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umagazine 澳大新語

科研成果轉化
澳大推動創新創業發展

Transforming the Fruits of Scientific Research:
UM Promotes Innovation and Entrepreneurship

澳大特色學科走進慕課
UM's Signature Courses to Be Launched on MOOC Platform

以生命影響生命
地震工程學專家阮家榮教授
'A Life Infuencing Other Lives' —
The Story of an Earthquake Engineering Expert, Prof Yuen Ka Veng

編者的話　Editor's Words

蘇格拉底說過：“要推動世界的人，須先自己行動。”

澳大一向支持師生把創新想法付諸實行，一方面支持師生把科研成果轉化成對社會有貢獻的產品，實踐以研究推動社會進步的宗旨；另一方面成立創新中心，推動大學科技成果轉化和開發，令澳大在知識創新、技術創新方面作出更多貢獻。今期封面故事，我們探討澳大近年在產學研方面取得的卓越成績，以及如何透過創新中心的平台，協助師生將其創意理念轉化成實踐，最終能以成果推動世界的發展。

創新科技日新月異，電子科技推動社會發展的同時，也逐漸改變了我們的生活和學習模式。人工智能驅動社會轉型，澳大在相關領域人才培養上有甚麼新策略，以應對社會的轉變？澳門將要面臨智慧城市的到來，澳大在人工智能研究範疇上可以提供哪方面的技術支援？在線課堂慕課（MOOC）的出現改變了傳統的上課形式，澳大的慕課團隊正計劃推出具有澳大特色和創意的課程，他們在課程設計上如何做到具吸引力、創新性以及能夠體現澳大學科的特色？

澳大眾多教授都是臥虎藏龍之輩，學術成果蜚聲國際。今期我們專訪了地震工程學之父 George W. Housner 的第三代弟子、結構力學專家阮家榮教授，以及犯罪學專家劉建宏教授，暢談他們的成功經驗。

廣邀校內各學院老師撰寫的“學院專欄”，今期介紹有關金磚國家商法碩士課程的創新教學法和學習方式，以及應用智慧城市技術於殘障人士生活的最新研究。

Socrates once said, 'Let him who would move the world first move himself.'

This is the spirit that moves this university, in teaching and research. In research, our staff and students aim to transform their scientific pursuits into products that promote social progress and utility, so that outcomes which benefit individuals will benefit many others as well. To this end, we have established the Centre for Innovation to take our research downstream and to influence technological innovation. Our cover story in the current issue features recent outstanding achievements in this area, and reports the ways in which the Centre for Innovation is helping staff and students to become technological entrepreneurs in a fast-developing world.

Innovative technology is changing human society at lightning speed. In particular, digital technology has opened the floodgates to social development and has even altered the way we live and learn. Artificial intelligence is driving social transformation, and UM is at the forefront of training AI experts to cope with paradigm-shifting progress. As a society, Macao is redesigning itself into a smart city, a project in which the university will play a leading role. In teaching too, innovation is the order of the day. Our Massive Open Online Course team is busy designing a digital learning platform that will change and challenge the conventional pedagogic model with course offerings that showcase UM's own unique characteristics and attractive features.

The university's deep talent pool will surprise many. Some boast celebrated and decorated careers and achievements. In this issue, we honour our own specialist whose academic genealogy is traceable to George W Housner, the father of earthquake engineering. He is Prof Yuen Ka Veng, an acclaimed expert in structural engineering in his own right. We also train the spotlight on our noted criminologist Prof Liu Jianhong with his own unique perspective on his discipline.

Our 'Faculty Column' has a standing invitation to teachers in all departments and faculties to write about subjects close to their hearts. In the current edition, we run one report on the innovative teaching and learning methods adopted by our commercial law programmes for BRICS countries, and another on the latest research which applies smart city technology for the benefit of people with disabilities.

張惠琴　Katrina Cheong

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is a biannual publication of the University of Macau. It aims to provide information on the latest development of the university in teaching, research and other areas.

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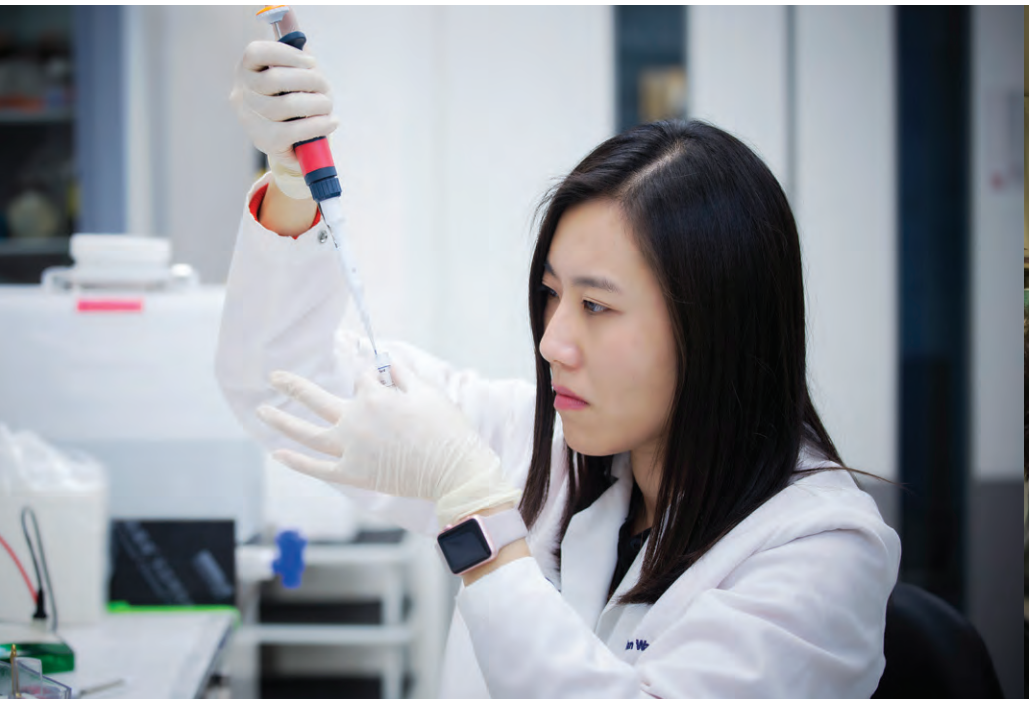
科研成果轉化
澳大推動創新創業發展

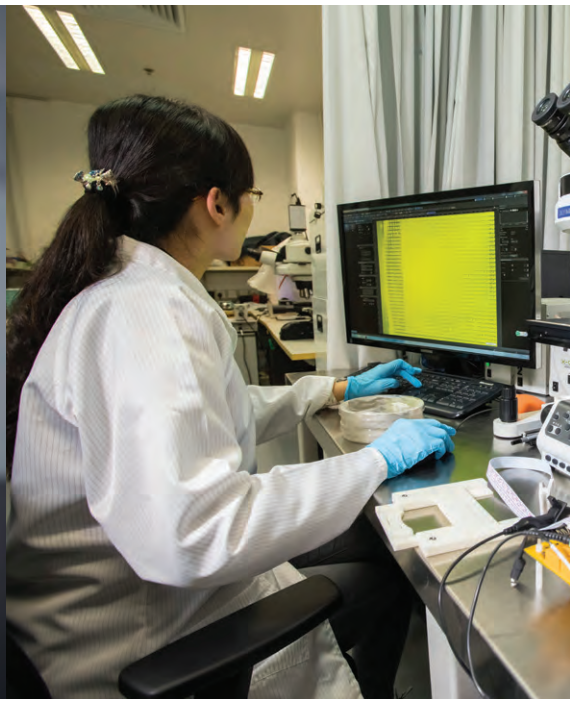
Transforming the Fruits of Scientific Research:
UM Promotes Innovation and Entrepreneurship

在大眾創新，萬眾創業的氛圍下，加上粵港澳大灣區帶來的發展動力和創業前景，令不少澳大學生計劃走上創業這條路。澳大近年全力支持師生創新創業，並鼓勵師生將科研成果轉化為產品投放市場，冀以新知識新技術為社會服務。今期封面故事，我們通過一系列文章探討師生和校友創業的抱負、澳大在產學研方面的成果，以及如何為師生提供創業支援的平台。

Riding the wave of popular interest in innovation and business start-ups, and capitalising on the developmental energies and entrepreneurial possibilities unleashed by the Guangdong-Hong Kong-Macao Greater Bay Area concept, many UM students are scratching their business ownership itch. In recent years, UM has spared no effort in helping our staff and students to establish innovative ventures. In particular, we have nudged them to transform their research results into marketable products. Contemporary society is best served by the application of new knowledge and the introduction of new technologies.

Our cover story in the current edition takes an up-close-and-personal look at what is new on the business-creation front among staff, students, and alumni, as well as at the fruits of our research labours, so as to better position ourselves to provide the necessary platform for assisting our budding entrepreneurs.





產學合作 貢獻社會

Benefiting Society with the Fruits of Scientific Research

文 Text｜余偉業 Kelvin U　圖 Photo｜ 譚金榮、李思、黃詠豪 Eric Tam, Manuel Reis, Fernando Wong

近年，澳門大學開始與業界緊密合作，透過不同合作模式，為把苦心經營的研究成果推出市場做好準備，轉化成對社會有貢獻的產品，令科研不再是紙上談兵。從因應社會需要到轉移成果，澳大如何探索出一條產學研持續發展的出路？

In recent years, the University of Macau (UM) has embarked on close collaborations with industry. In doing so, it has experimented with different models of cooperation in order to push the products downstream, turning them into valuable social assets. Scientific research is no longer just dreams on paper or blue sky thinking within the ivory tower. It involves translating research results into tangible benefits for society. Going forward, how might the university carve a path towards sustainable scientific development?

科研趨向
以技術轉移為本

澳大科研團隊眾多，研究項目也涉獵不同的範疇，當中包括微電子、中醫藥、機電工程、生物醫學、社會科學和人文等多個領域，各團隊每年需努力不懈，達至不同階段的研究目標，而且要爭取持續性經費，項目本身需具備很強的競爭力。本身是微電子專家的澳大副校長（研究）馬許願教授表示，大學內部和外部均設有不同研究資助基金可供申請，兩者皆由來自不同領域的專家審批，準則嚴謹，須具研究價值、充分理論依據、新穎學術思想、可行的研究內容等。

馬教授解釋，澳大研究資助項目大概可劃分兩類，一）理論型研究，較著重於追求學術上的真理；二）應用型研究，建基於理論研究之上，開發嶄新的應用技術，較著眼於是否對社會有所作為。兩者均有不同的資助來源，如有國家自然科學基金委員會（NSFC）、澳門科學技術發展基金（FDCT）、廣州市科技創新委員會等。

澳大已從國內、美國和其他地區成功申請到共 63 項研究專利
UM has been granted 63 patents in mainland China, the United States, and other regions

對於應用型研究的資助申請，項目本身需具很明確的可操作性，其研究成果日後能轉化為產物，回饋社會。馬教授認為這樣也很合理，“社會投入如此多資源，如果沒好好加以利用，那技術永遠都是純理論，如今這些準則令科研項目推向新的層次。值得高興的是，澳大獲取的研究經費一直穩步上揚。”

豐碩研究成果 促技術轉移

沒有紮實的理論研究產出，就沒有應用的技術轉移。澳大近年的科研成績，具體可反映於師生在國際學術期刊發表論文的數量，從 2009 年約 144 篇到 2017 年躍升至 1,410 篇，較過去八年上升了近十倍。當中，尤其以澳大兩個國家重點實驗室的研究成果最為突出。在投入運作 7 年後，兩實驗室先後獲海內外專家高度評價，肯定澳大在集成電路、中醫藥研究上的國際學術影響力，以及在科研人才的培養。馬教授指出，經過長年的奮鬥，澳大已積累了很多高質量的理論研究，開始邁向研究實踐的階段，當中有些更進展成新的研發，備受業界青睞，可見澳大研究正循序漸進從學術期刊中“走出來”。

目前，澳大已從國內、美國及其他地區成功申請到共 63 項專利。馬教授表示，有部分專利已吸引到國內外的企業機構問津，有些更達成合作協議，為投入生產做好準備。他說：“我們（科研人員）一直醉心工作，由概念規劃到實踐，一切從零開始，每一步走來都得來不易，現在終於來到科研成果轉化的階段。”

教研為日後 技術轉移鋪路

澳大鼓勵學生創新和實踐，多參與研究實習項目；老師們除了兼顧教學和研究的工作外，也會為學生提供不同的研習機會。馬教授表示，教學和研習是相輔相成的，學生的研究成果也有機會在國際頂尖學術會議和學術期刊上發表，與來自世界不同地方的學生一較長短，這樣才令大學有優勢深化科研的發展，帶來更高質量的產出。

為配合特區政府智慧城市的建設及大學科研持續發展，澳大近年大力鼓勵師生從事具創新性的、能直接回饋社會的研究，培養學生的創新創業能力。馬教授指出，當師生的科研項目有一定技術基礎後，如獲具國際權威的相關學刊刊登，大學便視乎其研發技術的成熟情況申請專利，從不同的層面提供專業支援，為轉化研究的技術成果作準備。另外，也成立了澳大創科有限公司，期望能為技術成果作商業配對。陸續開始有師生透過不同的合作模式， 成功與有興趣的企業接洽。“透過澳大技術支援、吸引企業投資技術研發，澳大未來將會有更多已具技術成果的項目得以孵化。”

迎難而上把握大灣區契機

據馬教授觀察，澳門在技術轉移方面仍處於初步的發展階段，投資氛圍及營商環境有待適應，而且這些關鍵條件也不可能在一夜間要有就有。“澳門是一個相當細小的地方，要成功啟動技術成果的孵化難度甚高，澳大科研團隊想繼續研發就要靠自己。經驗告訴我們，科技範疇的項目競爭非常激烈，未來需要與粵港澳大灣區不同地方政府或公司機構合作才得以發展，絕非單單在澳門可以成事。”

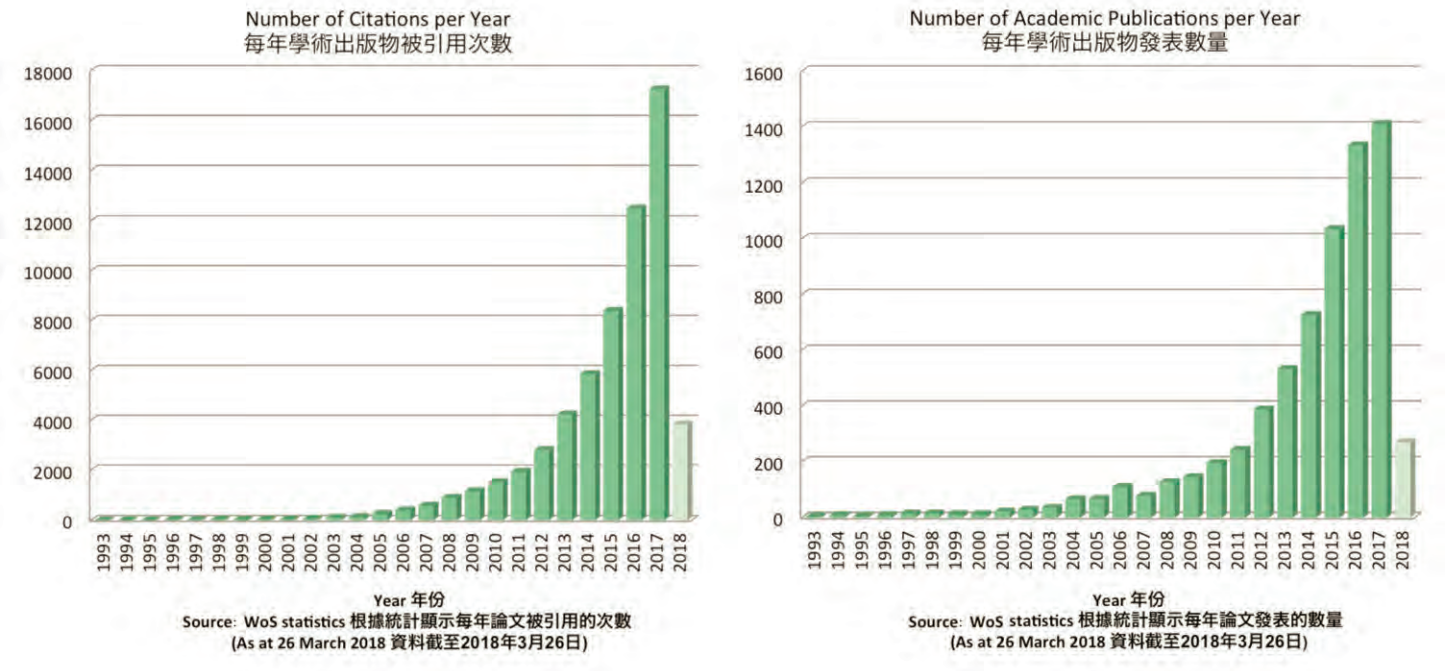
為了加大力度拓展應用型研究項目、推動產學研發展，澳大在 2017 年首次向廣州市科技創新委員會就相關研究申請“廣州市 2018 年科技創新發展專項（對外科技合作專題）”資助。第一次申請就有九個項目獲批，是一個相當不俗的成績。“澳大近年積極把澳大研發的科技引進到大灣區。”馬教授說：“在過去五年，我們克服了重重難關，解決了許多澳門與內地法律上的差異，開始步入產出的階段。目前，國內不少公司和地區政府對澳大研發的項目相當感興趣。”

