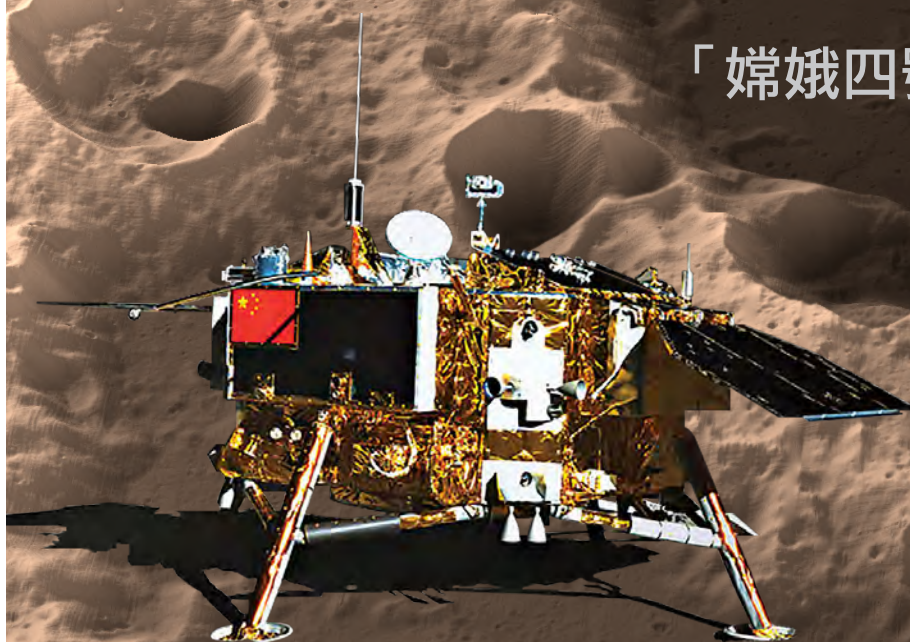


理PolyU 程Milestones

March 2019
2019年3月

Historic Chang'e-4 landing
backed up by PolyU's
advanced technologies

理大先進技術支援
「嫦娥四號」歷史性登月創舉



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

Photo source: China National Space Administration
相片來源：國家航天局

Opening Minds • Shaping the Future
啟迪思維 • 成就未來

PROMISE FOR
EDUCATION AND RESEARCH
教研承諾

Opening Minds Shaping the Future 啟迪思維・成就未來



Research 科研

- Addressing societal needs
應對社會所需
- Making positive impact
on the world
造福世界



Education 教育

- Nurturing future-ready global citizens
培養敢於應對未來的世界公民
- Shaping socially responsible leaders
of tomorrow
塑造懷抱社會責任的未來領袖



Internationalisation and Engagement with the Nation 國際化及參與國家發展

- Embracing internationalisation for education
and research
推動教育與科研的國際化
- Championing Belt and Road and Greater Bay
Area development initiatives
推動「一帶一路」與「大灣區」發展的項目



Knowledge Transfer and Wider Engagement 知識轉移及廣泛參與

- Transforming research excellence into
impactful applications
轉化卓越科研為具影響力的應用方案
- Nurturing entrepreneurs to do well and
do good
培育「創富創善」企業家





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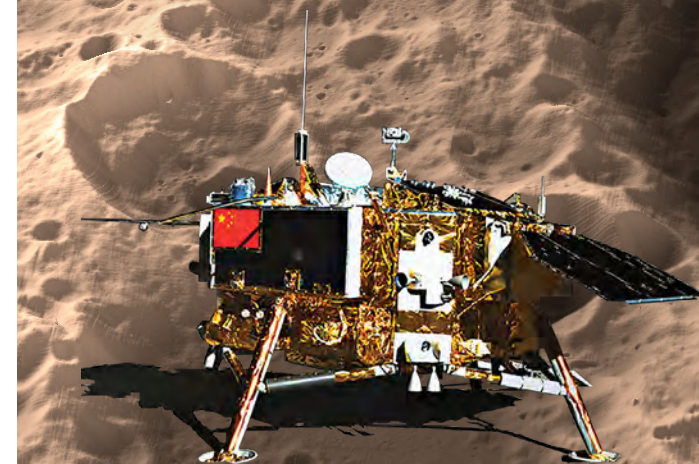


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Historic Chang'e-4 landing backed up by PolyU's advanced technologies

理大先進技術支援
「嫦娥四號」歷史性登月創舉



PolyU's experts from multiple disciplines worked together to help China make history with the first soft landing on the far side of the Moon, supported by an innovative lunar topographic mapping and geomorphological analysis technique for selecting Chang'e-4's landing site. The advanced Camera Pointing System also helped in unveiling this mysterious region.

理大多個學科的專家同心協力，幫助中國締造歷史，大學嶄新的月球地形測繪和地貌分析技術為「嫦娥四號」選取著陸點。此外，「相機指向系統」，更有助揭開了月背神秘的面紗。

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Historic Chang'e-4 landing backed up by PolyU's advanced technologies

理大先進技術支援「嫦娥四號」歷史性登月創舉



(From left) Dr Robert Tam Wai-man, Associate Director, Industrial Centre; Ir Prof Alexander Wai Ping-kong, Vice President (Research Development); Dr Wu Bo, Associate Professor, Department of Land Surveying & Geo-Informatics; and Prof. Yung Kai-leung, Chair Professor (Precision Engineering) and Associate Head, Department of Industrial and Systems Engineering (左起) 工業中心副總監譚惠民博士、副校長(科研發展) 衛炳江教授工程師、土地測量及地理資訊學系副教授吳波博士，以及工業及系統工程學系講座教授(精密工程) 兼副系主任容啟亮教授

PolyU's experts from multiple disciplines worked together to help China make history with the first soft landing on the far side of the Moon, supported by an innovative lunar topographic mapping and geomorphological analysis technique for selecting Chang'e-4's landing site. The advanced Camera Pointing System also helped in unveiling this mysterious region.

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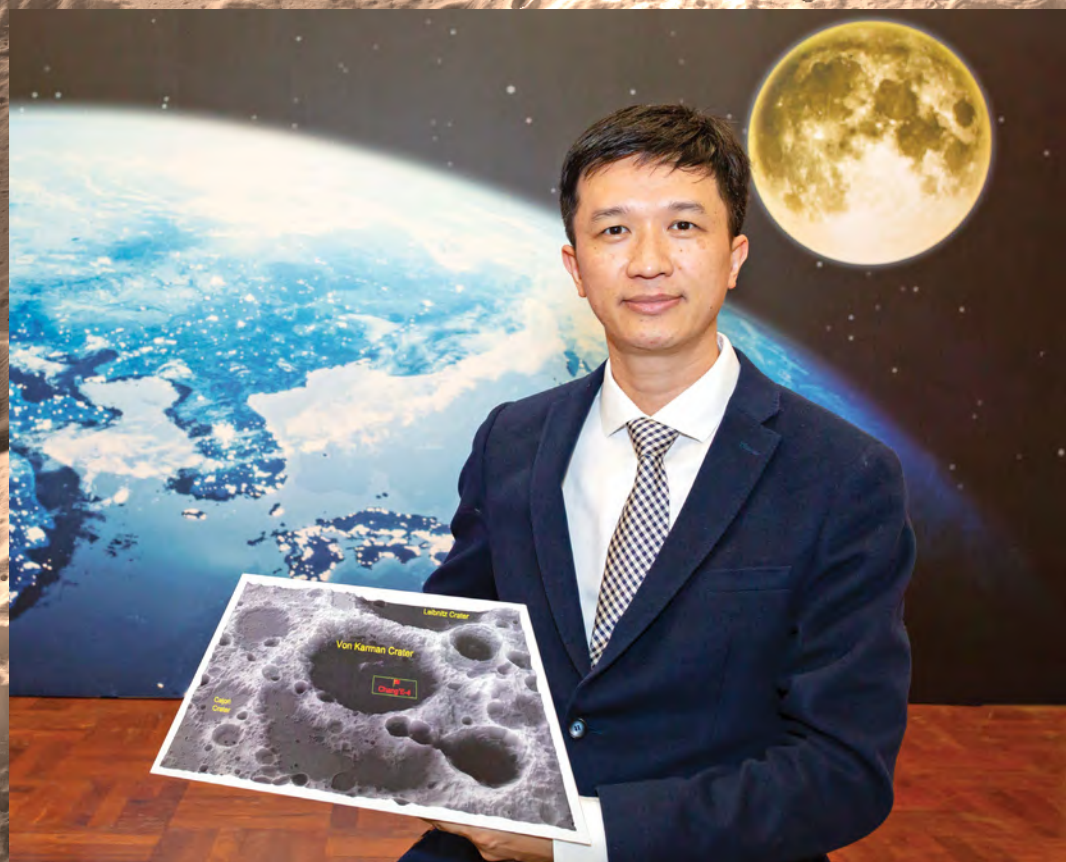
The Sun had just risen over the Von Kármán crater of the Moon on 3 January 2019 when China's Chang'e-4 lunar probe performed the very first soft landing on the far side of the Moon. This historic event, the nation's second lunar landing and a milestone in its pioneering lunar exploration programme, was greatly aided by multidisciplinary effort from researchers at PolyU.

Since 2010, PolyU has had the honour of working with the China Academy of Space Technology (CAST) to transform research excellence into cutting-edge engineering applications for China's space flight missions. The Chang'e-4 mission is the latest outcome of this fruitful collaboration, building on the success of Chang'e-3, the first Chinese lunar landing mission, to propel the nation to the forefront of space exploration.

2019年1月3日，當太陽在月球上的卡門撞擊坑上方緩緩升起後，中國的「嫦娥四號」月球探測器史無前例成功登陸月球的背面。理大跨學科研究人員的努力，協助國家二度登月，亦標誌著探月工程的一個新里程。

自2010年起，理大有幸與中國空間技術研究院（五院）合作，讓其卓越科研轉化為尖端的工程應用技術，貢獻中國航天任務。繼中國「嫦娥三號」首次登月成功，之後「嫦娥四號」是雙方合作的最新成果，為中國航天任務作出貢獻。

Photo source: China National Space Administration
相片來源：國家航天局



Dr Wu Bo
吳波博士

Finding the best location for landing

When the Chang'e-4 lander touched down at 177.6° east longitude and 45.5° south latitude in the unexplored South Pole-Aitken Basin region of the Moon, PolyU's experts were overwhelmed after years of hard work in landing site characterisation and analysis. The researchers needed to find a site that was both safe and of scientific value, and the Von Kármán crater, a treasure-trove of geological data, fulfilled both criteria.

However, selecting the right site was not an easy task. In March 2016, Dr Wu Bo, Associate Professor in the Department of Land Surveying and Geo-Informatics, and his team began to amass a huge amount of lunar remote sensing data from multiple sources to create high-precision and high-resolution topographic models of two potential landing regions.

The first challenge was the mountainous, rugged terrain. As large boulders would block the progress

of the rover, Yutu-2, and small rocks could become trapped in its wheels, Dr Wu's team had to gather information on more than 400,000 craters and 20,000 boulders to find an area that was flat enough to allow the lander to touch down safely and the rover to explore freely. With elevation differences as large as 16 km, Chang'e-4's descent design had to be nearly perpendicular.

Communicating with Earth was the second challenge. "The Chang'e-4 landing site is on the far side of the Moon," explained Dr Wu, "without direct radio communication from Earth." The team therefore intensively studied the terrain of the candidate landing regions to identify potential obstructions to signal reception and data transmission between the lunar probe and the mission control centre on Earth. After the successful landing, these terrain data also helped Dr Wu's team and CAST to schedule the activities of the lander and its companion rover.

