



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

Excel *x* Impact

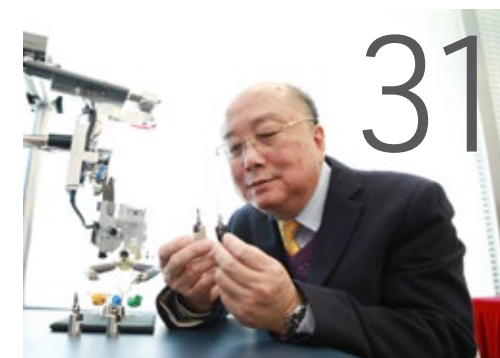
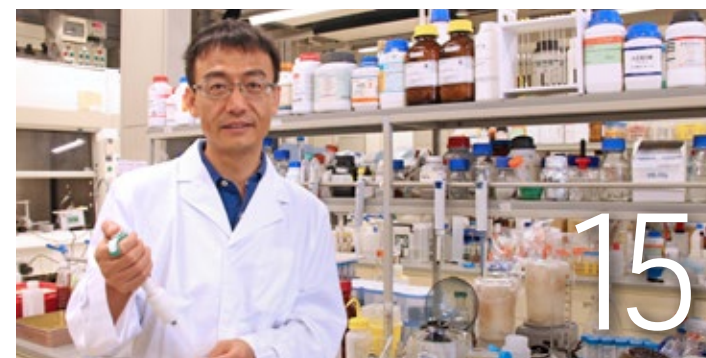
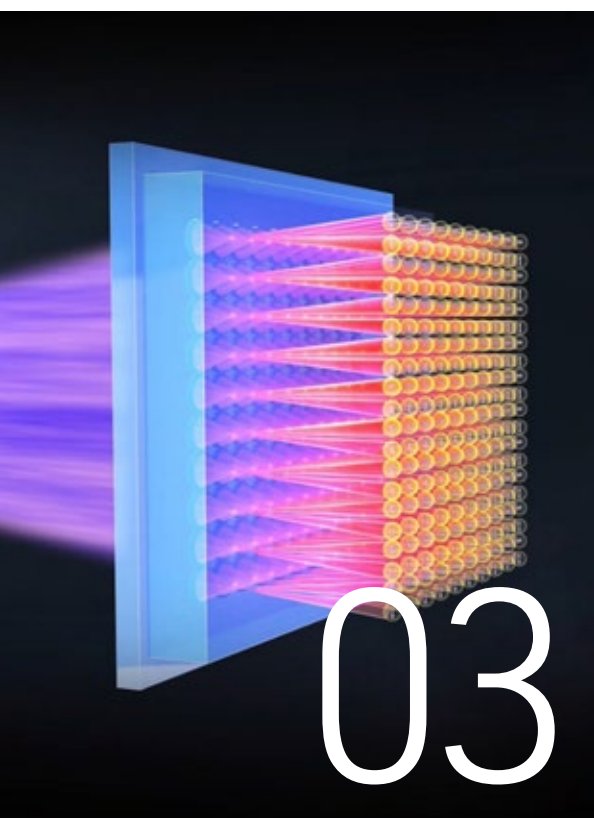
Autumn 2020

A QUANTUM leap forward in COMPUTING

Finding opportunities
in times of crisis

Language: the heart of
what it is to be human

Helping solar panels "sweat" to
increase energy efficiency



President's Message

By the time this publication reaches you, we will already be well into the 2020/2021 academic year. Due to the COVID-19 pandemic, many classes continue to be run online in this semester, but we have also been able to allow some face-to-face teaching activities on campus while remaining vigilant to safeguard our students and staff.

PolyU is always committed to fulfilling its social responsibility through its educational and research endeavours. During this unprecedented pandemic, social responsibility has taken on a new meaning. Our researchers and students have been harnessing their expertise to help the public cope with the pandemic through impactful research and innovative solutions. We have also implemented online Service-Learning for our students – allowing them to serve distant communities through online means.

On our National Day, we held a solemn Flag-raising Ceremony, bringing together hundreds of people from the PolyU community to celebrate the 71st anniversary of our country. We see it as our duty to nurture successful future professionals and leaders with a deep affection for their family and nation, an international perspective and a strong sense of social responsibility.

I am pleased to share with you more stories of PolyU in this issue. Enjoy reading!

Jin-Guang Teng
President

Cover Story

- 03 A quantum leap forward in computing

Dialogue

- 07 Finding opportunities in times of crisis
- A conversation with Deputy Council Chairman
- 09 Accelerating world-changing research to drive impact
- A conversation with Deputy President and Provost

Education

- 11 Tripartite hospitality programme wins international recognition
Research selected for "Top 10 Science Advances in China of 2019" and included in 2020 National College Entrance Examination
- 12 PolyU offers HK's first MSc in Medical Physics
- 13 Occupational therapy and physiotherapy master's programmes help meet societal needs

Research and Innovation

- 14 A more energy efficient future is in our power
- 15 Helping solar panels "sweat" to increase energy efficiency
- 17 PolyU receives HK\$18 million from Health and Medical Research Fund

Knowledge Transfer and Entrepreneurship

- 19 PolyU solution reduces energy consumption in buildings by up to 40%
- 21 Surfing the wave of market trends

Spotlights

- 23 Flag-raising ceremony to celebrate National Day
- 24 PolyU's joint research proposals awarded Theme-based Research Scheme funding
- 25 PolyU wins Public Policy Research Funding for studies on social incidents
- 26 PolyU excels in shipping and maritime research
Renowned hotelier honoured for lifetime achievement

PolyU Community

- Staff
- 27 Major external appointments and awards of PolyU members
- 28 Senior staff appointments and promotions
- 29 Professor William Shiyuan Wang, Chair Professor of Language and Cognitive Sciences
- Language: the heart of what it is to be human

- 31 Professor Yung Kai-leung, Chair Professor of Precision Engineering
- From homemade gadget to high-precision instrument
- 33 PolyU academic scoops Shortridge Hardesty Award
- 34 Two PolyU scholars named RGC Senior Research Fellow and Research Fellow

Alumni

- 35 Mr Banting Sze Wai-pan, Chairman, CEO and Founder of Freetech Road Recycling Technology (Holdings) Limited
- A road doctor
- 37 Dr Johnny Ng Kit-chong, Founder and Chairman of Goldford Group
- Passing the torch

Students

- 39 Welcome to the new academic year
Laboratory enthusiast gets closer to dream
- 40 Students win external scholarships for their inspiration and aspirations
- 41 Mathematics prodigy thrives at PolyU

Highlights

- 42 PolyU ranked among best universities in the world
Library extension and revitalisation funding approved

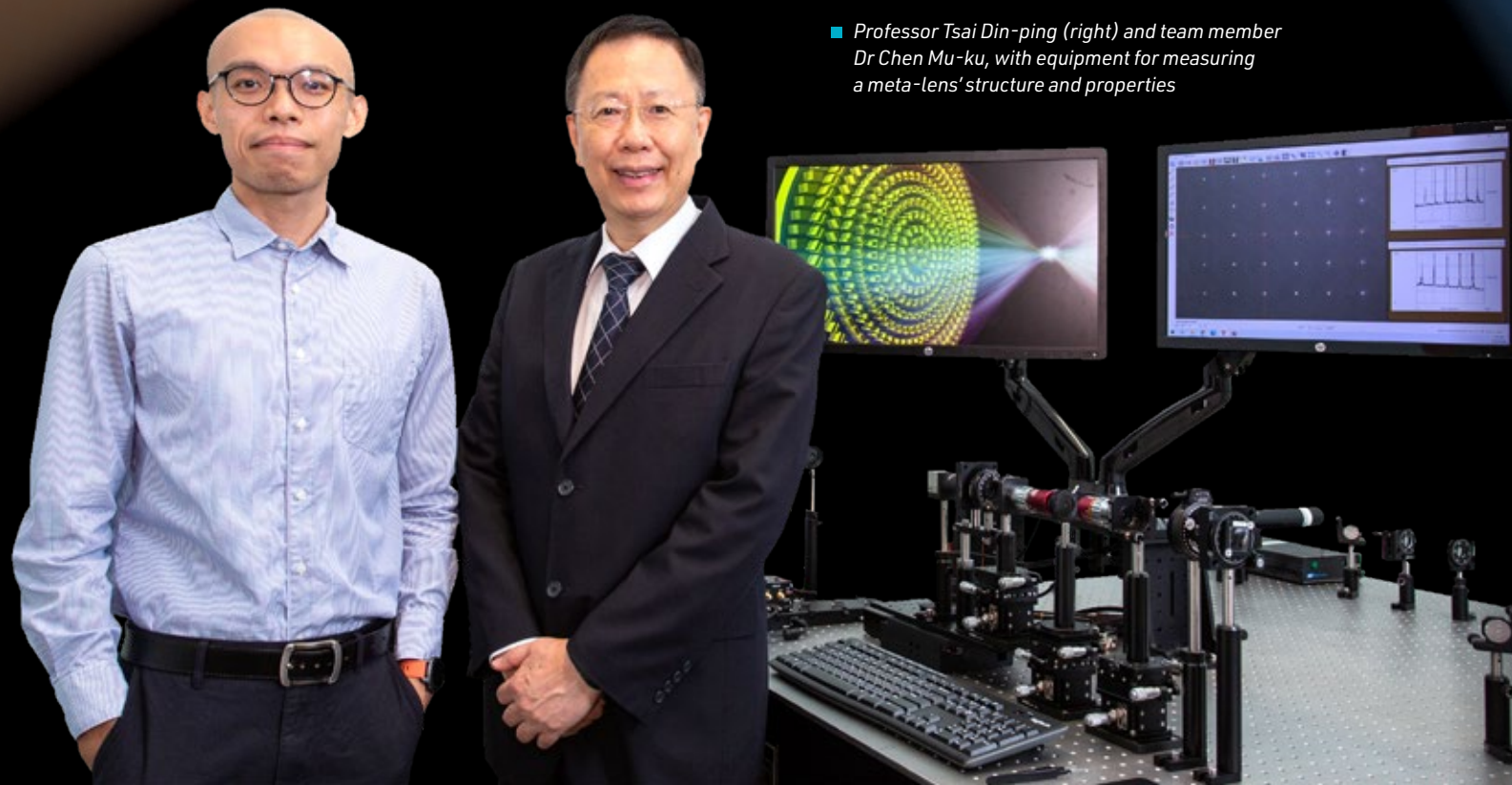
A QUANTUM leap forward in COMPUTING

PolyU is first in the world in making meta-lens array quantum optical chips tiny, precise and high dimensional, opening the way for further advances in quantum computing

From Silicon Valley in California to Shenzhen, China, leading IT companies across the world have been looking for the key that will take quantum computing to the next level. Now, a team of Chinese researchers led by Professor Tsai Din-Ping, Chair Professor and Head of PolyU's Department of Electronic and Information Engineering, have developed an approach that promises to unlock the full potential of this exciting new technology.

Although still in the early development stages, quantum computing has been widely heralded as the most significant advance in computer technology since the invention of the transistor. Once this technology has matured, it could lead to major breakthroughs in the quest for new life-saving drugs, alternative forms of energy, hacker-proof data encryption, and so much more.

■ Professor Tsai Din-ping (right) and team member Dr Chen Mu-ku, with equipment for measuring a meta-lens' structure and properties



But what exactly is quantum computing? Essentially, it is a form of computing that harnesses particles such as electrons and photons to perform highly complex calculations. Quantum computers are so powerful, in fact, that they can solve lengthy mathematical problems in less than one second rather than the thousands of years needed by an ordinary computer.

Governments and companies like Google, IBM and Microsoft understand that quantum computing is the future and are pouring hundreds of millions of dollars to perfect the technology. Yet getting there will require overcoming a number of seemingly insurmountable challenges.

For one, the results are not always reliable. Qubits are famously unstable, as even the tiniest amount of vibration or a slight change in temperature can throw off its calculations. Quantum computers also generate tremendous amounts of heat, so in order to perform accurately, they must be operated in room-size freezers at temperatures many times colder than deep space.

These challenges may be daunting but they could soon be resolved thanks to an innovative new approach developed by Professor Tsai and his team.

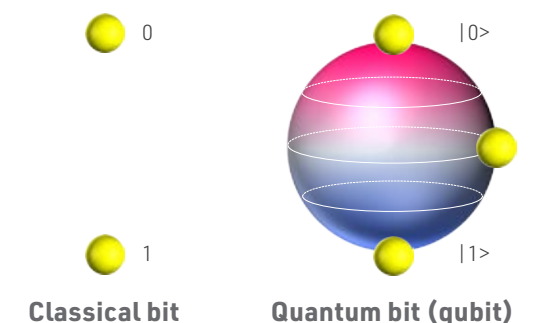
How quantum computers work their magic

In a traditional computer, all information is based on a "bit" (or binary digit), which can be either 0 or 1. That email you wrote, the TikTok video your kids uploaded, or the online newspaper you read this morning, all come down to the 1s and 0s that make up the long streams of binary data your computer depends on.

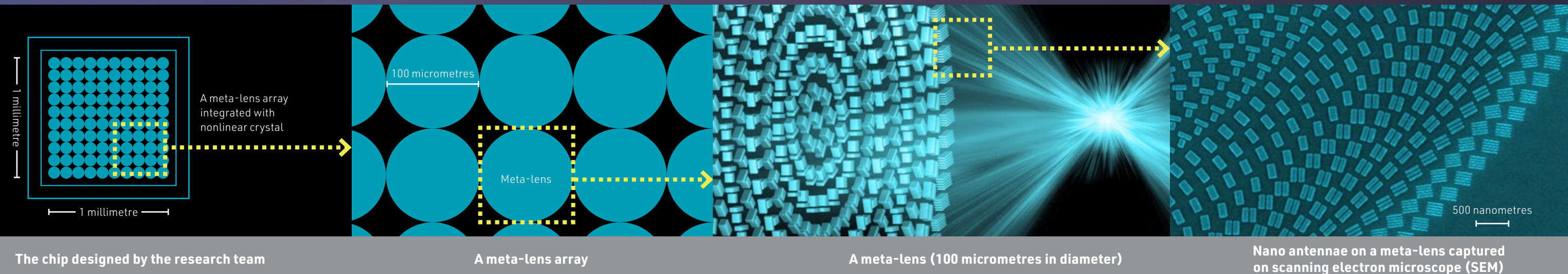
Quantum computers, on the other hand, run on "qubits" (or quantum bits), which are derived from the quantum state of sub-atomic particles. Unlike ordinary bits, they can be both 1 and 0 – or anywhere in between – simultaneously (known as "superposition"). This is accompanied by "entanglement", a somewhat enigmatic phenomenon in physics where two particles share information about each another. When

two particles such as photons (the basic unit of light) are linked this way, they can perform a vast number of calculations far beyond the capability of today's most powerful supercomputers.