對前景充滿信心

回望過去，馬教授認為，澳大研發得以開展及推出市場，除了感謝國家和澳門特區政府的支持外，也歸功於具國際競爭力的研發團隊。“目前，澳大研究隊伍非常穩定，不斷壯大和優化，如微電子國家重點實驗室，當中七成學術研究人員是來自澳門，也有從世界各地聘任的優秀教授，每位的投入都相當重要。”澳大在軟件上、硬件上都已俱備，馬教授看好澳大未來的科研前景，對回饋社會的技術研發充滿信心。

Scientific Research Geared to Technology Transfer

The university is teeming with research groups, with a multitude of research interests, from microelectronics, to Chinese medicine, electromechanical engineering, biomedicine, social sciences, and humanities. Each year, each team must struggle to reach a different research stage or target and must compete for funding to sustain itself. Consequently, research initiatives must be competitive. Prof Rui Martins, vice rector for research, and an expert in microelectronics, reminds researchers that there are internal and external funds available, for these pursuits, which are administered stringently by specialists from diverse fields. Projects must show intrinsic research value, solid theoretical foundation, innovative thinking, and feasibility.



澳大過去 10 年發表的論文數量
The number of papers UM published over the past decade

馬許願教授對澳大的科研前景充滿信心

Prof Rui Martins is bullish about UM's prospects in scientific research

The vice rector points out that UM research initiatives can be broadly divided into two categories: (1) Basic theoretical research with a primarily academic focus; (2) Applied research with a theoretical foundation which aims to develop innovative outcomes that have a positive impact on society. These research projects have different sources of funding, such as the National Natural Science Foundation of China, Macao's own Science and Technology Development Fund (FDCT), and the Guangzhou Science Technology and Innovation Commission (GSTIC). For applied research, to get the nod, each project must meet the test of feasibility that delivers tangible benefits to society. In Vice Rector Martins' view, this requirement is quite reasonable. He says, 'For society to pour so many resources into projects, if not proven to be of social utility, they will remain forever at the level of pure theory. These funding criteria are now pushing research projects towards a new level. I am happy to say that the university has seen a steady rise in research funding.'

Rich in Research Results, Rich in Technology Transfer

Without solid research, there will be no technology transfer. In recent years, UM's research prowess is reflected in the number of research papers authored by staff and students which are published in international journals. The quantity of published papers has increased from about 144 in 2009 to 1,410 in 2017, an almost tenfold increase over the past eight years. In particular, the output from UM's two state key labs is most impressive. After seven years, the two labs have won plaudits from both national and international experts, cementing UM's academic standing in integrated circuits and Chinese medicine, as well as in the incubation of talented researchers. Prof Martins adds that the university's long years of robust effort have paid off, having chalked up a considerable amount of high-quality research with a sound theoretical footing. UM is now leaning heavily towards applied research projects, some of which have evolved into innovative research that has found favour with industry. UM has gradually come of age and has emerged from the shadow of purely academic journals.

To date, UM has been granted 63 patents in mainland China, the United States, and other regions, with quite a few of them attracting enquiries from national and overseas corporations. Some have even resulted in cooperation agreements and are gearing up for the production stage. 'Our research personnel are intoxicated by their work,' says the vice rector. 'From conceptualisation to implementation, they began at zero. Every step of the way has not been easy. But now finally, we have arrived at a stage where our research results can be transferred.'

澳大芯片研究達前沿水平

UM is now ranked among the top in the world in chip research

澳大研究項目涉獵不同的範疇

UM's research projects cover different disciplines

Teaching and Research Paving the Way for Technology Transfer

The university nudges its students towards innovation and application, encouraging them to take part in research projects. Besides teaching and conducting research, UM academic staff members take it upon themselves to provide students with different research opportunities. The vice rector affirms that teaching and research are interrelated. Some student research has found its way into top international conferences and publications, bringing them into contact with students from other parts of the globe. This is the way to bring out the best in UM students and staff and take research to higher levels of quality and quantity.

Working in concert with the Macao SAR government on the building of a smart city, and in pursuit of the university's sustainable research development, in recent years UM has urged staff and students to undertake research that is innovative and has social applications, so as to nurture students' entrepreneurial capabilities. According to Prof Martins, once a research project has attained a certain theoretical status, such as having been published by a relevant authoritative international referreed journal, the university will, depending on the technical maturity of the project, apply for a patent, and will provide professional assistance at various levels, to facilitate conversion of research results. Significantly, UM founded UMTEC Limited, a commercial subsidiary of the university, with the objective of facilitating to match concrete technological research outcomes with potential industry partners. From time to time, some UM staff and students have managed to successfully connect with interested parties in industry through different modes of collaboration. 'By offering

technical support and attracting business enterprises to invest in technology development, we are on the way to incubating many more projects.' says the vice rector.

Embracing the Challenges and Opportunities of the Greater Bay Area

According to the vice rector, Macao's technology transfer is still in its infancy. The investment climate and business environment need to undergo necessary adjustments. But one cannot make key conditions appear overnight. 'Remember, Macao is a small place. Kick-starting technology incubation is not without its considerable difficulties. Mostly, the continuing development of these start-ups is in their own hands. Experience tells us that competition in the field of science and technology is fierce. Only by collaborating with local governments or companies within the Greater Bay Area can they hope to make a successful go of it. Macao alone cannot pull it off,' he says.

To widen the scope and strengthen its capability in applied research projects, and promote industry-university collaboration, in 2017, the university, for the first time, made a grant application to the GSTIC for the 2018 Guangzhou Innovative Science and Technology Project (Involving Collaboration with Non-local Partners). On its very first attempt, UM secured funding approval for nine projects, surely an impressive outcome. 'In recent five years, UM has overcome obstacle after obstacle, solving numerous problems posed by the differences in law between Macao and mainland China. We are now entering the season of harvest, with many mainland companies and regional governments expressing keen interest in our research projects,' the vice rector says with pride.

Bullish about the Future

'Looking back, there is no doubt that we owe much of our initial success to the support of the central government and the SAR government, as well as to the prowess of our research teams. UM's research capability is becoming better and stronger with each passing day. Up to 70 per cent of our research staff in the microelectronics state key lab, for example, are home-grown, with the rest recruited internationally, each pulling his or her own weight. UM is ready, in software and hardware. I am bullish about our prospects in scientific research and in developing technologies that can produce tangible benefits for society.' These are the confident words of our vice rector as the university faces the future.

澳大積極推動產學研發展

UM actively promotes the collaboration among universities, research institutes, and companie

澳大教研並行拓展創科領域
UM Explores New Frontiers in Both Teaching and Research

科研成果獲投資者青睞

Innovations from Academic-industry Collaboration Keeping Investor Doors Open

文 Chinese & English Text | 余偉業 Kelvin U
圖 Photo | 何杰平、譚金榮 Jack Ho, Eric Tam

經過多年耕耘，澳門大學的研發項目已踏入收成階段，過程中不但培育了不少研究人才，也為學生創新創業鋪路，而當中更有尖端研究項目取得令人矚目的成果，具獨佔鰲頭之勢。

The research and development (R&D) teams from the University of Macau (UM) have achieved fruitful outcomes after years of hard work and dedication – they have not only created entrepreneurial opportunities for talented young researchers over the years, but have also developed remarkable products with high potential to take the lead in their respective fields.

自創全球領先檢測儀

斑馬魚有著獨特的生物和生理特徵，是一種理想的大規模藥物篩選模型。據估計，全球百多個國家中有 3,000 多個科研機構用到斑馬魚，進行遺傳生理、環境污染和藥物的檢測。目前，最廣為企業機構選購的某檢測儀品牌，在斑馬魚實驗操作上過於傳統，且技術上存在眾多局限，造成研究人員工作上諸多不便。有見及此，澳大團隊自主研發“高通量微流控芯片幼魚活體檢測儀”，解決了斑馬魚檢測中常見、惱人的技術難題。

項目負責人、澳大中華醫藥研究院助理教授李卓榮指這台儀器採用自主研發的高通量微流控芯片，取代傳統的多孔反應板，同時控制所有魚的位置；再配以集成化微流控芯片自動拍攝，圖像清晰，“這台機器突破多方面人手操作局限，將實驗效率大大提高，是目前全球同類型產品儀器不能比擬的。”

潛在投資者已存在

另一項目負責人、澳大中華醫藥研究院教授李銘源表示，有眾多政府部門、商業機構、研究單位和藥廠需要相關儀器，對環境毒素、食品安全（如地溝油）、化妝品質量、藥物研發等方面進行數據收集和檢測分析。他說：“市場對我們這台機器的需求相當之大，目前國際上只有一間來自國外的品牌作競爭對手，該品牌儀器每次只能對一條班馬魚作自動檢測，而我們的品牌則可同一時間全自動處理二百多條魚的檢測，技術含量較其他品牌高一百倍以上。”李銘源教授期望把該技術成果推向國際市場。

在 2017 年，澳大這台檢測儀器於“兩岸四地協同創新路演大賽”上首次亮相，並獲來自海峽兩岸暨港澳地區的專家評審一致讚賞，成功出線。“當中一位評審對此研發相當感興趣，認為此項目值得投資。我們當初研發的出發點，只是為實驗室製作一部儀器供自己使用，但由於市場上缺乏此儀器，很多來自不同國家或地區的專家學者在參觀完實驗室後，對儀器大感興趣。”李銘源教授保守估評，該儀器能於今年完成質量檢測，為推出市場作好準備。

研發進軍葡語國家市場

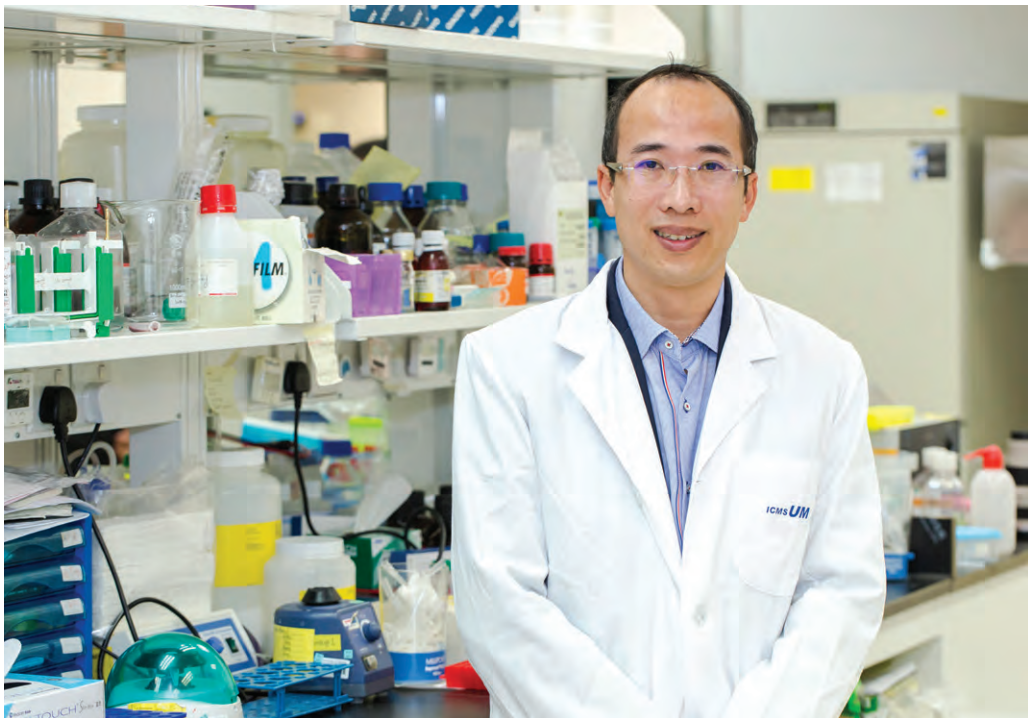
澳大另一自主研發、帕金森氏症的解藥“益智素”，可有效預防及治療帕金森氏症，引起從事藥物研究的機構關注。2014 年，在葡國總統席爾瓦見證下，澳大與葡萄牙公司 TechnoPhage 簽署合作協議 ，雙方正式展開中醫藥方面的合作，並就“益智素”新研發達成技術轉移共識。項目負責人李銘源教授表示，這將有助“益智素”保健品打進歐洲營養食品市場。

目前，澳大的“益智素”已成功申請專利，獲歐美及內地的知識產權保障。李銘源教授表示，作為葡萄牙主力生產藥物的公司，TechnoPhage 在“益智素”研發的早期階段，已有意投資此項目，並一直與澳大保持緊密的溝通和交流。現階段“益智素”已準備製作成膳食補充劑。“是次合作牽涉歐洲以及其他葡語系國家市場。TechnoPhage 這葡萄牙本土公司，對歐洲新穎食品法規熟悉，較易把‘益智素’產品引入和申請註冊，目標是打進龐大歐洲和巴西市場。相關合作得以順利進展，某程度上是得益於澳門作為中葡商貿合作的平台。”

為帕金森氏症帶來曙光

繼阿爾茨海默症後，帕金森氏症是第二大慢性神經退化疾病，目前全球患病人數約 700 萬，中國患者人數達 200 萬以上。帕金森氏症是中腦（腦幹的一部分）黑質的神經細胞退化，造成休息性手抖、全身僵硬、動作遲緩。然而，市場上仍未有預防和抑制帕金森氏症效果理想的健康產品或藥物。澳大團隊花了九年時間，經歷多代師生的努力，從“四大南藥”益智仁中發現了活性“益智素”，研究結果發現有潛力減緩病情惡化，為病患帶來新的曙光。

李銘源教授表示，帕金森氏症的病因尚未明確，其發病原理為中腦的黑質受破壞，黑質無法產生控制人們運動和平衡能力的“多巴胺”神經細胞。目前，臨床治療以緩解症狀為主。澳大團隊深入研究“益智素”在多種帕金森動物模型的防治作用，發現“益智素”治療顯著降低了小鼠多巴胺神經元的細胞損傷，改善了小鼠的運動障礙。“從益智仁分離提取出全新結構的小分子‘益智素’，可開發成藥



李銘源教授
Prof Lee Ming Yuen

研究團隊從中藥益智仁中發現活性益智素
PD-001, a bioactive ingredient extracted from *Alpinia oxyphylla*

李卓榮教授
Prof Li Cheuk Wing

食兩用的保健產品，將成為由中藥的單體化合物開發為國際膳食補充劑的首例。未來，會繼續進行更多臨床實驗，把‘益智素’開發成藥物。”