選取最佳著陸點

當嫦娥四號著陸器在未經勘探的月球南極 - 艾特肯盆地內東經 177.6 度與南緯 45.5 度的位置順利登陸後，多年來努力研究及分析著陸點地貌特徵的理大專家感到雀躍萬分。研究人員需要尋找一個安全且具科學價值的著陸點，而卡門撞擊坑這個地質數據寶庫正符合這兩項條件。

然而，選取合適的著陸點並非易事。早於 2016 年 3 月，土地測量及地理資訊學系副教授吳波博士及其團隊已開始從不同渠道搜集大量月球遙感數據，為兩個候選著陸區製作高精確度和高解像度的地形模型。



月球崎嶇起伏的地形是首項挑戰。由於巨石會阻礙月球車「玉兔二號」前進，而小石塊則有機會卡住車輪，因此吳博士的團隊收集了四十多萬個撞擊坑和超過兩萬塊巨石的資料，務求找出平坦的區域讓著陸器安全登陸，同時確保月球車能活動自如進行探測。由於著陸區地形的高度差異可達十六公里，嫦娥四號著陸器必須採取近乎垂直的方式下降。

第二項挑戰是要與地球保持通訊。吳博士說：「嫦娥四號的著陸點位處月球背面，無法與地球透過無線電直接通訊。」於是團隊對候選著陸區的地形進行深入研究，以識別月球探測器與地球的控制中心之間足以影響信號接收和數據傳輸的潛在障礙。嫦娥四號成功登陸後，這些地形數據亦有助吳博士的團隊及五院為著陸器和月球車部署進一步行動。

On 8 December 2018, Chang'e-4 was successfully launched from the Xichang Satellite Launch Centre.
2018 年 12 月 8 日，「嫦娥四號」從西昌衛星發射中心成功發射升空。

A new chapter in lunar exploration

PolyU researchers were also involved in the development of a space tool instrumental to the success of this historic mission. The probe's Camera Pointing System (CPS), which helps to capture images of the Moon and facilitates the mission control centre to command the movement of the rover, was developed jointly by CAST and a team headed by Prof. Yung Kai-leung, Chair Professor (Precision Engineering) and Associate Head of the Department of Industrial and Systems Engineering at PolyU.

An earlier version of the CPS was used in the Chang'e-3 mission in 2013. As the first Hong Kong made instrument to be deployed in China's lunar exploration programme, it was found to be durable enough to operate smoothly under the Moon's stringent environment. Yet the design of the new CPS had to be even more sophisticated to withstand the high-density radiation and extreme temperatures – falling as far as -173°C and soaring to 127°C – on the Moon's far side.

The PolyU-CAST team rose to this challenge, deploying their expertise in multi-axis machining to enclose all of the device's delicate electrical parts, signal lines and wiring inside a resilient product shell. Equally intricate and time-consuming was the task of preventing corrosion by using as few assembly parts and joints as possible. This was achieved through innovative design and high-precision fabrication, combining many parts to form a single component and removing unnecessary materials from a single solid material block.

The completed CPS, mounted on the upper part of the probe's lander, weighs just 2.8 kg and has a wide range of motion in the Moon's low-gravity environment, which is just one-sixth of the Earth's gravity. Testifying to the outstanding expertise of Prof. Yung and his team, and to the world-class resources of PolyU's Industrial Centre, the CPS has already enabled Chang'e-4 to send back stunning panoramic images of the lunar landing and rover deployment – the world's first-ever glimpses of this uncharted region.

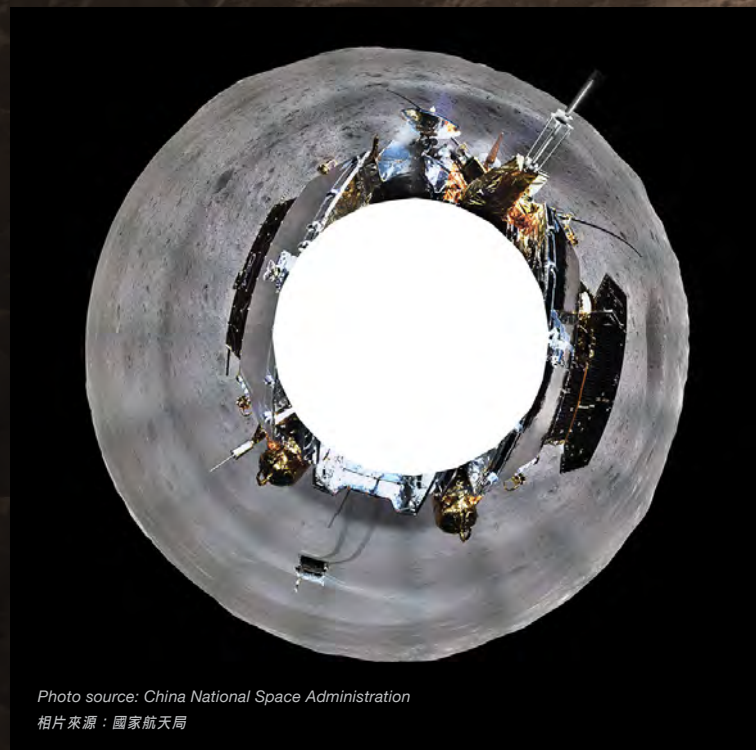


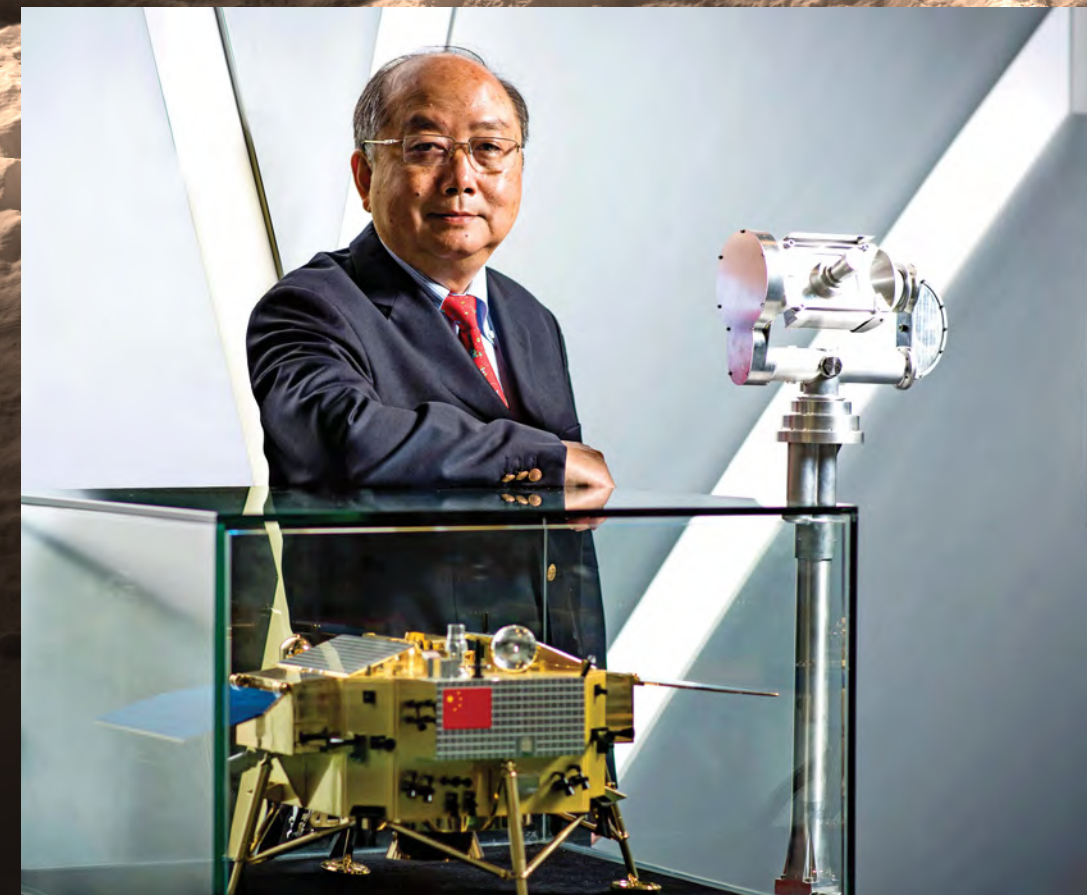
Photo source: China National Space Administration
相片來源：國家航天局

360 degree panoramic image taken by the camera mounted on the CPS
相機指向系統上相機所拍攝的 360 度月背全景影像

Both teams of experts have been working to support the nation's lunar missions for years. Expressing his pride in the "ultra-high standard" of PolyU's research and innovation so far, Prof. Alex Wai, PolyU Vice President (Research Development), was adamant that the University would continue to build on this ground-breaking work to help the nation work on ever more challenging space projects.

"In the future," he said, "PolyU will continue to adopt a cross-disciplinary approach and integrate our pool of expertise and resources to develop more sophisticated and effective solutions for the nation's space exploration programmes." These will include not only the Chang'e-5 lunar exploration mission but also China's first mission to explore Mars. Like the Chang'e-4 expedition, these projects are expected to unfold the mystery of the Moon and even the solar system.

Prof. Yung Kai-leung
容啟亮教授



探月任務新一章

理大研究人員亦有參與開發成就這次歷史任務的航天儀器。探測器上用以協助拍攝月球影像及幫助控制中心指揮月球車活動的「相機指向系統」，正是由五院和理大工業及系統工程學系講座教授（精密工程）兼副系主任容啟亮教授帶領的團隊共同研發。

這套「相機指向系統」在 2013 年嫦娥三號探月任務時已被採用，為首部由香港研製並獲國家探月計劃選用的儀器，它可在月球嚴峻的環境中持久運作。然而新製造的「相機指向系統」的設計必須更為精密，以抵禦月球背面的高幅射量和極端溫差一可下降至攝氏零下 173 度及上升至 127 度。

理大與五院的團隊迎難而上，利用他們在多軸加工方面的專長，將所有精細的電子部件、訊號線和電線都安裝在防禦力強的儀器外殼內。預防出現腐蝕的工作亦同樣複雜和費時，故儀器必須盡量減少組裝部件和接合點。團隊透過創新的設計和高度精確的製造過程，將眾多部件合併為單一部件，並將不必要的材料從單一固體材料中移除。

最終製成的「相機指向系統」安裝於在著陸器的頂部，僅重 2.8 公斤，能夠在月球低引力（相等地球地心吸力的六分之一）的環境下大幅度移動。因著容教授及其團隊極其出色的專業水平，配合理大工業中心的世界級資源，該系統已成功協助嫦娥四號傳送登月和月球車探測活動的全景相片，讓全球首次一睹這片神秘領域的風光。

多年來這兩個專家團隊積極支持國家的探月工程。理大副校長（科研發展）衛炳江教授對理大在科研與創新方面表現出「極高水平」引以為傲，並深信大學會繼續開天闢地，以協助祖國發展更具挑戰性的航天項目。

他說：「未來，理大將繼續採用跨學科的模式，結合不同的專門知識和資源，為國家的航天任務研發更多精密而有效的方案。」這些項目不但包括嫦娥五號探月任務，更有及中國首個火星探索計劃。正如嫦娥四號的探測項目一樣，此等項目有望揭開月球甚至太陽系的奧秘。



Leading alma mater to scale new heights 飲水思源 理大輝煌

Illustrious industrialist Dr Lam Tai-fai has a long affiliation with PolyU as a student, an alumnus, a Council and Court Member and Deputy Council Chairman. Now, as he takes the helm as Council Chairman, he is set to lead his alma mater to scale new heights and actively participate in and contribute to the nation's development.