■ A qubit can be both 1 and 0, or anywhere in between, at the same time.



Zooming in to reveal the antennae in the chip



Let there be light

The concept behind their approach is based on a series of miniature “meta-lenses” composed of extremely fine antennae for capturing photons from a laser beam and focusing them on the same point.

“The design principle is very simple,” says Professor Tsai. “We made very small antennae and placed them on a surface made of gallium nitride, a semiconductor material known for its excellent optical quality.

“We made each antenna as ‘nano’ as possible, because that gives you the precise ability to control light at a very fine level.”

A typical nano antenna developed by the team measures 45 nanometres (width) x 80 nanometres (length) x 800 nanometres (height). More than 250,000 of these tiny antennae went into the composition of one lens, which measures 100 microns in diameter, about the size of a human hair. To demonstrate how their approach works, the team designed and fabricated a 1mm x 1mm optical chip with an array of 10 x 10 lenses containing a total of 25 million antennae, each in a different size, dimension and orientation, and all integrated with a nonlinear crystal, which can polarise incoming light.

Did you know?

1 millimetre = 1,000 micrometres (microns)
1 micron = 1,000 nanometres

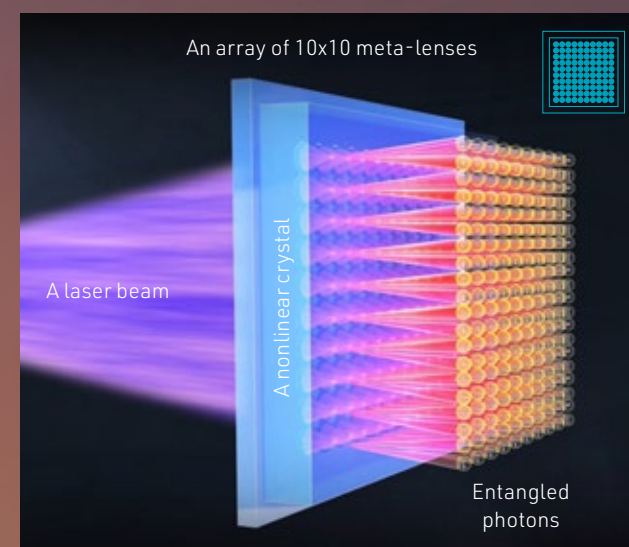
When a laser beam is focused at the centre of the nonlinear crystal, each meta-lens on the chip will generate two photons from one photon. In a series of experiments, the team demonstrated that the multi-photon pairs are superimposed and correlated with each other.

The high-dimensional quantum entangled optical chip that resulted from this exercise is the first in the world, opening the way for further advances in quantum computing.

Power to the nth degree

Entangled photons are critical for quantum information as they are capable of generating millions more bits than a traditional computer.

■ Schematic of the high-dimensional quantum entangled meta-lens array optical chip



In the past, however, this was extremely difficult to achieve with quantum computing.

“Before, when people attempted to make a high dimensional quantum chip this way they had to do it with a laser beam that split many different times through different crystals,” says Professor Tsai. “It was almost impossible for them as the laser light died down every time it went through the crystals. And the setup is bulky.

“But we were able to do it with one crystal in one tiny chip – a world first.”

Why is this so significant? Mainly because the number of bits generated is high dimensional (an extremely large number of dimensions, $d + 1$).

“We now have traditional style computers of 64 bits,” says Professor Tsai. “Their computational power is 2^{64} , but with our 10 x 10 array meta-lens, it is much more than 2^{100} . Even more promising, we believe our approach can easily achieve even greater computational power.”

What’s more, during trial runs Professor Tsai’s team was able to obtain a fidelity rate of nearly 98.4%, which confirmed the feasibility of their quantum entangled optical chip. In addition to this, the chip can operate at room temperatures, eliminating the need for liquid helium or nitrogen cooling systems and ultra-high vacuum facilities.

A breakthrough with revolutionary potential

The cutting-edge research carried out by Professor Tsai’s team was done in collaboration

with Nanjing University, University of Science and Technology of China, National Taiwan University, Academia Sinica, East China Normal University, and National United University.

Although the chip is still in the development phase, its revolutionary potential was recognised by one of the world’s top scientific journals, *Science*, which published a paper co-authored by the team, “Metalens-array-based high-dimensional and multiphoton quantum source”, in June 2020.

This recognition was highly encouraging for Professor Tsai and his team, who believe commercial applications for this compact and reliable chip may not be far off. “Our research will help quantum information science realise many applications in our daily life in the future,” Professor Tsai says.

“One example is cashless payments. At the moment, when you make a transaction, a security code is generated randomly with 2 bit computing (1s and 0s). The current maximum would be 4 or 5 digits. With quantum computing, the code generated would be much longer and virtually impossible to break.”

A workable quantum computer, however, is not likely to replace your smartphone anytime soon. Yet because of the advances made by the PolyU team, commercial applications may be closer than previously thought.

“The revolution comes from here, with our chip,” says Professor Tsai. “It truly is a technical breakthrough.”

Finding OPPORTUNITIES in times of crisis

A Conversation with Deputy Council Chairman Dr Lawrence Li Kwok-chang

Dr Lawrence Li Kwok-chang has been a member of the PolyU Council since April 2010. He took up the role of Treasurer of the University in April 2015 and became Deputy Council Chairman in January 2019. A specialist in Ear, Nose and Throat Surgery, Dr Li also serves on several government committees and professional bodies.

What changes have you seen at the University during the years that you have served on the PolyU Council?

The changes I have witnessed have taken place not just in PolyU, but also in society, and in how the University fits in with the times. In the past, PolyU was under the radar, despite making contributions to society on various fronts. But in recent times, the University has become more visible. For example, in the fight against the COVID-19 pandemic, PolyU researchers developed the rapid automated multiplex diagnostic system, which can identify COVID-19 in an hour in a very cost-effective way. We also made face and eye shields for Hong Kong's frontline medical workers. The first batch of face shields were made just 10 days after the design was finalised. This kind of work shows PolyU's value to society, and connects us with the life of the city.



I encourage students to have an open mind. University is a place where you are able to ask questions, to find direction, to explore.



What special ingredient do you think has made PolyU a top university?

PolyU has always changed with the times. The world is now solutions driven, which means that solutions need to be driven by demand. Today, AI is a major focus of attention and it opens a whole new world for the engineering discipline, which is one of the strengths of this University.

In the same way, education must have a purpose. In the past, Hong Kong education was utility driven, which makes personal development very difficult. But each person is different. Therefore, education needs to allow students to develop as a whole person, not just to become technically competent. It is about opening students' minds. Holistic education is another of PolyU's strengths.

What attributes and attitude would you encourage PolyU students to develop during their university years? What advice would you give them?

I encourage students to have an open mind. University is a place where you are able to ask questions, to find direction, to explore. I also encourage them to develop a vision and leadership skills. In this respect, mentorship can be very helpful, particularly if the process starts by asking the students what their aims are, and making the mentorship match based on that.

Contributing to society is also very important. If students are in a position to help others, they should take advantage of opportunities that broaden their horizons and allow them to get to know people from different backgrounds. Serving others also helps instil humility in young people.

Could you share one of your achievements as a PolyU Council Member?

I was previously tasked with the role of Chairman of the Investment Committee, making sure the University's finances came right. When I took on this role, it was after the bankruptcy of Lehman Brothers and we had lost funding. We needed to establish financial stability to make sure we could perform the University's core functions, and be transparent, as we were subject to outside independent review of our investment strategies. It's all down to risk management of the investment portfolio. This is not difficult for me as a doctor, since I deal with the more difficult risk management of life and death every day. The whole concept of the University investment is to support its education and research functions, and PolyU has been doing very well financially.

The world is currently going through a very difficult time. Can you share any advice with PolyU students and staff on how to deal with and alleviate stress? Do you have a motto to share?

You have to have hope. We can't retain the good times, and the difficult times will also pass, but you do need to have a vision of where to go. It can help to look at things from an historical perspective and to see how knowledge and events build on each other, and different solutions evolve and emerge in their own time. One of my mottos is "In crisis, you evolve."

What personal habits do you think are most important to cultivate?

I am actually fairly disciplined. I get up in the morning and do half an hour of cross-training before going to the office to see patients. Exercise is always important. You need good health to have the strength to do things.

Is there a particular book or philosophy that you would like to recommend?

I would like to mention a book, published in 2019, called *The Age of Living Machines: How Biology will Build the Next Technology Revolution*, by Susan Hockfield, a neuroscientist and former president of MIT. It describes the marriage of biology and engineering to add value and produce new technologies and products. From this book, I can see that a university should take a continuous development view – a clearly argued, carefully considered long-term view, with a defined destination. My most important takeaway from this book is the vision and commitment of a predominantly science-orientated university that is dedicated to society, and how it can make a difference.

■ At the PolyU Entrepreneurship Parade, Dr Li encourages entrepreneurs to keep an open mind in their business ventures.



Accelerating world-changing RESEARCH to drive IMPACT

A Conversation with Deputy President and Provost Professor Alex Wai

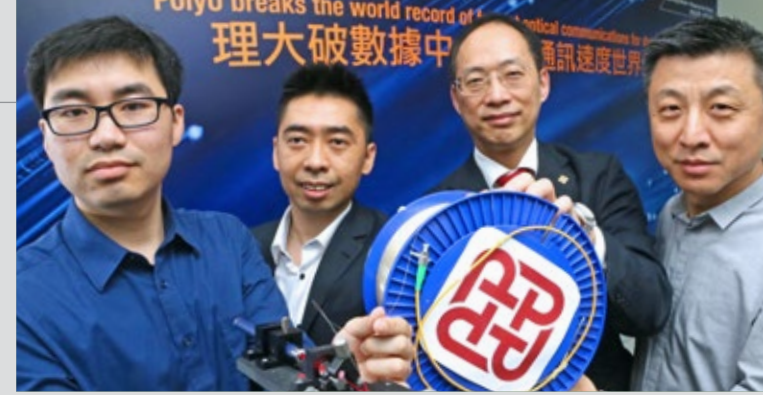
Ir Professor Alexander Wai Ping-kong is an expert in high-speed optical fibre communication systems. He obtained his PhD degree from the University of Maryland, USA in 1988. He then worked on a space shuttle project before conducting his own research at the University. In 1996, he returned to Hong Kong to join PolyU's Department of Electronic Engineering as an Assistant Professor, and has served in various leadership roles during the past 24 years.

How has PolyU changed since you joined in 1996?

PolyU has changed tremendously. When I first joined, PolyU was in a transition from a polytechnic to a bona fide university. We put a great deal of effort into promoting a research culture and gradually improved our competence in academic and scientific research, leading to significant achievements with major breakthroughs. Now we are doing very well in both basic and translational research. PolyU is a world-renowned university delivering interdisciplinary research that benefits the community.

You assumed the role of Vice President (Research Development) in 2010. How did you assist PolyU's development in research and innovation?

As Vice President (Research Development), I aimed to bolster the research culture in different disciplines and advocated interdisciplinary collaboration. To create an environment of peer support, one initiative I took was setting up a dialogue platform called "research salon" for our academics from different disciplines to meet and exchange ideas regularly. Leveraging this platform, we invited speakers to give short presentations



■ Professor Alex Wai (second from right), also Chair Professor of Optical Communications, teams with PolyU researchers to break world record of the fastest optical communications for data centres.

on specific research topics, which often triggered fervent discussions. I also took the opportunity to talk about how to pool and allocate research resources appropriately.

In addition, I started a vetting process for colleagues applying for significant research funding from the Research Grants Council. They had to explain the gist of their proposals to their peers, who might not be experts in the field. In the first few years, I intentionally gave the Principal Investigators a hard time by asking challenging questions. But it helped our research colleagues collect their thoughts and refine their proposals before submission. Thanks to the hard work of my colleagues, PolyU has made significant improvements in receiving large research grants in the past 10 years.

You are currently PolyU's Deputy President and Provost. What is your aspiration for education?

New technology is rapidly changing the landscape of tertiary education. Automation, artificial intelligence (AI), big data and other evolving technological innovations are not only altering how classes are conducted, but also making some professional skills obsolete, with jobs disappearing. We need to equip students with the mindset and capabilities for self-learning and life-long learning, as well as strengthening their core competences, such as critical thinking, problem solving, and communication skills. Furthermore, we are going from a mass production concept of education to one of mass customisation. We should be able to offer individual students a mix of quality educational contents that best fit their interests, potentials and aims. I have introduced a strong sense of urgency that this is something we need to address because I think PolyU can take a lead in this area.

Could you share some words of encouragement with young scholars/researchers and students?

I am a diehard optimist. When there is change, there are opportunities. Many jobs in the future will become obsolete due to the AI revolution, but this



We are going from a mass production concept of education to one of mass customisation... I think PolyU can take a lead in this area.



change will also create significant opportunities for students, scholars and researchers who are brave enough to seize them. I would like to share one of my mottos with them: never give up.

Could you share some moments or important decisions that had a major impact on your life?

Two incidents stand out. The first was deciding to go the US to attend graduate school when I was young. I had never left Hong Kong before and I was not sure I was good enough. The second was the reverse: coming back to Hong Kong. I did not think I had done enough to prove myself as a researcher in the US. So, I originally intended to return to Hong Kong for only a couple years to witness the 1997 transition.

What are your passions and hobbies?

I have run 10K in the marathon race every year since I came back to Hong Kong. I really love martial arts and I practice Tai Chi almost every day early in the morning. I work a lot. My family jokes that when I retire, they will need to find an office for me to go into every day.

As you will be leaving PolyU to take up a new role at Baptist University, can you share a memorable moment at PolyU?

