced production costs also make it a promising solution for the renewable energy industry, where large-scale energy storage systems are becoming increasingly important.

### Description of the technology:

An energy storage system is a critical enabling factor for deploying unstable and intermittent renewable power sources, such as solar and wind power. Non-aqueous lithium-ion batteries dominate the battery market owing to their high energy density. However, they are flammable, which could bring catastrophic damages in large-scale applications. Aqueous batteries are safe but impractical for Li-ion replacement due to low voltage ( $<2V$ ). Prof. Lu developed a breakthrough aqueous electrolyte that allows batteries to reach the voltage of Li-ion while being non-flammable, non-toxic, and seven times cheaper. Redox flow batteries are promising technologies for large-scale electricity storage, owing to their design flexibility in decoupling power and energy capacity. However, the development of vanadium redox flow batteries is limited by the high-cost of vanadium, while the development of low-cost polysulfide flow batteries is prohibited by poor cycle life resulting from polysulfide crossover. Underpinned by Prof. Lu's research, a new type of selective membrane was created, which, for the first time, enabled the long-term operation of low-cost polysulfide flow batteries.

The development of grid-scale stationary energy storage systems is imperative to achieving massive deployment of renewable energies. Lithium-ion batteries are the most mature energy storage systems. However, their high flammability makes them unsuitable for large-scale energy storage in grids, and populated residential areas. All vanadium redox flow batteries are safe alternatives, but wide deployment is limited by the high-cost of vanadium.

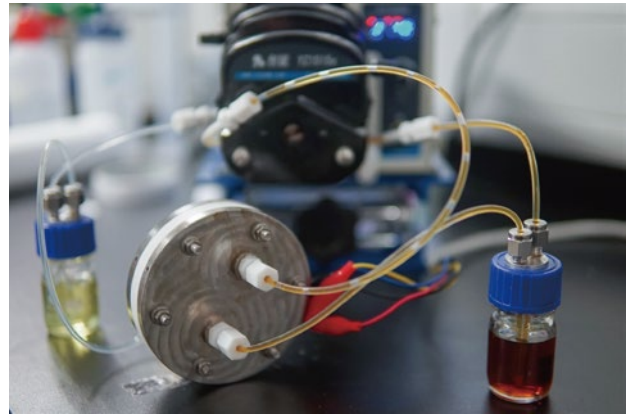
Prof. Lu and her research team developed advanced and intrinsically safe battery technologies using low-cost and sustainable materials, including safe and high-energy molecular crowding based aqueous lithium-ion batteries (a safe electrolyte that reaches the same voltage window as commercial Li-ion battery electrolyte but costing seven times less); low-cost polysulfide flow batteries (1,000 times cheaper than vanadium for charge storage); high-energy zinc iodine/bromide flow batteries (four times higher than vanadium flow batteries); and low-temperature heteropolyacid flow batteries (stable and high-power operation at  $-20^{\circ}C$  where vanadium flow batteries are not functional).

The battery technologies by Prof. Lu offer higher energy density at a lower cost compared to commercial vanadium flow batteries, representing one of the most promising candidates for large-scale energy storage with no fire risk and resource limitation. These prospects are foundations that warrant the success of her technology transfer initiatives and future commercialization.

In the long term, the global energy structure and living environment will benefit from our innovations. The penetration of worldwide renewable energy will be significantly increased owing to the availability of safe and low-cost large-scale energy storage solutions developed by Prof. Lu and her team. This will markedly reduce the use of fossil fuels and CO<sub>2</sub> emissions on a global scale.

### Impact beyond academia:

Prof. Lu and her team have been actively engaging in technology transfer to translate materials innovation into commercial scale systems. She co-founded Luquos Energy Ltd. to develop and commercialize these inventions for large-scale grid storage applications. The mission of Luquos Energy is to bridge the gap between intermittent renewable resources and constant energy demand. Luquos Energy has received tens of millions of HK dollars in prize/award/investment from Technology Start-up Support award, HKSTP Incu-Tech Award, TERA-Award, and its strategic partnership with Towngas, a leading energy company in Hong Kong. Many industrial users have contacted the company for collaboration and product deployment including CLP, MTR, HK Observatory, China Everbright Environmental Group, Cornerstone Technologies, etc.



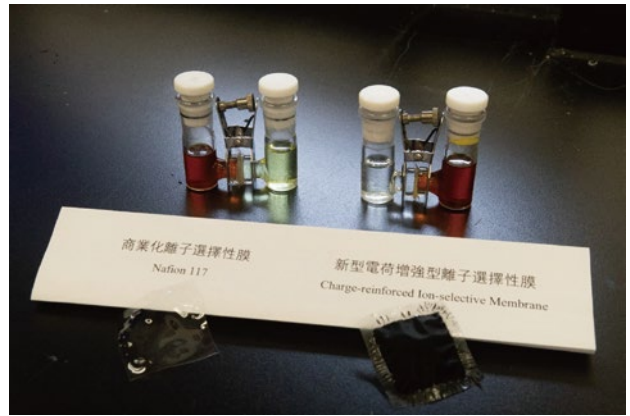
The prototype of demonstrated polysulfide-iodide redox flow batteries with CRIS membrane.

Luquos Energy has established a research centre in Shenzhen focusing on scaling up some of the key materials for the advanced flow battery technologies previously mentioned. At this stage, the lab scale flow battery prototype is about 500 W. The team aims to accomplish a 5000 W prototype by the end of 2023, which will then be integrated with a field test demonstration in Shenzhen, in collaboration with Towngas. The team intends to develop key scale up processes and pilot production to the hundreds of kW level by 2025 and MW-level by 2026.

The research team's work has led to safe and sustainable energy storage technologies, which will significantly increase the penetration of renewable energy and accelerate the transition to clean and renewable energy on a global scale. Lithium-ion batteries are potentially dangerous to deploy at scale and in populated areas due to their flammable nature. Innovations by the team create paradigm shifts in energy storage solutions that are intrinsically safe and low-cost while significantly exceeding former state-of-the-art performances. These innovations will help transform inefficient grids into modern micro-grids, coupling with renewables and reducing the use of fossil fuels.



Prof. Lu Yi-chun, CUHK Department of Mechanical and Automation Engineering and co-founder of Luquos Energy.



Crossover comparison between CUHK's charge-reinforced ion-selective membrane (CRIS, right) and commercial Nafion membrane (N117, left).

### Knowledge Transfer Cases with Impact

SDG Goal achieved



#### B. EduVenture-VR®

Principal Investigator: Prof. Morris Jong Siu-yung

Department & Faculty: Department of Curriculum and Instruction, Faculty of Education

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##### Summary:

EduVenture-VR®, an open and integrated virtual reality (VR) learning system, supports teachers and students in conducting immersive and interactive experiential learning at a low cost and with high user-friendliness. In Hong Kong, there have been 15 educational projects related to EduVenture-VR® for primary and secondary education, with a total funding of over HKD 72 million. So far, more than 500 schools and universities have utilised EduVenture-VR® across various subject disciplines, benefiting over 60,000 learners in Hong Kong, Mainland China, Taiwan, Macau and Australia. It has had a significant impact on technology-enhanced experiential learning in K-12 and higher education.