體外診斷工具 提升全球健康

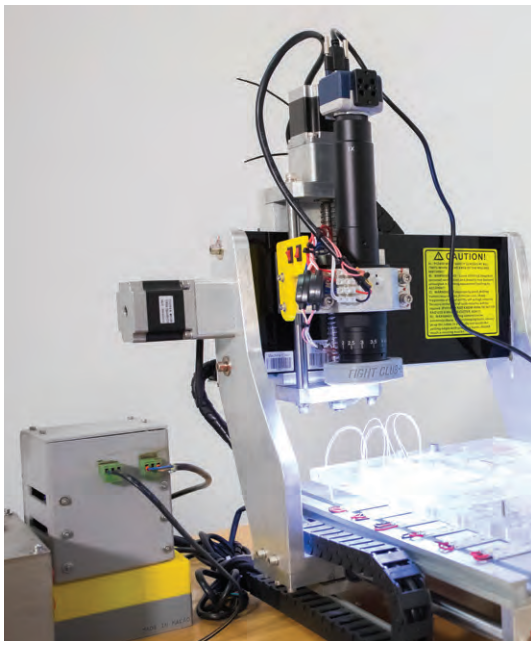
伊波拉病毒在 2013 年至 2016 年肆虐西非，奪走逾萬寶貴生命。當時若有便宜、快速、準確的病毒檢測工具可供使用，那疫症蔓延的情況可會不一樣。澳大另一研發以“體外診斷”技術製造新型的診斷工具，即抽取人體小量的血液、尿液、痰液或組織樣本，進行判斷疾病或機體功能的快速診斷檢測。項目負責人、澳大模擬與混合信號超大規模集成電路國家重點實驗室副主任麥沛然教授表示，檢驗所需時間的快慢，對傳染病會否在社區大規模爆發起警報作用。“此器材使用風險低、製作成本低，有效監測個人的身體狀況或症狀，為不同經濟收入、不同種族的人群提供診症機會，有助提升全球健康水平。”

麥沛然教授指出，隨著“體外診斷”技術的不斷成熟，將來會有更多相關產品和服務投入市場，成為疾病與健康管理不可或缺的工具。據《福布斯》雜誌介紹，2017 年相關的全球市場規模高達 700 億美元。麥教授說：“中山大學達安基因股份有限公司對體外診斷工具很有興趣，將落實相關合作。我們的研發項目已進入倒數階段，第一代產品將於今或明年面世。”

跨領域合作孵化成果

當研發項目技術成熟，且為推出市面作好準備時，澳大團隊就可透過大學把技術成果轉讓或授權給國內外的企業機構，進行大規模生產。麥沛然教授相信，在未來拓展技術轉移的路上，澳大需要與粵港澳大灣區內的人才和機構合作；但當中涉及很多操作上問題，如不同國家或地區的法律條文、可行的商業操作模式等，澳大都會在這方面提供專業的協助。

與此同時，李銘源教授也期望澳大未來可嘗試跨學科、跨領域合作，滙聚澳大不同專業人才，共同孵化大學的科研成果。“澳大有良好的科研環境，以及與外界合作的空間。對於研究員來說，法律法規、營商環境，是另一門學問。澳大如果構建一個技術轉移平台，由科研人員作技術產出，再由商法人才撰寫企業合作書，尋找投資、融資的機會，加強跨學術領域的合作，讓不同專才一展所長，這將是未來創新創業的發展方向。”



Global Leading, Self-developed Chemical Screen

Zebrafish is an ideal large-scale chemical screening model with a unique biological and physiological characteristics that make high-throughput screening feasible. There are now an estimated 3,000 universities, research institutes and companies from over 100 countries running genetic, physiological, environmental or medical testing on zebrafish. However, most researchers might have felt some inconvenience from the most widely purchased chemical screen using live zebrafish, and its technical limitations hinder productivity. In view of this situation, a UM team has developed a system that will solve the most common and frustrating technical barriers of screening in zebrafish.

澳大團隊自主研發“高通量微流控芯片幼魚活體檢測儀”

The Integrated High-throughput Microfluidic Chip Zebrafish Imaging System developed by UM researchers

According to Prof Li Cheuk Wing, an assistant professor of the Institute of Chinese Medical Sciences (ICMS) who serves as one of the project investigators, high-tech components such as the high-throughput microfluidic chip and the integrated microfluidic chip were developed by UM laboratories. The former chip can replace the industry standard 96-well plates and allows researchers to control how fish are positioned. The latter chip functions like a camera, automatically producing clear images of the organs for further studies. 'The screen has broken many limitations, especially in terms of operations. It has largely increased our efficiency for the most economical results that no other products of this kind could be compared with,' says Prof Li.

Potential Investors Have Arrived

Prof Lee Ming Yuen, the other project investigator, who is also an ICMS professor, notes that there is a significant demand for such a product. He adds that many government units, business companies, research institutions, and pharmaceutical companies have been using live zebrafish for various purposes, for instance, to screen out environmental pollutants, gutter oil (for food safety), and toxins in cosmetic products, or to collect data for healthcare research studies. 'There has been a great demand for our device. So far we only consider one foreign product as our competitor in the international market. This product could only automatically process one zebrafish at one time,' says Prof Lee. 'Meanwhile, our screen is fully automatic and is able to work with over 200 fish at the same time. The throughput of chemical screening and imaging capacities of our product are over 100 times better than that of the foreign brand.' Prof Lee looks forward to promoting this technology on the international market.

In 2017, the screen made its debut at a roadshow contest of the Cross Straits, Hong Kong and Macao Collaborative Innovation Forum in Macao. It was recognised by the competition jury for its innovative design and quality. 'One of the judges was very interested in our project and even remarked that the product is worth investing in. The reason why we started this project is quite simple – for our own use in the laboratory. It is very encouraging when many experts and scholars from different countries and regions say they want one after visiting our lab.' The process of quality control is currently ongoing and Prof Lee expects the quality and safety accreditation to be completed by the end of this year. At that time, the new product will be ready for launch.

Aiming for Lusophone Markets

Bioactive PD-001 Molecule – another UM-developed product which is likely to serve as an antidote for Parkinson's Disease (PD), has received a lot of industry attention. In 2014, in the presence of Portuguese President Aníbal António Cavaco Silva, UM signed a statement of work with the Portuguese company TechnoPhage to strengthen the collaboration between Macao and Portugal in Chinese medical sciences. The agreement between UM and Technophage signalled an official start of the collaboration, including the technology transfer of the PD-001 project. As the project

principal investigator, Prof Lee has high hopes for his product to enter the food and nutrition supplement market in Europe.

So far, the team has been granted a number of patents for the PD-001 Molecule by authorities in the United States and mainland China. As a biotechnology company based in Portugal, TechnoPhage showed an interest in collaboration in the early stage of the project, Prof Lee notes. Now, the molecule is almost ready to be manufactured into a dietary supplement. 'This project targets the European and Portuguese-speaking markets. TechnoPhage is more familiar with the European regulations on novel food and it is easier for them to bring our product there and apply for registration. There will be a huge market in European countries and in Brazil. The cooperation has been smooth and that is partly due to Macao's role as a service platform between China and Portuguese-speaking countries,' says Prof Lee.

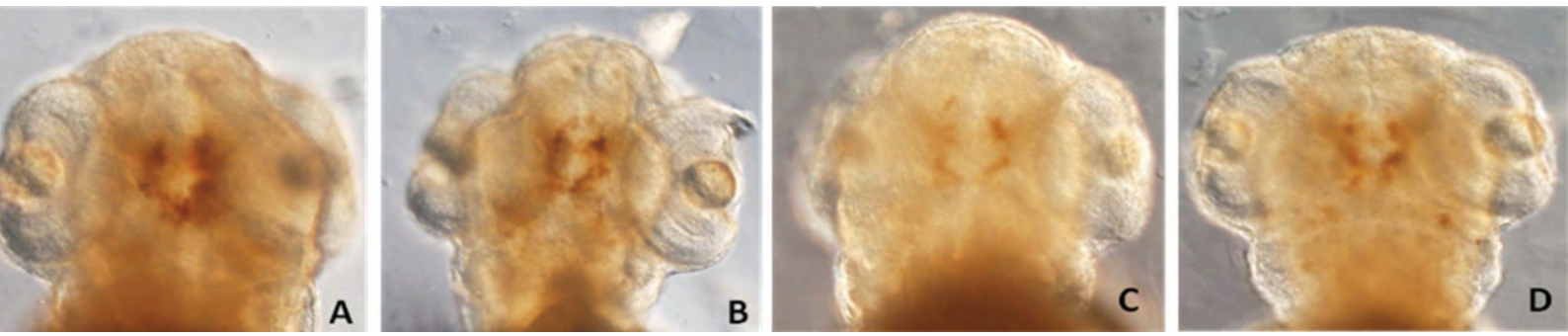
New Hope for Parkinson's Disease

Second to Alzheimer's disease in terms of prevalence, Parkinson's disease is a long-term degenerative disorder of the central nervous system that mainly affects the motor system. Currently, about 7 million people around the globe suffer from PD and over 2 million of them are Chinese. The motor symptoms from the disease are a result from the death of cells in the substantia nigra, a region of the midbrain. Generally coming on slowly over time, the symptoms include shaking, rigidity, slowness of movement, and difficulty with walking. However, there is no preventive or long-term effective treatment or health products available. It has taken Prof Lee's team nine years to isolate the bioactive ingredient of PD-001 from *Alpinia oxyphylla* that could prevent and ameliorate the development of the disease. This finding is a joint effort of many cohorts of students and faculty members involved in the project.

According to Prof Lee, the cause of Parkinson's disease generally remains unknown and the key pathological change in the body is dopaminergic neuronal loss in the substantia nigra, resulting in insufficient dopamine generated for the motor system. He observes that current clinical treatments only relieve the symptoms of the disease. The team successfully extracts and isolates PD-001 – a small molecule with a novel structure from the fruit of *Alpinia oxyphylla*. From laboratory studies designed to determine the preventive and therapeutic effects of PD-001 on different animal models of PD, the team found that treatment with PD-001 can significantly reduce cellular damage in the dopaminergic neurons and can improve dyskinesia. 'If things go smoothly, this project will be the first case of developing pure compound from traditional Chinese medicine as an international novel food ingredient. As to drug development, clinical trials will take longer time,' says Prof Lee.

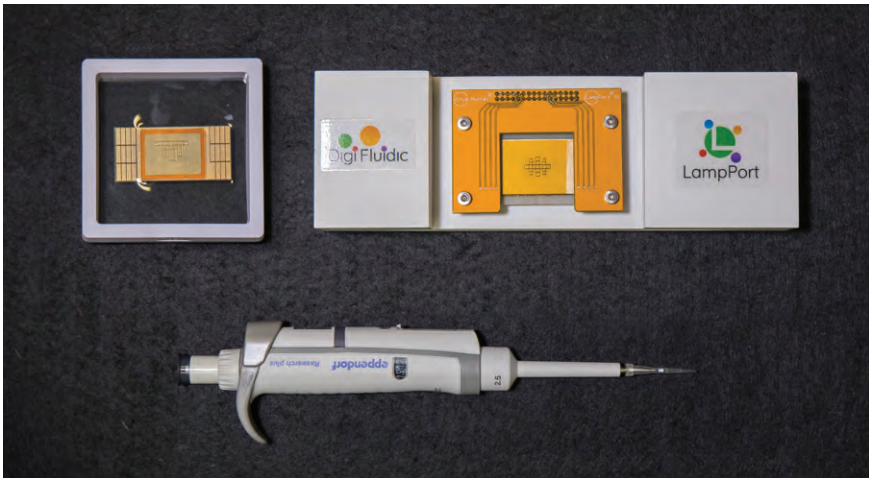
Diagnostic Tool for Promoting Global Health

The Ebola outbreak in West Africa claimed over 10,000 lives from 2013 to 2016. Probably, things would have been different if there had been an economical, fast and accurate virus detection tool available at the time. An in-vitro diagnostic (IVD) tool, an innovative medical product developed by another UM team can perform a rapid diagnostic test for infectious diseases by taking only a small specimen from the human body, such as blood, urine, sputum, or tissue. As the project investigator and the associate director (research) of UM's State Key Laboratory of Analog and



"益智素"可有效挽救帕金森氏症模型引起的多巴胺神經元損傷

The bioactive ingredient of PD-001 from *Alpinia oxyphylla* can significantly reduce cellular damage in the dopaminergic neurons from animal models of PD



澳大團隊研發的體外診斷工具，可快速診斷檢測結果
The in-vitro diagnostic (IVD) tool developed by UM researchers that can perform a rapid diagnostic test for infectious diseases

麥沛然教授
Prof Mak Pui In

Mixed-Signal VLSI, Prof Mak Pui In points out that the turnaround time for test results strongly affects the transmission speed of infectious diseases. 'This tool is low cost and low risk and is designed to rapidly identify symptoms and diseases occurring in individuals. It provides opportunities for people from all walks of life and ethnic groups to run rapid diagnostic tests, and that will help improve global health overall,' says Prof Mak.

Prof Mak notes that with the continuous development of IVD technology, there will be a high demand for IVD medical products and services in the future. He adds that IVD tools will be indispensable for disease and health management. According to *Forbes Magazine*, there has been a huge growth in the IVD global market, reaching 70 billion US dollars in 2017. 'At this point, the DaAn Gene Co., Ltd. of Sun Yat-sen University, a high-tech company whose expertise is molecular diagnostic technique, wants to work with us in this project. We will soon get down to the practical details of the collaboration. It is expected to launch the first-generation products either this year or next,' says Prof Mak.

Cross-disciplinary Collaboration Yields Better Results

When an R&D project is achieving technological maturity and ready to launch its products to market, the team will work with the university to reach technology transfer or authorisation agreements with domestic and/or foreign corporations for mass production. Prof Mak believes that in order to expand university services to accommodate the growing needs for technology transfer in the future, UM will inevitably collaborate with professionals and organisations from the Guangdong-Hong Kong-Macao Greater Bay Area. Meanwhile, he foresees there will be many challenges ahead, such as legal provisions and viable business plans in different countries or regions, and the university will continue to provide professional assistance in this regard.

Meanwhile, Prof Lee sees the need to foster a cross-disciplinary incubation environment that involves different experts and professionals nurtured by UM. 'We have enjoyed a productive research environment here in the university and there are plenty of opportunities out there to cooperate with entrepreneurs. What we need now is a platform that attracts professionals from various disciplines to jointly promote technology transfer. As a researcher, we are to innovate and create cutting-edge technologies. Then, we welcome legal and business professionals to jump in, like handling legal matters and business proposals, seeking investment and financing opportunities. By doing so, we will find our path to succeed in the innovation and entrepreneurship industry in the future,' he says.

澳大研發中藥益智仁治療柏金遜症
UM Develops Medicine from Yi Zhi Ren to Treat Parkinson's Disease

澳大升級斑馬魚成像儀推廣到市場
UM Develops Lab Device to Promote Zebrafish's Value in Scientific Research

創新中心的開放式辦公區
The open-plan office area in the Centre for Innovation

創新中心：支援師生創業平台

Centre for Innovation: A Platform to Support Faculty and Student Efforts to Start Their Own Businesses

文 Text ｜張愛華 Ella Cheong
圖 Photo ｜張愛華、部分由受訪者提供 Ella Cheong, with some provided by the interviewee

由去年開始，澳門大學校園多了一位忙碌的身影，無論在“百萬獎金創業大賽”、創新營、創業講座、創新創業課程，都會見到他——澳大創新中心主任顏至宏教授。每次見到顏教授，他身邊總是圍著一班熱切跟他討論問題的學生，他的忙碌背後，一方面是要推行各項跟校園創業有關的活動，一方面也反映了學生對創業的濃厚熱情。

Jerome Yen, director of the Centre for Innovation (CI) at the University of Macau (UM), has been a busy figure on campus since he joined the university last year. You will find him at the One Million Dollar Entrepreneurship Competition, at the Innovation Camp, and in innovation and entrepreneurship courses, always surrounded by a group of students eager to discuss questions. His busy schedule, which mainly revolves around promoting various kinds of entrepreneurial events on campus, is a reflection of student enthusiasm about starting businesses.