傑出工業家林大輝博士與理大淵源甚深，曾為理大學生、校友、校董會及大學顧問委員會成員，以及校董會副主席。現在，他以校董會主席的新身份為理大掌舵，帶領母校再攀高峰之餘，也推動理大積極參與和貢獻國家的發展。

Dr Lam Tai-fai graduated from the then Hong Kong Polytechnic in 1981. In view of his outstanding academic performance, the institution recommended him for a post in the Peninsula Group after graduation. Through hard work and perseverance, Dr Lam was promoted from a junior staff to Group Managing Director in just ten years, and has led the Group to become the industry leader. In 2000, Dr Lam was honoured with the Young Industrialist Award of Hong Kong.

Dr Lam has not only made significant contributions to the fashion and textile industry, but has also demonstrated strong commitment to education and sports development. He, in particular, has strong affection towards PolyU. In the past four decades, he has generously donated to his alma mater on many occasions and has been consistently involved in its development. In 2001, Dr Lam was honoured with the Outstanding PolyU Alumni Award. He also received a University Fellowship and an Honorary Doctorate of Business Administration from PolyU in 2000 and 2004 respectively. On 1 January 2019, he assumed the post of PolyU Council Chairman. He is dedicated to turning his vision for university education to reality, uncovering knowledge and nurturing talents for our society and our nation.

Your association with PolyU dates back almost four decades. You have strong ties with your alma mater and have always sought to give back to PolyU. How would you encourage, or how should the University encourage, students and alumni to look up to you as a role model?

We should learn to express gratitude and give back. My school years at the then Hong Kong Polytechnic has helped lay a solid foundation for my career development. I am very grateful for this, and hence is keen to seize every opportunity to give back to my alma mater.

Looking back, I have been serving PolyU in various capacities for more than 30 years. This indeed has benefitted me in many ways. For instance, I have opened up my eyes and mind, I have made many like-minded friends. In funding the establishment of PolyU's first full-time Master's degree programme in Fashion and Textile Design, I was able to realise my vision for the development of design, fashion and the textile industry. I hope that PolyU students and alumni will be more ready to contribute their time, resources or experience to facilitate the development of their alma mater. Not only will this enhance their personal growth and career development, but they will also feel rewarding as they see the University thrive as a result of their concerted effort.

林大輝博士 1981 年畢業於理大前身的香港理工學院，由於成績優異，他獲校方推薦，畢業後加入半島針織集團。憑藉其苦幹拼搏的精神，他在短短十年間由基層職員晉升至集團董事總經理，帶領集團成為業界翹楚。2000 年，林博士獲頒香港青年工業家獎。

林博士不但對時裝及紡織業貢獻良多，他對教育和體育發展也充滿熱誠，對理大更有著濃厚的感情，在過去近四十年多次向母校捐贈，亦從未間斷地投入母校事務。2001 年，林博士獲選為理大傑出校友，並於 2000 年和 2004 年分別獲頒授大學院士及榮譽工商管理博士學位。2019 年 1 月 1 日，林博士出任理大校董會主席一職，滿腔大計，矢志落實他對大學教育的願景，為社會、為國家開拓知識，作育英才。

你和理大結緣近四十載，對母校有強烈的歸屬感，一直積極回饋母校。你將會如何鼓勵，又或者你認為大學應如何鼓勵同學和校友會以你為榜樣？

做人要飲水思源，知恩圖報。理工的幾年學習生涯為我的事業發展打下了良好基礎，我一直心存感激，所以不斷爭取機會回饋母校。

回望過去三十多年，我在不同的崗位服務理大，個人其實有很多的得著，例如開拓了自己的視野胸襟，認識了不少志同道合的社會人士，而透過資助成立首個時裝及紡織品設計全日制碩士課程，亦成就了自己推動設計、時裝和紡織業的願景。我希望同學和校友不要吝嗇自己的時間、資源或者經驗，要積極參與母校的工作，無論對個人的成長或者事業的發展都會有所幫助，而且大家都一定樂見自己的母校在大家協力同心之下做得愈來愈好。



Could you share your expectations for the University as Council Chairman? What is the most pressing issue that you think the University should deal with?

PolyU is a publicly-funded university with roles and responsibilities defined by the University Grants Committee. Therefore, as Council Chairman, I am duty bound to fulfil these defined roles and responsibilities and to lead PolyU to live up to its vision: “be a leading university that advances and transfers knowledge, and provides the best holistic education for the benefit of Hong Kong, the nation and the world”. I hope that all our stakeholders, including Council Members, staff, students and alumni, will work hard together to turn our vision into reality.

However, to make further contributions to Hong Kong, the nation and the world, the University must constantly undertake SWOT analysis to understand its strengths and weaknesses, identify threats and capitalise on opportunities. The nation has unveiled its Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), with plans to link Hong Kong, Macao and nine cities in southern China to form an international technology and innovation hub. I believe that PolyU should seize the opportunity to participate in the GBA's development. The University's recent establishment of the Greater Bay Area International Institute for Innovation, Guangdong-Hong Kong-Macao Greater Bay Area Rail Transit Joint Innovation Union and Greater Bay Area Tourism Research Alliance are among the initiatives along this direction.

The next step will be to set up a branch campus of the University in the GBA. I hope to identify a suitable place in the GBA for the construction of the branch campus. Under preliminary considerations are sites in Guangzhou, Dongguan, Shenzhen, Foshan, etc. On the education front, we can offer PolyU's niche disciplines in the GBA with a view to nurturing talents for our nation. Hong Kong students can also have more chances to learn about the GBA through internship and service-learning opportunities. On the research front, the branch campus can provide sufficient land to build additional research facilities, which will help boost our research excellence.

In addition to fostering connections with the mainland and engaging the nation, PolyU must seek to strengthen its global network, building up more research and educational partnerships with overseas renowned universities.

作為校董會主席，可否分享你對大學的期望？你認為大學最迫切需要處理的事項是甚麼？

理大是一所以公帑營辦的大學，大學教育資助委員會亦為理大設定了角色和責任，所以，我作為校董會主席，首先便要履行這些既定的角色和責任，即如大學願景所說的：「矢志成為一所在開拓及轉移知識、提供優質全人教育方面均領先的大學，為香港、國家及世界作出貢獻。」我期望大學所有持分者，包括校董會成員，師生校友可以一起努力去落實願景。

但如果要為香港、國家及世界作出進一步貢獻，大學必須常做「SWOT」，了解本身的強項弱項，以及認清危機，懂得善用機遇。國家公布的粵港澳大灣區建設規劃綱要，計劃將香港、澳門和華南九個城市連繫起來，建立國際科技創新中心，理大就應該抓緊機遇，參與大灣區的發展。理大最近成立的「大灣區國際創新學院」、「粵港澳大灣區軌道交通協同創新中心」及「大灣區旅遊研究聯盟」等都是朝着這個方向推出的項目。

下一步就是要在大灣區設立分校，我希望在大灣區尋找到合適的土地來興建理大分校，初步選址包括廣州、東莞、深圳和佛山等。教育方面，可以將理大的優秀學科推展至大灣區，協助國家培育人才，而香港的學生亦可以有更多機會透過實習或服務學習去認識大灣區。科研方面，分校可以有充足的用地增建科研設施，對提升科研水準甚有幫助。

除了加強與內地聯繫，積極參與國家發展之外，理大亦必須強化國際網絡，與更多的海外知名院校建立科研和教育的合作關係。

You are also the Chairman of the Hong Kong Sports Institute (HKSII). How will your dual roles benefit both institutions?

The HKSII is gaining recognition in Hong Kong, and PolyU is globally renowned. It is truly an honour for me to chair both institutions, and yet this role comes with huge responsibilities. I hope, through strengthening the collaboration between the HKSII and PolyU, both institutions could scale new heights. For instance, by capitalising on PolyU's strengths in rehabilitation research and materials-related technologies, we can help Hong Kong athletes to sharpen their competitive edge. I hope to see the fruits of collaboration between the two institutions at the 2020 Tokyo Olympics. In addition, I hope that PolyU will admit more local elite athletes, providing them with development opportunities in both sports and in academic study.

Do you foresee any changes in PolyU's roles as a result of the nation's and the HKSAR government's focus on Belt and Road countries and the development of the GBA?

Chief Executive Mrs Carrie Lam once said that over the last 40 years, Hong Kong has served as both a witness to and a participant in the reform and opening up of our nation. Hong Kong has not only contributed to but also benefitted from this process. Similarly, PolyU will play multiple roles in the development of Belt and Road countries and the GBA: as a witness, a participant, a contributor and a beneficiary.

Going forward, we will be a more important player but our roles remain the same: nurturing talents, fostering research and innovation, as well as knowledge transfer. We have “witnessed” the efforts of the nation and the HKSAR government in promoting the development of Belt and Road countries and the GBA. We have “participated” in the establishment of the “University Alliance of the Silk Road”, the “Greater Bay Area International Institute for Innovation” and the “Belt and Road Cross-Professional Advancement Programme”, thus “contributing” significantly to nurturing talents and fostering research and innovation. PolyU has also “benefitted” from the nation's and the HKSAR government's policies on the development of the Belt and Road and GBA. For instance, with support from the nation, we collaborated with the Guangzhou Institute of Geochemistry under the Chinese Academy of Sciences to establish the Joint Laboratory of the Guangdong-Hong Kong-Macao Greater Bay Area for the Environment to advance research on environmental pollution.

Can you share some words of encouragement with PolyU staff and students?

One of the University's missions is “to foster a University community in which all members can excel in their aspirations with a strong sense of belonging and pride”. Staff and students are important stakeholders in the University. PolyU strives to provide its staff with a comfortable and stable working environment. We count on them to work together to carry out the Strategic Plan we set for our future, responding to the needs of our society and taking the University to the next level of excellence.

I have very high expectations of our students, so does our community. I will do my best to ensure the provision of more opportunities for students to unleash their potentials, and the provision of enough support on various fronts, so that they could grow and prosper. But students should also learn to respect themselves and be self-disciplined. They should cherish the opportunities they have and understand their responsibilities to the University, society and the nation.