##### Description of the project:

EduVenture-VR® (<https://vr.ev-cuhk.net/>) consists of three sub-platforms: Composer, Explorer and Retriever. The Composer is a web-based platform designed for teachers to create virtual fieldwork resources, enabling students to engage in virtual immersive and interactive experiential learning. The Explorer is a mobile application that allows students to access these resources using their mobile phones and cardboard goggles, facilitating virtual fieldwork experiences. Students interact with the resources by moving their heads and using their voices to respond to various learning scaffolds incorporated within them. The Retriever is a web-based platform for retrieving and extracting students' recorded virtual fieldwork progress stored in the cloud. It supports students in conducting self-reflection after the fieldwork and assists teachers in conducting debriefing sessions based on their students' achievements and areas of struggle.

Initially supported by a grant from the Research Grants Council (RGC), Prof. Jong and his research team at the Centre for Learning Sciences and Technologies (<https://clst.fed.cuhk.edu.hk/>) developed EduVenture-VR®. This innovative system aids teachers and students in facilitating immersive and interactive virtual experiential learning, offering a cost-effective and user-friendly solution. Positive results were obtained regarding the pedagogical effectiveness of EduVenture-VR® specifically in the domain of formal geography education in Hong Kong.

Following this success, Prof. Jong secured funding of over HKD1.5 million from the Education Bureau of the Hong Kong government to provide professional development training to geography teachers, focusing on the integration of EduVenture-VR® into their teaching practices. During the training, teachers not only learned how to use the EduVenture-VR® materials created by the research team but also acquired the skills to design their own materials according to their students' learning needs. This dual approach empowered teachers as both “users” and “creators” of EduVenture-VR® resources.

Furthermore, in collaboration with international scholars, research has been conducted on the implementation of EduVenture-VR® in various educational settings abroad. For instance, in primary education, the team partnered with Prof. T. C. Hsu's research team to investigate the pedagogical effectiveness of utilising EduVenture-VR® to support the learning and teaching of earth science. In secondary education, in collaboration with Prof. G. J. Hwang's research team, Prof. Jong explored the pedagogical effectiveness of employing EduVenture-VR® for peer assessment in English speaking tasks. In higher education, working alongside Prof. G. Z. Liu's research team, Prof. Jong examined the pedagogical effectiveness of leveraging EduVenture-VR® to facilitate contextualised collaborative second language learning.

More recently, Prof. Jong and his team received substantial support from the Hong Kong Jockey Club Charities Trust (HKJCCT) through a two-phase grant totalling HKD 57.8 million. This funding enabled the team to undertake a large-scale project focused on utilising EduVenture-VR® to enhance secondary students' Chinese literacy and writing skills (<https://www.jc-vr-chinese.hk/>).



## Impact beyond academia:

### A. Impact on Local Education:

#### Reforming the Geography Education in Hong Kong

EduVenture-VR® has provided valuable insights into the education policy regarding Geography fieldwork in Hong Kong. The Education Bureau (EDB) issued three sets of “Invitations to Quotation” that referenced EduVenture-VR® as a recommended virtual reality (VR) learning system for the development of teacher professional development programmes in Geography fieldwork. These programs aim to enhance students’ learning, motivation and effectiveness not only in Hong Kong but also in the Guangdong-Hong Kong-Macao Greater Bay Area. Additionally, the EDB published EduVenture-VR® virtual Geography fieldwork materials on their webpage, serving as a reference for teachers.

#### Developing Teacher Professional Development Programmes on the Effective Use of EduVenture-VR® in Geography and Other Subject Disciplines

Recognising the pedagogical potential of EduVenture-VR®, the Education Bureau (EDB) took the initiative to organize a series of seminars and professional development programmes aimed at training teachers in the effective utilisation of the system. Over the years, the principal investigator (PI) has been awarded over HKD 3 million in funding by the EDB to design and conduct seven one-year professional development programmes. These programmes have equipped 1,111 teachers with the necessary skills to incorporate EduVenture-VR® into Geography education and e-Learning in general. The participating teachers expressed high satisfaction, giving our programmes a score of 4.4 out of 5. They also commented that “VR could effectively stimulate students’ interest” and they “would apply VR in classroom and join more similar courses in the future”. The EDB has published EduVenture-VR® training materials online for teachers’ reference.



Prof. Morris Jong Siu-yung, Department of Curriculum and Instruction, Faculty of Education, CUHK and founder of EduVenture-VR®

#### Innovating Conventional Chinese Language Pedagogies

Prof. Jong received a funding of HKD 23.34 million from the Hong Kong Jockey Club Charities Trust (HKJCCT) for a 3.5-year project titled “Jockey Club VR Project for Enhancing Chinese Language Literacy.” The project aimed to enhance Chinese writing literacy among Hong Kong secondary students by immersing them in virtual literary walks using EduVenture-VR®. The project involved the participation of 51 secondary schools, benefiting 14,774 students and 156 Chinese language teachers. According to the project evaluation, 87% of the students demonstrated advanced Chinese writing skills after using EduVenture-VR®, and 96% of the teachers gained more confidence in integrating the system into Chinese education. Mr. Chi-Kian CHAN, the Vice Principal of SKH St. Mary’s Church Mok Hing Yiu College, commented that EduVenture-VR® “successfully deepened students’ proficiency in Chinese writing” and “strengthened their connection with the community”.



In March 2022, the Education Bureau Circular Memorandum No. 58/2022 recommended the EduVenture-VR® Chinese language teaching packages as key resources to support students' self-directed learning during the suspension of face-to-face classes due to COVID-19. In July 2022, Prof. Jong was awarded an additional funding of HKD 34.46 million from the HKJCCT to conduct the second phase of the project (2022-2025) and further expand the impact of EduVenture-VR® in Chinese language education.

#### B. Impact on Overseas Education:

##### Enhancing Learning Motivation and Effectiveness in K-12 Education in Taiwan

After achieving success in Hong Kong schools, EduVenture-VR® has gained significant popularity among teachers in Taiwan. In 2021, the principal investigator (PI) and his team collaborated with the National Taipei University of Education (NTUE) to introduce a VR school-based support programme in several counties in Taiwan, including Taipei, Tainan, Hualien and Keelung. This programme provided online seminars, VR training workshops, and school-based pedagogical consultation services to 330 students and 35 teachers. The evaluation exercise revealed that 90% of the students believed that EduVenture-VR® helped them learn more effectively in class, while 97% of the teachers expressed their willingness to continue utilising the system in their teaching endeavors.



##### Fostering Work-Integrated Learning in Tertiary Education in Australia

In Australia, the School of Property, Construction and Project Management (PCPM) at the Royal Melbourne Institute of Technology University has integrated EduVenture-VR® into more than 15 undergraduate construction programmes, providing over 1,500 students with enhanced learning opportunities through virtual construction site visits in the classroom. The principal investigator (PI) and his team conducted two online EduVenture-VR® training courses for the Faculty of PCPM and the College of Vocational Education. Prof. Peter Wong, the Associate Dean of the School of PCPM, wrote in his testimony that EduVenture-VR® "is much more effective than the conventional teaching methods". During the pandemic, EduVenture-VR® created "an immersive and safe environment" for students to learn essential on-site construction skills and technologies.