學生創業支援平台

顏教授說：“學生有很多創新的想法，對創業的熱情也很高漲，但創業者不光要有熱情，創業背後還涉及眾多複雜問題，這些學生都需要去學。”

2017 年 2 月成立的澳大創新中心，幫助老師和學生將其創意理念轉化成實踐的一個支援平台，此外，中心還有一個目標就是推動大學科技成果轉化和開發，令澳大在知識創新、技術創新方面作出更多貢獻。顏教授說：“中心啟動後，即推出一系列的創業活動，包括開辦創業講座、創新創業課程、應用程式訓練營等，並為有意創業的師生和校友提供創業基金支持，從師資、技術和資金多方位資助學生把創新思維變成產品或服務投入市場，實現創業計劃。”

專家指導少走彎路

顏教授過往曾任職香港應用科技研究院互聯網金融總監、《福布斯》及《財富》500 大公司的高級副總裁及副首席風險官、香港大學、香港科技大學及香港中文大學的教授，跟業界關係密切。創新中心成立之後，他馬不停蹄展開工作，當中包括邀請校外企業家和本地社團如澳門工商聯會舉辦經驗分享會及介紹本澳創業扶持政策。“我們邀請了於 2015 年榮登美國《福布斯》雜誌 30 Under 30（30 位 30 歲以下創業成功人士）名人榜的湯瑋銳走進澳大校園分享他的創業和業務拓展經驗，湯先生在求學時期便勇於開拓自己的事業，其公司已獲著名投資公司‘紅杉資本’垂青融資。”顏教授希望學生能從創新創業系列講座得到啟發和吸收經驗，在創業時也會少走彎路。

顏教授還邀請澳大各學術單位的專家加入創新中心的創業諮詢團隊，為有意創業者提供團隊管理、市場拓展、財務管理、融資、持續經營、法律、知識產權、業界合作等全方位的創業諮詢支援服務。“我們充分利用大學的人力資源，開設相關創業課程普及創業所需的基本知識，讓師生不僅能學習技能，更能獲得創業觀念和精神上的提升，培養創業精神。

創業課程著重實踐

在 2017/2018 上學年，澳大首次面向本科生推出創新創業的課程，為有意創業的學生提供機會和深入瞭解創新創業中遇到的問題。顏教授說：“創業課程著重動手實踐、演講訓練和分析技巧，上完這門課後，學生能具備一些法律、金融、財務管理、團隊建立的知識。我們會從學員中篩選出有商業潛力的創業團隊進入創新中心的孵化平台，為學生提供項目落地執行的有力協助。”

顏至宏教授
Prof Jerome Yen

首批入駐創新中心的孵化團隊在入駐儀式上介紹創業項目
The first teams selected to join the Centre for Innovation for business incubation talk about their business plans in the admission ceremony

課程反應熱烈，2017/2018 下學年澳大把招生對象由本科生擴展至研究生，“研究生本身已在做很多創新方面的研究，甚至有些已開始了創業，把想法變成產品或服務在市場上運作。” 顏教授去年就鼓勵一批校內學生公司參加中銀盃百萬獎金澳門區創業大賽，其中一隊由 4 名來自不同學院的碩士研究生在中華醫藥研究院助理教授王春明博士等指導下，以創新醫用敷料“金創藥”項目取得澳門賽區首名，並代表澳門參加全國總決賽獲優勝獎。該創業隊伍還獲第三屆中國“互聯網 +”大學生創新創業大賽總決賽金獎。

顏教授說：“創新中心會為學生搭建創業的平台，如果學生有創新想法，可以寫一份計劃書給我們申請入駐或者參加創業大賽。如果在比賽中獲得高名次，我們會邀請學生團隊進來孵化。創新中心目前收到的入駐申請主要集中在中醫藥與健康、醫療科技相關、資訊及通訊科技三大領域。師生們可以憑具商業價值的項目計劃書申請一筆由澳大發展基金會提供的啟動資金，獲通過後，我們會提供一連串的專業指導，讓學生把想法變成可以落實的項目。”

創業不再局限澳門

澳門特區政府一直鼓勵產業多元化發展，加上配合粵港澳大灣區的發展，顏教授認為這些都會為學生帶來發展的機遇，“澳門要以創新科技帶動經濟發展，需要具有創新創業思維的年輕人。粵港澳合作的平台能幫助學生把視野放大，將來的創業空間會擴展至珠海、深圳、香港等地。未來，優秀的澳大畢業生要到甚麼地方創業不會再受到他本身身份的影響。”顏教授帶領的一些澳大學生創業團隊已跨出澳門，把公司設在橫琴創業谷，市場定位除了面向澳門也面向全國。

創業要有突破性思維

顏教授經常提醒學生在創業時要有突破性思維，要對很多東西有強烈的執著。“譬如雲洲科技的董事長從小就喜歡玩船，後來就把興趣變成事業。這些創業者都不是為了創業而創業，而是因為背後有濃厚的興趣作支撐。創業者有一種別人無法理解的狂熱使其能在艱難環境下熬過來，他們更懂得如何整合資源。”

世界很多知名大學都鼓勵年輕人創新，顏教授指美國斯坦福大學或麻省理工學院，會用開放的角度支持學生創業。“為配合澳門特區政府支持青年人創業的政策，創新中心將推出主題研究資助，支持開展以市場為導向的新型研究。在澳大，只要學生團隊能夠進駐到創新中心，就會有基金來幫助其走出第一步，基金會不需要學生回報，我們目的是希望學生最終通過創業回饋澳門社會。”

創新中心的大型會議室、獨立辦公室和咖啡區
The conference room, independent offices, and coffee area in the Centre for Innovation

A Platform to Encourage Students to Start Their Own Businesses

'Our students have many innovative ideas, and they are also enthusiastic about starting their own businesses,' says Prof Yen. 'But it takes more than passion to start a business. It involves a multitude of complicated issues that need to be learned.'

Established in February 2017, the CI serves as a platform to support faculty and students who want to put their creative ideas to test. Another objective of the institute is to enable university contributions in knowledge and technological innovation by promoting the development and transfer of scientific and technological achievements. 'After the CI was established, we immediately launched a series of entrepreneurship activities, including lectures, courses, and training camps,' says Prof Yen. 'We also provided financial support for faculty and alumni who wanted to start their own businesses. We help students to turn their creative ideas into marketable products or services by providing expert guidance, technology, and funding.'

顏至宏教授經常跟學生開會討論創業計劃

Prof Jerome Yen often holds meetings with students to discuss their entrepreneurial plans

Expert Guidance to Avoid Detours

Prof Yen has been the director of internet finance at Hong Kong Applied Science and Technology Research Institute, a senior vice president and deputy chief risk officer at a Fortune and Forbes 500 company, and a professor at the University of Hong Kong, the Hong Kong University of Science and Technology, and the Chinese University of Hong Kong. He also has close industry ties. Soon after the CI was founded, he swung into action, inviting entrepreneurs and representatives from local associations, such as the Industry and Commerce Association of Macau, to share their experience and provide information on local incentive policies for people hoping to start their own businesses. 'We invited Stanley Tang, who made the Forbes 30 Under 30 list in 2015, to share his experience in starting and expanding his business,' says Prof Yen. 'Mr Tang started his business while he was still in college, and his company has won favour with Sequoia Capital, a famous venture capital firm.' Prof Yen hopes that students can gain inspiration and experience from the series of talks on innovation and entrepreneurship so they can avoid detours when starting their own businesses.

Prof Yen has also invited experts from UM's various academic units to join the consulting team at the CI to support would-be entrepreneurs in such areas as team management, market expansion, financial management, financing, sustainable operation, legal matters, intellectual property rights, and industry-academia collaboration. 'We want to make full use of the human resources at the university and open courses to teach the basics so that our faculty members and students not only can acquire the necessary skills, but can also develop an entrepreneurial mindset and an entrepreneurial spirit.'

Entrepreneurship Courses with an Emphasis on Practice

In the first half of the 2017/2018 academic year, UM launched entrepreneurship courses for undergraduates for the first time, hoping to provide an opportunity for entrepreneurially inclined students to gain a deep understanding of the problems that may be encountered in the process of starting a business.

'These courses place an emphasis on practice, public speaking training, and analytical skills,' says Prof Yen. 'After finishing these courses, students will acquire some basic knowledge in law, finance, financial management, and team development. We will select some promising student teams for business incubation and support them in the implementation of their projects.'

學生隊伍 "金創藥有限責任公司" 在"中銀盃百萬獎金澳門區創業大賽"奪冠

A student team wins the championship at the Bank of China Trophy One Million Dollar Macao Regional Entrepreneurship Competition, with their product 'Golden Wound Dressing'.

The courses have been very well received. So well received, in fact, that UM subsequently decided to extend the scope of the courses to include postgraduates. 'Postgraduates have done a lot of innovative research. Some of them have already had some experience in turning an idea into a marketable product or service,' says Prof Yen. With his encouragement, some UM students participated in the Bank of China Trophy One Million Dollar Macao Regional Entrepreneurship Competition last year. A team of four master's students from different faculties, led by Dr Wang Chunming, an assistant professor from the Institute of Chinese Medical Sciences, won the championship at the Macao regional competition and an excellence prize at the national final, with their product 'Golden Wound Dressing'. The team also won the Gold Award at the Third China College Students' 'Internet+' Innovation and Entrepreneurship Competition.

'The CI provides a platform for students to start their own businesses. Students with innovative ideas can submit a proposal to us and apply to join the CI or participate in entrepreneurship competitions. If they are ranked high in the competition, we will invite them to join the CI for business incubation,' says Prof Yen. 'The applications received by the CI so far mainly focus on three areas, namely Chinese medicine and health, medical science and technology, and information and communication technology. Faculty and students with commercially viable proposals can apply for a start-up fund from the University of Macau Development Foundation. Upon approval, we will provide expert guidance to help students turn their ideas into feasible projects.'

邀請企業家跟學生分享創業經驗

The Centre for Innovation often invites entrepreneurs to share experiences with the students

Entrepreneurial Opportunities Beyond Macao

The government of the Macao Special Administrative Region has long promoted economic diversification. Prof Yen believes that this, combined with the development of the Guangdong-Hong Kong-Macao Greater Bay Area, will

create new opportunities for entrepreneurially-inclined students. 'The Macao SAR government hopes to drive economic growth with innovative technologies, and this calls for young people with innovative and entrepreneurial thinking,' says Prof Yen. 'The Greater Bay Area provides a platform for collaboration among the three regions, which can help students look beyond Macao and explore entrepreneurial opportunities in other places such as Zhuhai, Shenzhen, and Hong Kong. In the future, outstanding UM graduates should be able to start businesses anywhere they want regardless of where they come from.' In fact, some student entrepreneurial teams led by Prof Yen have done just that – establishing companies in Innovalley HQ, targeting not just Macao but the entire country.

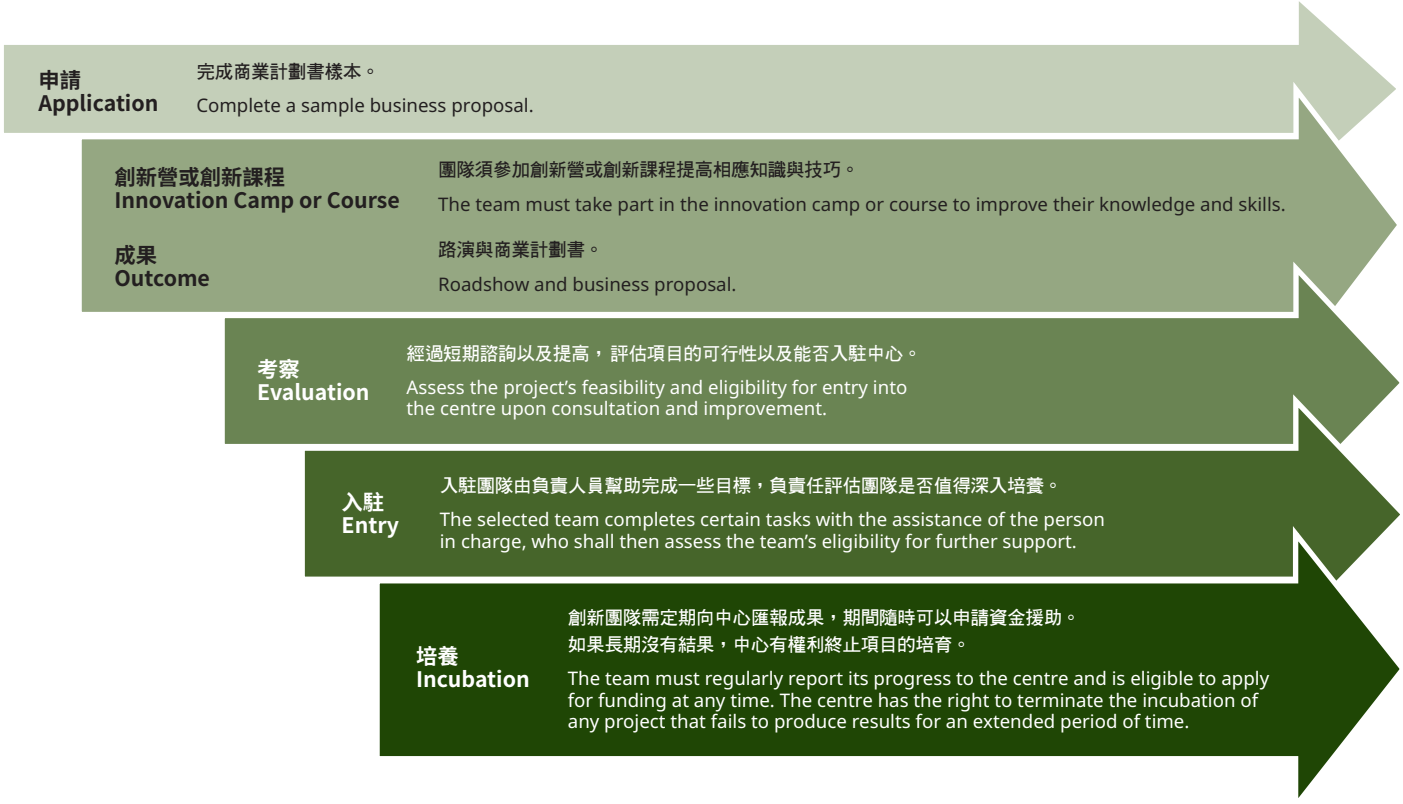
Starting a Business Requires Breakthrough Thinking

Prof Yen often reminds students that starting a business requires breakthrough thinking and a strong commitment to goals. 'Take the president of OceanAlpha. He loved to play with toy boats when he was a child. Later, he turned his interest into a career,' says Prof Yen. 'These entrepreneurs didn't start a business for its own sake. They were motivated by a strong interest. They share a kind of fervour that other people can't understand, and this fervour sustains them through difficult times. They are also better at integrating resources. '

Many prominent universities around the world encourage their students to be innovative leaders. Prof Yen cites Stanford University and the Massachusetts Institute of Technology as two examples, saying that both institutes support students in their entrepreneurial attempts with an open attitude. 'In response to the Macao SAR government's policy to support young people to start their own businesses, our institute will launch a research funding programme to support market-oriented innovative research projects,' he says. 'At UM, student teams who are invited to join the CI will receive funding so they can make the first step. The foundation doesn't expect payback from the funding. Our hope is that students can ultimately repay Macao through their entrepreneurial efforts.'

創新中心篩選入駐團隊及孵化遴選過程

The process of selecting student teams to join the CI for business incubation



創業離學生有多遠？

Is Entrepreneurship within Students' Reach?