What happened on this campus in November last year changed me as a person. The protestors' occupation and the police standoff made the campus intensely dangerous. I was relieved when the issue was finally resolved peacefully. I will never forget the moment I led a line of students calmly off the campus in the early morning of 19 November. I was put to the test and I think I passed. It got me thinking about whether I could do more in a different role.

In my new post, I will try to bring the two universities closer.

Tripartite hospitality programme wins international recognition



The Master of Science in Global Hospitality Business (MGH) programme, offered jointly by PolyU's School of Hotel and Tourism Management (SHTM), École hôtelière de Lausanne and Conrad N. Hilton College of Hotel and Restaurant Management at the University of Houston, has won the McCool Breakthrough Award 2020. The accolade is awarded by the International Council of Hotel, Restaurant, and Institutional Education, the world's largest organisation of hospitality and tourism educators.

Launched in 2015, the MGH is a first-of-its-kind partnership involving three leading institutions in Europe, Asia and North America. The programme was commended for its unique approach to graduate education in the hospitality sector, including its immersion in business projects, certification, and field trips to global business hubs.

The innovative educational strategy enables students to spend one semester in each of the institutions in different continents, providing them

with exposure to three distinct markets and diverse cultures. The tripartite programme strives to nurture a strong international mindset in future hospitality leaders, enabling them to excel in the dynamic global environment.

Rated number one in the world in the "Hospitality and Tourism Management" category according to ShanghaiRanking's Global Ranking of Academic Subjects 2020, PolyU's SHTM pursues a distinctive vision of hospitality and tourism education.

Research selected for "Top 10 Science Advances in China of 2019" and included in 2020 National College Entrance Examination

A question based on an article written by Dr Huang Bolong, Assistant Professor of PolyU's Department of Applied Biology and Chemical Technology, in collaboration with Professor Yan Chunhua and Professor Zhou Huanping from Peking University, was included in the examination paper for comprehensive science in the 2020 National College Entrance

Examination of China. The article proposes an innovative solution for designing efficient and stable solar cells.

The article submitted by Dr Huang's joint research team was published in *Science* magazine in 2019. By using theoretical calculations, it explains how rare-earth ion doping could be used to stabilise perovskite solar cells.

"Among different types of solar cells, perovskite solar cells have the highest solar light conversion efficiency. However, defects, such as zero-valence lead and iodine, often occur in perovskite solar cells due to environmental factors, which affect their performance," Dr Huang explained.

The research found that introducing rare-earth ions could eliminate the zero-valence defects through the redox cycle, stabilising the long-term functioning of perovskite solar cells, and enhancing their efficiency.

This research work was also selected as one of the "Top 10 Science Advances in China of 2019" by the Ministry of Science and Technology of China.



■ (From left) Dr Huang Bolong, Professor Yan Chunhua, and Professor Zhou Huanping

PolyU offers HK's first MSc in Medical Physics

The ageing population creates immense challenges for the delivery of healthcare services, leading to significant demand for medical professionals. One such area is medical physicists, who are critical in providing radiotherapy for effective cancer treatment. There are currently only 150 medical physicists practising in Hong Kong, too few to meet the growing need, while in Mainland China the gap is even larger. To help meet demand, PolyU started offering a Master of Science in Medical Physics this September, as no higher degree programme was previously available locally or in nearby regions.

Professor David Shum Ho-keung, Dean of the Faculty of Health and Social Sciences of PolyU, said, "We are pleased to be the first local university to offer a master's programme in medical physics, which, in addition to preparing students for a career in medical physics, will also help promote the development of the field itself."

A career as a medical physicist

Medical physicists specialise in radiation treatment technology, with their expertise spanning from diagnostic imaging to radiotherapy. Although they spend most of their time behind the scenes, they play a pivotal role in a medical team. For example, in the planning and implementation of cancer treatment, medical physicists are responsible for formulating treatment plans, calculating radiation doses, and testing and monitoring equipment to ensure it is operating correctly to achieve the treatment goal.

After obtaining a master's degree in medical physics, a resident physicist can embark on a three-stage professional examination, while serving in a hospital. Generally speaking, it takes about four to five years to attain certified recognition as a medical physicist in Hong Kong.

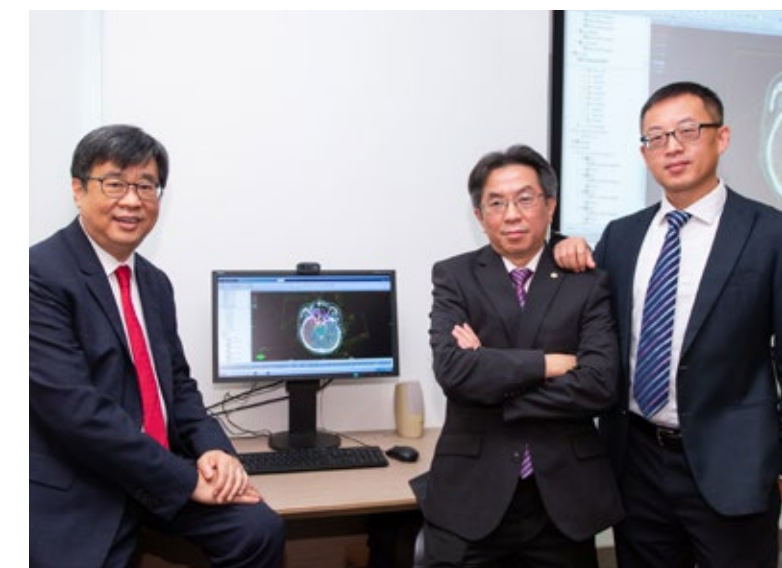
Interdisciplinary expertise

Medical physics is a discipline that crosses the boundaries of medicine, physics and engineering. PolyU's new programme offers interdisciplinary training for aspiring professionals keen to pursue a career in the field. It is hosted by the Department of Health Technology and Informatics (HTI) in the Faculty of Health and Social Sciences, with close collaboration with the Department of Applied Physics in the Faculty of Applied Science and Textiles. Professor Yip Shea-ping, Head of HTI,

pointed out, "In the past, no dedicated master's programme was offered by local institutions, and people have little understanding of what medical physicists do. We hope that by launching this new course, more people will understand the importance of medical physics and hence help to open new research areas in this field." The programme has established close connections with local hospitals, the healthcare industry, and medical physics societies in Hong Kong and overseas.

Professor Cai Jing, the programme leader and Professor of the Department of HTI, said, "We aim to broaden students' perspectives in medical science and technology development, and equip them with professional knowledge and relevant skillsets, as well as research capabilities."

The PolyU curriculum is aligned with international standards for medical physics graduate education. The self-financed programme offers full-time and part-time modes of study. It normally takes one year to complete on a full-time basis, and 2.5 years on a part-time one. Applicants for the programme should have a bachelor's degree in physics, applied physics, engineering physics, engineering, mathematics, radiography, natural science, or health technology. In the inaugural 2020/21 cohort, 26 students have enrolled, of which 70% have a physics or engineering-related degree, while 20% are graduates in radiotherapy.



■ (From left) Professor David Shum, Professor Yip Shea-ping, and Professor Cai Jing

Occupational therapy and physiotherapy master's programmes help meet societal needs



■ Graduates from the master's degree programmes serve in NGOs that offer care and rehabilitation services to the elderly, people with disabilities and children with special needs.

To help alleviate the manpower shortage in Hong Kong's healthcare and rehabilitation sectors, the Social Welfare Department (SWD) of HKSAR Government, in collaboration with PolyU and non-governmental organisations (NGOs), has been offering a Training Sponsorship Scheme since 2012. Under the scheme, SWD provides funding support for NGOs to sponsor students' tuition fees for enrolling in a two-year full-time entry-level master's degree programme either in occupational therapy (MOT) or physiotherapy (MPT) offered by PolyU. Upon graduation, students will be required to work at the NGOs with which they have signed up for three consecutive years.

So far, more than 250 students have been trained under the scheme. Professor Hector Tsang, Cally Kwong Mei Wan Professor in Psychosocial Health, Chair Professor of Rehabilitation Sciences and Head of PolyU's Department of Rehabilitation Sciences, said: "Students were admitted in alternate years in the previous four cohorts from 2012 to 2020. In view of the favourable feedback from the social welfare sector, we have decided to offer the programmes on an annual basis from 2021 to 2023." Forty-eight funded places in both the MOT and MPT programmes will be offered annually to bachelor's degree holders who

have obtained credits in the subjects of human physiology and human anatomy.

"It is gratifying that more than 65% of the participating students of the first two cohorts continue to serve in the NGOs after completing their post-graduation service. We are pleased to extend the scheme to provide sponsorship to more than 290 students in total," said Mr Gordon Leung Chung-tai, Director of Social Welfare, HKSAR Government.

Mr Peter Auyeung, Chief Executive Officer of Heep Hong Society, said their organisation had greatly benefited from the Training Sponsorship Scheme. "We are delighted that PolyU and SWD offer NGOs strong support by training more occupational therapists and physiotherapists. I am impressed by the graduates' passion for serving people in need."

Over the years, PolyU has played an instrumental role in nurturing talent so as to meet the changing needs of different sectors in the community. This scheme is a good testament to PolyU's fruitful collaboration with the Government and the industry to address societal needs. The MOT and MPT programmes also open up another career path for young people who wish to realise their aspirations of serving the community as qualified therapists.

A more energy efficient future is in our power

A new generation of highly efficient batteries may be closer than you think, according to a study by an international research team joined by PolyU and led by Collège de France, together with The French National Centre for Scientific Research, Massachusetts Institute of Technology and Canada's Dalhousie University.

The team's study, "Operando decoding of chemical and thermal events in commercial Na(Li)-ion cells via optical sensors", was published in the high-impact international journal *Nature Energy* on 24 August 2020.

Although existing commercial battery packs are equipped with temperature sensors, these sensors are not placed directly at each cell. According to Professor Jean-Marie Tarascon, Professor at the Collège de France and senior author of the study, this "leads to very conservative and ultimately inefficient battery management systems (BMS) since the actual sensors do not inform us what is really happening."

The research team achieved their breakthrough by incorporating optical fibre "Bragg" grating (FBG) sensors directly into 18650 format cells (a standard for commercial batteries). This had two benefits. Firstly, it allowed for the collection of clean, high-resolution optical signals from the sensors. And, secondly, by employing advanced signal analysis the thermal and chemical events taking place within the battery could be decoded.

By optimising the positions of the optical sensors, the team was able not only to obtain internal and surface temperatures in real time, but also to calculate battery heat generation and transfers with unprecedented accuracy. Consequently, new BMS optimised with optical fibre sensors could bring the world one step closer towards peak performance in energy storage systems.

Towards more efficient batteries ... and beyond

One of the key components of the batteries explored in this study—the FBG sensors—were developed by researchers in PolyU's Photonics Research Centre of the Department of Electrical Engineering. They included Chair Professor of Photonics and Head Professor Tam Hwa-yaw, Postdoctoral Researcher Dr Julien Bonefacino, and Associate Professor Dr Steven Boles.

"The technical and scientific advances highlighted in this project have been made possible by the convergence of battery science and optical fibre sensor engineering," said Professor Tam. "The superb chemical stability and ease of expansion make FBGs ideal for new applications in the energy industry."

Indeed, the team has already started to look at other energy storage devices using FBGs, such as alkaline batteries, fuel cells and supercapacitors, as well as other important applications, including catalysis and water splitting for the production of hydrogen.

■ (From left) Dr Steven Boles, Professor Tam Hwa-yaw and Dr Julien Bonefacino



Helping solar panels "SWEAT" to increase energy efficiency

Scientists at PolyU have come up with a novel method to cool down overheating solar panels and increase their energy output

Dr Wang Peng

When solar panels overheat, it causes a huge loss in energy generation. After years of research, a team at PolyU has come up with a novel solution to this problem, namely using sorption-based atmospheric water harvesting (AWH) to cool the panels down. The invention's water-capturing and "sweating" functions lead to an energy output gain of almost 20%.

A team led by Dr Wang Peng, Associate Professor in PolyU's Department of Civil and Environmental Engineering, came up with the idea of using a hydrogel-based material, consisting of a polyacrylamide-carbon nanotube substrate and calcium chloride, as a cooling agent. The hydrogel is attached to the underside of the solar panels, effectively giving them an "organ" that can capture water vapour from the atmosphere during the evening and at night, and store it. In the daytime, when the sun warms up the panels, the water trapped in the hydrogel evaporates, lowering the temperature of the solar panels in the same way that perspiration cools down human bodies.

Solar panels, the colloquial name for photovoltaic panels (PV panels), have been installed around the world for generations to generate energy through

absorbing light from the sun and converting it into electricity, known as the photovoltaic effect. However, much of the solar energy absorbed is turned into heat during the process, raising the temperature of the panels and reducing their efficiency in power generation. In fact, less than 25% of the solar energy absorbed by commercial panels is converted into electricity.

High temperatures reduce efficiency

"In summer, the temperature of PV panels installed in arid and semi-arid regions can be 40°C higher than the surrounding air. The high temperature reduces the energy conversion efficiency of the solar power system, with a reported 0.4% to 0.5% loss in conversion efficiency for each degree of temperature rise," Dr Wang explained. The high temperature not only lowers the efficiency of the PV panels, but it shortens their lifetime too.

Scientists have been striving to find a solution to overcome the overheating problem of PV panels. Traditionally, coolants made from hydrofluorocarbons (HFCs) and chlorofluorocarbons (CFCs) have been used at solar generators for this purpose. However, as both HFCs and CFCs are very potent greenhouse gases, with a warming potential thousands of times greater than carbon dioxide,

they are no longer considered to be good choices for coolants.

Efficiency increased by 13% to 19%

When looking for an alternative to HFCs and CFCs, Dr Wang thought harvesting water from the air, which would subsequently evaporate, could be a possible solution. His team tested the effectiveness of the hydrogel-based cooling agent in laboratory and real-life conditions. "Under laboratory conditions of 1.0 kW per square meter of solar radiation, the prototype device provided an average cooling power of 295 W per square meter of solar panels, lowering the temperature of the panels by at least 10°C," Dr Wang said. He thinks that with this magnitude of cooling effect, the electricity generation of a PV panel could be raised by 13% to 19% - a significant improvement in industry terms. The related research paper, "Photovoltaic panel cooling by atmospheric water sorption-evaporation cycle", was published in *Nature Sustainability*, Volume 3, Issue 8, in August 2020.