### Knowledge Transfer Cases with Impact

SDG Goals achieved



#### C. Safe and Effective Surgical Robot Platform

Principal Investigator: Prof. Samuel Au Kwok-wai

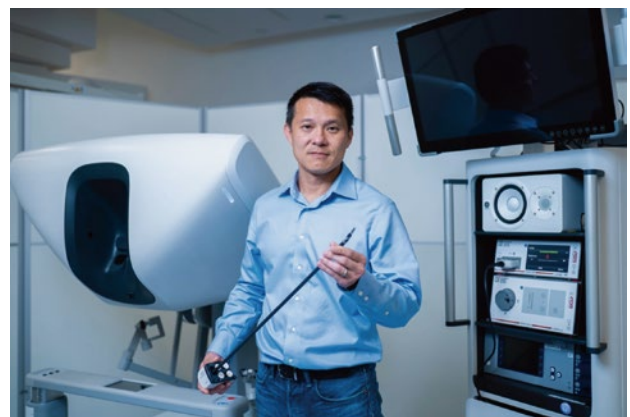
**Department & Faculty:** Department of Mechanical and Automation Engineering, Faculty of Engineering; Department of Surgery (by courtesy), Faculty of Medicine

##### Summary:

Both in Hong Kong and Mainland China, the demand for surgeons' services continued to exceed the supply, due to an ageing population and more elderly people needing surgery. Surgical robotic technology has demonstrated better clinical outcomes and is capable of easing the learning curve for surgeons. However, the high cost of the system prevents it from being widely adopted. Underpinned by the research of Prof. Au and his team, Cornerstone Robotics has developed a safe and effective surgical robotic platform that offers affordable robotic surgery. This development has had significant impacts on patients, healthcare, and the economy.

##### Description of the technology:

Surgical robotic technology has been widely adopted by surgeons to improve clinical outcomes. However, the high cost of getting started is a major barrier to wider adoption, limiting the number of patients who can benefit from robotic surgery. Apart from the affordability challenge, surgical robotic technology is a highly interdisciplinary field, ranging from mechanical design, sensing and control to human clinical trials. Cornerstone Robotics (CSR) is dedicated to independent research and the development of fundamental components such as mechanical architecture, electrical architecture, software architecture, complex algorithms, and visual imaging systems to tackle highly complex engineering problems. Customised parts not only help solve engineering problems, but they also reduce costs, which facilitates sustainable development. To enclose the technology development, Prof. Au co-directs an advanced platform established by The Chinese University of Hong Kong, Multi-Scale Medical Robotics Center (MRC), which offers pre-clinical evaluation support services for CSR as a part of the translation ecosystem. Currently, CSR has successfully overcome technical difficulties and realised the development of high-quality surgical robot products. The self-developed multi-port endoscopic surgical robot has successfully completed animal experiments in urology, as well as many cases of difficult operations in human clinical trials in urology and general surgery. Excellent performance has been highly appraised by many top clinical experts at home and abroad. The robot has smooth operation, precise control, realistic vision, excellent performance, both usability and accessibility, occupying the domestic technological highland. The company's first-generation laparoscopic surgical robot has entered the human clinical stage. It will apply for medical device certification on a global scale and will be approved for marketing in succession to serve global medical care and benefit more patients. In the long term, CSR will commit to developing safe and effective surgical robotic platforms which offer robotic surgery at an affordable price, ultimately improving the accessibility of high-end surgical robotic devices.



Prof. Samuel Au Kwok-wai, Founder of Cornerstone Robotics

Prof. Au is committed to the field of surgical robotics on both hardware and software sides. His research has laid a solid foundation for knowledge transfer and has played a pivotal role in the establishment of Cornerstone Robotics. Notably, his expertise in surgical robots is evident through his numerous inventions and co-inventions, including various surgical instrument and device designs, as well as their sensing and control. At CUHK, he and his team continue to develop novel surgical devices and related algorithms. Moreover, he led the development of an open-source toolkit of gravity compensation, making fundamental contributions to the surgical robot community. Supported by the Hong Kong Government and CUHK, Prof. Au co-founded the Multi-Scale Medical Robotics Center (MRC), which serves as a synergistic platform for clinicians, engineers, and researchers from worldwide universities to work together and forge new ways to translate engineering research innovations into medical practices. Prof. Au's commitment to advancing surgical robotics has transformed the landscape of affordable and effective robotic surgery, leading to improved clinical outcomes and healthcare.

## Impact beyond academia:

### A. Impact on Health and Wellbeing

Multiple-port laparoscopic surgical robots are versatile devices that find applications in a wide range of surgical procedures, including prostate, kidney, uterus, gastrointestinal, liver and gallbladder, lung, ear, nose, throat, and even cardiac surgeries. These complex and precise surgeries demand extensive experience from doctors. Therefore, despite the highest requirements and significant research and development challenges, laparoscopic surgical robots have found widespread application in surgical scenarios.

The first-generation laparoscopic surgery robot, independently developed by CSR, offers stable and precise operation to ensure the utmost safety and stability of surgery. Moreover, its high-definition, realistic imaging capabilities provide an immersive, stereoscopic vision, faithfully reproducing the surgical field of view. CSR surgical robots are designed with doctors and nurses in mind, making them convenient and easy to use.

The main hand of the CSR surgical robot is sensitive and lightweight, offering minimal friction during operation. It boasts superior system integration, higher precision, lower latency, and more precise manipulation, all of which contribute to the stability and safety of surgeons during surgery. Additionally, the installation process of the CSR surgical robot is straightforward, requiring just a single nurse to set up efficiently and arrange the necessary equipment before surgery. Instrument replacement and position adjustment can also be swiftly executed during the procedure. Furthermore, CSR surgical robots excel in controlling bleeding, preserving normal tissue function, and promoting faster post-operative recovery.

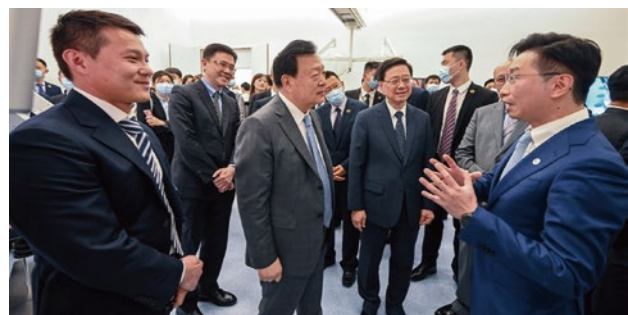
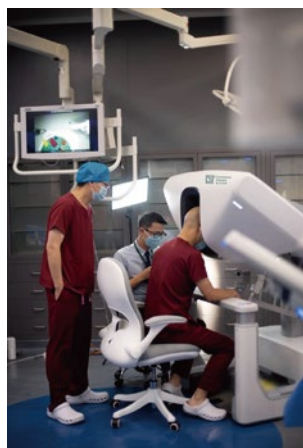
CSR has conducted successful multidisciplinary human clinical trials in the Hong Kong Special Administrative Region, completing over 30 cases in urology and general surgery. Prof. Wu Zhihui from the Department of Urology at The Chinese University of Hong Kong successfully performed ten clinical operations using the CSR surgical robot, confirming its effectiveness in terms of bleeding control, preservation of normal tissue function, and post-operative patient recovery. Statistical analysis revealed no significant difference between the CSR robot and traditional methods, thus establishing the international leading level of CSR's multi-port laparoscopic surgery robot.

Encouraged by the positive experiences of experts in clinical and animal experiments, CSR remains committed to advancing technology and product development. Its goal is to empower clinicians further, benefitting both medical professionals and patients.

### B. Economic impact

Since 2019, CSR has grown from around 10 people to a 400-person company that consists of over 60% being research and development personnel covering multiple disciplines. The company has three R&D centres established in Hong Kong, Shenzhen, and the Boston area (USA). Since its establishment, CSR has received multiple rounds of financing totalling over US\$230 million. In 2021, CSR established a mass production factory in the Longhua District of Shenzhen, taking advantage of the high manufacturing capability and capacity of the Greater Bay Area in China.