你同時也是香港體育學院（體院）董事局主席，這雙重角色能如何惠及兩所院校？

體院在香港越來越受重視，理大又享譽國際，能夠同時擔任香港體育學院董事局主席及香港理工大學校董會主席，我深感榮幸，也自覺責任重大。我希望能夠透過加強體院和理大的合作，使兩所院校的成就可以更上層樓，例如善用理大復康治療方面的科研和物料方面的科技，可以進一步提升香港運動員的競技水平，我期希望在 2020 年東京奧運會可以看到這兩所院校的合作成果。此外，我亦希望理大可以錄取更多香港精英運動員，令他們在體育與學業得以雙線發展。

國家甚至香港特區政府現時正致力於一帶一路和大灣區發展，這對理大所扮演的角色會否有所改變？

特首林鄭月娥曾說：在過去四十年，香港既是國家改革開放的「見證者」，也是「參與者」；是「貢獻者」，也是「受惠者」。對於一帶一路和大灣區發展，理大一樣是「見證者」、「參與者」、「貢獻者」和「受惠者」。

我們將會擔當更加重要的角色，但一樣是培育人才，一樣是推動科研創新和知識轉移。我們親身「見證」國家和特區政府積極推動一帶一路和大灣區發展；「參與」成立「絲綢之路大學聯盟」、「大灣區國際創新學院」、「一帶一路跨專業發展計劃」等等，對培育人才、推動科研創新方面「貢獻」良多，當然，理大亦「受惠」於國家和特區政府推動一帶一路和大灣區發展的政策，例如得到國家的鼎力支持，與中科院廣州地球化學研究所合作成立「粵港澳大灣區環境污染過程與控制聯合實驗室」，提升我們在環境污染方面的科研水平。

你對校內師生有何寄語？

大學其中一項使命是「營造讓員生志存高遠、心有歸屬、樂於以大學為榮的環境。」員生都是大學重要的持分者。校方會致力為教職員提供一個舒適穩定的工作環境，希望他們可以全情投入工作，一起推動我們為未來制定的策略發展計劃，積極回應社會需要，帶領大學再闢高峰。

我對學生、社會對學生都有很高的期望，我會盡力促使校方為學生提供更多讓他們發揮潛能的機會，並且給予他們各方面的支援，希望他們成材成器。但同學也必須自重自愛，珍惜機會，並且明白自己對學校、對社會、對國家的責任。💎

Technology 科技



The WiseEye system, developed by Prof. Calvin Wong, is equipped with a camera that can move back and forth on a weaving machine to capture images of the whole width of woven fabric.

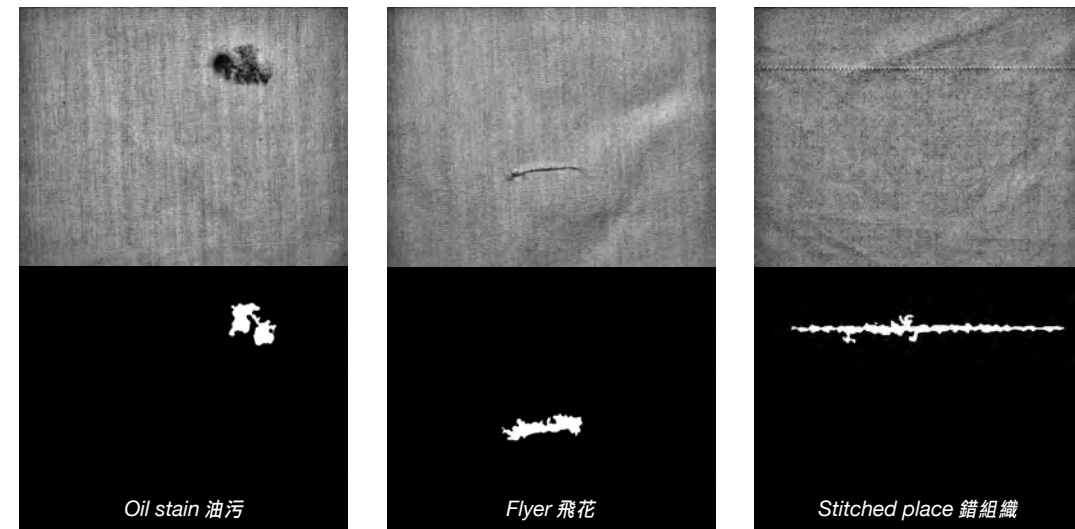
黃偉強教授研發了附設相機的「聰明眼」系統，該相機可於織布機上來回移動，拍攝整幅紡織品的圖像。

AI-powered WiseEye automates fabric fault detection

人工智能「聰明眼」自動檢測布料瑕疵

An intelligent automatic system for detecting fabric defects and improving quality control process has shown remarkable success in initial industry testing.

一個自動檢測紡織品瑕疵的智能系統，可改善質量控制過程，在業界初步試行已見卓越成效。



Common fabric defects detected by the WiseEye system.

「聰明眼」系統可檢測到的常見瑕疵。

One of the biggest challenges in the textile industry is detecting defects in materials to ensure high-quality products. Traditionally, fault detection has relied on the naked eye, but this tends to be inconsistent and inefficient at the task. Although some automated systems have been developed, they are expensive, have limited functionality and have a high rate of false alarms.

紡織業的其中一項重大挑戰，是要能檢測布料的瑕疵，確保能生產高質素的布品。一直以來，業界依賴以肉眼目測的方式檢查紡織品的瑕疵，然而效果參差，效率亦低。儘管業內也曾出現過一些自動化的檢測系統，但這些系統價格高昂、功能有限，而誤報率亦高。

WiseEye is an intelligent fabric fault detection system developed by the Textile and Apparel Artificial Intelligence Research Team, headed by Prof. Calvin Wong of the Institute of Textiles and Clothing. Integrating advanced technologies including AI and deep learning, this system comprises various components that perform different functions: A high-powered LED light bar illuminates the fabric and a high-resolution charge-coupled device camera is mounted on a rail to capture images of the whole width of the fabric during the weaving process. The images are then fed into an AI-based machine vision algorithm to detect fabric defects. The computer system receives real-time information, whereas analytical statistics and alert can be generated as necessary.

紡織及服裝學系黃偉強教授帶領的紡織及服裝人工智能研究團隊，研發了一套名為「聰明眼」的智能紡織品瑕疵檢測系統。該系統融合先進科技包括人工智能及深度學習技術，並由多個具備不同功能的部件組成：高功率 LED 燈管用以照明紡織品，而安裝在織布機軌道上的高解像度 CCD 相機，可在紡織過程中拍攝整幅紡織品的圖像。圖像經過人工智能的機器視覺算法處理後可即時檢測到紡織品上的瑕疵。電腦系統在收取這些實時資料後，可按需要而提供分析統計和警報。

Prof. Wong explained that "WiseEye is not only a technological breakthrough that meets industry needs, but it also marks a significant milestone in the quality control automation for the traditional textile industry".

黃教授指出，「『聰明眼』的技術突破不但能滿足業界所需，亦標誌著傳統紡織業在自動化品質控制方面的重要里程」。

Big data and deep learning technologies were also used in WiseEye. With input of data on thousands of yards of fabric into the system, WiseEye was trained to detect some 40 common fabric defects with exceptionally high accuracy at a resolution of up to 0.1 mm/pixel.

「聰明眼」運用大數據和深度學習技術，透過輸入數以千碼計的紡織品數據訓練「聰明眼」，使它能檢測近四十種常見的紡織品瑕疵，精確度極高，達到每像素零點一毫米。

The WiseEye system was tested in a manufacturing environment for more than six months. It was able to reduce loss and wastage due to faulty textiles by 90%, thus allowing considerable savings and enhancing production efficiency.

「聰明眼」系統在工廠環境中試行超過六個月，成功減少因紡織品次貨而引致的損耗和浪費達九成，大大節省成本，提升生產效率。

Currently, the system can be applied to most types of fabric with different weaving structures in solid colours. The research team plans to further develop WiseEye to detect defects in fabrics with complicated patterns, such as stripes and checked patterns, with a view to improving the quality of textiles and clothing for consumers.

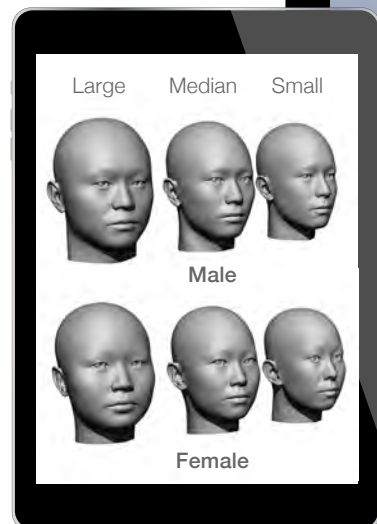
目前，該系統可應用於大部分不同紋理的純色紡織品上。研究團隊計劃進一步將「聰明眼」擴展至檢測紋理更複雜的紡織品，例如附有條紋及格子圖案的布料，以期為消費者帶來更優質的織品和服裝。

Technology 科技

Sizing products for Chinese 中國尺碼產品

The design tool allows designers to select templates of suitable head and face dimensions, face shapes and genders.

該設計工具讓設計師選取合適的頭部和面部尺寸、面形及性別的模板。



Sample 3D head templates of different sizes
不同尺碼的三維頭型模板



SizeChina FaceForm, a novel 3D design and evaluation tool developed by the School of Design, helps designers produce head and face products that specifically fit the Chinese population.

由設計學院研發的創新三維設計及評估工具「中國尺碼 FaceForm」，有助設計師製作符合中國人尺碼的頭部和面部產品。

Dr Luximon Yan pictured with
various 3D head templates
圖為張燕博士與不同的三維頭型模板



Designing products to fit the human body is no easy task. Accurate anthropometric information is necessary, and the type of information available is crucial. For instance, one-dimensional body measurements are widely used to design products such as furniture. However, these information do not provide sufficient detail to produce well-fitting head and face products.

Recently, the availability of 3D models of the human body has made the task easier, but those models are based on data from Western 3D body scans, including head and face scans. This means that products such as helmets and facial masks might not fit Chinese head shapes, a problem that Dr Luximon Yan and her research team from the School of Design, sought to address.

The research team created a new 3D design and evaluation tool called SizeChina FaceForm, based on a database of anthropometric data collected from more than 2,000 Chinese adults located around the country. Researchers selected sample head scans and used the dimensions as a reference to create small, medium and large face templates for both men and women.

The team also created a user-friendly interface using the Solidworks computer-aided design software, to make it simple for designers to use the face templates for designing and evaluating products. The interface has three main tabs that allow the designer to select templates with the appropriate head dimensions, face dimensions and face shape, as well as the gender that fit for Chinese people.

Once a suitable head and face shape template is selected, a 3D headwear product design file can be imported. The 'product' can then be simply overlaid onto the template to check the fit and identify where changes are needed to fit the Chinese head shape. The software can also be used to design products from scratch, ensuring a better fit from the beginning of the process rather than at the final evaluation stage.

This digital design tool is an excellent example of how innovative research can be translated into practical products for the benefit of industry and society. Well-fitting products like helmets are not only more comfortable to wear, but can also help save lives. The researchers plan to develop the software further so that it can be used to design products for other parts of the body, such as footwear.

設計符合人體體型尺碼的產品絕非易事，必須具備準確的人體測量資料，而可供參考的資料類型亦是一個關鍵。單維的人體尺寸常被用於設計傢俬等產品，但這些資料未能提供充足細節以生產合身的頭部和面部產品。

最近，人體三維模型的出現令設計工作較為容易。然而，這些模型均按照西方人的三維人體掃描數據製成，包括頭部和面部掃描，因此頭盔和口罩等產品或未能符合中國人的頭型。這正是設計學院張燕博士及其研究團隊嘗試解決的問題。

研究團隊從中國各省市收集二千多名中國成人人體測量數據，然後製成「中國尺碼 FaceForm」數據庫，並研發出嶄新的三維設計及評估工具。研究人員選取頭部掃描樣本的尺寸數據作為參考，分別製成了男、女的小、中和大碼頭型樣板。

團隊利用 Solidworks 電腦輔助設計軟件製成了簡易的操作介面，方便設計師利用面型模板來設計和評估產品。該操作介面設有三個主要部分，讓設計師選取合適中國人頭部尺寸、面部尺寸和面形、以及性別的模板。

當設計師選取了合適的頭型和面型模板後，便可匯入設計好的三維頭部產品檔案，並輕易將設計套上模板以檢查產品尺碼是否適合中國人的頭型，以及需要改動的地方。該軟件亦可在一開始設計產品時使用，以確保在設計過程的初段而非在最後評估階段才照顧到尺碼的要求。

這套數碼設計工具正是一個好例子，展示出如何將創新研究轉化為實用產品，從而惠及業界和社會。合身的產品，例如頭盔，不僅在穿戴時更覺舒適，亦有助保障用家的生命。研究人員計劃進一步完善該軟件，用作設計人體其他部位的产品，例如鞋履。

Technology 科技

Preventing elderly from wandering away

預防長者走失

The PolyU-developed multi-functional eNightLog system can monitor dementia patients' activities in bed to prevent them from falling or wandering away.