Solar energy expected to become more important

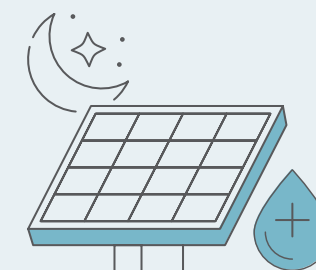
Dr Wang, who is currently Associate Editor of *Environmental Science & Technology*, a journal published by the American Chemical Society, is passionate about moving forward with the technology. More than 600 gigawatts (GW) of solar power capacity

exists worldwide, meeting 3% of the world's electricity demand. The figure is expected to rise to 3,000 GW by 2030, meaning solar power will generate more electricity than the combined total of all other kinds of renewable energy. With solar energy expected to be increasingly harnessed to provide electricity in the years to come, improving the design of solar power generators to enhance their efficiency is more important than ever.

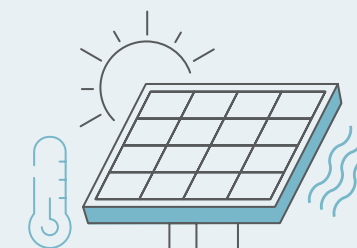
Although Dr Wang is optimistic that his novel design can help reduce energy loss from solar panels, he also admits that there are problems that need to be overcome. Although the performance of the hydrogel remains almost unchanged a week after its installation, more tests are needed to show that it can sustain its function after a longer period of exposure to hot weather. "If the current material can't last for at least two years, we'll have to work on another one," he said.

As Dr Wang and his team work together to tackle these challenges, he is confident that, given the potential to harvest moisture from the air, hydrogel-based cooling could provide an ideal solution to the problem of overheating solar panels. Hydrogel-based coolant is also an economically viable solution. "The production cost for the coolant is low and can be further reduced," he said.

With Hydrogel

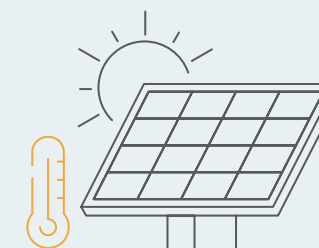


The hydrogel captures water vapour from the atmosphere during the evening and at night, and stores it.



In the daytime, the water trapped in the hydrogel evaporates, lowering the temperature of the solar panels, leading to a 13% to 19% increase in electricity generation.

Without Hydrogel



Without the cooling effect of the hydrogel, the temperature of the solar panels will remain high, lowering the efficiency of the PV panels and shortening their lifespan.



PolyU receives HK\$18 million from

HEALTH and MEDICAL Research Fund



■ (From left) Professor David Shum, Professor Alexander Wai, Deputy President and Provost, and Professor Yip Shea-ping give details of the University's eight research projects on COVID-19

In the latest round of the Health and Medical Research Fund (HMRF) of the HKSAR Government's Food and Health Bureau, researchers from PolyU's Faculty of Health and Social Sciences have secured funding for a total of eight projects to fight against COVID-19 in protection of the health of people and the community

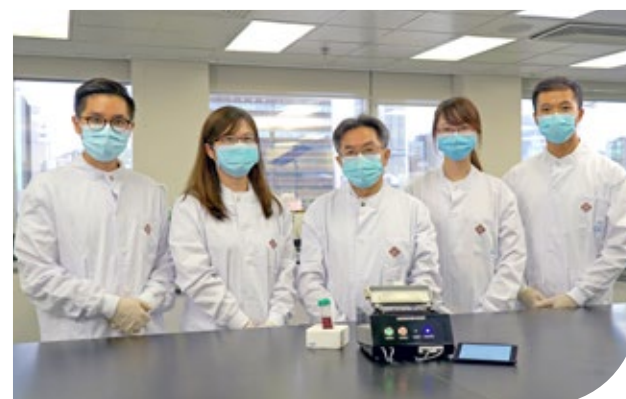
The HMRF has granted a total of HK\$59 million to 23 projects at local universities, with PolyU accounting for more than 30% in terms of both monetary value and the number of projects funded. The PolyU projects cover a wide range of disciplines in which the University excels, such as health technology, biomedical sciences, healthcare, rehabilitation and social sciences.

Effective detection and surveillance

Professor Yip Shea-ping, Head of Department of Health Technology and Informatics (HTI), and his researchers are developing a portable device for the rapid screening of suspected cases of COVID-19 in decentralised settings, such as airports, quarantine centres and private clinics. Their project, "A low-cost handheld device for decentralised detection of SARS-CoV-2 and host response in COVID-19 patients: development and evaluation", aims to help reduce the spread of COVID-19 and make the decision on whether people should be hospitalised or quarantined straightforward at times when the number of infected cases exceeds hospital capacity. (Funding: HK\$2,716,484)

Meanwhile, Dr Gilman Siu Kit-hang, Associate Professor, Department of HTI, is leading a team working on a project titled "Whole-genome sequencing of COVID-19 cases in Hong Kong: development of a geophylogenetic database and characterisation of SARS-CoV-2 variants circulating in the community", which will develop a geo-phylogenetic database to help visualise the local transmission of COVID-19. (Funding: HK\$2,998,100)

■ Professor Yip (middle) and his team with the device



Transmissibility and infectability of the virus

At the same time, Dr Polly Leung Hang-mei, Associate Head and Associate Professor of Department of HTI, is leading a project titled "Characterisation of the distribution of aerosols released from drainage ventilating pipe of public housing buildings". The team will establish a model to help predict the risk of aerosol exposure for top-floor residential units and determine the best combination of physical parameters, such as washroom ventilation and drainage ventilating pipe configuration, to reduce infection risks. (Funding: HK\$1,526,600)

Effective clinical management

In another area, Professor Cai Jing of Department of HTI heads his research team in a project titled "AI-empowered chest X-ray and CT quantitative analysis for COVID-19 patient management", which aims to create multiple novel Artificial Intelligence (AI)-empowered imaging and data analysis techniques tailored for COVID-19 applications. Combining these techniques, the research team will build an AI-empowered software tool for the quantitative analysis of COVID-19 pneumonia in chest X-ray and CT images. (Funding: HK\$2,769,000)

Enhanced infection control and prevention strategies

The study "Psychological trauma and unsafe behavior during the COVID-19 pandemic: a mixed method study of people's emotion, knowledge, attitude and behaviour", led by Professor David Shum Ho-keung, Dean of Faculty of Health and

Social Sciences, will examine Hong Kong residents' current level of psychological trauma, their level of knowledge and attitudes about COVID-19, their behaviour towards infection prevention, and their reasons for not taking appropriate preventative action. (Funding: HK\$1,408,810)

In addition, Dr Elsie Yan Chau-wai, Associate Professor, Department of Applied Social Sciences is leading a project titled "Public compliance with disease prevention and public health measures to control COVID-19", to facilitate compliance with Disease-Prevention Measures (DPM) in future pandemics, inform public-health strategies to control COVID-19 and any future infectious diseases, and collect baseline data for potential future longitudinal research to examine how current facilitators of and barriers to DPM compliance could affect future practices. (Funding: HK\$1,127,120)

Furthermore, Dr Angela Leung Yee-man, Associate Professor of School of Nursing and Deputy Director of WHO Collaborating Centre for Community Health Services, and her team are working on the project "Blended Gaming COVID-19 Training System (BGCTS) with World Health Organisation (WHO) guidelines for staff in residential care homes: A cluster randomized controlled trial", to assess the effect of the BGCTS on infection control practices, compliance rates and knowledge of the standard precautions among all staff in residential care homes. (Funding: HK\$1,212,432)

Rehabilitation management

Professor Fu Siu-ngor, Associate Head of Department of Rehabilitation Sciences, is in charge of a project looking at "3R rehabilitation management of COVID-19 survivors using centre-based and online-based approaches", which studies the changes in physical fitness, cognitive and psychosocial functions, and health-related quality of life of COVID-19 survivors during the first 18 months following their infection. It also evaluates the impact of centre-based and online-based cardiopulmonary rehabilitation on survivors with suboptimal pulmonary functions. (Funding: HK\$4,470,546)

Apart from these projects, PolyU academics, with other funding support from the Government and industry, have also been taking part in various research projects to fight the pandemic and protect lives.

PolyU solution

REDUCES ENERGY CONSUMPTION

in buildings by up to 40%

Buildings consume more than 90% of Hong Kong's electricity. In commercial and industrial buildings, more than 50% of the energy is used to provide central air conditioning. As a result, improving the efficiency of air conditioning systems can have a significant impact on the city's power consumption, not only saving money but also helping the environment.

A PolyU research team led by Ir Professor Wang Shengwei, Chair Professor at the Department of Building Services Engineering, has spent a number of years formulating optimisation strategies to enhance the energy performance of air conditioning systems. Their solutions have found ways to reduce energy usage by between 15% and 40% in a range of commercial and industrial buildings, including factories, hotels, commercial and office complexes, and underground facilities.

In many cases, the low efficiency of air conditioning systems is the result of poor or obsolete design, improper operation and controls, and a lack of maintenance. To help buildings save energy, Professor Wang and his team took a three-pronged approach to the problem, looking at life-cycle optimisation, adaptive commissioning, and fault diagnosis in air conditioning systems.

Life-cycle optimisation

The team took a holistic approach to optimising the efficiency of air conditioning systems. Under a process they referred to as "life-cycle optimisation", air conditioning systems were subjected to a thorough examination at every stage, from design to construction to operation, to maximise their performance.

At the design stage, the researchers ensured the most appropriate energy-efficient technologies were used for the air conditioning system. They then optimised the system by simulating electrical loads and working conditions, including integrating and connecting different building services, to come up with a design that had the highest chance of meeting the air conditioning demand with the minimum energy consumption.

Adaptive commissioning

Traditionally, a central air conditioning system is designed so that it is tuned to certain specific conditions or balance points. However, the characteristics of the actual system after construction may deviate significantly from the design. To minimise this discrepancy, the team employed the concept of adaptive commissioning, under which different operational options are included in the design to allow more flexibility at the construction stage.

Professor Wang explains: "Instead of building one big pump of full capacity in a cooling tower, for example, we could build three small pumps that add up to the same capacity. That gives the leeway of running one to three pumps according to the actual need. When the water-loop hydraulic resistance is low, we may operate only two small pumps to save energy."

Fault diagnosis

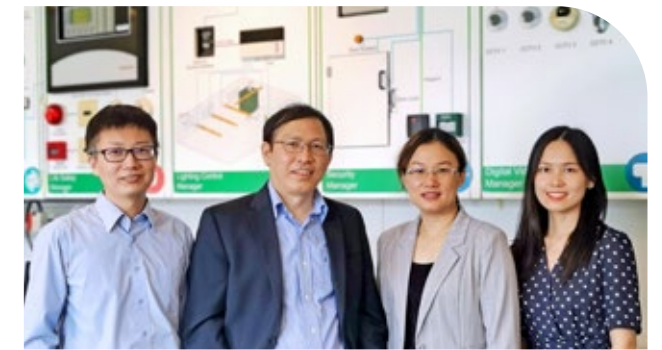
When the air conditioning systems were in use, the team looked at different operation modes to see how they affected energy consumption, with a view to meeting the same cooling demand with less energy. Fault diagnosis plays a key role in this process.

"Components may fail over time, leading to performance degradation. They may also need to be cleaned or tuned up from time to time. Thus, when an air conditioning system is not performing optimally, we need a mechanism to check where the fault is and to fix the problem as soon as possible," Professor Wang says.

The team used big data analytics to effectively locate faults in information-super-rich buildings, which are equipped with built-in Internet-of-Things sensors and building automation systems that collect a huge volume of data every day. Even in information-poor buildings, where very little data is available, the team was still able to analyse energy use to discover the pain points that lead to wastage.

Promoting energy-efficient buildings

Professor Wang and his team have been providing optimisation solutions for air conditioning systems for a number of buildings through offering



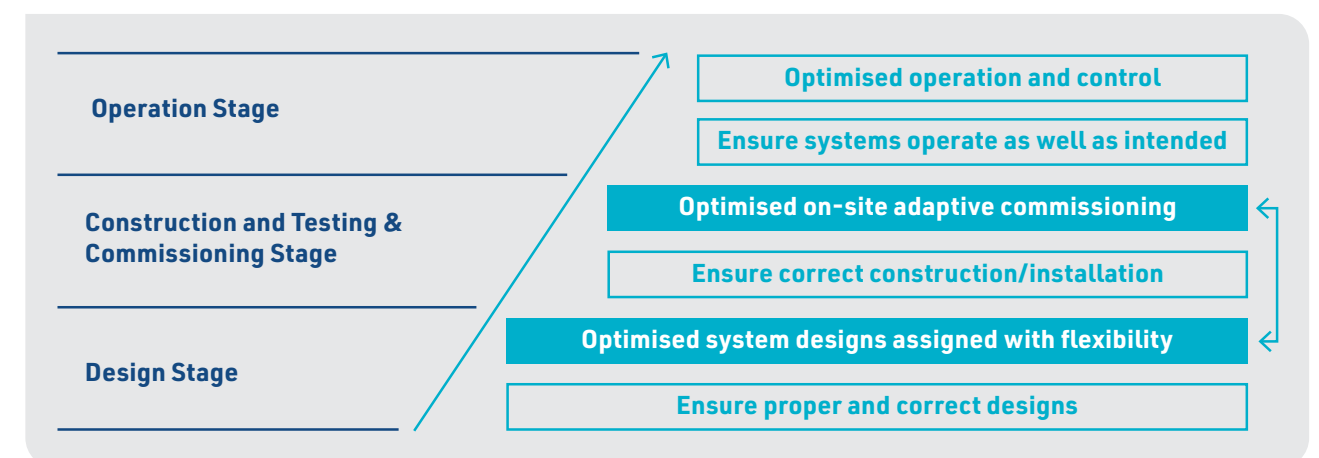
■ Professor Wang Shengwei (second from left) and his research team

consultancy services. They have also used the same strategy to optimise lighting, lifts, and other systems in 25 buildings, including 10 buildings on PolyU's campus, to improve overall energy efficiency.

In one high-rise commercial complex in Hong Kong, to which the PolyU team has been providing services for more than 10 years, the optimisation strategies reduced annual electricity consumption by more than 10 million kWh, leading to an annual saving of more than HK\$10 million on electricity bills.