As a pioneer in China's innovative surgical robot industry, CSR has successfully established a comprehensive technology platform with high barriers to entry. Since its start-up period, CSR has consistently prioritised the global market, leveraging its formidable technical prowess to execute a comprehensive international strategy. This approach has enabled the creation of highly competitive surgical robot products, thereby delivering top-tier, exceptional-quality Chinese solutions to the world.



The Multi-Scale Medical Robotics Center (MRC), co-directed by Prof. Samuel Au (1st from left) and Prof. Philip Chiu (1st from right), produces top-tier research outcomes and provides pre-clinical evaluation support services for CSR. Its exceptional reputation has attracted visits from VIPs, such as Mr. Xia Baolong, Vice Chairman of the 13th Chinese People's Political Consultative Conference and Director of the State Council's Hong Kong & Macao Affairs Office (center).



## D. Restoration of degraded Hong Kong coral habitats using multiple active coral restoration approaches

Principal Investigator: Prof. Apple Chui Pui-yi

School & Faculty: School of Life Sciences, Faculty of Science

### Summary:

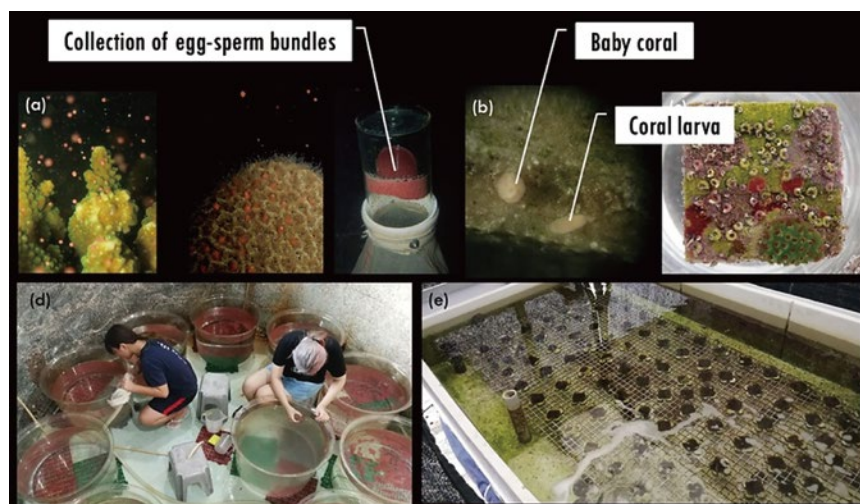
One of the wonders of the world, corals are facing widespread threats. Climate change poses a significant risk by weakening and potentially killing them. Additionally, overpopulation and the devastating effect of human activities on ecosystems have further intensified the threats faced by corals. This research aims to address the decline in coral populations, enhance biodiversity, and promote reef resilience to effectively cope with the challenges posed by future climate change.

### Description of the project:

Coral reefs worldwide are experiencing a significant decline due to climate change and anthropogenic disturbances. Previous reef restoration efforts primarily focused on asexual propagation of coral. However, this project adopts a comprehensive approach to coral restoration in Tolo Harbour and Channel in northeastern Hong Kong. It incorporates multiple active restoration techniques, including both sexual and asexual coral propagation, establishment of ex-situ coral nurseries, and implementation of larval enhancement techniques.

The conventional restoration strategy uses asexual propagation techniques, such as the transplantation of coral fragments. However, this method has limitations concerning the genetic diversity, which constrains the resistance of these fragments against future stress and disturbances, and it inevitably causes damage to the donor coral communities. An alternative approach involves the use of sexually propagated corals as a means of restoration. This technique involves collecting egg-sperm bundles from corals during mass spawning, allowing them to fertilize and develop into larvae, which then settle as recruits on artificial substrata. These recruits are grown in nurseries and subsequently transplanted at different ages into the sea. Due to the high fecundity of corals, this approach ensures the generation of a significant number of successful coral propagules with higher genotypic diversity. Consequently, it increases the chances of obtaining propagules with a high adaptive potential and better resistance to disturbances.

Reef restoration is still in its infancy in Hong Kong and mainland China, with most coral restoration studies relying on asexual fragments of adult colonies combined with various nursery techniques. While the sexual propagation approach has been successful in some global locations, it has never been attempted in Hong Kong until now. In 2019, our team accomplished a significant milestone by breeding and successfully outplanting laboratory-bred corals in a marine park, confirming their sexual viability in the field. This marked the first complete life cycle of sexually-derived corals in Hong Kong, providing clear evidence of the feasibility of implementing this technique in the region.



Farming sexually propagated corals in Marine Science Laboratory, CUHK (a) Spawning of *Acropora tumida* and *Platygyra acuta*. (b) Planula larva and spat. (c) 6 months old *A. tumida* baby coral (d) Students were culturing coral embryos. (e) 2 years old coral juveniles in the culturing facility. © Coral Academy

Hong Kong, located in southern China, is home to extensive coral communities, boasting a remarkable coral diversity of at least 84 scleractinian coral species across 28 genera. Despite their richness, the coral communities in Hong Kong face numerous threats, including high sedimentation, eutrophication, hypoxia and heavy metal pollution. Tolo Harbour and Channel, a sheltered harbour located in the northeastern New Territories of Hong Kong, once hosted over 30 coral species with a substantial coral coverage of over 80% in Knob Reef. However, the combined effects of urban reclamation along the inner harbour coupled with the booming human population in the 1980s have had a devastating impact on the marine environment and ecosystems in the area.

The drastic rise in anthropogenic activities, including agriculture, piggery, and industry, has resulted in a substantial increase in the discharge of organic sewage into water streams. As a result, the excessive nutrient levels in the water have created a pollution gradient, leading to frequent occurrences of eutrophication and algal blooms. This tragic incident has been infamously known as Hong Kong's first marine ecological disaster. In response to this crisis, the local government has taken progressive measures to address the issue of severe water pollution caused by inadequate wastewater treatment.

Despite the implementation of the Tolo Harbour Action Plan (THAP) in 1987, which led to a significant improvement in water quality, surveys conducted by Prof. Chui's team have revealed that even after fifteen years, there has been no natural recovery of coral in Tolo Harbour and Channel. The coral coverage in the area remains alarmingly low at just 2%. This slow recovery can be attributed to the lack of coral recruitment, potentially caused by factors such as high sedimentation and intense competition for space with fouling organisms like algae, oysters, barnacles and bryozoans. While natural recruitment of corals is necessary, it alone is insufficient to restore the damaged coral communities. Additionally, the restoration of marginal non-reefal coral communities poses additional challenges due to their inherent limitations compared to reefal systems.

The research team is currently employing multiple active coral restoration approaches in Tolo Harbour and Channel to address the decline in coral populations, enhance biodiversity, promote coral growth, and foster reef resilience to tackle climate change. Through these combined efforts, a scientifically rigorous coral restoration protocol using sexual recruits is being developed. This protocol is envisioned to serve as a critical part of future management strategies not only for coral reefs and communities in Hong Kong but also in other parts of southern China. Moreover, its application can extend to marginal coral communities worldwide. To complement these restoration efforts, workshops, public seminars and outreach programmes will be conducted to raise community awareness, knowledge and long-term engagement. This comprehensive approach forms the foundation for a global campaign focused on coral restoration and the improvement of marine environments.