文 Text ｜張愛華、校園記者陳拓 Ella Cheong, UM Reporter Chad Chen　　圖 Photo ｜張愛華 Ella Cheong

大學畢業後不想被打工捆綁自己，想把創意變成自己公司經營的服務或產品，惟創業起步階段困難重重，不知如何開始？為了幫助學生組織創業團體，教授創業各項細節，澳門大學在 2017/2018 上學年首次推出“創新與創業課程”選修課程，下學年更把授課對象擴展至研究生。這課程對學生有何幫助，我們採訪了通過此課程組成的“智能衣廚”和“順風車”兩個創業團隊，瞭解他們的創業構想。

University graduates who have no desire to be tethered to a job, and who dream of turning their creativity into a product or a service, face many daunting challenges. They may not even know where to begin. To assist students to find their footing in kick-starting an entrepreneurial initiative, and teach them the nitty-gritty of running a business, the University of Macau (UM) has, in the 2017/18 academic year, and for the very first time, launched an elective programme in innovation and entrepreneurship. In the second semester, it will be extended to postgraduate students. To find out how useful this programme is for students, we interviewed several students who are behind two business initiatives aided by this programme: the 'Smart Closet' and 'Ride Sharing'.

“創新與創業課程”全面指導學生如何創業
The innovation and entrepreneurship programme provides all-round training for students

結合 AI 和 3D 技術

“創新與創業課程”旨在教導學生如何開發突破性的產品和服務、開展創業營銷、保護知識產權、準備商業計劃書及路演等，以培育未來企業家。課程同時傳授學生基本的創業知識，讓學生學習構建創新型企業的過程。金融及商業經濟學系的三位學生麥家瑩、鄭漢文和許佳輝通過該課程組成了創業團隊，並且在這門課上想出了“智能衣廚”的創業概念。

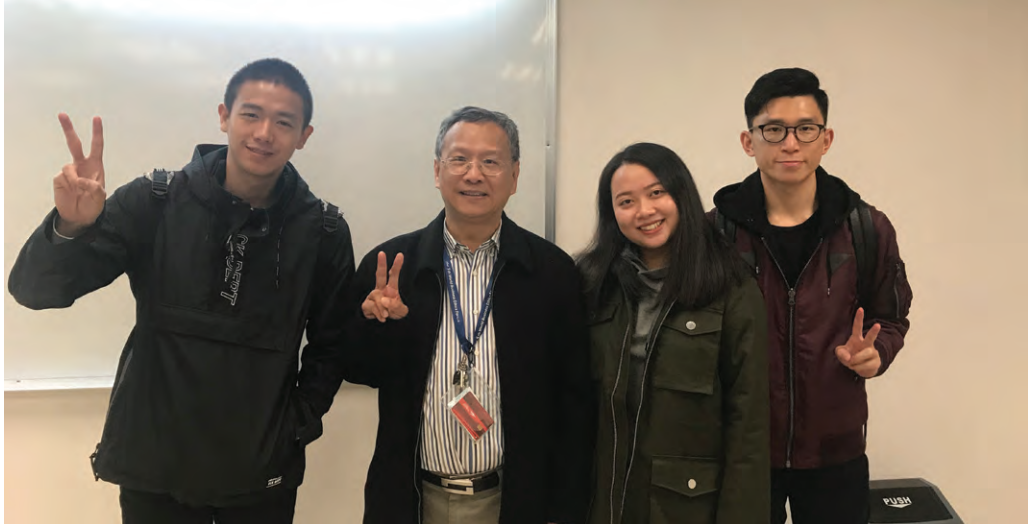
他們的創業概念是將 AI（人工智能）和 3D 技術結合的方法運用在衣櫥上，麥家瑩說：“使用我們服務的用家，不用親身到服裝店，直接可以在家裡透過我們提供的智能系統試穿不同款式和風格的服裝。”

源自童年遊戲

這概念源自於麥家瑩童年時經常玩的換衣搭配遊戲，她說：“使用我們系統的用家，只需要穿著貼身一些的衣服並從不同方位拍攝自己，就可以建立個人的 3D 模型。數據庫中存有大量商場中衣服的 3D 模型，用家也可以在家自行將個人服裝進行掃描。我們的智能系統可以自動顯示配搭效果，用戶不必親自去商場試穿。除了模擬用戶的穿衣效果更可以用 AI 技術根據用戶的喜好推薦擁有個人風格的搭配，還可以逐步優化。”

有信心受客戶歡迎

許佳輝表示，有信心該智能系統推出後會受到客戶的歡迎，“我們計劃一開始會和客戶簽訂合約，第一年免費使用，第二年我們公司會抽取利潤，而第三年就會收取相應的廣告費。當用戶在搭配衣服時，智能系統會進行合理推薦，這樣一方面滿足用戶搭配需要，另一方面促進商家銷量，達到雙贏的狀態。”



課程結束後，“智能衣廚”團隊與導師顏至宏教授合照
The ‘Smart Closet’ team with their instructor Prof Jerome Yen at the end of the programme

課程助尋創業靈感

創業最重要是擁有一個良好的團隊，鄭漢文表示“創新與創業課程”還幫助學生找到好的合作夥伴。“課程幫助我們找到創業的靈感，並且學到創業過程中所需要的知識和技巧。教授把創業前的籌備和創立公司的各項細節都詳細解釋和分析，面面俱到。每個團隊還要模擬一分鐘的電梯演講，加強了同學的演說和銷售產品的能力。”

對創業前景樂觀

目前“智能衣廚”團隊中欠缺 IT 人才，他們希望可以在科技學院的學生中尋到合作夥伴。三人對於澳門現時的創業環境很樂觀，麥家瑩說：“大學很支持學生創業，校園也提供很多的創業平台，這對於學生來說都是很好的機會，希望更多澳大同學可以把握機會，實現自己的創業理想。”

澳門拼車平台

另一學生創業團隊“順風車隊”，計劃建立澳門第一個資源共享式交通出行平台——“澳門拼車平台”。想出這一經營構想的是工商管理學院四年級學生施琪琪。她說：“順風車對於內地學生來說絕不罕見，但這一共享的概念在澳門則是一個全新的想法。”

“順風車隊”創業團隊也是參加“創新與創業課程”的學生，施琪琪說：“參與課程的學生來自不同專業，大家都可以按興趣和專長組隊。能夠找到志同道合又有默契的創業團隊不容易，課程正好為想創業的學生提供機會。”

服務兩大群體

“順風車隊”團隊設計的手機系統主要利用大數據、網絡技術和遠程通信技術，實現整個過程中的電子化、數字化和網絡化。施琪琪說：“我們團隊目前還缺乏資訊科技方面夥伴，我們歡迎擁有這方面技術的澳大學生加入一起創業。”

他們服務對象必須是澳門高校學生或者博彩企業的員工，施琪琪指出，首先這兩個群體坐的士頻率很少，對於出租車行業不會形成很大的衝擊，而且對於上班上學乘車需求十分固定；其次，有學生或者博彩企業員工這個身份的認證，對於乘客的安全也有保障。“我們會為車主和乘客之間設立一個互相評分的機制，也方便以後的用戶乘車或載人時進行選擇。用戶僅以小費的形式答謝車主，對出租車行業不會帶來衝擊。”

減少出行壓力

施琪琪預計這拼車平台推出後會受到歡迎，“使用我們平台的乘客可以減少出

行壓力，更方便到達目的地。車主方面，我們也有一些吸引優惠，例如可以收取貼士或賺取積分，進行抽獎活動等。”她透露第一期投資將於今年暑假進入，用於開發與推廣，第二期投資預計將於明年初進入，用於拓展業務。

冀望學生多角度思考

顏至宏教授指出“開設創新與創業課程的目的，主要是想學生多留意在現實生活中所碰到的痛點，並鼓勵學生從多角度深入探討和調研痛點的解決方案，令創業項目更接地氣。他說：“雖然有些解決方案會受到一些地方法律上的約束，但仍希望學生能以開放及理性的角度來積極尋求及優化解決方案，這樣才能走出培養優秀創新創業人才的第一步。”

Integrating AI and 3D Technology

The programme's principal aim is to teach students how to set up a breakthrough product or service, how to manage its sales and marketing capability, protect its intellectual property rights, prepare a business proposal and stage road shows. In other words, the programme aims to turn them into future entrepreneurs, lock, stock and barrel. They are given the basic know-how for setting up a business and the opportunity to learn the ropes by running an innovative enterprise. Three of the students, Maggie Mai, Kevin Zheng, and Damon Xu, from the Department of Finance and Business Economics, developed the innovative 'Smart Closet' business concept.

Their business concept is predicated on the integration of AI and 3D technology to create a clothes closet. 'Our service users need not be physically present in clothing stores,' says Mai. 'They can make use of our smart system to try on garments of different types or styles in the comfort of their own homes.'

Inspiration from a Favourite Childhood Game

Interestingly, this concept had its origin in Mai's favourite childhood game of playing 'mix and match'. She explains that users of their system need only to put on a form-fitting garment and photograph themselves from different angles to build their own personal 3D model. They can also scan their personal garments at home. The AI system will automatically produce the perfect mix-and-match. No visit to the mall is necessary. Besides simulating user garment fittings, the AI technology will parlay their preferences into developing their own styles or fashion sense. What's more, they can be improved incrementally over time.

Confident the Service Will Be Cool with Customers

Xu declares that he is confident that the service will find favour with customers. 'Our plan involves signing a contract with our customers. In the first year, all fees are waived. In the second, our company will begin to extract a profit, and in the third, advertising revenues will be generated accordingly,' he says. 'This system is so smart that when users are trying on the mix-and-match, the AI system will suggest an appropriate recommendation, thereby addressing customer needs and boosting sales of merchandise at the same time. It is a win-win situation.'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1. 麥家瑩 Maggie Mai　2. 鄭漢文 Kevin Zheng　3. 許佳輝 Damon Xu

The Programme to Discover Your Entrepreneurial Creativity

The key to a successful enterprise is having a good team, according to Zheng. 'This programme has been great in helping us find good business partners. It also assists us in discovering creative ideas and learning the skills and knowledge necessary to start a business,' Zheng says. 'Our professor not only passes on the nitty-gritty of business establishment and operation, he leaves no stone unturned in his analysis. The programme's highlight is the one-minute elevator pitch by each team to sharpen our persuasive sales and communication skills.'

Rosy Prospects for the Business

Currently, what's lacking in this particular team is IT expertise. For this reason, members hope to attract partners from the Faculty of Science and Technology. All three existing partners are very optimistic about their business prospects. Mai ends by thanking the university for being 'very supportive of student entrepreneurship, and for providing numerous platforms for this purpose. There are now opportunities galore for students to make the dream of having their own business come true.'

Macao Ride-sharing Platform

Another team is the 'Ride Sharing', the first resource sharing transport platform in Macao. The creator of this concept 'Macao Ride-sharing Platform' is Si Kei Kei, a fourth-year student from the Faculty of Business Administration. She points out that 'ride-sharing is nothing new to mainland students, but in Macao, it is a brand-new concept.'

All three founders hail from the programme. Si says, 'Students in the programme come from different disciplines and professions. This is a good place to find like-minded partners which is not always an easy thing to do. But this programme brings us together.'

Targeting Two Potential Pools of Clients

The ride-sharing system makes use of big data, internet technology, and telecommunications techniques to create a seamless digitised network. But they still lack an IT-savvy partner, and welcome any UM student with this expertise to join them.

The service targets students from higher education and employees from the gaming industry in Macao as their primary clientele. The reason for this is that members of these two groups are not known to be frequent users of the taxi service. Their service is therefore unlikely to have an adverse impact on the taxi industry. Besides, these potential riders keep fairly regular hours going to and from class or work. And they all carry IDs confirming their status, thus guaranteeing passenger safety. 'We will set up a ride review system for both car owners and passengers, so that both can exercise a certain amount of choice in the use and provision of service. Users only pay for their service through gratuities. Consequently, this service will have minimal impact on the ride-hailing industry,' says Si.

施琪琪 Si Kei Kei

Reducing Transport Hassles

Si believes that this ride-sharing service will be a boon to users, reducing their transport hassles, and getting them to their destinations more conveniently. 'As for car owners, we will offer them certain incentives, such as gratuities or credit points and lucky draws,' she says. Phase I of the investment will commence this summer, with the funds attracted used for launching and promoting the business. Phase II will kick off early next year, with business development as its focus.

Calling for Multi-angle Thinking

Prof Jerome Yen is at pains to point out that the primary purpose of the programme is to invite students to find the pressure points in any life situation and to attack any problem from multiple angles, thereby keeping the business more down-to-earth. He adds that while some proposals or solutions may be subject to certain legal constraints, he still hopes that students will approach them with an open mind and from a rational perspective. This is the first essential step in nurturing outstanding entrepreneurial talent.

從 0 到 1 澳大學生學習如何創業
UM Students Learn How to Start Their Own Businesses from Scratch

創業經驗分享
易研創始人張榮顯校友

eRS Founder Angus Cheong's Story of a Start-up

文 Text | 張愛華 Ella Cheong
圖 Photo | 張愛華、部分由受訪者提供 Ella Cheong, with some provided by the interviewee

九年前，澳門大學傳播系校友張榮顯博士創立了澳門首間研究諮詢機構 ——“易研方案 (eRS)”，在“下海”創業前，他在澳大傳播系已任教了 13 年，主要教授研究方法、網絡應用及統計分析等課程。當初之所以決心創業，他是抱著一個願景：“希望能把學術成果轉化成可實際應用的東西，為社會創造更多價值”

Nine years ago, Dr Angus Cheong, an alumnus of the University of Macau's (UM) Department of Communication, founded e-Research & Solutions (eRS), Macao's first research consultancy. Before he took the plunge, he had been teaching for 13 years in the UM Department of Communication, where his main responsibility was teaching courses in research methods, network applications, and statistical analysis. What stirred his entrepreneurial itch? — a simple desire to turn his academic knowledge into social utility.