"Our solutions not only save electricity cost, but also contribute to power grid stability by using energy stored in buildings and shutting down part of the cooling plant for short periods of time, without sacrificing user comfort," Professor Wang explains.

By improving the power efficiency of individual buildings in the private and public sectors, the PolyU team is helping to deliver significant energy-saving benefits to society.



■ The systematic approach to life-cycle smart optimisation and diagnostics solutions for buildings' air conditioning systems

SURFING THE WAVE of market trends

Mr Edwin Wong

- BBA (Hons) in Marketing, PolyU (2011-2014)
- Founder & CEO, Cloudbreakr



■ Edwin shares his entrepreneur experience with the local start-up community.

PolyU has long embraced the spirit of entrepreneurship and innovation. To this end, the PolyU Micro Fund (the Fund) was set up to support students and alumni in business and social enterprise start-ups. Many of these ventures provided students with the inspiration to continue their entrepreneurial pursuits after graduation. Cloudbreakr is one example of how a student's early entrepreneurial experience was used to grow a successful social media enterprise that covers local and overseas markets.

The idea for Cloudbreakr dates back to when one of its founders, Edwin Wong, was a student of the Department of Management and Marketing. Edwin remembers that while he was not particularly interested in academic lectures, he enjoyed attending sessions where entrepreneurs shared their experience, enabling him to learn about the practical aspects of running a business. Noticing Edwin's enthusiasm for business, his professors advised him to enter entrepreneurial competitions to hone and test his skills.

A final-year business venture

With this encouragement, Edwin spent much of his final year crafting proposals for his own start-up. "Putting theory into practice is the real test of how much you have gained from your studies. I applied the knowledge I learnt in classes to design marketing, operational and budgeting plans for my start-up,"

Edwin says. His business proposal went on to win seed funding of HK\$100,000 from the Fund.

With the seed fund, Edwin established his first business venture in 2014, when he was still a final-year student. It was a social enterprise that used a "buy one, give one" concept to promote conscious consumption. "It provided an online sales platform for companies. When consumers bought one item through the platform, a similar item was given to someone in need," the 29-year-old entrepreneur explains.

While running this worthy cause, Edwin observed that endorsements and repostings by internet celebrities increased visits to and purchases from the online platform. This experience not only taught him the importance of influencer marketing in the social media world, but also planted the idea for a bigger business venture.

In 2014 and 2015, after his graduation, Edwin realised there was no software in the market that helped people identify the right spokesperson and media for different brands. Nor was there a way to measure the impact of key opinion leaders and online public opinions on a brand's value. After one year of incubation, Edwin started Cloudbreakr in 2016 in an attempt to bridge these gaps.

Combining data analysis and influencer marketing
Supported by the HKSTP-PolyU Tech Incubation

Fund, Cloudbreakr is a social media analysis platform which combines data analysis and influencer marketing to provide clients with marketing tools and service solutions. By analysing big data, the platform helps companies understand market trends, create unique content and improve the effectiveness of influencer marketing. "Cloudbreakr is a metaphor borrowed from windsurfing. Like windsurfers riding on a wave, we stay on top of market trends," the social media expert explains.

The company did well from the beginning. Edwin remembers that upon its launch, a company whose product design conveys a strong sense of social mission consulted him for advice. "Through identifying the right bloggers, celebrities and media, we orchestrated a series of publicity manoeuvres that boosted the brand's image and charity sales," he recalls.

That said, Cloudbreakr also encountered challenges during its initial stage of operation. While Cloudbreakr focused on Instagram analysis, their competitors were running Facebook marketing or other related businesses. "Back then, many brands still did not pay much attention to Instagram and we had to wait for the right moment. It takes time to educate the market," Edwin says.

Venturing out of Hong Kong

Although there were moments of hardship, Edwin received support when he needed it most. Edwin says the departure of a partner upset him and made him worried that investors would be deterred. But in reality, investors remained highly supportive of Edwin. One investor even sent him a cheque to express his faith in Cloudbreakr. He told Edwin: "Go ahead with confidence."

Edwin greatly treasures the appreciation he receives from investors. He recalls a similar experience he had when launching his first business venture at PolyU. "Many teachers at my department and staff at the Institute for Entrepreneurship helped me. Sometimes, it was as simple as making a phone call for me," he says.

Since its launch in Hong Kong, Cloudbreakr has expanded its operations to Taiwan, Thailand and Malaysia. It has also moved from focusing on Instagram to including analysis of Facebook and YouTube. Along with the success of Cloudbreakr, Edwin has also developed a more mature business sense. To aspiring PolyU students, he says: "Grasp opportunities to participate in innovation projects. Widen your horizons and step out of the campus to get to know people in the industry."

What is PolyU Micro Fund?

Launched in 2011, PolyU Micro Fund Scheme is the University's first seed fund programme to encourage entrepreneurialism in the PolyU community and to promote knowledge transfer and commercialisation of innovation and technology developed at PolyU.

It is open to applications from both current students and alumni, with each successful start-up awarded a maximum of HK\$120,000 of funding, as well as receiving entrepreneurship training and business consultations. Since its launch, the scheme has granted more than HK\$15 million to support over 160 start-ups. PolyU is the first university in Hong Kong to launch a seed funding programme to support start-ups.

■ Edwin (second right) and his team won the Diamond Award in the Global Student Challenge: PolyU Pre-Challenge 2013/14. The Challenge is an international competition open to students from business schools and universities across the world.





Flag-raising ceremony to celebrate National Day

The Hong Kong Polytechnic University held a flag-raising ceremony on campus to commemorate the 71st anniversary of the founding of the People’s Republic of China on 1 October 2020. Several hundred PolyU members, including Council and Court members, senior management, deans and department heads, staff and students, attended the ceremony.

The event was followed by a simple reception officiated by PolyU Council Chairman Dr Lam Tai-fai and President Jin-Guang Teng. Speaking at the event, Dr Lam encouraged members of the PolyU community to appreciate what the country had accomplished and the tremendous opportunities its development brought to Hong Kong. He said, “PolyU, as a member of the higher education sector, is committed to providing strong support for the country’s development through its teaching and research.” President Teng added that PolyU not only contributed to, but also benefited from the development of the country. He said, “We at PolyU are dedicated to nurturing successful future professionals and leaders with a deep affection for their family and nation, an international perspective and a strong sense of social responsibility.”



PolyU’s joint research proposals awarded Theme-based Research Scheme funding

Leading researchers at PolyU have joined forces with peers at other local universities to conduct research funded by the University Grants Committee (UGC) on themes of strategic importance to Hong Kong’s long-term development. In the Theme-

based Research Scheme 2020/21 run by UGC’s Research Grants Council (RGC), PolyU will contribute its expertise in the following three joint research projects:

Project Title	Theme	PolyU Researcher as Co-Principal Investigator	Approved Budget (HK\$ million)
Towards Personalised and Innovative Treatment for Acute Myeloid Leukaemia	Promoting good health	Dr Alvin Ma Assistant Professor, Department of Health Technology and Informatics	46.667
Assess Antibiotic Resistome Flows from Pollution Hotspots to Environments and Explore the Control Strategies	Developing a sustainable environment	Professor Li Xiangdong Chair Professor in Environmental Science and Technology; Associate Dean (Research), Faculty of Construction and Environment	34.213
A High-performance Distributed Machine Learning Framework for Graph-based Streaming Data with Smart City Applications	Advancing emerging research and innovations important to Hong Kong	Professor Cao Jiannong Chair Professor of Distributed and Mobile Computing, Department of Computing	33.332

A total of seven research proposals were approved this year, with a total budget of HK\$263 million, of which HK\$230 million will be funded by the RGC and the remaining HK\$33 million will be provided by the universities concerned. The projects, which were selected following a series of rigorous peer reviews, aim to tackle key challenges identified by the Hong Kong SAR Government, and are expected to have a

significant positive societal and economic impact on Hong Kong.

PolyU is committed to transforming research excellence into impactful innovations through multidisciplinary and inter-institutional collaborations.



PolyU wins Public Policy Research Funding for studies on social incidents

Five PolyU-led projects have been awarded a total of HK\$2.08 million by the Public Policy Research Funding Scheme in a special round of funding launched by the Government's Policy Innovation and Co-ordination Office. The special round of funding

was set up to support research into the underlying causes of the social incidents that took place in the second half of 2019, and the political, economic, cultural and societal issues that have contributed to deep-seated problems in society.

The following projects are being led by PolyU:

Project Title	Topic	Principal Investigator	Funding (HK\$)
A Stepped-Care, Multi-disciplinary, Evidence-based Approach to Strengthen Adolescence and Family Well-being after Social Unrest	Communication, support and conflicts among family members and friends	Dr Herman Lo Associate Professor, Department of Applied Social Sciences	560,165
Effects of Social and Political Unrests on Mental Health of Older People in Hong Kong	Mental health of the general public, psychosocial support and rehabilitation	Professor Daniel Lai Former Head, Department of Applied Social Sciences	492,200
Hong Kong Junior Secondary School Students' Attitudes Towards and Engagement in Political Activities Involving Violence and Destruction: The Associated Individual, Family, and School Factors from a Positive Youth Development Perspective	The orientation of young people and school education	Dr Yu Lu Associate Professor, Department of Applied Social Sciences	455,580
The Influences of Social Mobility Beliefs on Social-Political Attitudes among Hong Kong College Students	Underlying causes of the recent social incidents (including the socio-demographic characteristics of the participants) Development opportunities and upward mobility of young people	Dr Lin Li Research Assistant Professor, Department of Applied Social Sciences	276,115
Hashtag Activism in Hong Kong Protests	The impacts and importance of social media on social and political development	Dr Aditi Bhatia Associate Professor, Department of English	285,171

All the research projects started in April 2020. The projects will provide professional training to social workers, study the mental wellbeing of elderly people affected by the social incidents in Hong Kong,

investigate the social factors affecting the political behaviour of young people and find out how social and political views were formed through social media during the unrest.

PolyU excels in shipping and maritime research

Researchers from PolyU's Department of Logistics and Maritime Studies have gained recognition for their outstanding achievements in shipping and maritime research.

According to Thomson Reuters' ISI Web of Science, PolyU tops the list of the world's leading shipping schools for publishing shipping-related articles between 2017 and 2019. The report shows that a total of 561 shipping-related articles were published in the transportation category during that period, among which 56 papers were produced by PolyU.

The University has also been ranked first for both the number of research papers published in the maritime transportation field and their weighted score in a study of Chinese universities.



The study, published in 2019 by open access publisher Hindawi, analysed articles published in 65 "Social Sciences Citation Index" and "Sciences Citation Index" maritime and transportation journals between 2000 and 2015. The articles were submitted by 50 authors from or affiliated with institutions in Mainland China, Hong Kong, Taiwan and

Singapore. Among these 50 authors, Professor Edwin Cheng, Dean of the Faculty of Business, was ranked second in terms of the number of papers published.

In addition to conducting impactful shipping and maritime research, PolyU is also the sole provider of comprehensive maritime education at the tertiary level in Hong Kong.

Renowned hotelier honoured for lifetime achievement

PolyU's School of Hotel and Tourism Management (SHTM) has bestowed the SHTM Lifetime Achievement Award 2020 upon Mr Robert H. Burns, founder of Regent International Hotels, in recognition of his significant contribution to the development of hospitality and tourism. Mr Burns, a longstanding partner of the SHTM, was inducted into the School's famous Gallery of Honour at the same time.

With a career spanning six decades, Mr Burns is a legendary figure in the hotel industry, and is known worldwide for setting new benchmarks in luxury hospitality.

In 1970, he founded Regent International Hotels in Hong Kong, building one of the industry's most renowned five-star brands. The flagship Regent Hong Kong has been voted the "best hotel in the world" among other international awards. Under Mr Burns' leadership, the group opened 18 luxury hotels worldwide in 22 years.

Mr Burns has also taught on Stanford University's MBA programme for 20 years and lectured extensively throughout Asia-Pacific for the US State Department and Pacific Asia Travel Association.

The SHTM Lifetime Achievement Award was established in 2016 to



■ Mr Robert H. Burns

recognise leaders who help define the global hospitality landscape and advance the industry.

Major external appointments and awards of PolyU members

From June to August 2020, the following PolyU members were either appointed significant duties to share their scholarly expertise to benefit the wider community or had their academic efforts duly recognised.