### **Impact beyond academia:**

#### **A. Environmental impact**

With the support of the PEW Fellowship in Marine Conservation, Prof. Chui and her research team out-planted around 200 coral fragments in the Bush Reef and the Knob Reef on natural substratum in Tolo Channel for the purpose of coral restoration and monitoring at an experimental scale. Five genera of coral, originating from corals of opportunity, including one branching genus (i.e. *Acropora*) and four massive and submassive genera (i.e. *Platygyra*, *Porites*, *Leptastrea* and *Cyphastrea*) were used. Ongoing post-outplant monitoring has revealed a remarkable survivorship rate of 87.33% over a span of 3.5 years, accompanied by positive growth. Furthermore, these outplants have provided habitats for various marine organisms, including seahorses and butterflyfishes.

Apart from the use of asexually propagated corals, the research team conducted a preliminary study in 2019-2020 involving the out-planting of sexually propagated juveniles of *Acropora pruinosa* corals on a small scale. These juvenile corals were cultured in the coral nursery at the Simon F. S. Li Marine Science Laboratory, CUHK, until they reached a size of 2cm. Subsequently, in 2019, they were out-planted in the field. Follow-up monitoring revealed these corals to have high survivorship (88%) and positive growth. In 2022, these laboratory-bred and outplanted corals were confirmed to have reached sexual maturity and were observed to be spawning in the field.

#### **B. Educational and societal impact**

Underpinned by the research in coral restoration, Prof. Chui founded the highly successful education outreach programme called "Coral Academy" in Hong Kong ([www.coralacademy.hk](http://www.coralacademy.hk)). This initiative aims at raising students' and public awareness and inspires action in coral conservation.

Over the past 4 years, Coral Academy reached at least 30 local secondary schools and over 20,000 students and teachers through the team's school-based outreach programmes. In 2022, Coral Academy signed a memorandum with WWF-HK to collaborate on WWF-HK Hoi Ha Marine Life Centre as a coral conservation and nursery demonstration hub to foster education and learning for coral conservation in Hong Kong. This way, the education and expertise of the Coral Academy could be put to good use for the betterment of Hong Kong's marine life. A demonstration that solidifies scientific knowledge is applied to real-life situations for the benefit of society and the rest of the world.



Prof. Apple Chui, School of Life Sciences, CUHK and founder of Coral Academy

Examples of Education outreach programme organized by Coral Academy:

- **Secondary School Coral Nursery Education Programme** - The only coral restoration-related experiential learning education programme in Secondary Schools in Hong Kong

For more details, please refer to: <https://www.coralacademy.hk/secondary-school-coral-nursery-prog>.

- **Citizen Scientist Programme: Coral Rescuer** - A pioneer citizen scientist programme in coral restoration for the public in Hong Kong

A video summarising the programme can be viewed at: <https://youtu.be/l-Hg8XbJ4Bs>.

- **360° VR Underwater Hong Kong**

With support from the Agriculture, Fisheries and Conservation Department (AFCD), a learning package with Underwater 360 o VR videos has been developed for local secondary schools. 18 local secondary schools received this learning package in May 2022 and were used by around 500 secondary school students.

For more details, please refer to: <https://www.coralacademy.hk/360vr-underwater-hongkong-eng>.

- **Journey to Coral Restoration**

Funded by the Subventions for Biodiversity Education (2022) of the AFCD, lab tours were organized for secondary school students and the general public.

For more details, please refer to: <https://www.coralacademy.hk/journey-to-coral-restoration>.

- **Learn about Coral Communities in Tung Ping Chau Marine Park**

Eco-tours were organized for secondary school students. Participants can have a quick glimpse of Hong Kong's marine ecology as well as the magnificent coral world through different interactive activities, including an introductory seminar on corals, coral identification workshops, and a guided eco-shore exploration in the marine park to observe various traces of intertidal wildlife and corals. Afterwards, participants will visit the coral culturing facilities at the Simon F. S. Li Marine Science Laboratory at CUHK, and end the day with a first-hand adoption of a coral experience.

For more details, please refer to:

<https://www.coralacademy.hk/learn-about-hong-kong-coral-communities-in-tpc-marine-park>.

## Annex 3

### Updates on Table 4.1 of Initial Statement

	UGC Performance Indicators	2021-22	2022-23
1	Number of patents filed in the year (with breakdown <sup>[Annex 5]</sup> by country and type)	419	481
2	Number of patents granted in the year (with breakdown <sup>[Annex 6]</sup> by country and type)	264	260
3	Number of licences granted (with breakdown <sup>[Annex 7]</sup> by type)	45	78
4	Income (on cash basis) generated from intellectual property rights	\$65,257,391	\$71,056,181
5	Expenditure involved in generating income from intellectual property rights	\$8,042,459	\$15,969,030
6.1	Number of economically active spin-off companies	9	8
6.2	Total number of social enterprises launched under the Sustainable Knowledge Transfer Project Fund	18	20
6.3	Accumulated number of active technology startups supported by the Technology Start-up Support Scheme for Universities (TSSSU)	63	71
7	Net income generated (or net loss arising) from spin-off <sup>(a)(b)</sup>	Profit of \$38,188,806	Profit of \$7,980,610
8	Number of collaborative research projects, and income thereby generated <sup>(a)</sup>	240 cases \$178,293,811	243 cases \$175,593,174
9	Number of contract research projects (other than those included in "collaborative research projects" above), and income thereby generated <sup>(a)</sup>	104 cases \$61,775,612	70 cases \$37,909,212
10	Number of consultancies, and income thereby generated <sup>(a)</sup>	280 cases \$191,535,817	278 cases \$157,177,972
	Subtotal Income Item (4)+(7)+(8)+(9)+(10)	\$535,051,437	\$449,717,149
11	Income received from Continuing Professional Development (CPD) courses <sup>(a)(c)</sup>	\$1,360,371,156	\$1,500,598,488
	Total Income Item (4)+(7)+(8)+(9)+(10)+(11)	\$1,895,422,593	\$1,950,315,637
12	Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD needs	6,685,363.5 <sup>(e)</sup> hours (2,286 courses with 260,241 students)	6,744,130.5 hours (2,049 courses with 354,066 students)
13	Number of public lectures / symposiums and speeches to a community audience	1,002	976
14	Number of performances and exhibitions of creative works by staff or students	69	79
15	Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies <sup>(d)</sup>	1494	1488

#### Footnotes

(a) Subject to year-end adjustments.

(b) Only wholly-owned subsidiaries or controlling companies are included.

(c) Including income from non-award bearing programmes offered by the School of Continuing and Professional Studies and the Asia-Pacific Institute of Business.

(d) Honorary, visiting and inactive staff are not included.

(e) Revised figure.



