



INDUSTRY, INNOVATION AND INFRASTRUCTURE

Research

PolyU Academy for Interdisciplinary Research (PAIR)

While emerging technologies are profoundly changing the way people live and work, the world faces multiple unprecedented challenges. To effectively respond to these, it is necessary to integrate expertise from different technical and scientific disciplines.

To this end, PolyU has inaugurated PAIR to promote impactful interdisciplinary research and innovation. PAIR comprises 11 research institutes and 6 research centres, making it one of the largest interdisciplinary research platforms in the Greater Bay Area. Academy goals include building a globally modern industrial system, promoting ecological conservation, expanding infrastructural connectivity, building a global technology and innovation hub, and contributing to the UN SDGs.



Conceptual Design and Performance Evaluation of High-Strength Pervious Concrete

Research led by Ir Professor Poon Chi-sun, Michael Anson Professor in Civil Engineering, Director of Research Centre for Resources Engineering towards Carbon Neutrality, Chair Professor of Sustainable Construction Materials, Head of the Department of Civil and Environmental Engineering, proposes a novel design concept of a high-strength pervious concrete, aiming at improving its compressive strength while ensuring adequate permeability. Experimental results show that the mechanical properties of concrete could be improved as a result of using ultra-high performance paste, improving homogeneity and compatibility between aggregates by eliminating coarse aggregates, and enhancing cement paste thickness between aggregates. These enable the production of a high-strength pervious concrete with a **compressive strength of 60.93MPa** and a **water permeability of 0.37mm/s**, which would potentially broaden the scope of application of pervious concrete.



Pilot Trial of a New Land Reclamation Technique

A research team led by Ir Professor Yin Jianhua, Chair Professor of Soil Mechanics at the Department of Civil and Environmental Engineering, has developed an innovative technique for land reclamation using horizontal band drains to aid vacuum preloading to facilitate reuse of dredged sediment as fill material.

A pilot trial at a land reclamation site carried out jointly with the Civil Engineering and Development Department of the Hong Kong Government and industry partners has recently been completed successfully. Supported

by a Research Grants Council funding of nearly HK\$10 million, the trial outcome will provide vital reference for sustainable marine reclamation in Hong Kong and will significantly advance understanding of soft ground problems.

Carbon-Neutral Biochar Partition Block

A team led by Professor Dan Tsang, former Professor of the Department of Civil and Environmental Engineering has produced application-oriented biochar from yard waste and developed the first carbon-neutral biochar partition block with value-added and climate-smart functions. The block has diverse applications, ranging from improving soil fertility to being added to building materials to reduce the construction industry carbon footprint.

The project has received grants of approximately HK\$8.8 million from the Hong Kong Government's Green Tech Fund and the technology has been commercialised through PolyU start-up NeutralCrete Limited. It is anticipated that widespread adoption of the new products would help reduce the burden on landfill sites and contribute to achievement of the Greater Bay Area's aim of carbon neutrality.

Education

Undergraduate Research and Innovation Scheme (URIS)

Aiming to enhance technological innovation capabilities, PolyU launched the URIS in 2021. The scheme advocates inquiry-based learning to nurture the next generation of researchers and innovators, provides students with the opportunity to conduct research under the supervision of the University's scholars. It offers an important chance for students to develop higher-order thinking skills, such as logical, innovative and critical thinking. The experience and skills acquired by students through their research also help broaden their future career horizons. More than **110 projects** have been approved and funded, and over **200 students** participated in the URIS in the 2021/22 academic year.

Cultivating Students' Innovative and Entrepreneurship Mindset

The Department of Industrial and Systems Engineering (ISE) and the Department of Management and Marketing (MM) host a number of subjects which nurture students' innovative thinking and entrepreneurship.

The ISE subject "Entrepreneurship and Innovation" aims to give students an overview of the concept of entrepreneurship and entrepreneurial strategies, while developing an awareness of the sources and processes of innovation, and the ability to analyse innovative business. Some MM subjects enable students to understand how to deliver social innovation to solve the world's pressing issues, to achieve SDGs, and to develop an entrepreneurial mindset via project learning and guest lectures delivered by local entrepreneurs.



Incorporating STEM into Service-Learning Projects

PolyU believes that STEM education is a vital prerequisite for individual development and has integrated STEM into its service-learning programmes and projects.

For instance, "Promoting Digital Literacy in Developing Societies", hosted by the Department of Electrical and Electronic Engineering, enables students to effectively apply their knowledge to practice as they conduct IT workshops, mini-lectures and hands-on training for service recipients in remote regions of Cambodia or Vietnam.

Another subject "Technology Beyond Borders: Service Learning across Cultural, Ethnic and Community Lines", hosted by the Department of Computing, enables PolyU students to interact with children overseas who have little access to STEM education. Students introduce the children to trending technology concepts like artificial intelligence and machine learning, giving them an introduction to science and technology as well as helping to instil a passion for innovation. In the 2021/22 academic year, **163 students** enrolled on the subject.