理大研發的 eNightLog 系統可監測患認知障礙症的長者在睡床上的活動，預防他們跌倒或走失。



Installed above the bed, the eNightLog system contains three sets of sensors, including the near infrared 3D sensor, impulse radar ultra-wide band sensor and environment sensor, which can be used to monitor the elderly's activities, health and ambient movements. The system utilises colours, text and images to indicate the status of the elderly in bed and alert caregivers when necessary.

安裝在睡床上方的 eNightLog 系統備有三組感應器，包括近紅外線三維感應器、超寬頻脈衝雷達感應器和環境感應器，用作檢測長者的活動和健康，以及環境數據。系統使用顏色、文字和圖像顯示長者的狀態，並在有需要的時候向護理人員發出警報。



Elderly with dementia suffer from a decline in memory and self-care abilities. Night-time wandering is also common among these patients. Therefore, lowering patients' risk of falls, getting hurt and even wandering away are the challenges facing caregivers.

The Department of Biomedical Engineering has a long history of developing assistive and rehabilitative technologies that respond to societal needs. Prof. Zheng Yong-ping and his research team of the department developed the non-invasive and non-contact eNightLog system to track the elderly's respiration rate and activities in bed.

Installed above the bed, the system contains near-infrared sensors to provide real-time tracking of user's condition (lying down, sitting on bed or bedside, standing beside the bed, leaving the bed). The system is also equipped with an impulse radar ultra-wide band sensor that detects the patient's respiration rate, monitoring the user's health condition and sleep quality. When signals outside a pre-set normal range are detected, the system sends an alert to the caregiver so that he/she can take immediate actions and prevent the patient from falling, getting hurt or wandering away.

17 systems have been installed and tested in a dementia-specific day care centre and residential home (Jockey Club Centre for Positive Ageing) for two months, during which it detected 380 incidences of elderly leaving their beds at night. It also recorded 525 instances when the caregiver went in to accompany the elderly to leave the bedside area. Results of the clinical trial showed that the accuracy rate of the eNightLog in detecting the elderly leaving their beds is 100%.

The research team plans to further enhance the system's functions to detect heart rate and body temperature, and connect the system with smart devices like smart diaper. This non-restraint monitoring system has already been patented and, once in general use, will greatly improve the quality of life of the elderly, bringing benefits not only to elderly people with dementia, but also other elderly in need and disabled persons while reducing the heavy workload of caregivers. This innovation has won the Gold Medal at the 46th International Exhibition of Inventions of Geneva.

Prof. Zheng Yong-ping (second from right) and his research team members
鄭永平教授（右二）及其研究團隊成員



患有認知障礙症的長者除了有記憶力衰退及自理能力逐漸減退的情況外，於夜間游走亦是患者常見的普遍現象。因此，減低患者受傷、跌倒甚至游走的風險，往往成為照顧者所面對的挑戰。

生物醫學工程學系一直致力研發輔助及復康科技，以回應社會需要。系內的鄭永平教授及其研究團隊研發了非約束和非接觸式的 eNightLog 系統，用以監測長者在睡床上的呼吸和活動。

該系統具備近紅外線三維感應器，安裝於睡床上方後，可實時檢測患者狀況（躺下、坐在床上或床旁、站在床旁，或是離床）。系統更結合超寬頻脈衝雷達感應器，能夠探測患者呼吸率，以監察患者的健康狀況，從而知道其睡眠質素。當系統偵測到患者的狀況已超越了預設正常範圍時，便會觸發警報通知護理人員，讓他們即時提供支援，以免患者受傷、跌倒或游走。

研究團隊在一所腦退化症日間中心及院舍（賽馬會耆智園）內安裝了十七個系統，並進行了為期兩個月的測試。測試期間，系統監測到各長者於晚間曾離床三百八十次；系統亦同時記錄了護理人員陪同長者離開房間共五百二十五次。臨床測試結果顯示，eNightLog 系統能偵測長者離床的準確率達百分百。

未來，研究團隊計劃將進一步提升系統的功能，包括：監測心跳率和體溫；並接駁智能尿片等裝置。這種以非約束的方式監測用者的系統已獲得專利，若能廣泛應用，不但可以大大提升認知障礙症患者的生活質素，並減輕護理人員繁重的工作量；亦有望惠及更多有需要的長者及殘疾人士。這項創新發明在瑞士日內瓦舉行的第四十六屆國際發明展中榮獲金獎。

Business & Management 工商管理



Doing good, feeling good? 助人為快樂之本？

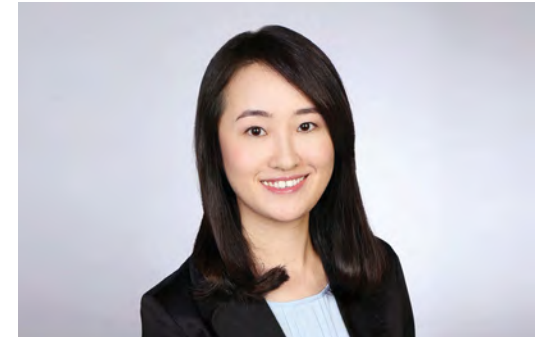
A recent PolyU study has explored the factors that influence employees' helping behaviour in organisations.

理大最近一項研究探討了影響機構員工互助行為的原因。

Many organisations encourage helping behaviour, or organisational citizenship behaviour, among employees because it is generally accepted that a supportive work culture improves both team and organisational performance. Research in this area, one of the most prominent in the field of organisational behaviour, has consistently shown that helping others makes people feel better about themselves, as expressed in the “doing good–feeling good” effect.

許多機構都會鼓勵員工互相幫助，或者建立機構公民行為模式，因普遍認為守望相助的工作文化能提升員工及機構的表現。這個範疇是機構行為最常研究的範疇之一，先前的研究都證明幫助別人會產生良好的自我感覺，正如常說的「助人為快樂之本」。

Dr Katrina Lin Jia
林佳博士



Recent studies, however, suggest there are some circumstances in which helping may not produce a feel-good effect. Helping others can be tiring and time-consuming, especially in a busy workplace. Understanding the factors that influence how employees feel about helping is thus useful for organisations to ensure staff behavior are promoting rather than hindering organisational citizenship culture.

In a recent study, Dr Katrina Lin Jia from the Department of Management and Marketing explored whether different types of motivation for helping influenced the helper's feelings about providing help. In some situations, people are motivated to help because they find it enjoyable and meaningful to do so (referred to as autonomous motivation). In others, they only provide help because they feel it is expected of them or because they believe it will gain them external rewards (referred to as controlled motivation).

The study tested the hypothesis that autonomous motivation is positively associated with positive affect, whereas controlled motivation is negatively associated with positive affect. Consistent with that hypothesis, the doing good–feeling good effect only applied to those who were autonomously motivated to offer help. Those who provided help because of controlled motivation not only failed to experience the effect, but actually reported feeling less good about themselves.

The two different types of motivation both had ongoing effects. Helpers who were autonomously motivated had greater intentions to help others in the future and were more likely to provide such help. In contrast, helpers who acted because of controlled motivation were less likely to help in the future.

Taken together, these findings have important learning points for organisations. They should, of course, continue to encourage organisational citizenship behaviour, but it is also important to allow employees autonomy in deciding whether, to whom, when and how to provide help. Doing so will avoid the negative consequences of compulsory citizenship behavior, cultivate an organisational culture in which employees are truly willing to help, and facilitate organisational team spirit.

然而，近年的研究指出，在某些情況下，幫助別人未能達致快樂的果效，為同事提供協助可能會耗時費力，特別在繁忙的工作環境中。因此，了解有甚麼因素會影響員工對幫助同儕的感受是十分重要，這有助機構確保員工的行為是幫助而非窒礙機構公民文化。

管理及市場學系林佳博士最近就助人的不同動機進行研究，以了解這些動機會否影響員工對提供協助的感覺。某些情況下，人們認為助人既愉快又有意義（這稱為「自我推動動機」），因此有動力為同儕提供協助。在其他情況下，員工覺得有責任或相信助人會帶來實際好處的情況下才會提供幫助（這稱為「受限制性動機」）。

這項研究假設基於「自我推動動機」助人的員工會產生「助人為樂」的效應，而基於「受限制性動機」而提供幫助的員工，則會感受到「助人未必快樂」的效應。結果印證了假設的論說，「助人為樂」的效應只出現在自發助人的員工身上。基於受限制性動機而提供幫助的員工，不但未能感受到快樂，實際上反而產生更差的自我感覺。

該兩種不同的動機均有持續效應。自發助人的員工有更大意欲及更有可能在將來向同儕提供援助。反之，源於受限制性動機而助人的員工日後則未必再向他人提出協助。

上述的結論對機構有重大的啟示。機構當然應繼續鼓勵機構公民行為，但同時應給予員工自主權，以決定是否、向誰、何時及怎樣提供協助。這樣可避免強制推行公民行為所帶來的反效果，推動員工真心樂意互助的機構文化，並提升機構團隊精神。❖

Business & Management 工商管理



Forecasting hotel occupancy with OECD data

善用經濟合作與發展組織數據 預測酒店入住率

Researchers associated with the School of Hotel and Tourism Management have devised an innovative approach to forecast hotel occupancy trends. This will benefit hoteliers and the tourism sector as a whole.

酒店及旅遊業管理學院的相關研究人員設計了一套創新的方法，能預測酒店入住率的趨勢，這將惠及酒店業以至整個旅遊行業。

Balancing supply and demand to manage profit is a major challenge for hoteliers worldwide as making accurate occupancy forecasting is always critical to hotel growth. How can hotel room occupancy rate be predicted? Prof. Brian King at the School of Hotel and Tourism Management, along with Principal Investigator Dr Candy Tang (University of Macau) and Prof. Stephen Pratt (University of the South Pacific) have devised an innovative, affordable and highly effective method of prediction using readily available macroeconomic data. Their effort reflects an increasing global interest in gathering reliable market intelligence through the Internet to advance the growth of tourism.

As planning for hotel operation involves high-risk, high-capital investments and heavy fixed costs, inaccurate forecasts can cause many problems. If predictions are overly optimistic, resources may be wasted and revenue lost. On the other hand, underestimating demand may lead to inadequate food provision and a shortage of duty staff. Either scenario can damage a hotel's reputation, which may have an adverse effect on local tourism in general.

In the past, hotel rooms were usually pre-purchased by traditional tour wholesalers. However, with the growth of online travel agencies such as booking.com and Expedia, it is becoming increasingly difficult for hotel managers to predict hotel room demand. As tourism is vulnerable to economic changes, hoteliers must also consider the macroeconomic environment when making operational and strategic decisions. While international chain hotel groups can commission expert consultants and use intelligent systems to ensure the accuracy of their forecasts, such expensive services are often beyond the reach of small and medium-sized hotels.