## Annex 4

### Updates on Table 4.2 of Initial Statement

	Other Performance Indicators	2021-22	2022-23
1	Knowledge Transfer Project Fund (KPF): Projects supported by the UGC KT Fund	2021-22: 11 Accum. num: 204	2022-23: 10 Accum. num: 214
2	Sustainable Knowledge Transfer Project Fund (S-KPF)	2	2
3	Technology and Business Development Fund	7	discontinued
4	IdeaBooster Fund (Newly Launched in 2022-23)	n/a	18
5	Number of other KT projects and activities not funded by the UGC KT Fund	346	505
6	Number of websites on KT activities at Faculties / Departments / Centres <sup>(a)</sup>	187	191
7	Number of publicity or media features related to KT, including print, online and electronic media <sup>(b)</sup>	2,713	2,805

#### Footnotes

(a) Including websites, mobile applications, social media channels and video-sharing platforms

(b) Including appearance on social media channels and video-sharing platforms

## Annex 9

### Knowledge Transfer Project Fund (KPF) - Project List (Jul 2022 - Jun 2023)

#### KPF - Completed projects

No.	Project Code	Project Title
1	KPF19CHF05	Telling stories: A digital humanities approach to documenting linguistic diversity in Hong Kong
2	KPF20GWP02	"Strong Shoulders For Elderly" Campaign
3	KPF20GWP05	Reaching Out to the Unreached Community: Delivering Mental Health Outside the Box through Whole-of-Community Campaigns
4	KPF20GWP10	Youth AI Health Ambassador Training and Outreach Program for Brain Health
5	KPF20QEP12	Decoding the concealed emotions of children with special educational needs
6	KPF20QEP15	Virtual Trainer for Improving Health & Fitness of Middle-aged adults
7	KPF20GWP16	Hip Protectors to Prevent Hip Fracture of Older Adults in Hospitals and Nursing Homes
8	KPF20GWP22	Enhancing Mental Health of the Deaf Community in Hong Kong
9	KPF20QEP26	Personalised Child Story Channel
10	KPF20CHP21	Living Heritage: Transforming Hong Kong's Abandoned Villages into Cultural Destinations
11	KPF20GWP08	Combating Sarcopenia in Fragility Fracture Patients in Hong Kong
12	KPF20GWP23	Self-management Blood Pressure for Happier Digital Life
13	KPF20GWP27	Health is wealth, Stay active, Eat healthy
14	KPF21CHP09	Hong Kong as an Outdoor Museum: EduVenture supports Non-Chinese Speaking Students in Learning Chinese Culture
15	KPF21GWP15	Communication Rehabilitation for Older Adults with Hearing Loss
16	KPF21GWP20	Intervention for promoting old-age preparation in the community
17	KPF21GWP26	Risk screening for prodromal Parkinson's disease in elderly using smartphone
18	KPF21GWP33	Augmented Reality in Orthopaedic Trauma – A New Era of Surgical Training
19	KPF21GWP36	Express Heart Check at Elderly Community Centres across 18 Districts of Hong Kong
20	KPF21QEP01	Music Playgroup to Enhance Language Development in Infants and Toddlers: A Pilot Community Program
21	KPF21GWP07	Assessing and health coaching for cardiometabolic risk in middle-aged group
22	KPF21GWP14	The Production of Hong Kong Cantonese Language Assessment test for Preschool Children
23	KPF21GWP29	Improve bowel and urinary function at home during COVID-19
24	KPF21QEP25	An online-platform for tracking students' learning engagement and wellbeing for online and mixed-mode teaching with immediate improvement feedback

#### KPF - Projects in Progress

No.	Project Code	Project Title
1	KPF20QEP09	Sleep to remember: Promoting early language development by making best use of sleep
2	KPF20SCP07	Visualizing the past, connecting to the present: Revitalization and sustainability of Shek-O community after natural disaster
3	KPF21GWP02	Healthy Ageing x Ageing in Place
4	KPF21GWP21	Sleep Innovation and Technology: Improving Community Access to Evidence-based, Real-time, Adaptive Intervention using Commercial Smartwatches to Improve Sleep Quality
5	KPF21GWP34	One Size Does Not Fit All, Choice-Based Programs to Enhance Mobility in Older Adults
6	KPF21OTH08	Implicit design generation and additive manufacturing of novel personalised hip protectors in elderly care to prevent pelvis fracture
7	KPF22GWP02	Educating stay-home mothers to implement paediatric massage techniques for children with autism spectrum disorders (ASD)
8	KPF22GWP03	Capacity Building for Advance Care Planning

## Annex 9

### Knowledge Transfer Project Fund (KPF) - Project List (Jul 2022 - Jun 2023)

#### KPF - Projects in Progress

No.	Project Code	Project Title
9	KPF22GWP19	Medical communication assistance to enhance patient engagement and health literacy
10	KPF22GWP20	A training programme for community health workers in promoting cervical cancer screening among South Asian ethnic minorities in Hong Kong
11	KPF22REP21	Promotion of palliative care and advance directives in the South Asian ethnic minority population of Hong Kong
12	KPF22REP23	Multilingual E-Resources for Vocabulary Acquisition: Enhancing Learning Cantonese as an Additional Language and Maintaining Home (Heritage) Languages
13	KPF22REP29	Modular Prosthetics with Interchanging Task-Specific Tools for Upper Limb Amputees
14	KPF22GWP34	AR-Home & AR-Centre Rehab
15	KPF22GWP01	Promoting Early Identification of Osteopenia Patients at High Risk of Fracture using 3D High-Resolution Peripheral Quantitative Computed Tomography (HR-pQCT) in Hong Kong
16	KPF22REP06	Developing teleassessment for trilingual children in Hong Kong: augmented Reality enhanced intervention
17	KPF22GWP07	Healthy knees, life is a breeze: the platform for better knees
18	KPF22GWP09	Promotion and Prevention of Overactive Bladder and Voiding Dysfunction in Community
19	KPF22GWP10	Knowledge transfer of the advanced morphokinetic analysis on embryos' developmental potential in in vitro fertilization
20	KPF22COP11	Peace In and Peace Out: Narrative Approach to Peace Education in Hong Kong
21	KPF22GWP14	An Artificial Intelligence chatbot for sleep education
22	KPF22GWP22	A screening platform for dysphonia in teachers: Early identification and prevention
23	KPF22GWP27	Improving Use of Online Resources and Enhancing Mental Health for Migrant Domestic Workers in Hong Kong
24	KPF22CHP36	Collaborative Conservation: Regenerating Mui Tsz Lam village with Participatory Rebuilding
25	KPF22CHP37	Multi-Temporal InSAR Remote Sensing for Sustainable Conservation of World Heritage
26	KPF23GWP03	Improving the psychological well-being of older adults with an online lifestyle medicine program
27	KPF23GWP05	Education and Promotion of Weight Control in School Children of Hong Kong
28	KPF23GWP12	Thriving through the storms: A school-based mental health promotion program for building psychological flexibility and resilience
29	KPF23GWP23	Prevention of non-communicable diseases through screening and educating individuals on health-risk behaviours in the community
30	KPF23REP24	Promoting Deaf Access to Justice: Legal Basics in Hong Kong Sign Language
31	KPF23GWP28	Reducing inequality in women' s health: Providing cervical screening and decision-aid counselling by trained peers in deprived populations
32	KPF23REP29	E-learning platform for enhancing life planning competence of people with intellectual disabilities
33	KPF23GWP33	Enhancing Mental Health of the Deaf Community in Hong Kong (Phase 2)
34	KPF23GWP01	Power Up and Mange Parents (PUMP): Resolve 20 common dilemmas in autistic children
35	KPF23GWP02	Establishment of website-based bio-electrical drug database with interactive business intelligence elements focused on gastrointestinal pacemaker activity for public access
36	KPF23GWP13	Transferring research output to benefit the community: Production of a Computerized Adaptive Test on Receptive Vocabulary for Preschoolers
37	KPF23GWP11	Healthy Back, so the Good Life is Back
38	KPF23GWP14	Empower our Youth and Transform our Future
39	KPF23GWP20	Embodied Conversational Agent (ECA) on Mental Health with Humanoid Robot for Child Well-being Therapy
40	KPF23GWP21	Fit & Active Retirement: A mobile-based, combined coach- and peer-led physical function programme for young-old retirees
41	KPF23GWP25	Developing an e-health platform to improve maternal health and reducing long-term risk of chronic diseases for women with gestational diabetes
42	KPF23SCC27	Plastic-free grocery: wet market film screening X cross cultural environmental communication
43	KPF23GWP38	Navigate the Complexities of Rare Diseases: A community-academic partnership program on co-creating a patient journey visualization toolkit