無心插柳

張榮顯博士 1995 年畢業於澳門大學英文傳意課程（傳播系前身），在大學時期，創辦傳意學會。畢業工作一年後回校在傳播系任教。為「亞太區互聯網研究聯盟」創會成員及現任主席，創辦澳門互聯網研究學會及澳門民意調查研究學會並任會長。自 2001 年加入有 30 幾個國家的專家學者組成的“世界互聯網項目”，並於 2009 年在澳大籌辦該項目的年會。現時是易研方案及易研信息科技創始人兼總裁，但所有上過他課程的學生都稱呼他為“張 Sir”，包括他公司的所有同事。張 Sir 笑說：“公司團隊的核心成員是我當年教過的傳播系學生。我們一起奮鬥多年，經歷不少風雨 ，彼此像相處在一個家庭一樣。”

近幾年，大數據一詞相當流行，無論政府或商業機構都洞悉大數據潛在的價值，張 Sir 公司的宣傳標語也是“數據創造價值”（Data Create Value）。今天很多認識他的人，都讚他九年前就預知大數據的商機。

回想創業初始階段，張 Sir 說：“其實，我剛出來創業的時候並未看到社會對大數據需求的發展趨勢，但因為之前一直在澳大做互聯網的研究，對網民用戶的特性和習慣有所瞭解。而我在做民意調查分析的時候，把線上線下的數據結合起來，現在情況剛好證明我們做的事情是正確的，而我們現在所做的就被稱為‘大數據’。現在回想，這些都是無心插柳所成。”

困難和風險

由一位學者轉型為一間中小企的營運者，脫掉了澳大招牌的光環後，張 Sir 在創業前期面臨很多的困難和風險，包括要面對資金、人力資源、產品開發進度危機、與不同學歷背景的團隊成員之間的磨合，以及客戶會對其公司知名度和公信力的質疑等。他的應對方法就是在質量方面嚴格把關，並根據國際標準訂立了一套嚴謹的質量監管策略，“我們以質量為核心，用周到的服務說服客人，我們一直堅持的原則漸漸得到政府和客戶的信任。”向客戶提交計劃書時，張 Sir 會比別人做多三倍的努力，“別人寫 8 頁紙，我們就寫 24 頁紙的計劃書。我們運營的是服務，不同於銷售商品，建立口碑過程漫長，期間也經歷了很多失敗。”

持續轉型

張 Sir 帶領的數據研發團隊，目前在海峽兩岸暨港澳地區提供以數據驅動的數據挖掘、網絡挖掘、電子政務、民意調查、顧客滿意度調查、網絡大數據平台搭建及營運等服務，並自置澳門唯一的綜合性網絡挖掘暨民意調查實驗室，以及在港澳管理著四個調查中心。2015 年，易研是本澳唯一被邀請出席在烏鎮舉行的第二屆世界互聯網大會的中小企代表。

易研目前面對的競爭對手主要來自大專院校和跨國企業。 為了提升服務水平，爭取更多客戶的信任，張 Sir 創業以來數次為公司進行轉型和升級，“我們先前做民意調查，後來再添加市場研究，集中與數據相關的業務，包括從數據的收集、處理、分析及提煉洞察，並日漸搭建起供自己團隊應用的數據分析平台，後來更以 SaaS 模式供我們的客戶使用。這是我們先做好定位，再一步步把服務內容擴大和多元化。”

現時，易研以數據作為核心，專門做數據分析和存儲，再把數據轉化為可視化的具有嚴謹性、公信力的平台，以迎合商家、政府、高校的需要，包括文本數據分析、品牌監測、酒店聲譽分析、顧客關係管理及網絡大數據分析平台等。經過九年的摸索和數次因應市場需要的轉型，張 Sir 的團隊已得到澳門特區政府部門、國務院某部委、國家級的智庫、香港最大的慈善機構等的任用和信賴。公司客戶遍佈港澳及內地，最近在台灣也找了合作夥伴，他說：“我們希望能夠多走出去尋求更好的發展，不局限於本土應用。我們現在與內地、美國、瑞士、葡國的專家學者進行學術合作。我們提供的服務為技術研究型，所以並沒有地域限制。”

創業建議

澳門近年興起的創業熱潮，張 Sir 認為雖然很多學生的創業意識增強了，但是創新能力還不足夠。

張 Sir 是一個熱愛 “開荒”的人，被朋友稱為“創意狂人”，易研所有產品全都是由他帶領自主研發。對於有意創業的澳大學生，張 Sir 不吝授予一些錦囊：“學生創業時，不是簡單地在互聯網上‘加’入一些甚麼東西，應從想要解決甚麼問題出發，思考自己能用甚麼手段和工具來解決它。只有這樣，才能拋開互聯網對思維的限制，使創新更加具有實用性。”另外，他還對學生提出四點建議：“一、事前必須要籌備好可茲營運的資金，即便是短期的；二、有冒險精神，當覺得創業時機成熟時，就立刻去做，不要有太多顧慮；三、做好調查分析，結合市場需求，挑選可行的、有發展潛力的朝陽行業；四、市場發展策略、公司團隊管理、服務質量要做得充足。”

此外，張 Sir 認為創新需要政策的扶持，而大學正是一個很好的創業創新平台，“大學可以擔任研究和創新孵化的角色，幫助師生的創新成果轉化。” 在經營易研的同時，張 Sir 一直不忘本職，多年來都是朝著產學研的目標前進，跟在大學工作時一樣 ，除了做民意調查研究之外，還做互聯網和新媒體的研究，經常受邀於眾多場合發表演講，同時，不定期出版專業報告、出席研討會及發表論文。訪問結束時，他說：“我希望通過一系列實踐轉化為成果，之後帶回校園。終有一天，我要回到校園，這是我的人生目標。”

張榮顯博士籌辦的世界互聯網項目年會 2009 年在澳大舊校園舉行

The 2009 annual conference for the World Internet Project, organised by Dr Cheong, was held at UM old campus

A Case of Serendipity

Dr Cheong graduated from UM's English communication programme (the predecessor of the Department of Communication) in 1995. While a student, he founded the Communication Society. A year after graduation, he returned to teach at his alma mater. Currently, he is the founding chairman of the Asia Pacific Internet Research Alliance. As though this was not enough, he also established the Macao Association for Internet Research and the Macao Polling Research Association over both of which he presides as the incumbent president. Since 2001, he has been a member of the World Internet Project, which boasts specialists from over 30 countries as members. In 2009, he organised an annual conference for this project at UM. He may be the founder and CEO of eRS, but to his students and his staff, he is simply 'Teacher Cheong'. He is quite amused by this salutation as the core members of his team were his former students who have been with him through thick and thin.

張榮顯博士應邀參加烏鎮世界互聯網大會
Dr Cheong at the World Internet Conference in Wuzhen

張榮顯博士與傳播系吳玫教授、陳懷林教授發佈澳門全民意指數
Dr Cheong, along with Prof Wu Mei and Prof Chen Huailin from the Department of Communication, releases the *Macao Total Public Opinion Index*

In the last couple of years, the term 'big data' has been all the rage. Its value is now known to both government and the private sector. This explains why he has adopted 'Data Create Value' as the slogan for his company. Many praise him for being prophetic in predicting the commercial possibilities of big data as far back as nine years ago.

Looking back over the teething period of his business, Dr Cheong says humbly, 'To be honest, when I first started the business, I didn't foresee the emerging trend in society's demand for big data. At the same time, what I did at the university in understanding the nature and habits of internet users, as well as in analysing public opinion polls, was mostly putting together the data both online and offline. Hindsight shows we were right in doing what we did – and what we did was essentially big data study. I put it down to serendipity.'

Hurdles and Risks

To go from scholar to SME operator, without the halo of the university's prestige, Dr Cheong faced many hurdles and risks, from getting seed money and human resources, to the speed of product development, not to mention meshing students from different backgrounds into a functioning team and facing down the skepticisms of clients about a company that lacks an established reputation or recognisable name. His answer to these challenges is simple: a strict control over quality, adopting an international standard and strategy for quality assurance. 'We speak with quality, and provide attentive service to win clients over,' he says. 'This has paid off after winning the trust of the government and other users.' There is one telling detail: in submitting a proposal to a client, Dr Cheong would put in three times as much effort as other service providers. Where others use eight pages, he would use 24. 'What we sell is service. It is different from selling a product. Building a word-of-mouth reputation takes time plus many trials and errors,' he says.

Reinventing Ourselves on an Ongoing Basis

Under Dr Cheong's leadership, his team offers a range of services, including data-driven data mining, network mining, electronic government, public opinion polls, customer satisfaction surveys, and the building of big data platforms and other operational services. In doing so, he has launched Macao's first laboratory for network mining and public opinion surveys, with the work spread over four survey centers he runs throughout the Hong Kong-Macao region. In 2015, eRS became the only SME to be invited to the Second World Internet Conference in Wuzhen.

eRS's competitors mostly come from other institutions of higher learning as well as multinational corporations. To maintain a high standard of service and to win over the trust of its growing clientele, the company under Cheong's leadership has undergone several transformations and upgrades. 'We first carried out public opinion polls, followed by market research, while focused squarely on data-dependent business service, from data collection, processing, analysis to harvesting, thereby building a data analysis platform that stands our team in good stead. Later, we also provide SaaS (Software as a Service) for our customers. In other words, we first positioned ourselves strategically, and then expanded and diversified,' he says.

張榮顯博士的團隊大部分是澳大傳播系學生
Dr Cheong's team is mostly made up of graduates from UM's Department of Communication

At present, its core business is data – specialising in the analysis and storage of data, then turning it into a tightly regimented and credible platform to meet the needs of business, government, and the higher education sector – ranging from data analysis, brand monitoring, hotel reputation analysis, customer relations management and of course the big data platform. Through nine years of exploration and several reinventions, Dr Cheong's team has earned the trust and patronage of the Macao SAR government, a committee under the State Council, national think tanks, and the largest charity organisation in Hong Kong. The company's clientele is now scattered across mainland China, Hong Kong, and Macao. It has even found a business partner in Taiwan. Dr Cheong is both keen and hopeful about seeking more and better opportunities farther afield, so that its catchment area goes beyond local sources. Cooperation is underway between his team and experts and scholars in mainland China, the United States, Switzerland, and Portugal. As a technological research service, it aims to be borderless.

張榮顯博士等出版的《澳門數碼生活》描述了過去十年澳門居民使用數碼工具的狀況
Digital Life in Macau, jointly published by Dr Cheong and his collaborators, depicts how digital tools were used in the everyday lives of Macao residents over the past decade

張榮顯博士建議學生要找有潛力的朝陽行業來創業
Dr Angus Cheong advises students to choose what is feasible among promising sunrise industries

Suggestions for Entrepreneurship

The tide of entrepreneurship is sweeping across Macao. UM students are increasingly interested in starting businesses. But they still lack innovative capability.

Dr Cheong is bitten by the pioneering bug, so much so that some of his friends have taken to calling him 'The Crazy Man of Creativity.' You only have to look at the range of products that Dr Cheong and his team have developed. For the business-minded students at UM, Cheong proffers this piece of advice: 'In starting a business, it is not simply a matter of adding something extra to the internet. You should proceed from the perspective of solving an identified problem. Think about how you are going to tackle the problem. Only then can you break free from the constraints the internet has placed on our thinking by making sure that the innovation has practical applications.' To the above advice, he offers four additional specific suggestions: 1. First raise sufficient funds to cover operational needs, even if it is over a short term; 2. Begin with a risk-taking attitude, so that when the time is ripe, you can go for it, without second-guessing yourself; 3. Do your homework and find what the market needs, choose what is feasible among promising sunrise industries; 4. Arm yourself with a development strategy, a good team, and bring the service up to scratch.

Dr Cheong believes that innovation cannot succeed without government support. The university is without doubt the ideal platform for innovation. It can play a role in innovation and incubation, helping staff and students to transition into technology transfer. In operating his business, Dr Cheong never allows himself to forget that his goal is the integration of industry and research. His work now is consistent with his work during his university days: carrying out public opinion surveys, and studying the internet and new media. Except now he is in demand as a speaker at various public functions, as a contributor to publication of professional reports, and as an invitee to conferences and writer of learned papers. At the end of our interview, his parting message is: 'I hope to take the fruits of our tried-and-true applications in business back to the university. One day, I shall be back again on campus. Things will then come full circle – and that is my goal in life.'

成功創新創業有秘訣？顏志宏、張榮顯經驗分享
Jerome Yen and Angus Cheong Share Their Experiences of Starting a New Business

人工智能創新機遇
改革課程吸納人才

Artificial Intelligence Breeds Innovation Opportunities
Curriculum Reform Attracts Talented Students

文 Text ｜林祖兒、黃首豪 Judite Lam, Saohou Wong
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英文翻譯 English Translation ｜楊姍姍 Sunshine Yang

人工智能在數據分析、整理及運算方面能協助人們處理大量複雜和勞動性的工作，世界各地都預示人工智能將為人類社會帶來莫大轉變。澳門大學電腦及資訊科學系不少教授都在鑽研人工智能技術，他們的科學研究對推動澳門智慧城市發展可以提供哪些技術支援？在人才培養上，該系又有甚麼新的策略，以吸引更多優秀人才入讀？

The unparalleled advantages of artificial intelligence in data analysis, processing, and computation liberate human beings from massive complex and labour-intensive tasks. Therefore artificial intelligence will enable fundamental changes to society. Professors from the Department of Computer and Information Science of the University of Macau have dedicated an array of research to artificial intelligence technology. To what extent might their research endeavours fuel Macao's quest to create a smart city? Moreover, what resources does this department have at its disposal to attract talented students?

智慧消防雲平台

電腦及資訊科學系的研究團隊當中有多位教授正在進行人工智能的研究，在國際上也取得了優秀的成果。多年來專注於人工智能技術研究的電腦及資訊科學系教授、IEEE 院士唐遠炎在研究人工智能上備受肯定。他的主要研究方向是模式識別，模式識別是人工智能的一個重要分支。唐教授將熵理論引入模式識別，建立文本分析與理解的理論框架；完成首部有關小波理論和模式交叉學科的英文和中文專著；創辦國際上第一本關於小波及其應用的 SCI 期刊和國際會議等。

最近唐教授和團隊開始研究智慧消防雲平台的建設，他解釋說：“智慧消防雲平台是一個監控網絡中心平台，利用人工智能技術收集建築物的圖像並進行偵測，檢視一些潛在性及帶有危險性的建築材料或路障，然後派人員到現場檢查及維修，進一步提升火災監控和預警系統，預防火災發生。”雖然這項技術還是起步階段，但唐教授相信智慧消防將完善建築設計上的防火系統、電路、供水等構思，有效地提高建築設計和施工的整體安全性，保障市民生命及財產。

視頻追蹤違法車輛

澳門要發展智慧城市，需要得到各方面的配合，當中包括發展智慧交通，增加道路交通的安全性。研究圖像識別、分類、對像追蹤及識別十多年的電腦及資訊科學系主任潘治文教授，已發表數十篇高質量論文，他最近進行視頻追蹤的研究，技術可以實時應用在違法車輛檢測。“該系統可以看到一輛或多輛車停在馬路，同時檢測它停了多久，只要設定違規時限，系統便可紀錄汽車相片、識別車牌，並通知執法部門，而且不需要特別硬件，只要有攝影機拍攝影片即可，這項實時監控技術已申請專利。”潘治文教授說。

此外，潘治文教授正與廣告公司合作，研究在自動售賣機上安裝鏡頭，透過鏡頭去檢測消費者的生物特徵，像性別、年齡以及有多少人，為廣告公司提供相關資訊做統計廣告成效，讓企業更精準投放廣告策略與預算。

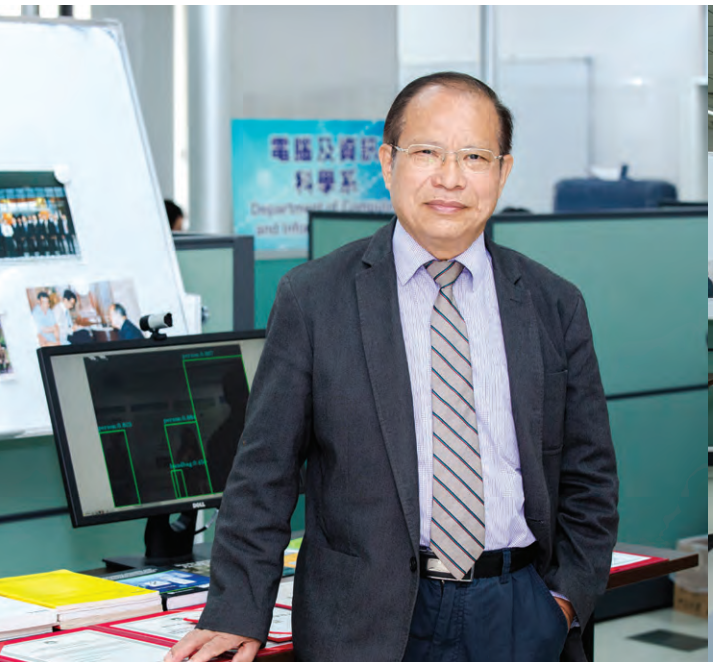
無人機械採集圖像

電腦及資訊科學系副主任黃志文教授致力將人工智能融入無人機械，利用無人機械穿梭澳大採集大量圖像，配合人工智能技術進行分析並重新整合，構造三維畫面，並自動為三維物件或範圍貼上語意標籤，如天空、道路、車、樹等，這項技術稱作語意三維圖像重構（Semantic 3D Reconstruction）。

黃志文教授說：“這項技術對將來應用在無人駕駛技術十分重要，只要無人車輛擁有辨別物件或空間範圍功能，就可以即時呈現實際的路面情況和架構，從而更準確地判斷面前的東西是人還是物件，增加駕駛的安全性。”他補充指：“無人駕駛汽車可按既定路線行走，以澳大為例，若將無人駕駛汽車應用在穿梭巴士上，就能按照預先設定的路線行走，而且能解決聘請司機的問題，穿梭巴士亦可以 24 小時運作。”