Researchers found that the data provided by the Organization for Economic Cooperation and Development (OECD) data, which are readily available online, offer an alternative. The team first analysed almost four decades of data on hotel occupancy in Hong Kong. They then investigated the accuracy and reliability of three indicators – the OECD composite leading indicator, the OECD business survey index and the OECD consumer confidence index – for predicting peaks and troughs in the occupancy data.

Promisingly, the results revealed that changes in all three indices occurred before changes in hotel room demand. Therefore, these data, especially the OECD consumer confidence index, can be an excellent predictor of overall Hong Kong hotel occupancy rates. As a supplement to established forecast systems, this highly effective planning method will benefit not only resource-constrained hotels but also governments and investors seeking to enhance tourism infrastructure.

平衡供求以管理利潤是全球酒店業的重大挑戰，能夠精準地預測入住率對酒店業務增長至為關鍵。但怎樣預測酒店客房入住率？酒店及旅遊業管理學院金博藍教授聯同首席研究員鄧美鳳博士（澳門大學）和柏歷國教授（南太平洋大學）設計了一套創新、經濟且非常有效的方法，利用現有的宏觀經濟數據用來預測入住率。他們的研究反映了透過互聯網收集可靠的市場情報作促進旅遊業務增長之用，已經是一個環球趨勢。

由於酒店營運的規劃工作牽涉高風險、高資本投資及大量的固定成本，預測失準可帶來很多問題。假若預測過於樂觀，可能導致資源浪費和損失收入。反之，低估需求則可能出現食物供應不足及當值人手短缺的情況。兩者均可損及酒店的聲譽，甚至對當地整體旅遊業產生負面影響。

昔日，傳統的旅行團經銷商通常會預先訂購酒店客房。但隨著 booking.com 和智遊網（Expedia）等網上旅行社興起，酒店管理人員預測酒店客房的需求就愈來愈困難。由於旅遊業容易受經濟變化的影響，酒店業在作出營運和策略決定時，必須同時考慮宏觀經濟環境。跨國連鎖酒店集團可委託專家顧問和選用智能系統確保其預測的準確性，但中小型酒店卻往往未能負擔這些昂貴的服務。

研究人員發現經濟合作與發展組織（OECD）的免費數據提供了一個另類選擇，而且在網上隨手可得。團隊首先分析了香港近四十年來的酒店入住數據，再研究了 OECD 綜合領先指標、OECD 商業調查指數及 OECD 消費者信心指數在預測入住率數據中的旺淡季準確性和可靠性。

結果顯示，在酒店客房需求出現調整前，以上三項指數已有所變化。因此這些數據，尤其是 OECD 消費者信心指數，可成為預測香港整體酒店入住率的理想工具。這套高效的規劃方法可輔助既有的預測系統，不但讓資源緊絀的酒店受惠，亦為有意提升旅遊基礎設施的政府及投資者帶來裨益。

Prof. Brian King
金博藍教授



Social Sciences 社會科學



Why children with autism have communication difficulties?

自閉症兒童為何有溝通困難？

Researchers have found evidence that the inability to comprehend presupposed information may be key to the communication difficulties of children with autism.

研究人員發現導致自閉症兒童溝通困難的關鍵原因，可能是對話期間，他們未能理解當中的預設信息。

Children with autism often have communication difficulties. They cannot understand, share and respond to others' feelings and perspectives during conversations. No research can explain why they occur in the past. Dr Candice Cheung of the Department of Chinese and Bilingual Studies has recently found evidence of a key factor impeding the communication of children with autism – a deficit in their ability to comprehend presupposed information from received information during conversations.

自閉症兒童普遍有溝通困難，他們在對話時往往未能理解、分享和回應別人的感受及觀點。過往未有研究能解釋其成因。中文及雙語學系張志恆博士最近發現了一個窒礙自閉症兒童溝通的關鍵因素，就是他們在對話過程沒有足夠能力從接收的信息中理解預設信息。



Dr Candice Cheung
張志恆博士

Effective communication relies on a set of background beliefs (or presuppositions) shared by those involved in conversations. Dr Cheung and her team explored the significance of four common types of presupposition for the communication of children with autism. They analysed and compared data from 21 Cantonese-speaking children with autism and 101 normal Cantonese-speaking children in mainstream primary schools in Hong Kong.

If one person tells another that "Sue was absent again", the second person usually understands that Sue has been absent before. This is known as a *lexical* presupposition. In this case, the iterative adverb "again" presupposes that Sue has missed class before. However, children with autism fail to understand that Sue has been absent before.

On the other hand, an *existential* presupposition is the assumption that things or people referred to by definite descriptions (those beginning with "the") exist. If someone says, "The professor was sick yesterday", a hearer assumes that the professor is a real person. A *factive* presupposition is similar, but triggered by a factive verb such as "know". If someone says, "John knows Mary is a pianist", a hearer generally understands that the information "Mary is a pianist" is true. However, children with autism can neither assume that the professor is real nor understand that the information "Mary is a pianist" is true.

In addition, a *structural* presupposition is triggered by sentences containing a specific construction, such as temporal clauses (those with temporal conjunctions like "before" and "after"). For instance, if one says, "After David came, everyone was happy", a hearer usually assumes that the content of the temporal clause—that is, "David came" is true while children with autism fail to do so.

Relative to the normal children, the children with autism clearly showed a deficit in comprehending the above presuppositions, a deficit that appears to be due to the disorder rather than deficits in general language ability or non-verbal intelligence.

As an understanding of presuppositions is instrumental to successful communication, the research finding opens up an important pathway for future studies of the same category.

有效的溝通有賴在對話過程中，參與者能否就對話內容的背景觀念充分理解預設信息 (presuppositions)。張博士及其團隊探討了四種常見預設信息對自閉症兒童溝通方面的影響，她們就二十一名操粵語的自閉症兒童及一百零一名操粵語、正常發育和就讀主流小學的兒童進行研究，採集數據並分析和比較。

假如一個人告訴另一個人「Sue 又缺課了」，對方通常會理解為 Sue 以往曾經缺課，這稱為詞彙預設 (lexical presupposition)。在這個例子中，「又」(again) 這個迭代副詞預設 Sue 以往曾經缺課。然而，自閉症兒童未能理解 Sue 以往曾經缺課。

另一方面，存在性預設 (existential presupposition) 一般假設描述的人或事（以英文字「the」開首）真實存在。假如有人說：「這位教授昨天病了」，聽者會假設這位教授是一個真實的人。這與事實性預設 (factive presupposition) 相似，但事實性預設是由「知道」一類的事實性動詞所觸發。當有人說：「John 知道 Mary 是位鋼琴家」，聽者一般會理解「Mary 是位鋼琴家」這信息是真確的。不過，自閉症兒童未能假設教授真的存在，亦不能理解「Mary 是位鋼琴家」這信息的真確性。

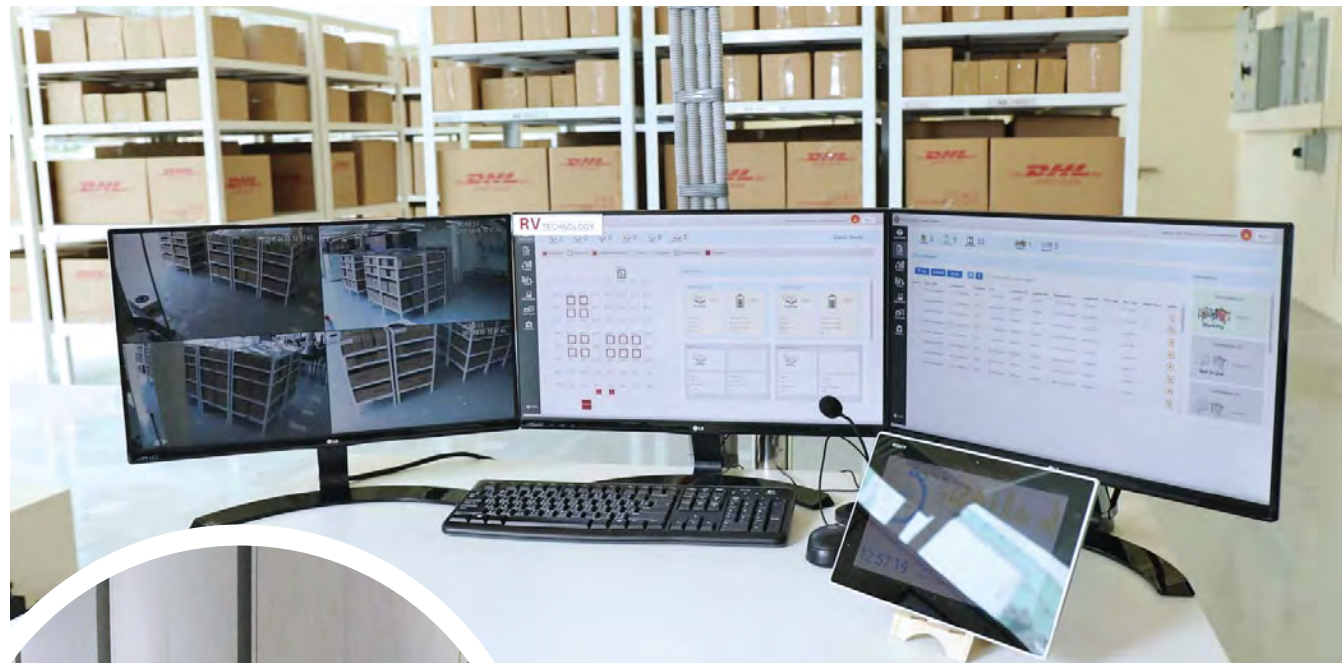
此外，結構性預設 (structural presupposition) 是由特定句子的組成方式觸發，例如時間分句（有「之前」和「之後」等時間連接詞的句子）。例如有人說「David 來到之後，所有人都很開心」，聽者普遍會假定「David 來到」這時間分句是真的，而自閉症兒童則沒有此假定能力。

相對於正常發育中的兒童，自閉症兒童明顯對預設信息的理解不足。這似乎是由自閉症的不協調引起，與他們的語言能力或非語言智商並無關係。

由於理解預設信息對溝通十分重要，研究結果為未來同類型的研究開拓重要方向。

Smart warehousing system meets the needs of Industry 4.0

智能倉庫系統滿足工業 4.0 需求



Control centre of the Smart Robotic Warehouse Management System
智能機器化倉庫管理系統的控制中心

PolyU researchers have developed a smart robotic warehouse management system that revolutionises logistics operations by providing fully automated, unmanned and round-the-clock services.

理大研究人員研發出一套智能機器化倉庫管理系統，可提供全自動化、無人操作的全天候服務，革新了物流業的運作模式。

The compact and flexible Autonomous Mobile Robot, utilising QR Code navigation technologies, has a maximum loading of 500 kg. It can easily move the entire storage rack, facilitating fast picking and replenishment.

採用二維碼導航技術的自主移動機械人外表小巧靈活，但能載重達五百公斤，可輕輕鬆鬆地移動整個貨架，方便揀貨和補貨。



Dr Carmen Lee (front middle) and her team
李嘉敏博士（前排中）及其團隊

Online shopping is ubiquitous in today's digital age, and the rapid growth of e-commerce has fuelled a massive demand for third-party logistics services. Yet traditional logistics providers, with their low-technology and labour-intensive warehouses, are also lagging behind, due to labour shortage caused by ageing population.