## Annex 10

### Sustainable Knowledge Transfer Project Fund (S-KPF) (Jul 2022 - Jun 2023)

#### Social Enterprise List

##### S-KPF graduates

No.	Project Code	Company	Website
1	SKPF22GHW03	Happy Ageing Lab Company Limited	<a href="https://www.happyageinglab.com/">https://www.happyageinglab.com/</a>
2	SKPF22GHW02	Speech and Hearing Social Enterprise Limited	<a href="https://speechhearing.org/">https://speechhearing.org/</a>

##### S-KPF on-going

No.	Project Code	Company	Website
1	SKPF22GHW06	Physical Literacy Academy for Children and Youth (PLACY) Limited	NA
2	SKPF22SCC05	Soyvestors Co. Limited	<a href="https://soyvestors.com/">https://soyvestors.com/</a>
3	SKPF22GHW01	HerBChain Co., Limited	<a href="http://herbchain.hk/">http://herbchain.hk/</a>
4	SKPF22SCC04	Condition_Lab Limited	<a href="https://condition-lab.com/">https://condition-lab.com/</a>

#### Newly funded

##### Learniversity Limited

SKPF23QED02

Prof Morris JONG (Department of Curriculum and Instruction, Faculty of Education)

To provide innovative technology-supported pedagogical solutions for education practitioners to enhance learning and teaching quality, and bring substantial positive impact in the education community by making virtual field trips more accessible, affordable and sustainable.

##### Countryside Curators Limited

SKPF23SCC05

Prof Thomas CHUNG (School of Architecture)

To enhance and invigorate countryside conservation, revitalising cultural and natural heritage of Hong Kong, and deliver education programmes to raise public awareness and appreciation towards rural conservation.

## Annex 13

### Knowledge Transfer Seminars/Events organised by ORKTS (1 Jul 2022 - 30 Jun 2023)

No.	Date (dd-mm-yyyy)	Title	Speaker(s)	No. of Participants	Mode (Online/Hybrid)	Venue
1	01/07/2022	Life Science Incubator: Partnering With JLABS To Go To The Market	Dr. Sharon Chan & Mr. Julien Dedman	16	Physical	UGA@CUHK InnoPort
2	5/07/2022	Fintech and the Future of Social Innovation	Mingles Tsoi/Chief eXploration Officer, ParticleX	120	Online	Zoom
3	8/07/2022	Social Impact Academy 2022 - Module 3 Creating a financial model for your social venture	Mark Cheng/Ashoka	20	Online	Zoom
4	13/07/2022	Public Engagement with Impact - Best Practices from the Hong Kong Jockey Club Charities Trust	Irene Leung/Head of Charities, The Hong Kong Jockey Club Charities Trust	50	Online	Zoom
5	19/07/2022	Blue is the New Green – Coral Conservation and Climate Change	Prof Apple Chui/Research Assistant Professor, School of Life Sciences, CUHK & Founder, Coral Academy	120	Online	Zoom
6	27/07/2022	IP for Entrepreneurs	Dr. Albert Wai-Kit Chan, Ph.D., J.D.	~80	online	hosted by IP team
7	29/07/2022	Social Impact Academy 2022 - Module 4 How to pitch your social business for funding	Mark Cheng/Ashoka	20	Online	Zoom
8	30/07/2022	HKSEC 2021-22 Award Ceremony cum HKSEC Judge's Sharing	Ada Yip/Chief Empowerment Officer, Urban Spring Anita Lee/Co-founder & CEO, Time To Gold	100	Online	Zoom
9	9/08/2022	A Brief Introduction To Impact Investing	Cintia Nunes/Co-Director, The Mills Fabrica HK	140	Online	Zoom
10	17/08/2022	Preliminary Announcement: Enhancement Measure of Technology Start-up Support Scheme for Universities (TSSSU+)	Mr. Jonathan CHEE	75	Online	zoom
11	23/08/2022	Life Science Training Programme: Launching and Funding Startups Seed to Series B (Session 1)	Life Science Nation	42	Physical	LT2@Esther Lee Building
12	23/08/2022	Using Social Return On Investment (SROI) to Measure Social Impact	Dr Terence Yuen/Founder & Executive Director, Hong Kong Institute of Social Impact Analysts (HKI-SIA)	150	Online	Zoom
13	24/08/2022	Life Science Training Programme: Launching and Funding Startups Seed to Series B (Session 2)	Life Science Nation	42	Physical	LT2@Esther Lee Building
14	08/09/2022	Startup Series: Entrepreneurial Sales & Marketing - Part 1	Mr. Jonathan CHEE	35	Online	zoom
15	09/09/2022	18th PILOTS Lite Programme Fall 2022 - Info Session	Mr. Jonathan CHEE	20	Online	zoom
16	9/09/2022	Coffee, Tea, or Coffee Tea? Part II: Governance for social enterprises	Ms Ng Tze-wei/Associate, Stephenson Harwood LLP	20	Online	Zoom
17	17/09/2022	SDGs around the Corner	Erica Chan/Co-founder, Summer Production Cynthia Cheung/Youth Social Entrepreneurship and Innovation Coordinator, UNDP APAC Eddie Li/Co-founder, Green One Lab Dr Shirley Yeung/Associate Professor & Head, School of Business, Gratia Christian College UNPRME	150	Online	Zoom
18	23/09/2022	從教授到醫企創業家 — 無創產檢「走過」全球之旅   Happy Hour 創業訪談	盧煜明教授, 趙慧君教授, 陳君賜教授	~100	onsite in InnoPort	jointly hosted by ORKTS and AAO
19	27/09/2022	Entrepreneurship Fireside Chat Series - Meet the Entrepreneur: Mr Philip Lam	Mr Philip Lam	7	Physical	2B@CUHK InnoPort
20	27/09/2022	The Importance of Mentoring in Social Entrepreneurship	Prof. Howard Ling, MH/Chief Consultant, HKCSS Social Enterprise Business Centre Michelle Chan/Co-founder, Mealingful	150		Zoom