Dr Daniel Chan Wai-ming

Associate Professor, Department of Building and Real Estate

Award

- Winner Award (Category: Research), apfpm Project Management Achievement Awards 2019 by the Asia Pacific Federation of Project Management (apfpm)



Professor Cheng Li

Chair Professor of Mechanical Engineering

Appointment

- Vice-President, International Institute of Noise Control Engineering



Dr Ivan Ho Wang-hei

Assistant Professor, Department of Electronic and Information Engineering

Award

- The Organizer's Choice Award and Toronto International Society of Innovation & Advanced Skills (TISIAS) Special Award, 2020 International Invention Innovation Competition in Canada



Professor Cathy Hsu

Chair Professor, School of Hotel & Tourism Management

Appointment

- Editor-in-Chief, *Tourism Management*



Dr Rick Kwan

Assistant Professor, School of Nursing

Award

- Emerging Nurse Researcher/Scholar Award by the Sigma Theta Tau International Honor Society of Nursing



Dr Lam On

Associate Director & Teaching Fellow, Chinese Language Centre

Appointment

- Chief Examiner, Chinese Language Paper 2, Hong Kong Diploma of Secondary Education Examination, Hong Kong Examinations and Assessment Authority



Professor Alice Yuen Loke

Associate Head & Professor (Postgraduate Education), School of Nursing

Award

- 2020 International Nurse Researcher Hall of Fame by the Sigma Theta Tau International Honor Society of Nursing



Dr Qiao Zhonghua

Associate Professor, Department of Applied Mathematics

Award

- RGC Research Fellow



Dr Shih Yi-teng

Assistant Professor, School of Design

Award

- Winner and Honorable Mention, European Product Design Award



Professor Sun Defeng

Chair Professor & Head, Department of Applied Mathematics

Appointment

- 2020 Fellow of the Society of Industrial and Applied Mathematics



Professor Wang Yuhong

Professor, Department of Civil and Environmental Engineering

Award

- The Organizer's Choice Award and Toronto International Society of Innovation & Advanced Skills (TISIAS) Special Award, 2020 International Invention Innovation Competition in Canada



Professor Wong Wai-yeung

Associate Dean, Faculty of Applied Science and Textiles
Clarea Au Professor in Energy
Chair Professor of Chemical Technology

Award

- RGC Senior Research Fellow



Professor Wu Bo

Associate Head (Research) & Professor, Department of Land Surveying and Geo-informatics

Award

- Leader of the Year Award 2019 by Sing Tao News Corporation Limited



Professor Yung Kai-leung

Chair Professor of Precision Engineering
Associate Head, Department of Industrial and Systems Engineering

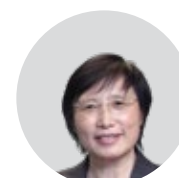
Award

- Leader of the Year Award 2019 by Sing Tao News Corporation Limited

Senior staff appointments and promotions (between 1 July and 30 September 2020)

Congratulations to the following PolyU members who have recently taken up a new capacity at the University. (listed in alphabetical order)

Appointments



Professor Chen Xiaojun

as Director, University Research Facility in Big Data Analytics on 1 July 2020



Professor Louise Cummings

as Associate Dean, Faculty of Humanities on 1 July 2020



Mr Peter Hasdell

as Associate Dean (Academic Programmes), School of Design on 1 September 2020



Dr Mark Meulenbeld

as Associate Dean, Faculty of Humanities on 1 July 2020



Mr Edward Shen

as Registrar on 3 July 2020



Professor Wong Kwok-yin

as Vice President (Education) on 1 September 2020



Ir Professor Zhang Ming

as Head, Department of Biomedical Engineering on 1 July 2020

Language: the heart of what it is TO BE HUMAN

An internationally renowned figure in linguistics, Professor William Wang has made accomplishments that are impressive by any standard. His theory of lexical diffusion changed the way people think about how languages evolve in time. He founded the *Journal of Chinese Linguistics* in 1973, the first international journal in this field and still one of the most impactful publications in this area, and served as its editor through to 2018. Google Scholar lists him as the most cited scholar in the area of Chinese linguistics.

The acclaimed scholar, who joined PolyU in 2015 as Chair Professor of Language and Cognitive Sciences, has won many accolades. To name a few, he is Professor Emeritus of the University of California at Berkeley and an Academician of Academia Sinica, the highest academic honour one can attain in Taiwan. He is Honorary Professor at several universities, including Peking University. He received a Lifetime Achievement Award in Anthropology from Shanghai Society of Anthropology in 2017 and an Honorary Doctor of Humane Letters from the University of Chicago in 2018.

Theory of lexical diffusion

During his 60-year-long academic career, Professor Wang's passion for linguistics has never diminished. His research covers a wide range of topics, including phonetics and phonology, automatic speech recognition, and the biological and evolutionary bases of language and cognition. His theory of lexical diffusion marked a seismic change in linguistics and has played a prominent role in the linguistic understanding of sound changes. "Today, the theory of lexical diffusion is being applied for studying historical and social aspects of many languages of the world," the professor says.

As an academic, he has had a significant impact on research, advancing theories and setting up institutions. Lexical diffusion aside, he challenged the view that language complexity means progress. "Complexity and progress are elusive words that are hard to define," the professor argues. He has established linguistics departments and language laboratories in the US and Hong Kong and conducted extensive field work on languages spoken by ethnic minorities in Southwestern China. In the past decade, he has turned his attention to the relationship between language and cognitive decline brought about by ageing.

Professor William Shiyuan Wang

- PhD in Linguistics, University of Michigan, 1960
- Chairman, Department of Linguistics & Department of East Asian Languages, Ohio State University, 1963-1965
- Professor of Linguistics, University of California in Berkeley, 1966 – 1994
- Chair Professor of Language Engineering, City University of Hong Kong, 1995 – 2004
- Research Professor, Department of Electronic Engineering, Chinese University of Hong Kong, 2004 – 2015
- Joined PolyU in 2015 as Chair Professor of Language and Cognitive Sciences, Department of Chinese and Bilingual Studies

■ Professor Wang with one of his books on phonetics



■ Professor Wang and his big family of children and grandchildren at his 80th birthday celebration in Hawaii

Language biomarkers for predicting neurodegeneration

Professor Wang has a personal reason behind this recent shift in his research interest. The late Nobel laureate in physics Professor Charles Kao was his friend. He explains: "Charles succumbed to Alzheimer's disease (AD) in his later years. AD typically onsets decades earlier than it can be detected clinically. When he received medical treatment, it was already too late." The linguist is hopeful that his latest ageing-related study will unearth language biomarkers to predict the risks of neurodegeneration.

The Shanghai-born linguist believes truly original scholarship is multi-disciplinary in nature. Throughout his long and productive career, he engaged in numerous cross-disciplinary projects that utilised knowledge in linguistics, computational science and bio-science. At PolyU, he helped to set up the Research Centre for Language, Cognition and Neuroscience in 2019, which uses psychological and brain-imaging techniques to examine language-related issues in the brain. The ageing-related study the professor is currently undertaking at the centre aims to identify brain changes from a huge quantity of longitudinal data amassed over time. "The world is ageing rapidly and I hope this project can contribute to basic sciences as well as help answer society's urgent challenges," he says.

It is this urge to have a real impact on humanity that drives the linguist to focus on both academia and

the real world. The same urge attracted him to join PolyU. "I appreciate the University's dual emphasis on the exploration of knowledge, as well as the application of knowledge for practical use," he says.

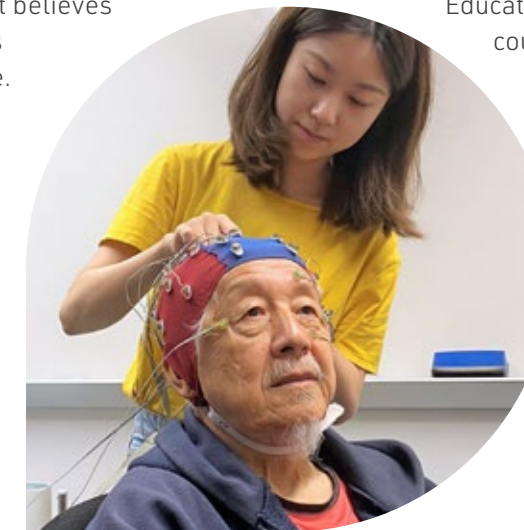
Non-WEIRD based knowledge

After living in different parts of the world, Professor Wang decided to settle in Hong Kong in 1997, working for two other local universities before joining PolyU. He was attracted to Hong Kong in part because the city has inherited 2,000 years of Chinese linguistic tradition, and in part because he wanted to contribute to the building of systems of knowledge that are not dominated by WEIRD (an acronym for Western

Educated Industrialised Rich Democratic countries). "If one is truly thinking globally, there is an urgent need to reach out to other parts of the world, such as Asia and Africa, where most of the world's population reside," he says.

In his 80s, the scholar is still as energetic as ever before. He stresses that physical fitness is the foundation of mental health. His hobbies included sailing boats and piloting small airplanes; currently in Hong Kong he regularly plays golf and tennis. In his college days, he once wrote a short play about the Chinese legend of the cowherd and the weaver girl (牛郎織女); he loves Chinese and Western music, and has even written several songs.

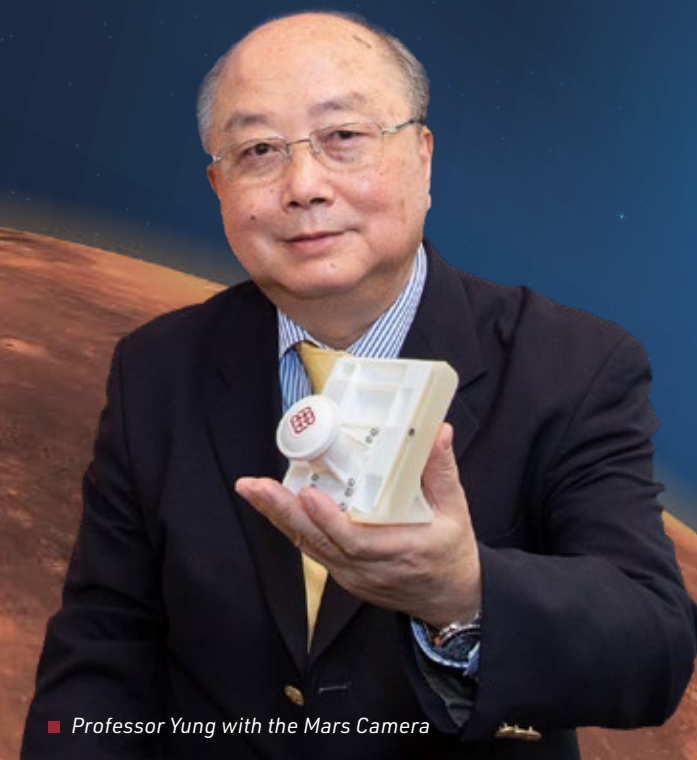
Swimming in the ocean of knowledge for more than 60 years, Professor Wang believes language is at the very heart of what it means to be human. "We can manipulate biological evolution and control cultural evolution. All this becomes possible because we invented a very powerful mental instrument, language, for creating, handling and accumulating vast amounts of information across space and time," he says.



■ Professor Wang serving as a subject for a study on ageing and cognitive decline at PolyU

From homemade gadget to high-precision instrument

PROFESSOR YUNG'S JOURNEY TO SPACE EXPLORATION



■ Professor Yung with the Mars Camera

Professor Yung Kai-leung

- Diploma in Mechanical Engineering, Hong Kong Technical College (PolyU's predecessor), 1970
- BSc in Electronic Engineering, Brighton University, 1975
- MSc, DIC in Automatic Control Systems at Imperial College of Science, Technology & Medicine, University of London, 1976
- PhD in Microprocessor Applications in Process Control, Plymouth University, 1985
- Fellow Member of the Hong Kong Institution of Engineers
- Fellow of the Hong Kong Academy of Engineering Sciences
- Joined PolyU in 1986

When the Chang'e-4 lunar probe successfully landed on the far side of the Moon on 3 January 2019, Professor Yung Kai-leung, Associate Head of PolyU's Department of Industrial and Systems Engineering and Sir Sze-yuen Chung Professor in Precision Engineering, breathed a huge sigh of relief and was able to smile again.

Professor Yung was the brains behind the Camera Pointing System (CPS) mounted on the upper part of the probe's lander, which enabled the probe to capture and send back stunning panoramic images of its landing and rover deployment on the Moon. When the precision engineer looked at those images, sent from 400,000km away from the Earth, all he felt was joy and excitement.

First Hong Kong scientist working for China's space missions

Manufacturing a space tool such as the CPS is the ultimate challenge for precision engineers. This challenge first came to Professor Yung a decade ago when the China Academy of Space Technology (CAST) invited him to design and develop an instrument that could control the rotation of a camera for a space probe's landing on the moon.

The first-generation CPS that Professor Yung's research team designed made its debut at the launch of Chang'e-3 in 2013. It functioned well during the lunar mission, capturing images of the Moon and facilitating the movement of the lunar

rover. With his work designing the CPS, Professor Yung was marked by the honour of being Hong Kong's first scientist to participate in research work for instruments used in China's space missions. The success of the CPS in the 2013 mission led to the CPS being used on the nation's next lunar exploration—the Chang'e-4 mission to the uncharted side of the Moon.

After participating in these two lunar exploration projects, Professor Yung went on to contribute to the design of the "Mars Landing Surveillance Camera" ("Mars Camera") for China's first-ever Mars mission, Tianwen-1. The spacecraft for this mission launched in July this year is scheduled to arrive in Mars' orbit in February 2021 and land on the surface of Mars in around May 2021. Professor Yung is currently also working on the Lunar Surface Sampling and Packaging System for Chang'e 5 to collect samples

■ The young scientist (middle of second row in white shirt) with his secondary school classmates



from the Moon. This mission is slated for takeoff towards end of 2020.

An interest that emerged during adolescence

While the CPS and Mars Camera are standout innovations that Professor Yung is proud of, he is equally fond of the invention he made when he was still a schoolboy. One of his favorite pastimes during secondary school was photography but it was a hobby that was too expensive for a student. "I could not even afford to buy the ready-made chemicals for developing film and prints, let alone a projector for printing photos," he recalls.

Undaunted by the difficulty, the young scientist went to a public library to learn the formulas for producing the chemicals needed for developing films and prints. "With little money, I then purchased the necessary chemical components from street stores, and mixed them in the right proportion according to the book," he recalls. "I found old, abandoned camera lenses, and put a light bulb beneath a piece of glass inside a self-designed homemade wooden box to create a makeshift apparatus for exposing the prints," Professor Yung explains. His enthusiasm led him to found the school's photography club and he was its chairman for the first two years. The club used his homemade chemical developing solution and projector system for some time before a proper darkroom was established at the school.

After secondary school, Professor Yung studied at the Hong Kong Technical College, the predecessor



My dream is to use my knowledge to help the nation's scientific and technological advancement, as well as to invent things that benefits people.



of PolyU, and obtained a Diploma in Mechanical Engineering in 1970. He then worked for two years to save enough money for his study in electronics in the UK. While the precision engineer's interest in engineering and technology emerged during his adolescence, it grew into an abiding passion when he pursued his undergraduate and postgraduate studies abroad in the 1970s. After graduation, Professor Yung worked for several UK companies, including the internationally-recognised Cranfield Unit for Precision Engineering.

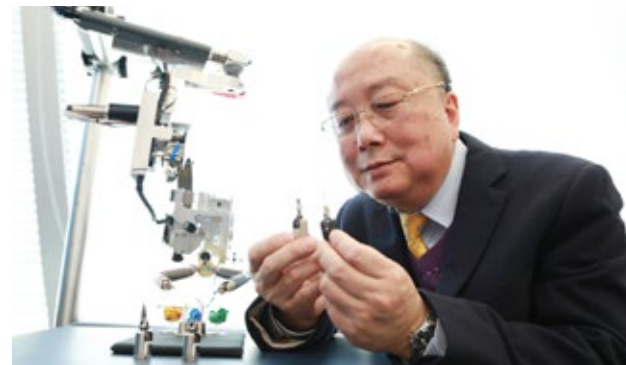
His 14 years of overseas experience sharpened Professor Yung's knowledge of the design and development of high-precision equipment. When he joined PolyU in 1986, he was already a seasoned researcher, ready to take up challenges he had never dreamt of.