To cope with this challenge, a team from the Department of Industrial and Systems Engineering led by Dr Carman Lee Ka-man collaborated with an industrial partner, RV Automation Technology Company Limited, to jointly develop a smart robotic warehouse management system that transforms traditional warehouses into contemporary, high-technology and unmanned logistics fulfilment centres.

Developed under the funding support of the Innovation and Technology Commission, this revolutionary system combines the most advanced Industry 4.0 technologies – the Industrial Internet-of-Things (IIoT), Autonomous Mobile Robots (AMRs) and Cloud Computing – to improve the scalability, speed and efficiency of various stages of logistics operations, including warehouse management solutions, storage lockers and express services, etc.

The system's success is a shift from person-to-goods to goods-to-person in logistics operations. Workers no longer need to search for specific items to fulfil orders, as AMRs simply deliver the required goods in storage racks for fast picking and replenishment. Thanks to cutting-edge swarm robotics and optimisation algorithms, these AMRs also collaborate efficiently to fulfill a range of activities, including re-slotting, multi-deep storage and batch picking, etc.

The practical value of this research project has already been demonstrated in the recently opened RobEx Centre, Hong Kong's first fully automated and unmanned smart warehouse facility in Hong Kong Science Park. The smart robotics warehouse management system has been complimented for operating round-the-clock, maximising operational efficiency and reducing the need for physically demanding human labour. In addition, big data analysis helps to scale warehouse services to meet demand in peak hours and reduce human errors in parcel storage and delivery.

In December 2018, this project won the Gold Award and Outstanding Automation Award at the Asia International Innovative Invention Awards. The system is expected not only to enhance the development of the logistics industry – a key pillar of Hong Kong's economy, but also to help create a safer working environment for the industry.

網上購物在現今數碼年代非常普及，而電子商貿的急速發展更令第三方物流服務需求龐大。與此同時，傳統的物流供應商因以低技術和勞力密集型的倉庫運作，隨着人口老化導致勞工短缺，其發展也正在倒退。

為對應這項挑戰，工業及系統工程學系李嘉敏博士帶領團隊，與業界夥伴精銳動力科技有限公司合作研發了一套智能機器化倉庫管理系統，將傳統倉庫改革成為現代化、高科技和無人操作的物流營運中心。

這革命性系統的研發工作由創新科技署撥款資助，融合了工業物聯網、自主移動機械人和雲端運算等最先進的工業 4.0 技術，大大提升了倉庫管理、儲物櫃和速遞服務等物流運作各個流程的規模、速度和效率。

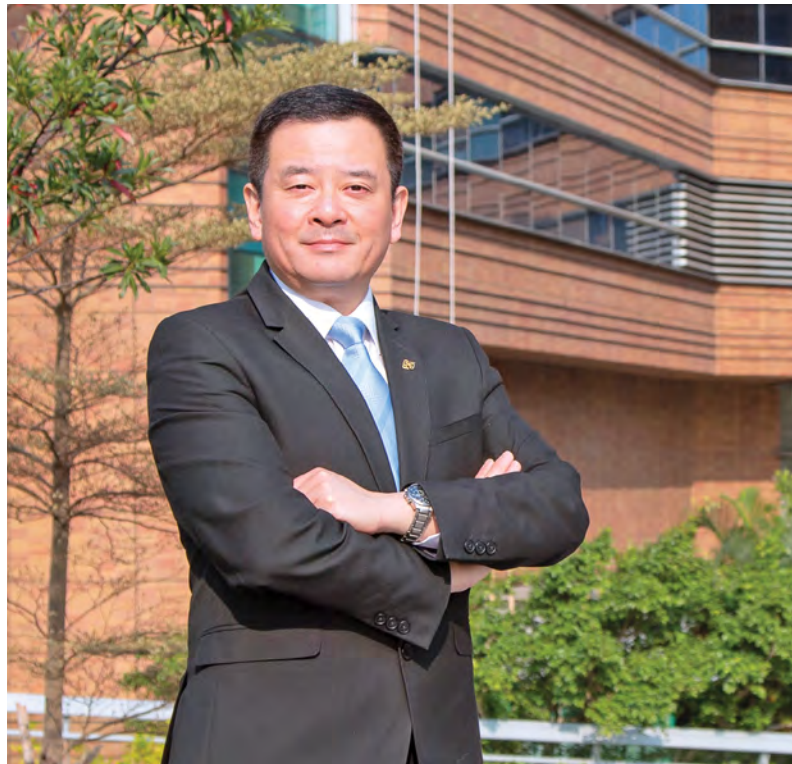
該系統成功之處是將物流的操作模式從「人到貨」轉變為「貨到人」。工人無須再按訂單搜尋特定貨品，自動移動機械人會從存貨架提取並遞送所需貨品，並幫助補貨。配合尖端的群體機械人技術和優化算法，這些自動移動機械人也能有效率地互相合作並完成一連串的工作，包括重新分配貨位、將貨品作多層存儲和分批補貨等。

本港首個全自動無人操作智能倉庫「機械人速遞中心」最近於香港科學院開幕，印證了這個研究項目的實用價值。智能機器化倉庫管理系統可全天候運作，充分提高營運效率並減少對勞動工人的需求。此外，大數據分析亦有助提升倉庫服務以配合繁忙時段的需要，並減少儲存和送遞包裹時的人為錯誤。

2018 年 12 月，這項目榮獲亞洲國際創新發明大獎的金獎與傑出自動化發明大獎。物流業是香港經濟的重要支柱，這系統不但能推動物流業的發展，更有助業界創造更安全的工作環境。

A broader vision of education

宏大的教育願景



Prof. Ben Young spoke about his new role as Vice President (Student Affairs) and the importance of internationalisation in the higher education sector.

楊立偉教授分享他出任副校長（學生事務）所擔當的角色，以及國際化對高等教育界的重要性。

Prof. Ben Young, Vice President (Student Affairs), recently joined PolyU to oversee the University's policies and plans for student development and cultural promotion. He shared his people-oriented education focus and the importance of internationalisation to not only PolyU but also higher education in general.

You are a structural engineer by profession but your time in academia has always heavily featured people-oriented roles. What drew you to those roles?

This started when I was hall warden at the University of Hong Kong. The student interaction in a hall is very different to traditional teaching and learning in the classroom, where the interaction can be fairly limited. As a hall warden, I had many opportunities to interact with students. We lived like a big family, and the co-curricular activities organised by the hall office and by the students themselves, were in a way like a holistic education for the students. They got to learn many things that they might not have been able to learn in the classroom. For me, that was a valuable experience, and highly enjoyable.

副校長（學生事務）楊立偉教授最近履新，負責監督大學有關學生發展和文化推廣的政策與計劃。他分享其以人為本的教育方針，以及國際化對理大以至整體高等教育界的重要性。

你是一位專業的結構工程師，但在學界經常從事以人為本的工作。是甚麼吸引你出任這些職務？

這要從我在香港大學擔任舍監說起。在舍堂內，學生的互動有別於傳統教學及課堂學習，後者的互動相當有限，我作為舍監，有很多機會跟學生交流溝通。我們就像在一個大家庭內生活，而由舍堂和學生舉辦的各類聯課活動，某程度上就為學生提供了全人教育，讓他們學習眾多課堂以外的東西。對我來說，舍監一職是非常寶貴的經驗，我亦樂在其中。

What specifically appealed to you about joining PolyU as Vice President (Student Affairs)?

PolyU's brand promise is "Opening Minds • Shaping the Future". This resonates with my personal goal of educating our next generation. I plan to steer the development of co-curricular activities on a broader scale at the university level to enhance the quality of education. It is my mission to help students broaden their horizons through a rewarding university experience. Therefore, it is paramount to provide students with a wide range of rich experiences beyond the classroom, contributing to their holistic development as professionals and well-rounded individuals. In addition, I firmly believe that art and culture also plays an essential role in all-round education.

It is important to expand student diversity, provide more overseas and mainland China learning and research opportunities, and ensure that the programmes offered by PolyU are internationally benchmarked and globally competitive.

You have focused on student communication in previous roles. How are you planning to do this at PolyU?

It is one of the University's strategic priorities to enable students to acquire the attributes and competencies required to operate confidently in a global working environment and to make contributions as global citizens.

I plan to start a series of dialogue sessions about how to foster constant communication between local, mainland and international students. I will also lead the International Affairs Office to recruit more international students and increase the number of exchange students. Students will become familiar with people from different cultures and backgrounds, thus creating a campus environment that is international, enriching and inclusive. This will also foster students' global awareness and engagement.

You have a wealth of experience in promoting internationalisation among students. What particular insight have you gained that will be beneficial for PolyU?

I was very pleased to participate in the "Framework for the Internationalisation of Doctoral Education" conducted by the European University Association from 2012 to 2015. The Association has more than 800 higher education institutes in 48 European countries. I served as one of the six steering committee members and was the only member from Asia.

Institutions around the globe have different doctoral education strategies. This project was launched to develop an online normative self-evaluation tool for use in identifying good practices and facilitating benchmarking when institutions seek to internationalise their doctoral education. Those are some of the good practices.

How critical is university internationalisation to Hong Kong as a whole?

Hong Kong has become a regional education hub, drawing students and staff members from all over the world. We can only continue to attract these people if we ensure that our tertiary education is in line with and competitive according to international standards.

有甚麼特別吸引你加入理大擔任副校長（學生事務）一職？

理大以「啟迪思維・成就未來」作為教研承諾，這與我個人對教育下一代的目標很類似。我會透過推動更廣泛的聯課活動以提升教育的質素。我的使命是透過提供有意義的大學體驗，開闊學生的視野。因此，為學生提供多元化和豐富的課外體驗是極為重要的，有助他們在專業和個人方面的全面發展。此外，我深信藝術和文化在全人教育中有著關鍵的角色。

增加不同國籍學生以拓闊學生社群、提供更多海外和中國內地的學習和科研機會，以及確保理大的課程符合國際標準和具環球競爭力都是十分重要的。

你過往在不同崗位中都專注於提升學生的溝通能力，你計劃如何在理大推動這方面的工作？

大學的其中一個策略重點是要培養學生具備適當的特點和能力，可以滿懷自信地在國際化的環境下工作，並且成為世界公民，作出貢獻。

我計劃開展一系列的對話活動，探討如何促進本地、內地與國際學生之間的溝通。我亦將帶領國際事務處招收更多國際學生和增加交流生的數目，讓理大學生認識來自不同文化和背景的人士，繼而營造國際化、豐富多彩且共融的校園環境，這亦有助推動學生認識世界和參與國際化的活動。

你在推廣學生的國際化發展方面經驗豐富，當中有何獨特見解可以為理大帶來裨益？

我很高興能在 2012 至 2015 年間，參與由歐洲大學協會（European University Association）帶領進行的「博士教育國際化框架」項目。該協會的成員來自歐洲四十八個國家逾八百所高等教育院校。這個項目的督導委員會有六位成員，我是其中一位，也是唯一一位來自亞洲的成員。

世界各地院校在博士教育上的策略各有不同。因此，我們透過此項目開發網上規範性的自我評估工具，使院校在推動博士教育國際化時，可以識別良好的實踐方法，並且有助與國際基準接軌。這都是一些良好的實踐方法。

大學國際化對香港整體而言有多重要？

香港已成為區域的教育樞紐，吸引到世界各地的學生和教職員。我們要持續吸引這些人才，就必須確保我們的高等教育是符合國際標準和具競爭力。✦



Supporting Hong Kong's healthcare system 支援香港醫療體系

Prof. David Shum, the new Dean of the Faculty of Health and Social Sciences, returned to Hong Kong after a long overseas sojourn and joined the Faculty. He shared his vision for the Faculty's development.