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Engagement

PolyU InnoTech Open Day

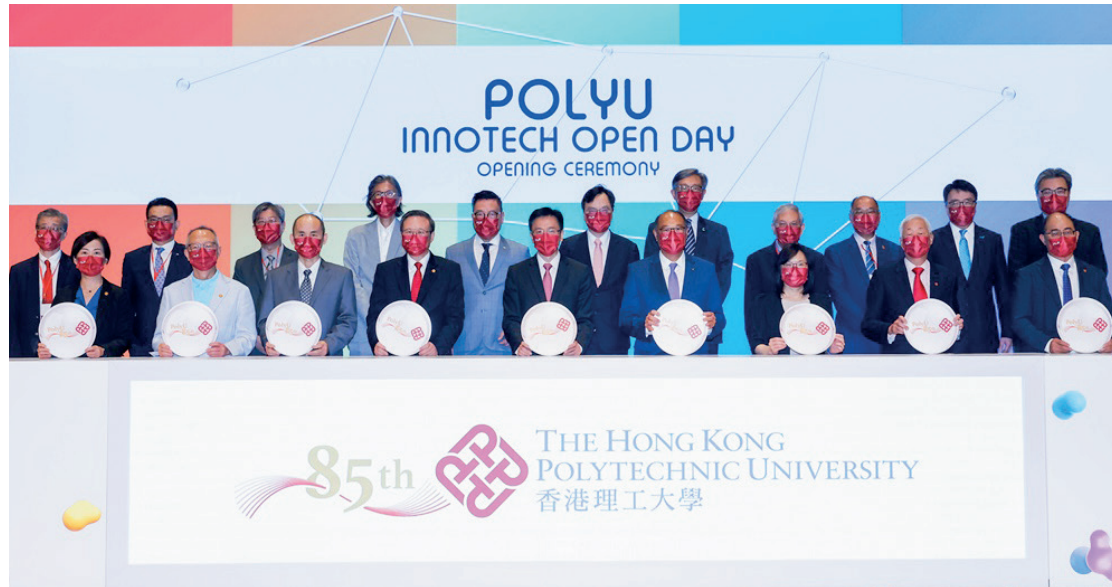
The first-ever PolyU InnoTech Open Day was held on campus on 16 July 2022 to showcase the University's efforts in promoting Innovation and Technology (I&T). The event was attended by members of the PolyU community, government officials, entrepreneurs, industry partners, start-ups, researchers and young talents, as well as prospective university students and their parents.

Supported by 19 key organisations in Hong Kong's I&T ecosystem, the Open Day featured a wide range of activities such as breakout sessions for research and innovation, thematic tours, exhibition of impactful innovation, start-up pitching, unicorn's sharing, as well as a virtual seminar given by the 2020 Nobel Laureate in Physiology or Medicine, Sir Michael Houghton.

Good Seed Programme

Good Seed is a social innovation training and funding programme developed by the Knowledge Transfer and Entrepreneurship Office and the Jockey Club Design Institute for Social Innovation, aiming at unlocking the creative potential of young people to drive social innovation for the benefit of the underprivileged, with design, technology and business as major foci.

From September 2021 to July 2022, the programme engaged **700 Hong Kong citizens** in interactive training workshops which equipped them with understanding and skills needed to become social change-makers. A total of **166 preliminary ideas** were co-created and **22 social projects** were granted HK\$200,000 to drive innovative solutions to tackle poverty issues and promote social inclusion among different target sectors.



Science World: Exploring Space to Benefit Mankind

The science education programme was organised by the Research Centre for Deep Space Explorations and the Global Engagement Office, and included a space experiment competition which attracted **26 experiment proposals** from **22 secondary schools**. It stimulated secondary school students' interest in STEM education, deepened their understanding about benefits of space explorations to humankind, inspired their innovative thinking in technology through the utilisation of the China Space Station.

Policies and Operations

PolyU Proof-of-Concept (POC) Funding Scheme 2.0

With the aim of instilling a problem-driven innovation mindset in young people, the POC Scheme was upgraded to POC 2.0 to support the ideation and prototyping of student innovations. In 2021/22, the scheme engaged **139 students** and granted funding support to **38 projects**, while supporting and preparing students to participate in local and overseas innovation and entrepreneurship competitions. PolyU teams won **29 awards** in 2021/22, the highest number ever recorded.

PolyU Micro Fund Scheme 2.0

Launched in 2011, the Micro Fund Scheme was the first funding initiative to aim at cultivating an innovative and entrepreneurial spirit in the PolyU community, and promoting knowledge transfer and the commercialisation of PolyU's innovations and technologies. Each selected start-up is awarded up to HK\$120,000 and receives pre-incubation support. In 2021, PolyU partnered with Hong Kong Science and Technology Parks Corporation (HKSTP), upgrading the fund to the 2.0 Scheme. The upgraded scheme helps accelerate the rate at which PolyU start-ups enter HKSTP's ideation and incubation programmes.

PolyU's Entrepreneurship Society, InnoHub and PolyVentures Mentorship Programme

In 2021/22, the student-initiated PolyU Entrepreneurship Society recruited **124 new members** to expand the entrepreneurship community, increasing the total membership to 772. In the same year, the University hosted 16 entrepreneurship events through PolyU InnoHub, attracting **more than 1,200 participants**. Furthermore, the PolyVentures Mentorship Programme was enhanced based on domains designed to provide systematic support to PolyU start-ups. A total of **31 industry and professional mentors** have been engaged to advise and guide PolyU start-ups at different stages of development.



Total start-ups
450+



Academic-led start-ups
29



University spin-offs
30



Tech start-ups
220+

Design and social start-ups
230+



Unicorns
4



Included in Forbes Asia 100 to Watch List
3



Accumulative entrepreneurs nurtured
1,477



Accumulative number of awards
329



Patents and trademarks granted
100