From space tools to medical equipment

At PolyU, he stepped into the area of space engineering, adapting dental forceps to become the "Space Holinser Forceps" used by astronauts for precision soldering. He also participated in space research projects for the European Space Agency's 2003 Mars Express Mission and the Sino-Russian Space Mission in 2011.

Professor Yung has used his knowledge in precision engineering for space explorations to make precision instruments for medical use too. Along with a team of researchers from the Department of Surgery of The University of Hong Kong and funding support from industry, he helped to develop a novel surgical robotic system with internally motorised surgical arms that enable surgeons to conduct minimally invasive surgeries.

Professor Yung's long-standing commitment to research and his outstanding achievements have won him numerous accolades. These include President's Awards for Outstanding Performance/Achievement from the University in 1999 and 2014. He was also awarded the Bronze Bauhinia Star by the Government in 2015 in recognition of his contributions to scientific research, particularly in machine design, automatic control systems and space technology.



■ Professor Yung with the surgical robotic system

Dreams of a space scientist

While Professor Yung very much enjoys working on his dream research projects at PolyU, he likes teaching young people too. For students who aspire to do research work, the veteran space scientist says: "Besides having a strong skill for basic research, communication ability is also important. Scientists not only need to have an innovative mind, but they also need to communicate their ideas with others clearly, as new inventions are the result of close teamwork."

Professor Yung says his dream is to use his knowledge to help the nation's scientific and technological advancement, as well as to invent things that benefits people. With his dedication, this is certainly a dream that is coming true.

PolyU academic scoops Shortridge Hardesty Award



Ir Professor Ben Young, PolyU's Vice President (Student and International Affairs) and a professor of structural engineering at the Department of Civil and Environmental Engineering, was bestowed the 2020 Shortridge Hardesty Award in April this year. This is one of the most prestigious awards given by the American Society of Civil Engineers (ASCE). He won the award for "his research contributions to the stability design of cold-formed steel and stainless steel members, including the development of design specifications in North America".

Ir Professor Young is only the second recipient of the award from Asia since its inception in 1987. Recipients of the award are world-leading researchers who have contributed substantially in applying fundamental results of research to solutions of practical engineering problems in the field of structural stability. The ASCE is a professional body founded in 1852 with over 150,000 members from 177 countries.

Two PolyU scholars named RGC Senior Research Fellow and Research Fellow

Two PolyU scholars have been selected as awardees in the inaugural Senior Research Fellow Scheme (SRFS) and Research Fellow Scheme (RFS) (2020/21 exercise) launched by the Research Grants Council (RGC). The two academics, who received the award in recognition of their exceptional research capabilities and the potential impact of their proposed research projects, will receive research funding grants totaling HK\$13 million. By hiring relief teachers at the rank of assistant professor, they will be released from their teaching duties, starting from 1 January 2021, to focus on their research projects for a period of 60 months.

Professor Raymond Wong Wai-yeung, Associate Dean (Research) of the Faculty of Applied Science and Textiles, and Chair Professor of Chemical Technology at the Department of Applied Biology and Chemical Technology, has been named an "RGC Senior Research Fellow". Professor Wong is an internationally renowned scholar for his research on metallocopolymers and metallo-organic molecules with energy functions and photofunctional properties. He was also included for six consecutive years (2014–2019) on the list of Highly Cited Researchers published by Thomson Reuters/Clarivate Analytics.



Supported by the SRFS, Professor Wong will be working on a project titled "Metallated Graphyne-Based Materials: Synthesis, Characterization, Properties, Functionalization and Application Studies". The project will study a family of metallated graphynes (MGYs) and their derivatives using a bottom-up approach, contributing to a relatively under-explored area of bottom-up metallated congeners of graphynes and graphdiynes. The project will lead to a better understanding of MGYs, paving the way for them to be a next-generation 2D nanomaterial, and helping to develop low-cost,

environmental-friendly materials for the manufacture of new catalysts, optoelectronic and energy products.

Dr Qiao Zhonghua, Associate Professor at the Department of Applied Mathematics, has been named an "RGC Research Fellow". A distinguished scholar in the field of numerical analysis and scientific computing, Dr Qiao also won the RGC's Early Career Award 2013/14.



The title of Dr Qiao's project is "L-infinity Stability of Exponential Time Differencing (ETD) Numerical Schemes for Phase Field Models with High-order Dissipations". Phase field models have become increasingly important and popular in many physical and chemical applications on phase transition of multi-component mixtures. A large number of works are devoted to numerical simulations of phase field equations. Most of the existing works on numerical analysis for models with high-order dissipation usually need an assumption on the L-infinity boundedness of numerical solutions. This project aims to provide a theoretical justification of L-infinity boundedness of numerical solutions of the ETD schemes for phase field models with high-order dissipation.

The SRFS and RFS, which are awarded annually, aim to provide support to outstanding academics in UGC-funded universities to facilitate their research efforts and promote research excellence. The SRFS is awarded to 10 academics at full professor rank or above, while the RFS is awarded to 10 academics at associate professor rank. The supporting university will receive a fellowship grant of around HK\$7.8 million per SRFS award and HK\$5.2 million per RFS award. The schemes aim to build up a pool of local research talent to enhance Hong Kong's competitiveness and foster the development of its higher education sector.

A ROAD DOCTOR

Thriving on innovation with hard and soft skills as well as inner strengths



■ Mr Sze graduated in 1989 at the then Hong Kong Polytechnic.

Banting Sze, Chairman, CEO and founder of Fretech Road Recycling Technology (Holdings) Limited, is a man for all seasons. Now a successful entrepreneur, the mechanical engineering graduate from the then Hong Kong Polytechnic (predecessor of PolyU) is thankful for his alma mater for not only paving a path for his business venture, but also providing the ingredients for him to develop his own philosophy on innovation.

Fretech is the only Hong Kong-based green road maintenance company listed on the Main Board of Hong Kong Stock Exchange. Also known as the "Road Doctor", the company performed the critical task of maintaining Beijing's Chang'an Avenue before national day parade on the nation's 60th anniversary in 2009, establishing the company a leading position in the industry.

From humanities knowledge to innovative thinking

PolyU has helped to make Mr Sze the well-rounded person he is today. "At PolyU's wonderful library, I used to read books about history and philosophy for inspiration. Our lecturers instilled in me the love of cultural roots too. Professor H. C. Man, now Dean of the Faculty of Engineering, shared stories about old Hong Kong. The late Ir Professor Leung Tin-pui, then Hong Kong Polytechnic's head of mechanical engineering and a master of the Chinese language, enlightened me about the importance of mastering Chinese." The exposure to humanities in his adolescence eventually helped Mr Sze develop his own theory on how to keep his business innovative.

The entrepreneur later went to study a master's degree in information technology in the UK and completed with distinction. Back to Hong Kong, he obtained a Master of Arts in Quantitative Analysis for Business from another local university. But among all these, PolyU has the most profound influence on him. "I acquired the skill of self-learning at PolyU which brings lifelong impact to me. It was an extremely fruitful and memorable time," he said.

Mr Banting Sze Wai-pan

- Higher Diploma in Mechanical Engineering, Hong Kong Polytechnic, 1989
- Master of Science in Information Technology, University of Warwick, 1991
- Master of Arts in Quantitative Analysis for Business, City Polytechnic of Hong Kong, 1994
- Chairman and CEO, Fretech Road Recycling Technology (Holdings) Limited
- Adjunct Professor, University of Chinese Academy of Sciences and PolyU
- Member, Departmental Advisory Committee, Department of Mechanical Engineering (ME), PolyU
- First Outstanding ME Alumni Award, PolyU
- Member, Nanjing Municipal Committee, Chinese People's Political Consultative Conference
- Expert member, Public-Private Partnerships, United Nations Economic Commission for Europe

"Healing" highways

After working as a young engineer for two years, he followed his entrepreneurial dream to set up a trading company introducing imported machines for infrastructural projects in Hong Kong. Aspiring to establish his own brand and expand his business, he went to Nanjing in the mid-1990s. Since then, he has developed a business empire centred on road maintenance, which now encompasses R&D, equipment manufacturing, contracting, material design, education and training.

Dedicated to recycling and low-carbon economy, he believes his company's world-leading innovative green technology creates win-win-win scenarios for all parties involved. The hot-in-place recycling train and engineering technology the company developed, for instance, involves using a unique radiating heating technology to heat up and soften pavements, and adding in new asphalt mix for paving and compacting. With this recycling technology, revamped roads have high qualities that comply with standard requirements of new-built roads. Most importantly, this is achieved by a 100% recyclable process with low-carbon emission.

The helmsman of the technology-driven company, Mr Sze remarked, "Innovation is a painful process. It is more demanding than creativity because innovation requires concrete output." The arduous process to innovate does bear fruit. Fretech now owns over 200 national and international patents that cover multiple disciplines such as material science, control and mechanical engineering.

The entrepreneur explains his philosophy of business innovation that involves three dimensions:

in-depth analysis on market needs, strong logical reasoning, and a risk-conscious mindset. Market knowledge is a soft skill and an art, logical thinking is a hard skill and a science; both can be acquired. Mindset, however, is about the inner strengths that cannot be learned from any curriculum.

Mr Sze is grateful that his education and personality have blessed him with the three qualities that enable innovation. "Engineering education trained up my logical thinking. My interest in history and culture that has developed since studying at PolyU enriched my perspectives. Also, I have constant reflections as I walk through life's journey," he said.

Inner strengths of leaders

Today, Mr Sze has businesses all over China, but success did not come easily. Back in the 1990s, he was frustrated by people's mistrust of him as a young man. Weeping alone one night, he shared his feelings in a hand-written letter to his staff. This has become a practice as he continued to write to his staff in the decades that followed.

The altruistic leader is keen on passing on knowledge. He is an adjunct professor at the Chinese Academy of Science and at PolyU. He also gives back to his alma mater by setting up Fretech Technology Bursary for PolyU students, and by sharing his rich business experience with students and alumni.

As the head of an enterprise of 1,000 staff members, Mr Sze believes leaders need to have inner strengths: courage, endurance, perseverance and tolerance. When asked for words of encouragement for young people, he said, "Be open-minded and look beyond Hong Kong."

■ Mr Sze and his staff in Nanjing with the hot-in-place recycling train



PASSING THE TORCH

An entrepreneur who gives back to society by incubating promising start-ups

Dr Johnny Ng Kit-chong

- BEng in Manufacturing Engineering, PolyU, 1996
- Doctor of Philosophy, PolyU, 2002
- Postdoctoral research on Proactive Computing, Tsinghua University, 2006
- Founder and Chairman, Goldford Group
- Founding President, Hong Kong Youth Synergy Foundation
- Member, National Committee of the Chinese People's Political Consultative Conference
- Council Member, Hong Kong Arts Development Council
- Innovative Entrepreneur of the Year, 2003
- Outstanding PolyU Alumni Award, 2015
- Medal of Honour, HKSAR Government, 2018



Dr Johnny Ng Kit-chong, Founder of Goldford Venture and Founding President of Hong Kong Youth Synergy Foundation, humbly described himself as an average young person from a grass-root single-parent family when he entered the Hong Kong Polytechnic (predecessor of The Hong Kong Polytechnic University) back in 1993. Today, the award-winning entrepreneur is incubating tens of start-ups and nurturing thousands of young people to give back to society in the way the University has blessed him.

Life-changing experience

"Entering PolyU was the turning point," said Dr Ng. "Probably because Manufacturing Engineering was the right discipline for me, I was happily surprised to come first in class in the first year. With scholarships as incentives, I worked hard and graduated with first-class honours in 1996."

He further pursued postgraduate studies at PolyU while working in a company at the same time, benefitting from the University's signature Teaching Company Scheme. "I gained exposure to management, operations and setting up businesses. Studying and working 18 hours a day helped me develop resilience."

With an entrepreneurial dream, Dr Ng and three other students at the University launched the start-up 303 Company Limited, named after the room EF303 on campus where the four undertook their research projects, to provide software services in 1999. In 2001 when the world was shattered by the 9/11 incident, He founded Titanium Technology to specialise in biometric face-recognition technology as heightened security measures. He achieved all these while pursuing a doctoral degree at the University.

Overcoming challenges

Successful people turn failures into blessings. Dr Ng's company was duly prepared for a government tender on face recognition in 2003, only to be defeated by a foreign firm in the home game. He was so disappointed that he almost quit the industry altogether. After some thoughts however, he decided to launch a new approach, this time targeting the bigger market on the Mainland.

Dr Ng went to Beijing and persuaded a Tsinghua professor to accept him as a postdoctoral student. Two years later, with new knowledge and expanded network, he became the pioneer behind bio-recognition technology deployed in the Shenzhen-Hong Kong border. His company later contributed to

the 2008 Beijing Olympics by facilitating entry of VIP guests during opening and closing ceremonies.

Nurturing younger generation

Dr Ng has now assumed a transformed role as a venture capitalist that incubates biotech and fintech start-ups in Hong Kong, Mainland China and Korea. "Just as PolyU had nurtured me, I am now nurturing young talent in society. I would be the happiest if they do better and better," said Dr Ng. "Passing the torch is both important and healthy to society."

With engineering and entrepreneurial expertise, capital, business and government connections, his investment firm bridges various parties in the ecosystem and provides space, angel funding and consultation to assist start-ups on the road to prosperity. To date, the company has nurtured more than 100 start-up teams.

With the heart to serve the younger generation, Dr Ng sold Titanium Technology and founded the Hong Kong Youth Synergy Foundation in 2010. He was also the Chairman of the Hong Kong United Youth Association in 2016-2017. Facilitating exchange tours, internship, entrepreneurship and employment, he had taken over a thousand local youths to Mainland and overseas cities for personal and professional development.

Ties with PolyU

Dr Ng remains closely knitted with his alma mater. Since becoming Outstanding PolyU Alumni awardee in 2015, he has been a mentor to nearly 20 student mentees with entrepreneurial pursuits via PolyU's

■ Dr Ng is committed to nurturing young talent in society.



mentorship programme. His company, which has been offering internships for PolyU's final-year students, will participate in the Innovation and Technology Commission's STEM Internship Scheme to foster university students' interest in pursuing careers in innovation and technology upon graduation. Besides earmarking HK\$1 million for PolyU's Tech Launchpad Fund Scheme to support technology start-ups, Dr Ng is also an advisory committee member of the College of Professional and Continuing Education, and an adjunct professor at the University's Department of Industrial and Systems Engineering (ISE).