旅居海外多年的岑浩强教授重返香港，出任醫療及社會科學院院長。他分享對學院發展的願景。

Prof. David Shum, the new Dean of the Faculty of Health and Social Sciences (FHSS) and Chair Professor of Neuropsychology, is a world-renowned researcher in human memory and a seasoned administrator. After decades overseas, he returned to Hong Kong last year and joined PolyU. Below is his sharing about his vision and plans for the FHSS.

醫療及社會科學院（學院）新任院長兼腦神經心理學講座教授岑浩强教授是世界知名學者，專長於研究人類記憶，也是一位資深管理人員。他旅居海外多年，去年返港後加入理大。以下是他就學院的願景和計劃所作的分享。

How has your experience in Australia shaped your approach to strategic teaching and research directions at the FHSS?

In terms of teaching, as Dean of the Health Group at Griffith University I gained experience promoting interdisciplinary collaboration, with health students from different areas benefitted from attending lectures and undertaking training together. I have started to encourage that at the FHSS. I also had a lot of exposure to the latest teaching approaches, such as MOOCs, blended learning and flipped classrooms. I want to invite experts in such areas to the Faculty to talk about their successful experiences.

In terms of research, I have experience in building up critical mass at research centres. Research is a group activity because everyone has his/her own strengths. By forming good teams with talent from various disciplines and backgrounds at the Faculty, we will be able to tackle big research questions that cannot be answered by a single discipline.

How do the Faculty's health promotion efforts match the Hong Kong government's stance on developing primary healthcare?

Soon after I joined the FHSS, we organised a primary health care symposium on future challenges, at which academics, government and NGO representatives, and healthcare practitioners worked together to devise cross-disciplinary ways of helping to develop primary healthcare in Hong Kong. The government was very supportive of this kind of cross-disciplinary activity.

What can the Faculty do to help enhance the health of the elderly?

Hong Kong is among the cities with the highest life expectancy in the world. My colleagues in the Faculty are doing good work in areas such as the ageing eye research, developing new health technologies for older people and helping them deal with problems like chronic pain and stroke with the ultimate goal to improve the quality of life of the elderly. My mission is to support and coordinate such efforts to bring benefits to the elderly in the community.

What led the Faculty to recently increase places in some undergraduate programmes?

We needed to offer more student places to catch up with demand in healthcare staff in the public system because the ratio of patients to professionals is quite high in Hong Kong by international standards. Many of the 'baby boomer' professionals are now retiring. A great deal of experience is being lost, and we need to train new blood for different healthcare professions.

What kind of research are you now pursuing?

I am currently researching on the behavioural effects of ageing and brain injury with two collaborators in Australia – a nursing professor and an occupational therapy professor.

Do you have any plans to contribute further to Hong Kong's healthcare system?

I now represent PolyU on the Hospital Authority Board, and the healthcare system has developed a lot since I left Hong Kong in the 80s. I am determined to actively contribute my expertise to the Board.

你在澳洲的經驗對你規劃學院的策略性教研方向有何影響？

就教學而言，擔任格里菲斯大學健康醫學院院長一職豐富了我在推動跨學科合作方面的經驗，該學院讓修讀不同健康醫學的學生一起上課及接受培訓，學生從中獲益良多。現時，我已開始在學院推行這種做法。此外，我亦有機會接觸最新的教學方法，例如大型開放式網絡課程（MOOCs）、混合式學習（blended learning）和「翻轉教室」（flipped classrooms）等。我希望可以邀請到這些領域的專家到學院分享成功經驗。

在研究方面，我對為研究中心招攬人才累積了一定經驗。研究是一種團隊活動，因為每人都各有所長。透過召集學院內不同學科和背景的人才去建立優秀的團隊，我們將能應對單一學科無法解答的重大研究題目，尋求突破方案。

學院推廣健康的工作如何配合香港政府發展基層醫療的立場？

在我加入學院不久，我們舉辦了一個以探討基層醫療未來的挑戰為主題的研討會，集合了學者、政府與非政府機構代表及醫護人員的力量，構思以跨學科的方式協助發展香港的基層醫療。政府非常支持這種跨界別的活動。

學院可怎樣幫助改善長者的健康？

香港是全球人均預期壽命最長的城市之一。學院同事在相關的範疇努力耕耘，如研究眼睛老化、為長者研發健康新科技，以及幫助他們應付長期痛症和中風等問題，最終希望改善長者的生活質素。我的使命是要支持和協調這些工作，為社區的長者帶來裨益。

是甚麼促使學院早前增加部分本科課程的名額？

我們需要提供更多學額以追上公共醫療系統對醫護人手的需求。跟很多國家比較，香港的病者與醫護人員的比例相當高。很多「戰後嬰兒潮」時期出生的醫護人員將陸續退休，令業界失去大量有經驗的人才，因此我們要為不同醫療專業培育新血。

你現在正進行哪些研究工作？

我正聯同澳洲一位護理學教授和一位職業治療學教授進行年老及腦損傷對行為影響的研究。

你有否計劃對香港的醫療體系進一步作出貢獻？

自我於八十年代離港後，本地醫療體系已經改變了很多。我目前代表理大擔任醫院管理局（醫管局）大會成員，將會積極參與，為醫管局大會貢獻所長。❖

Research books and monographs authored by PolyU academics (July 2017 - June 2018)
理大學者撰寫的研究書籍及專題著作 (2017 年 7 月至 2018 年 6 月)

Department 部門	Researcher 研究人員	Publication Title 刊物名稱	Published by 出版	Place of Publication 發行地
AF	Dr Angelia Wang Jia 王佳博士	Conceptualizing Copyright Exceptions in China and South Africa: A Developing View from the Developing Countries	Springer International Publishing	Switzerland 瑞士
AMA	Prof. Qi Li-qun 祁力群教授 *	Tensor Eigenvalues and Their Applications	Springer SBM	Singapore 新加坡
CBS	Prof. Huang Chu-ren 黃居仁教授 *	Mandarin Chinese Words and Parts of Speech: A Corpus-based Study	Routledge	London, UK 英國倫敦
CBS	Dr Kim Sun-A 金善娥博士 *	Pronunciation Rules of HSK Characters: Learning and Teaching Principles	Hawoo	Seoul, Korea 韓國首爾
CC	Prof. Jia Jin-hua 賈晉華教授	Gender, Power, and Talent: Daoist Priestesses in Tang China	Columbia University Press	New York, USA 美國紐約
CC	Prof. Jia Jin-hua 賈晉華教授	Study of Classical Chan Buddhism	Kyuko Shoin Press	Tokyo, Japan 日本東京
CC	Dr Brian Tsui Kai-hin 徐啟軒博士	China's Conservative Revolution: The Quest for a New Order, 1927-1949	Cambridge University Press	Cambridge, UK 英國劍橋

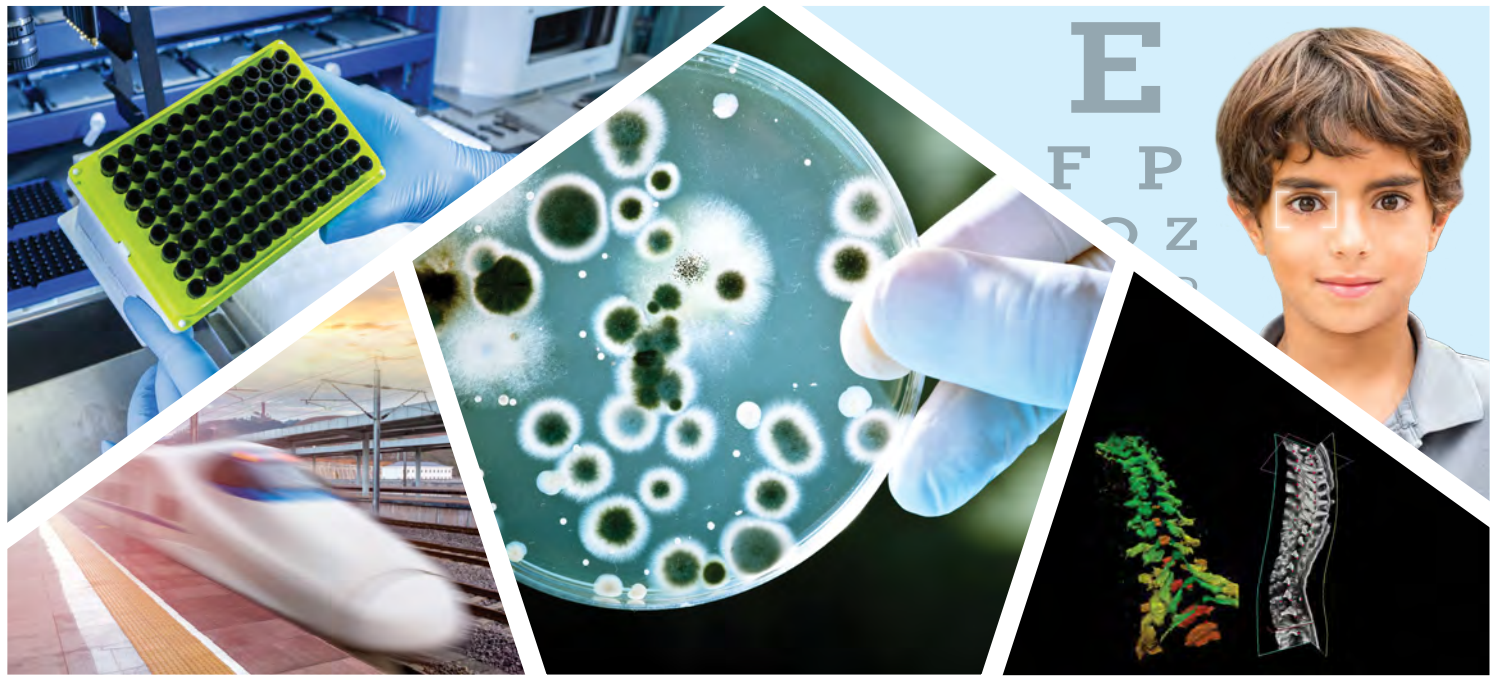
*Co-author 合著

Department 部門	AF School of Accounting and Finance 會計及金融學院
	AMA Department of Applied Mathematics 應用數學系
	CBS Department of Chinese and Bilingual Studies 中文及雙語學系
	CC Department of Chinese Culture 中國文化學系

From July 2017 to June 2018, PolyU academics produced a total of 3,159 refereed journal papers, 1,629 conference papers and 1,646 other publications.

由 2017 年 7 月至 2018 年 6 月，理大學者共發表三千一百五十九篇學術期刊論文、一千六百二十九篇會議論文，並出版一千六百四十六份其他學術刊物。◆





Under the 2018/19 Research Impact Fund (RIF) of the Research Grants Council, 10 PolyU-led projects were awarded a total of \$65 million funding, representing one-third in terms of both funding and the number of projects of the RIF in 2018/19. PolyU's performance in the RIF exercise is well above all the government-funded universities in Hong Kong.

在研究資助局 2018/19 年度研究影響基金撥款當中，由理大帶領的十個項目共獲得六千五百萬元資助，獲撥款計劃的數目及撥款額均為是次研究影響基金撥款的三分之一，領先本港其他政府資助大學。



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