圖像識別與目標跟蹤算法

研究多媒體訊息安全和圖像處理與理解的電腦及資訊科學系副教授周怡聰強調說：“研究人工智能是世界大趨勢。”周怡聰教授現時進行圖像識別與目標跟蹤的算法研究，圖像識別技術除了可以應用在過海關的身份驗證（人臉識別），更可以在海量的數據



唐遠炎教授
Prof Tang Yuanyan

唐遠炎教授與團隊研究智慧消防技術
Prof Tang Yuanyan and his team working on smart fire control technology

之中找到罪犯及其位置。隨著澳門特區政府要將澳門發展成“以數字引領科技，智慧服務民生”的智慧城市。他認為專案的發展必將給澳門帶來更多的發展與研究機遇，“培養一批雲計算、人工智能人才，這給澳門本土的人工智能發展提供了巨大的契機。”

周怡聰教授認為澳大在人工智能研究上有很大的發展空間，“我們實驗室的博士生最近發表了兩篇圖像識別的高質量論文，這是澳大首次在計算機視覺和人工智能領域的國際頂級會議上發表由澳大獨立完成的科研成果，另外，我們系近年在碩博士生招生情況非常理想，都能反映學生希望能在人工智能學科上的探求。”

除了培養碩博士生，周教授從 2012 年開始每年舉辦計算機視覺與人工智能夏令營，通過程式設計與參數的設置，控制計算機視覺的小程式，讓中學生體驗人工智能技術並學習其操作功能，從實踐中提升他們對人工智能技術的興趣，當中不少中學生因此入讀澳大。今年暑假周教授更會介紹最新最熱門的虛擬現實（virtual reality，VR）和深度學習（deep learning, DL）技術，讓中學生不僅可以親身體驗 VR 和 DL 技術，還能學習 VR 和 DL 背後的科學原理。

改革課程吸納電腦人才

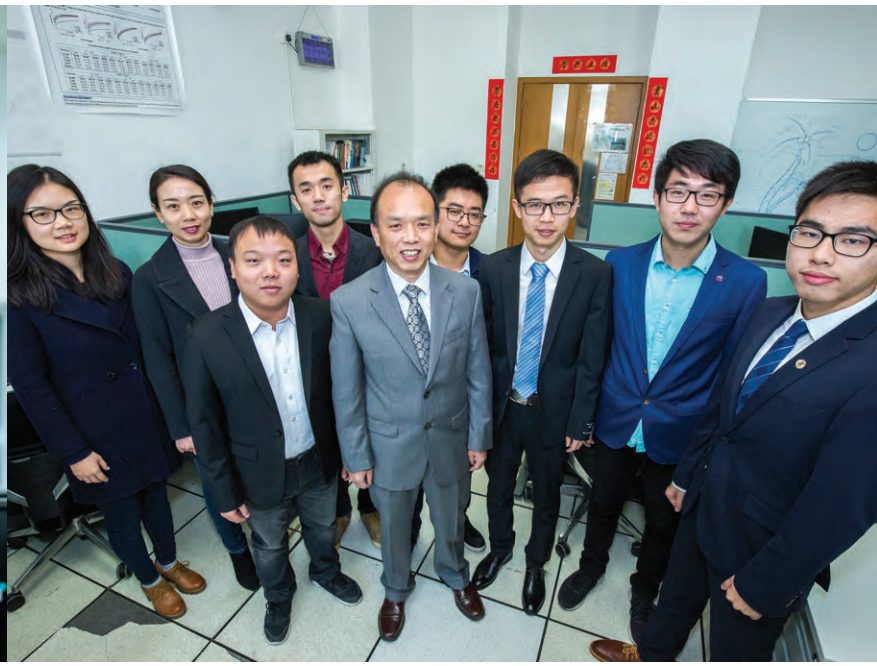
電腦及資訊科學系至今培養了 1,088 名校友，主要從事本地公司軟件工程師、政府部門人員、高中或大學教育工作者等，一些校友更創建自己的科技公司。該系主任潘治文教授過去指導過不少優秀的學生，其中一位學生梁嘉俊，就利用電腦圖像處理技術分析舌頭運動，讓行動不便或殘障人士透過電子視像鏡頭掃描舌頭擺動，來控制輪椅移動方向、鍵盤操作等等。該學生畢業後亦開設科技公司。

潘治文教授表示，發展智慧城市需要很多技術人員，未來對電腦科學的人才需求也會愈來愈大，“人工智能與數據科學都是現時熱門的學科，我們已積極推動課程改革，在設計本科或碩士課程時，加入人工智能相關的課程。現時本科課程已包括數據科學，學生可以選擇數據科學或人工智能領域，並按自己的興趣發展。研究生課程也正在加入相關課程。”

A Cloud Platform for Smart Monitoring of Fire

Many professors on the research team of the Department of Computer and Information Science are devoted to the exploration of artifcial intelligence(AI). For instance, Prof Tang Yuanyan, as a fellow of the Institute of Electrical and Electronics Engineers (IEEE), has been dedicated to AI research for years. His contribution in this domain has received many accolations. His major research interests include mode recognition, a crucial subfield in AI research. He introduced entropy theory into mode recognition and

周怡聰教授
Prof Zhou Yicong



周怡聰與視覺與圖像處理實驗室的研究團隊
Prof Zhou Yicong and the research team from the Vision and Image Processing Laboratory

established a theoretical framework for textual feature analysis and comprehension. Additionally, he is the first to publish an academic monograph on wavelet theory and mode interdisciplinarity in both Chinese and English; he is a well-known organiser of international conferences and the founder of an international SCI journal focused on wavelet theory and application.

Prof Tang and his team are currently building a cloud platform for smart monitoring of fire. He explained to us the details of this platform: 'The cloud platform for smart fire control is by essence a centralised monitoring network platform which utilises AI technology to collect and monitor images of architecture to identify potential risks or dangerous construction material or roadblocks. Upon identification of such risks, personnel could be dispatched to investigate onsite and heed the maintenance, so that the fire monitoring and alarm system can be enhanced to prevent fires.' Although this technology is still in its infancy, Prof Tang is confident that the smart control system could perfect the fire monitoring system, electrical circuits, water supply, and other plans related to architectural design and construction safety, to safeguard people's lives and properties.

Video-tracking Law-breaking Vehicles

To develop Macao into a smart city calls for coordination from various sectors, among which smart transportation and safer roads are high on the agenda. Prof Pun Chi Man, head of the Department of Computer and Information Science, has been exploring image recognition, classification, target tracking and recognition for over a decade. He has published dozens of high-quality papers. Currently, he is working on video tracking which can find wide application in real time vehicle monitoring. According to Prof Pun, 'This system could record the number of cars parked by the roadside and duration of parking. As long as the time limit for violation is pre-set, the system is capable of recording vehicle images, recognising car plates and notifying the competent judicial departments. No special hardware, other than a video camera, is required for this system. A patent has been applied for this real-time monitoring technology.'

Besides, Prof Pun is cooperating with an advertising company to explore the possibility of setting up cameras on vending machines, where the bio-features of consumers, such as gender, age, and number could be detected. Such information could help the advertising company to assess the impact of advertisements, serving as a reference to develop more precision-targeted advertising strategies and budget plans.

Collecting Images by Drones

Prof Vong Chi Man, associate head of the Department of Computer and Information Science, is committed to incorporating AI technology into drone application. By controlling drones to collect images within the University of Macau campus, AI technology may be leveraged to analyse and reconstruct the data to build a 3D image, with semantic labels automatically generated for the objects or areas in the 3D sample, such as sky, road, cars, trees, etc. This technology is known as Semantic 3D Reconstruction.

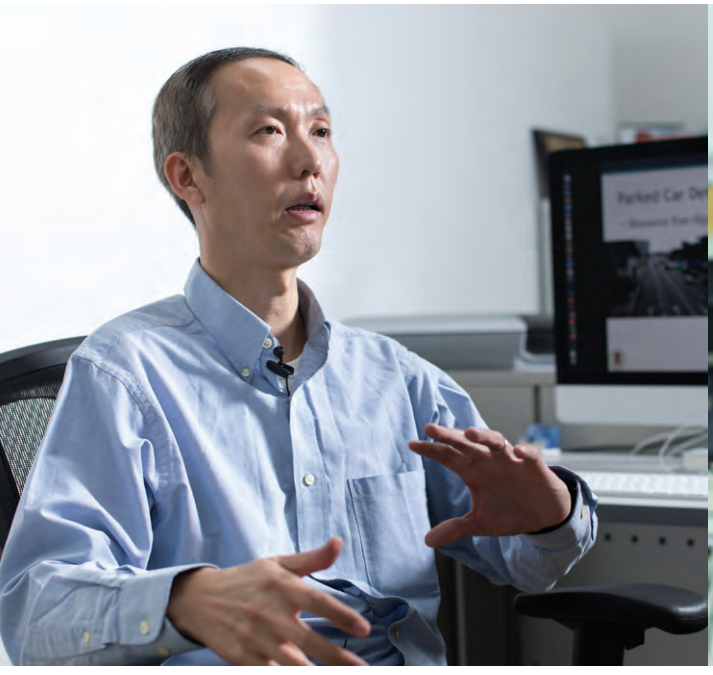
According to Prof Vong, 'The Semantic 3D Reconstruction technology is vital to unmanned piloting technology. The traffic condition and structure could be presented in real time, preceded by the unmanned vehicles' identification of objects or spatial scope, thereby better forecasting whether a human being or an object lies ahead. Correspondingly, driving safety could be enhanced.' He further elaborated, 'Unmanned vehicles can run on the pre-set route. Take the University of Macau for example, if we apply the unmanned piloting technology to the campus shuttle bus, the bus can run on a pre-set route and there is no need to worry about hiring drivers anymore. The campus shuttle can also work on a 24/7 basis'.

Image Recognition and Target Tracking Algorithm

Prof Zhou Yicong, associate professor of the Department of Computer and Information Science, is an expert in multi-media information security, image processing, and comprehension. He underlines the immense potential of AI, stating that the future trend of the world lies in AI research. At present, Prof Zhou is working on the algorithm for image recognition and target tracking. Image recognition technology is applied to identification of individuals at Macao Customs. It is also instrumental in locating criminals and determining their whereabouts.

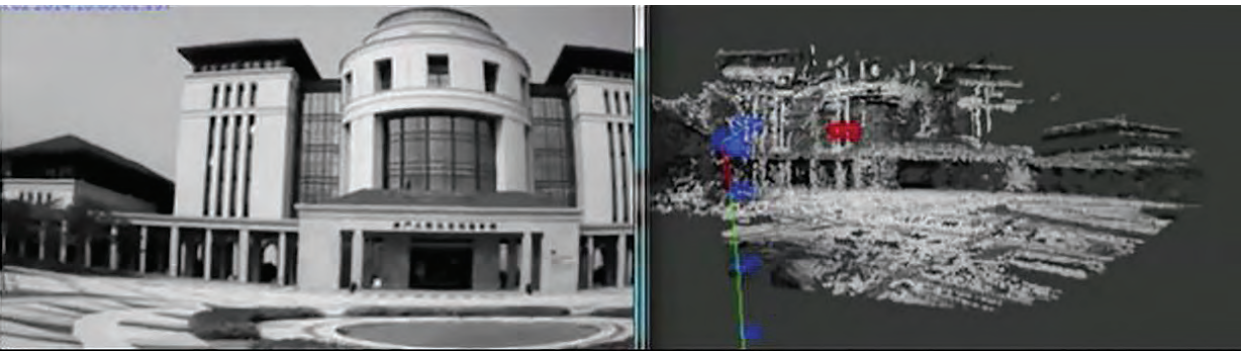
The Macao SAR government is resolute to build Macao into a smart city featuring the concept of 'digital guiding technology, smart technology serving people'. In a similar vein, Prof Zhou believes that this government plan will guide resesarch and development for Macao. 'This government agenda has made it imperative to train a wealth of talents in cloud computing and AI, which, indubitably, would provide Macao with tremendous opportunities to further tap the AI development'.

Prof Zhou is firmly convinced of the enormous potential of AI at the University of Macau. 'PhD students in our lab have recently published two high-quality papers about image recognition, marking the debut of UM researchers to publish wholly independent research findings on computer vision and AI in top international conferences. Besides, our department has ample postgraduate and PhD applicants in recent years, which reflects student's interests and aspiration to explore AI.'



潘治文教授
Prof Pun Chi Man

黃志文教授
Prof Vong Chi Man



黃志文教授採用無人機械在澳大取得的三維圖像

The 3D image Prof Vong Chi Man acquired on UM campus via drones

電腦視覺與人工智能夏令營

The Computer Vision and Artificial Intelligence Summer Camp

Alongside the cultivation of postgraduate and PhD students, Prof Zhou has been the organiser for the annual Computer Vision and Artificial Intelligence Summer Camp since 2012. This programme provides opportunities for middle school students to gain access to AI technology and learn about its application via programming and parameter designs and applications of computer vision, thereby enhancing their interest in AI development. Many participants of the camp were inspired to study at UM. For the upcoming summer camp, Prof Zhou plans to combine the latest and most popular virtual reality (VR) and deep learning (DL)technology into the teaching plan, so that middle school students can experience VR and DL themselves and understand the underlying scientific principles .

Curriculum Reform Attracts Talent in Computer Science

At present, the Department of Computer and Information Science has successfully delivered 1,088 graduates to the job market, most of whom have taken up positions as software engineers in local corporations, officials in government departments, or teachers in high schools or higher education institutions. Some alumni even established tech start-ups. Prof Pun, head of the Department of Computer and Information Science, has coached various outstanding and talented students. Among them is a student named Leong Ka Chon who applied computer image processing technology in order to analyse and scan tongue movements which enable the disabled to control a wheelchair or type on a keyboard. Also, upon graduation he founded his own tech start-up.

Prof Pun said that the smart city plan calls for more technology gurus and computer talents. 'AI and data science are among the most popular disciplines, we have taken the initiative to launch curriculum reforms to align with this trend. For example, we now offer courses on AI both at BA and MA levels. In this stage, data science is one of the key courses in BA programme. A student has the autonomy to choose data science or AI based on their own interests. The curriculum for the MA program is also subject to the corresponding reform.'

人工智能系列專訪：澳大講座教授唐遠炎

Artificial Intelligence Interview Series: UM Chair Professor Tang Yuanyan

人工智能系列專訪：澳大副教授潘治文

Artificial Intelligence Interview Series: UM Associate Professor Pun Chi Man

人工智能系列專訪：澳大副教授黃志文

Artificial Intelligence Interview Series: UM Associate Professor Vong Chi Man

人工智能系列專訪：澳大副教授周怡聰

Artificial Intelligence Interview Series: UM Associate Professor Zhou Yicon

澳大特色學科走進慕課

UM's Signature Courses to Be Launched on MOOC Platform

文 Text | 張愛華、校園記者王雪婷 Ella Cheong, UM Reporter Tiffany Wang
圖 Photo | 張愛華、何杰平 Ella Cheong, Jack Ho

在線課堂慕課（Mooc）的出現改變了傳統上課的形式，學生的學習也變得沒有時間和地域的限制。網路教學在全世界遍地開花，各地高等院校相繼推出不同類型的慕課，澳門大學去年也與北京慕華資訊科技有限公司訂定了合作協議，今年將有澳大的慕課放上清華大學的線上課堂“學堂在線”。目前，澳大已有多位老師組成慕課小組在積極籌備慕課中，他們在課程設計上如何做到具吸引力、創新性以及能夠體現澳大學科的特色？

Massive Open Online Courses (MOOC) have transformed learning by blurring geographical and temporal boundaries of the classroom. Indeed, MOOCs are all the rage, with universities from around the world scrambling to launch different courses on this new platform. Last year, the University of Macau (UM) signed a collaboration agreement with MOOC-CN Information Technology (Beijing) Co., Ltd. This year, some UM courses will become available on Tsinghua University's online course platform, www.xuetangx.com. Several UM professors have formed teams to prepare for this project. The challenge is designing courses that are attractive, creative, and distinctive.