"PolyU had given me my first employment. Studying, doing research, watching movies, playing games and founding a start-up together with my teammates during doctoral studies were fond memories. When I later developed face-recognition devices, I again collaborated with PolyU lecturers," Dr Ng remarked. "I had a great time at ISE, and the University had given me all these."

Dr Ng in turn wants to give PolyU students some advice. "Young people should keep open minds and should not be calculating. Do not be limited

by your disciplines or external factors. Skills and creativity count, but your mentality to open up is the most important."

The entrepreneur continued, "Despite current global challenges, I believe times of big changes offer vast opportunities. Look towards the future and grasp the opportunities that come with the developments in the Greater Bay Area."

Welcome to the new academic year



■ Introducing PolyU's support to students through the online Orientation Info Day

PolyU commenced the new academic year 2020/21 on 7 September, welcoming more than 4,600 undergraduates and 5,000 postgraduates to the University. In the face of the COVID-19 pandemic, the eight Faculties and Schools, together with the Student Affairs Office, various administrative offices and student

bodies, introduced their academic activities, student support services and co-curricular activities to freshmen through a series of online orientation sessions and the online Orientation Info Day.

In his video message to all students, PolyU President Jin-Guang Teng said, "I hope that

you will become leaders in your professions and the community, with a strong sense of social responsibility to make positive changes to our society, the nation and the world."

President Teng also stressed three aims for students studying at PolyU: to cultivate positive values, to develop self-directed learning skills, and to embrace diversity and inclusiveness with due respect for each other. These values represent the key qualities PolyU aims to foster in its students, in addition to professional knowledge and skills, to enable them to have a more rewarding and meaningful university life.

Laboratory enthusiast gets closer to dream

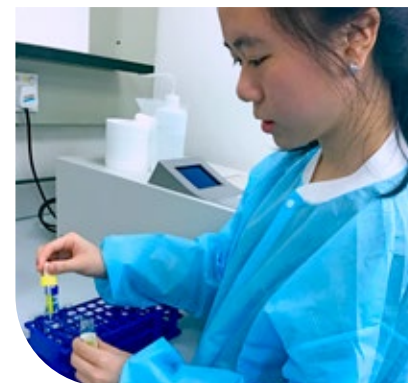
Angela Lee On-ying commenced her BSc (Hons) in Medical Laboratory Science at PolyU's Department of Health Technology and Informatics this academic year. She describes receiving her offer to study at the University as being a "very good present". In reality, it was an opportunity she had worked hard to achieve herself.

Angela completed her Hong Kong Diploma of Secondary School Examination two years ago and received an offer from a local university to study a bachelor's degree programme. To many people's surprise, she turned it down and instead enrolled in an associate degree in biomedical sciences. She was so interested in this area that she would look up reference material at libraries and continue to read even during the semester breaks. With

persistence and hard work, she attained the highest GPA (4.0) in her studies, leading to her receiving offers for bachelor's degree programmes from three universities, namely PolyU, the Hong Kong University of Science and Technology and the Chinese University of Hong Kong. She was happy to choose PolyU because, for her, studying medical laboratory science at PolyU is a dream come true.

Angela has been interested in the medical field since her secondary school days, and aspires to be a medical laboratory technologist (MLT). She had a taste of the profession during a short course in which she gained experience shadowing the work of practicing MLTs in the laboratory.

"I especially enjoyed doing experiments in examining



■ Angela aspires to become a medical laboratory technologist.

blood types, and learning about different parasites and microbes during the microbiology lectures," Angela said. "I want to pursue a career as an MLT because I hope to help patients find the right treatment for their diseases."

Her enthusiasm is set to grow further while studying the PolyU programme, which nurtures much sought-after MLTs, the unsung heroes working behind the scenes, particularly during epidemics.

Students win external scholarships for their inspiration and aspirations

Congratulations to five hardworking and creative PolyU students who have been awarded major local scholarships in recognition of their distinguished academic performance or highly innovative ideas.

HKIE Scholarship



Tong Cheuk-ying (BSc (Hons) in Biomedical Engineering, Year 2) was among three local undergraduate students to win one of the 2019/20 scholarships presented by The Hong Kong Institution

of Engineers (HKIE) for her outstanding academic achievements. Her interest in engineering stems from her curiosity, and as a child, she used to take apart her electronic toys to see how they worked. She was inspired to study biomedical engineering after trying a 3D ultrasound imaging device at a PolyU Information Day. Committed to becoming an engineer, she hopes to use her professional knowledge to help those in need.

Innovation and Technology Scholarships



Ching Chi-fung (BSc (Hons) in Radiography, Year 3) won the scholarship for his idea to incorporate Artificial Intelligence (AI) into radiotherapy treatment plans to expedite the process. The scholarship

will enable him to enrol in the Summer Institute in Anatomy held by Johns Hopkins University in the USA next year. "I hope to learn about cutting-edge radiotherapy planning techniques and apply such knowledge in future for better patient treatment," he said.



Chow Tsz-ching (BSc (Hons) in Occupational Therapy, Year 3) is another winner of the scholarship. She proposed integrating telecommunication software and rehabilitation technologies with AI,

Internet of Things and smartphones to create a technological platform to make rehabilitation

services easily accessible and sustainable. She plans to use the scholarship to attend three overseas placements to acquire the relevant knowledge to help her realise her idea, including studying treatments for dementia at the McGovern Institute for Brain Research of the Massachusetts Institute of Technology.



Another recipient of the scholarship, Tse Lok-yung (BSc (Hons) in Physiotherapy, Year 4) conducted research into applying AI and Virtual Reality technologies in hippotherapy. She believes

physiotherapists can help patients to recover faster by using a robotic horse-riding simulator. The scholarship will allow her to further explore this state-of-the-art technology in Switzerland and the USA.



Wong Lok-lam (BA (Hons) Scheme in Fashion and Textiles, Year 4) won the scholarship for her idea of using nano technology to create temperature sensitive fabric sleeping bags for the homeless.

"I hope to go into the business side of the fashion industry for my career, and I aim to pursue a master's degree in Entrepreneurship and Innovation. I also plan to join Imperial College London's next summer school, and have enrolled for an online short course on new business models at the London College of Fashion with the scholarship," she said.

The Innovation and Technology Scholarship is jointly sponsored and supported by the Innovation and Technology Commission and The Hongkong and Shanghai Banking Corporation Limited, and organised by The Hong Kong Federation of Youth Groups. It recognises undergraduates' passion and creativity in innovation and technology, as well as academic excellence. It offers them the opportunity to take part in elite training through participating in overseas or mainland programmes and internships. This year, four PolyU students were awarded the scholarship out of 163 applications.

Mathematics prodigy thrives at PolyU

Mathematics prodigy Manson Ip Chun-yin is only 15 years old but he is already a second-year student at PolyU. With his extraordinary mathematical talent, Manson, who has an IQ of 141, had a special educational journey, going to university after only two years at secondary school.

When Manson was only two years old, his parents realised he could already master multiplication rules meant for primary school students. The gifted child had completed the entire primary school mathematics programme when he was still only a primary two student. Encouraged by his parents, Manson went on to sit the International Advanced Level examinations when he was in secondary one and two, and attained a grade A in Mathematics and A* in Further Mathematics.

In 2018/19, Manson joined the Research Internship Programme organised by PolyU's Faculty of Applied Science and Textiles (FAST), which aims to nurture gifted secondary school students in science. Manson's strong interest in and remarkable sense of mathematics were immediately noticed by those teaching the programme. Manson was later admitted to PolyU's Bachelor of Science (Hons) in Investment Science and Finance Analytics programme at the Department of Applied Mathematics (AMA) after completing his secondary two studies.

Conscious of how young Manson is, the University is providing him with the necessary care and support to help him adapt to university life. AMA formed a team which meets Manson regularly to understand and support his learning needs, as well as assigning a senior student to be a peer mentor to share advice and experience.



■ Manson with Professor Kwok Kin-wing, Associate Dean of Faculty of Applied Science and Textiles

Manson has become used to the new learning environment. "Unlike secondary school teachers, professors at university are hands-off. I need to be much more self-disciplined and self-motivated in my study. At the same time, I have more freedom here in terms of my learning schedule, the subjects I choose and campus life. I mingle well with my classmates and we enjoy learning together," he says.

Dr Raymond Sze, AMA's Associate Professor and Programme Leader, also a member of the advising team, says: "During the year, we have been happy to witness Manson grow both mentally and physically. Sometimes, he just acts like a secondary school kid, sharing his teenager life with us. But when it comes to solving mathematical problems, his thinking is quite mature."

Looking ahead, Manson aspires to pursue further studies when he graduates. "After completing the master's and doctoral programmes, I want to go overseas for post-doctoral study," the prodigy says.

■ Manson (third from left, front row) at the University's orientation camp



PolyU ranked among best universities in the world



PolyU is constantly striving for excellence in the areas of education, research and knowledge transfer, and has become a world-leader in many disciplines.

The University is ranked 129th, up 42 places since last year, in the Times Higher Education

World University Rankings 2021, announced in September. The ratings covered more than 1,500 higher education institutions from 93 countries and regions, with universities assessed on 13 sets of indicators, including the quality of teaching and learning, research strength and

the number of citations, as well as international outlook.

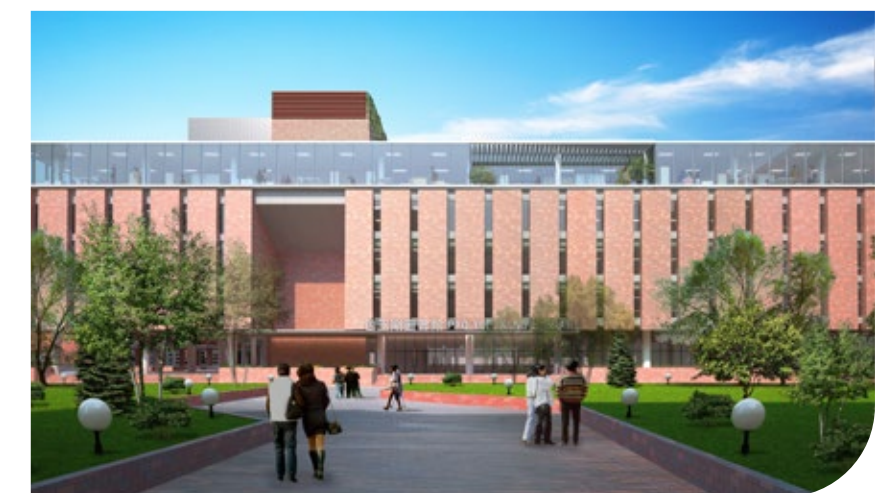
Published earlier this year, the QS World University Rankings 2021 placed PolyU 75th out of more than 1,600 universities globally. The evaluation was based on six metrics: academic reputation, employer reputation, faculty/student ratio, citations per faculty, international faculty ratio and international student ratio. In Asia, PolyU was rated 25th in the QS Asia University Rankings 2020.

Members of the University will continue to excel in providing a top-quality educational experience for students and translating research into impactful solutions to support the social and economic growth of society.

Library extension and revitalisation funding approved

The funding proposal for the extension and revitalisation work for PolyU's Pao Yue-kong Library was approved by the Legislative Council's Finance Committee in July 2020. The proposal, which was supported by the Secretary for Education, will see additional and modernised library space created to cope with the needs of the modern learning environment.

The main part of the project involves the construction of an additional floor, which will provide an extra 2,080 square metres of space. Existing floors will also be revitalised to improve facilities and learning spaces. Work on the project started in late July 2020. Construction of the additional floor will finish in the second quarter of 2022 while



■ An artist's impression of the extended library

the revitalization work of existing floors will be completed by phases till the fourth quarter of 2023.

Upon completion of the project, the library will be transformed into

a modern learning hub with new space for collaborative learning, quiet study, a presentation forum, and information technology workstation areas. It will also have a 24-hour learning centre, as well as recording studios.



PolyU Motto

**To learn and to apply,
for the benefit of mankind**

The Hong Kong Polytechnic University Magazine

Excel x Impact

Steering Board

President's Executive Committee

Editorial Committee

Chairman	Ir Prof. H.C. Man Dean, Faculty of Engineering	Co-Chairman	Prof. Kaye Chon Dean, School of Hotel and Tourism Management
-----------------	---	--------------------	---

Members	Prof. Wong Wing-tak, Dean, Faculty of Applied Science and Textiles Ir Prof. Edwin Cheng, Dean, Faculty of Business Prof. Li Xiangdong, Acting Dean, Faculty of Construction and Environment Prof. David Shum, Dean, Faculty of Health and Social Sciences Prof. Li Ping, Dean, Faculty of Humanities Prof. K.P. Lee, Dean, School of Design Prof. Esmond Mok, Dean of Students Ms Belinda Chow, Director, Alumni Affairs and Development Office Mr Joseph Chan, Head, Campus Sustainability Office Prof. Lu Haitian, Director, Chinese Mainland Affairs Office Ms Eunice Cheng, Interim Director, Communications and Public Affairs Office Mrs Ivy Leung, Director, Culture Promotion and Events Office Ms Blanche Lo, Director, Human Resources Office Dr Terence Lau, Interim Associate Vice President (Innovation and Technology Development) and Director, Innovation and Technology Development Office Mr Kelvin Wong, Interim Director, Institute for Entrepreneurship Mr Eric Lo, Interim Director, Global Engagement Office Miss Tina Yeung, Interim Head, Research Office
----------------	--

Editorial and Design	Communications and Public Affairs Office Special thanks to the School of Design for design advice
-----------------------------	--

Excel x Impact is published quarterly to keep the local and international communities informed of PolyU's activities, people and achievements. For contributions and enquiries, please contact the Communications and Public Affairs Office at paadmin@polyu.edu.hk.

www.polyu.edu.hk



@HongKongPolyU



@The Hong Kong Polytechnic University



@HongKongPolyU_Main

©The Hong Kong Polytechnic University

Printed on environmentally friendly paper