## Annex 13

### Knowledge Transfer Seminars/Events organised by ORKTS (1 Jul 2022 - 30 Jun 2023)

No.	Date (dd-mm-yyyy)	Title	Speaker(s)	No. of Participants	Mode (Online/Hybrid)	Venue
21	30/09/2022	Training on Impact Pathway (KPF info session)	Dr Norah Wang/Impact Analytics	50	Online	Zoom
22	03/10/2022	18th Round PILOTS Lite Programme Fall 2022 - First Round Interview	PI Centre	65	Online	zoom
23	03/10/2022	18th Round PILOTS Lite Programme Fall 2022 - Final Round Interview	PI Centre	29	Hybrid	3B@CUHK InnoPort & Zoom
24	05/10/2022	AI Technology and Career Opportunities x HKAI Lab x CUHK PI Centre x CUHK Office of Student Affairs	Mr. Timothy Leung & Dr. Dennis Lee	22	Online	zoom
25	11/10/2022	Social Enterprises in Hong Kong – Past, Present and Future Opportunities	Dr Elsie Tsui/Head of Social Innovation, ORKTS, CUHK	150	Online	Zoom
26	12/10/2022	Pharmaceutical Technology to Entrepreneurship	Dr. Bill Wong (Vice President of Preclinical Development, InnoRNA)*	~80	online	jointly hosted by CUHK and CUHK(SZ)
27	21/10/2022	Research-to-Market Series: Managing Your Startups (Governance 101) Part 1	Mr. Jonathan CHEE	17	Physical	2B@CUHK InnoPort
28	21/10/2022	S-KPF info session cum talk	Prof Kelvin Tsoi, Associate Professor, The Jockey Club School of Public Health and Primary Care, CUHK & Founder of DeepHealth Limited	50	Online	Zoom
29	01/11/2022	18th Round PILOTS Lite Programme Fall 2022 - Briefing session	Mr. Jonathan CHEE	13	Physical	UGA@CUHK InnoPort
30	04/11/2022	Happy Hour 創業訪談系列 - 物聯網趨勢淺談：初創數碼轉型	莊毅堅先生 & Mr. Jonathan CHEE	5	Physical	UGA@CUHK InnoPort
31	17/11/2022	Metaverse x CUHK Student startups : How “2” be innovative	Mr. Jonathan CHEE	17	Physical	2B@CUHK InnoPort
32	01/12/2022	Research-to-Market Series: Managing Your Startups (Governance 101) Part2	Mr. Jonathan CHEE	17	Physical	2B@CUHK InnoPort
33	16/12/2022	How to Protect Your Inventions: Patent 101 & New Patent Funding Schemes at CUHK	Ms. Jennifer Che, J.D. (Vice President and Principal, Eagle IP)	~80	online	hosted by IP team
34	21/12/2022	16th PI Teams Graduation Ceremony	Mr. Jonathan CHEE	38	Physical	UGA@CUHK InnoPort
35	12/01/2023	Legal Series 1: Structuring Founder Relationships and Founder Agreement	Mr. Pádraig Walsh	17	Physical	UGA@CUHK InnoPort
36	13/01/2023	《學人搞社創》新書分享會	譚少薇教授, 崔佩怡博士, 湯兆昇博士	~30	HUB (under the Commercial Press) in TST	jointly hosted by ORKTS and the Joint Publisher
37	13/01/2023	Startup Café: Munich & Hong Kong	Prof. Dominic Chan and Dr. Susanne Ritter von Marx	21	Online	zoom
38	16/01/2023	Flea market @ InnoPort	start-up from CUHK students and alumni, social enterprises from New Life Psychiatric Rehabilitation Association, Ms Agnes Wong from Trial & Error Lab	~100	onsite booth in inno330 for product sale	hosted by InnoPort team and inno330
39	31/01/2023	Entrepreneurship Series: Important Lessons for Meeting Investors and Raising Venture Capital	Mr. Voon Lee	31	Physical	UGA@CUHK InnoPort
40	08/02/2023	Legal Series 2: Protecting your start-ups through IP	Mr. Ricardo Lee	13	Physical	2B@CUHK InnoPort
41	17/02/2023	Online Social Networks: What can the data tell us?	Prof. Jeffrey YU (Professor, Department of Systems Engineering and Engineering Management, CUHK)	~100	online	jointly hosted by CUHK and CUHK(SZ)
42	28/02/2023	19th Round PI Programme Info Session	Ms. Joyce Mak	15	Online	zoom

## Annex 13

### Knowledge Transfer Seminars/Events organised by ORKTS (1 Jul 2022 - 30 Jun 2023)

No.	Date (dd-mm-yyyy)	Title	Speaker(s)	No. of Participants	Mode (Online/Hybrid)	Venue
43	02/03/2023	Legal Series 3: Teams That Earn Equity Together Excel Together	Mr. Pádraig Walsh & Mr. Hsiang LEE	15	Physical	UGA@ CUHK InnoPort
44	03/03/2023	Fireside Chat - First Step into CUHK Start-up Community	Mr. Wong Tak Kai Taka Mr. Wong Man Yeung Ivan Mr. Liu Wai Shing Charles	9	Physical	Inno 330@ CUHK InnoPort
45	10/03/2023	Training Modules 1 - CUHK Student-run Cosy Coffee Shop Startup(CU-SuCCeSS)	Mr. Nelson Zhai	12	Physical	2B@ CUHK InnoPort
46	13/03/2023	Training Modules 2 - CUHK Student-run Cosy Coffee Shop Startup(CU-SuCCeSS)	Mr. Andy Yip	11	Physical	2B@ CUHK InnoPort
47	30/03/2023	Legal Series 4: Understanding Business Formation	Mr. Pádraig Walsh	11	Physical	UGA@ CUHK InnoPort
48	31/03/2023	19th Round PILOTS Lite Programme Fall 2022 - First Round Interview	PI Centre	60	Online	zoom
49	19/04/2023	18th Round PILOTS Lite Programme Fall 2022 - Final Round Interview	PI Centre	49	Hybrid	3B@ CUHK InnoPort & Zoom
50	04/05/2023	Legal Series 5: Understanding Contracts	Mr. Pádraig Walsh	29	Physical	2B@ CUHK InnoPort
51	05/05/2023	19th Round PI Programme Briefing Session	Dr. Victor Lau	21	Physical	UGA@ CUHK InnoPort
52	15/05/2023	CUHK x InnoX Camp Summer 2023 Information Session	Dr. Victor Lau, Mr. GUO Yang & Apollo (OAO Limited)	10	Online	zoom
53	16/05/2023	Accounting Series: Budgeting for Start-ups (Day1)	Mr. Frenda So	47	Physical	205@ Esther Lee Building
54	19/05/2023	Social Impact Academy: Media Interview Dos & Don'ts	Across Asia Communications Limited	20	In Person	UGA
55	23/05/2023	Accounting Series: Budgeting for Start-ups (Day2)	Mr. Frenda So	20	Physical	205@ Esther Lee Building
56	30/05/2023	Accounting Series: Budgeting for Start-ups (Day3)	Mr. Frenda So	27	Physical	205@ Esther Lee Building
57	31/05/2023	Entrepreneurship Series: Fireside Chat - Why it's coffee?	Dr. Victor Lau	18	Physical	UGA@ CUHK InnoPort
58	01/06/2023	Legal Series 6: Understanding Licensing Contracts	Mr. Pádraig Walsh	18	Physical	UGA@ CUHK InnoPort
59	09/06/2023	Start-up Clinic	Dr. Victor Lau	2	Physical	2A@ CUHK InnoPort
60	15/06/2023	Happy Hour 【創業X機遇】【香港X大灣區】	許可博士 熊紹龍先生 龍志成先生	13	Physical	UGA@ CUHK InnoPort
61	21/06/2023	Entrepreneurship Series: Grow yourself Like a Start-up	Mr. Tianyi Qin	12	Physical	UGA@ CUHK InnoPort
62	21/06/2023	From Social Entrepreneurship to Intrapreneurship - a HKSEC alumnus's Journey in Unleashing Social Innovation From Within	Chester Cheng/ Co-founder, Carbon Wallet	50	Online	Zoom
63	17-21/04/2023	Meet up! Entrepreneurship Support Week (InnoBuddies @InnoPort)	ORKTS, CFe, SRSDO, GBAO, iCare, EPIN	~500	onsite booth promotion in the campus	hosted by InnoPort team