把葡英等特色課程推廣至全國

MOOC 是“大規模線上開放課程”的英文 (Massive Open Online Courses) 簡稱，支持澳大啟動慕課的副校長（學術）倪明選教授說：“慕課不是簡單的線上教學，慕課比較個性化，而且鼓勵老師用創新方法來教學。慕課有個好處就是可以因材施教， 老師把教學視頻放上慕課平台後讓學生先看，老師知道學生甚麼時候去看，看了多長時間，上課講義每一頁花了多長時間等等。老師對學生的進度瞭如指掌，可以因應情況對課程不斷作出修正。”

倪教授續說：“清華大學的‘學堂在線’是國內搞慕課投入最多的大學，清華大學跟美國的 Coursera 和 edX 都有協議，彼此的慕課是互通的。清華有 200 個全職人員來開發各種技術，來幫助老師做教學的改革，我是非常佩服這點。”

清華大學的“學堂在線”慕課平台 2013 年正式上線，並由北京慕華信息科技有限公司營運。 “學堂在線”至 2016 年底是全球第三大慕課平台。其課程數量逾 1,000 項，註冊學習者達 820 萬，選課總人次超過 1,000 萬。清華“慕課”的亮點之一，是運用大數據及智能計算，提高了教學績效，使跨專業、跨學校、跨國界、跨年齡的學習變為可能。倪教授說：“教母語為中文的人怎樣學葡文，這是我們澳大的強項，我們通過清華的平台和技術，把澳大的特色課程的影響力擴至全國，讓更多的學生共享學習。”人文學院院長靳洪剛教授和葡文系姚京明教授已著手規劃英語和葡語的慕課，倪教授有信心地說：“把這些課程以慕課形式來授課，影響力更大。”

靳洪剛教授是語言學專家，研究領域包括第二語言習得、語言認知、學習轉換等，她對科技和語言文學結合很感興趣，並正在設計一門第二語習得的慕課。她說：“澳門本身是一個多元文化和多語言的社會，我們學院最大特色學科就是語言，因此我們想透過線上課程更好地讓多些學生認識我們的中文、英語和葡語學科。”

靳教授親自設計的《二語習得》慕課，已進入了最後的教學製作階段，“這課程最大的特色在於語言學習和認知加工處理方面。”靳教授曾獲得卡內基全美優秀教授獎、漢明頓校際最佳教授獎，兩次獲頒沃頓終身成就獎，在美國出版過多套媒體教學材料，她在製作線上課程方面有豐富的經驗。她說：“慕課不同於一般的傳統課程，它對教學內容和形式有一定的要求，每一節都要有教學主題，每節課不能多於十分鐘，教學手法也要靈活有吸引力。”

副校長（學術）倪明選教授希望可透過高科技技術的配合，讓學生可以記住所學
Rector for Academic Affairs Prof Lionel Ni hopes to help students retain what they learn through high-tech solutions

慕課工作組

去年底，倪教授組織了有意推出慕課的澳大老師到北京大學和清華大學學習，“學堂在線”還專門為澳大的老師提供工作坊。 倪教授說：“教育學院助理教授李自豪和向天屏等四位老師去北京參與這工作坊，學習如何使用課堂在線，如何設計課程和用生動有趣的方法刺激學生的上課熱情。”倪教授去年向教育學院老師介紹清華大學慕課的技術時，希望藉此激勵老師參與，當時老師們沒有表現出太大的興趣，後來向天屏教授到上海參加一個教育的會議，會上有人提到慕課教學的影響力，倪教授笑著說：“向教授發現世界已經進步了，回來後即對我說要加入我們的慕課工作組，她現正籌劃開一門漢語拼音的慕課。”

電子科技為學生的學習模式帶來轉變
Electronic technologies have transformed people's mode of learning

李自豪教授去年以創新和顛覆式教學方法獲得國際傑出電子教學獎銀獎和澳大首個卓越教學獎， 他教的通識課之一《戲劇》拋開傳統，採用翻轉課堂以學生為中心、成果為教育基礎、探索式教育的授課方法並結合最新科技包括：擴增實境、人工智能和 zoom（雲端網上會議服務），靈活多變，為學生帶來全新和互動的學習經驗，因此大受歡迎。他在 2016 年首次開課只有 20 人報讀，到了第三學期，學生要排隊修這門課。

李自豪教授現正籌辦的慕課以挖掘個人潛在創意力為主，旨在幫助每個人發現並善用自己的創意思維。為此，他招賢納士，竭力打造澳大自己的慕課團隊。這個創意課邀請了英文系副教授兼教與學優化中心主任王嘉祺負責戲劇和音樂的部分，心理學系教授 Davood Gozli 分析創意的模式和其潛在規律。李自豪教授則探討肢體、思維、意念與創意關係。他說：“這門慕課最大特色是把不同人才融合一起，為學習者帶來非常有趣而又實用的東西。”

李自豪教授團隊現正籌辦的《創意》慕課將會對外開放，預計吸引世界各地學生報讀，“青少年到老年人，任何人都可以參加這門課。這門課程的內容與生活息息相關，是人們經常談論的東西。在 21 世紀社會，人類最重要的一項財富就是創意，這是機器人無法取代我們的東西。然而，專門針對創意教學的課程很少。現在在慕課平台上，有 3 到 4 門關於創意的課程，但都是圍繞商業、建築或音樂這三大主題。但我們這門課程是適用於任何人，因為我們有來自音樂、心理學、戲劇藝術和肢體的人才。我們為所有人準備了全方位的教學內容。”

教與學優化中心提供技術支援

目前每個學院都有老師參與慕課工作組，定期開會交換心得，教與學優化中心並為慕課製作組提供技術支援。倪教授說：“每門課內容教法不一樣，教跳舞的跟教歷史的很不一樣，不同院系老師彼此可以分享經驗，集思廣益。第一次設計慕課，會花很多成本，但慕課受眾數量龐大，還是很值得去做。我們還希望可透過高科技技術的配合，讓學生可以記住所學。” 倪教授希望未來推出多個有關澳門文化歷史的慕課，例如中國歷史文化、澳門文明、中華文明等。

靳洪剛教授和李自豪教授團隊的慕課計劃在今年完成和推出，相比其他大學老師製作慕課有幾十至幾百人的支援團隊，他們二人的製作團體僅五、六人，在資源和人力都有限的情況下，他們並沒因此放棄對品質的要求，無論對時間掌握、講課技巧、呈現手法等都十分講究。倪教授很欣賞澳大老師們的毅力和堅持，他說：“他們在資源有限的情況下仍然願意對教學進行改革，而且還是利用課後額外的時間去做，這是難能可貴的。他們都是我們慕課的種子老師，待我們首批慕課辦成功了，會再吸引更多的老師加入慕課製作的團隊中。”

Promoting Signature Courses to the Whole Country

Lionel Ni, UM vice rector for academic affairs, is a staunch supporter of the university joining the MOOC platform. According to him, MOOC is more than online education; it is individualised learning that encourages teachers to be creative in their instruction. In fact, one of the advantages of the MOOC platform is that it can cater to students' individual needs. Teachers can upload course-related content to MOOC for

澳大與北京慕華信息科技有限公司簽署合作協議
UM has signed a collaboration agreement with MOOC-CN Information Technology (Beijing) Co., Ltd

students to study beforehand. They can then monitor the students' progress by checking when the students studied the content and the amount of time they spent on it, thereby revising the content according to the students' progress.

Prof Ni explains that of all universities in mainland China, Tsinghua University has devoted the most resources to developing MOOCs. In fact, Tsinghua has signed agreements with Coursera and edX in the United States, which enables Tsinghua and these two platforms to access each other's online courses. 'What impresses me the most is that there are 200 full-time staff at Tsinghua working hard to develop various technologies to help teachers innovate their teaching,' says Prof Ni.

Officially launched in 2013, Tsinghua's online course platform, www.xuetangx.com, is operated by MOOC-CN Information Technology (Beijing) Co., Ltd. By the end of the year 2016, it had already grown to be the third largest MOOC platform in the world, with over 8.2 million registered learners and more than 1,000 courses collectively subscribed over 10 million times. One of the highlights of Tsinghua's MOOC platform is that it uses big data and smart computing, which not only improves teaching and learning outcomes, but also makes possible a mode of learning that is cross-discipline, cross-institution, cross-border, and cross-age group.

Prof Ni believes that teaching Portuguese language to people whose native tongue is Chinese is one of UM's strengths. Through Tsinghua's platform and technologies, UM will be able to promote its signature courses to students all over the country so that more students can learn Portuguese. Faculty of Arts and Humanities Dean Prof Hong Gang Jin and Prof Yao Jingming from the Department of Portuguese are already in the process of developing MOOCs in English and Portuguese. Prof Ni is confident that these courses will have a greater impact once taught on the MOOC platform.

人文學院院長靳洪剛教授
Faculty of Arts and Humanities Dean Prof Hong Gang Jin

Prof Jin is a linguist, whose research interests include second language acquisition, cognitive processing of languages, and transfer of learning. Prof Jin is especially interested in integrating technology in the teaching of languages and literature. She is now busy designing a MOOC in second language acquisition. 'Macao is a multicultural and multilingual society. Language courses are the signature courses of our faculty. So we hope to introduce these courses to more students through the MOOC platform,' she says.

The MOOC in second language acquisition, which was designed by Prof Jin herself, is now in its final stage of production. Prof Jin was named the 1998 CASE National Outstanding Baccalaureate College Professor of the Year. She received Hamilton College's 1963 Award of Teaching Excellence in 1996. She is also a two-time recipient of the NCOLCTL Walton Lifetime Achievement Award. Aside from being an accomplished educator, she also has a wealth of experience in creating online courses. While in the US, she published various audio-video teaching materials. According to Prof Jin, the distinctive feature of this course lies in language acquisition and cognitive processing. 'MOOCs differ from conventional courses in many ways,' she says. 'They have special requirements for content and format. They require a different theme for each class which must be limited to ten minutes, and they also call for flexible teaching methods to stimulate learner interest.'

MOOC Teams

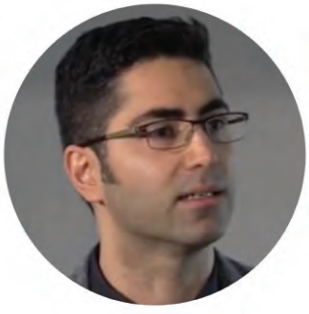
At the end of 2017, Prof Ni arranged for faculty members interested in launching MOOCs to visit Peking University and Tsinghua University to gain hands-on experience. Tsinghua University even organised a workshop for the UM delegation. According to Prof Ni, four faculty members from the Faculty of Education (FED), including assistant professors Li Zihao and Hsiang Tien Ping, travelled to Beijing to attend the workshop to learn how to use Tsinghua's online course platform, how to design courses, and how to stimulate student interest through innovative teaching methods. Last year, Prof Ni introduced faculty members from FED to Tsinghua's MOOC technologies, hoping to motivate them to participate in the MOOC project. But at that time, they didn't show much interest. Later, Prof Hsiang visited Shanghai to attend a conference on education. A participant at the conference mentioned the impact of MOOCs, which made Prof Hsiang realise the necessity of keeping pace with the fast-changing world. Upon returning to UM, she expressed her eagerness to join the MOOC team. She is now busy designing a MOOC in Hanyu Pinyin.

Last year, Prof Li Zihao won the Silver Award from the International Outstanding e-Learning Awards and UM's first Teaching Excellence Award, in recognition of his innovative teaching methods. One of the general education courses he teaches is theatre. In teaching this course, he departs from the traditional approach and adopts a 'flipped classroom'. He combines this student-centred, outcome-based approach with the latest technologies in augmented reality, artificial intelligence, and zoom, in order to create an interactive learning experience for students. The course has been very well received. When he first offered this course in 2016, only 20 students enrolled. A year later, the students had to beat a long queue for this elective course.

李自豪教授的課以發掘學生創意為主
Prof Li Zihao's courses aim to promote learner creativity

李自豪教授 Prof Li Zihao

王嘉祺教授 Prof Katrine Wong



Davood Gozli 教授 Prof Davood Gozli

《創意》慕課的師資團隊 The faculty team behind the creativity MOOC

Prof Li's team is designing a MOOC which aims to bring out the creativity hidden in every student. He has been actively recruiting talented people in order to create a MOOC team at UM. He invited Katrine Wong, associate professor from the Department of English and director of the Centre for Teaching and Learning Enhancement (CTLE), to be in charge of the part of the course related to theatre and music. Prof Davood Gozli from the Department of Psychology is tasked with the job of analysing the patterns and underlying laws of creativity. Prof Li himself is responsible for exploring relationships between body, mind, ideas, and creativity. 'The biggest characteristic of this course is that it brings together people with different talents, so we can create something that's both fun and practical for learners,' he says.

The MOOC in creativity will be open to students from all over the world, regardless of their age. It will cover oft-discussed topics directly related to everyday life. One of humanity's greatest assets in the 21st century is creativity, because this is one area in which machines can never replace humans. But unfortunately, there are very few courses in creativity. The three or four MOOCs currently available on this subject mainly deal with business, architecture, and music. The course designed by Prof Li's team, however, is different. 'There is something for everyone in this course,' says Prof Li.

CTLE Providing Technical Support

Currently, the MOOC team has teachers from each faculty. They meet regularly to share thoughts and exchange ideas. The CTLE provides technical support for the MOOC team. Prof Ni explains: 'Each course is different in terms of course content and teaching methods. That is why it is important for teachers from different faculties to share experience and come together to brainstorm ideas. This is the first time we have designed MOOCs, so there will be a lot of cost involved. But it's still worth doing because the platform can reach an astounding number of learners. We also hope to help students retain what they learn through high-tech solutions.' Prof Ni hopes to eventually launch more MOOCs related to the culture and history of Macao and China.

The MOOCs developed by the two current teams will be completed and launched within this year. Compared to MOOC teams at other universities, which can have dozens or even hundreds of members, UM's MOOC teams are very small, with only five to six people. But the team leaders refuse to compromise on quality simply because of size or constraints in resources and manpower. Indeed, they have been meticulous in preparing every aspect of the projects, from the duration of the course to presentation skills. Prof Ni is very impressed with the persistence of the two teams, saying, 'Not only are they willing to rethink and redesign their teaching with limited resources; they are also willing to do it during their spare time, which is even more admirable. They are our MOOC talent seed or pioneers. When our first MOOCs become successful, they are bound to attract more faculty members to join our team and grow our MOOC capability.'

不一樣的慕課 1—收集大數據令上課不單調
MOOC Is Different 1 – Big Data Makes Lectures More Interesting

不一樣的慕課 2—學好第二語言好方法
MOOC Is Different 2 – A Good Way to Learn a Second Language

不一樣的慕課 3—集不同老師建有趣課程
MOOC Is Different 3 – Interesting Courses Developed by Teachers from Different

以生命影響生命
地震工程學專家 阮家榮教授

A Life Influencing Other Lives -
The Story of an Earthquake Engineering Expert, Prof Yuen Ka Veng

文 Text ｜李巧雲、校園記者王紫琪
Albee Lei, UM Reporter Megan Wang
圖 Photo ｜何杰平 Jack Ho

常言道：親人是一生一世的關係，對澳門大學教務長兼科技學院代院長阮家榮來說，教育是“生命影響生命”，與學生之間的師徒情誼也是一生一世。阮家榮教授說：“身為人師，最滿足莫過於見證學生一路成長，以及自己的研究成果可以惠及人類。”

To most people, biological ties are for life. But for University of Macau (UM) Registrar and Interim Dean of the Faculty of Science and Technology, Yuen Ka Veng, so are ties between teachers and students. Education is about one life influencing other lives. Prof Yuen, for one, has derived much gratification from watching his students grow and seeing the fruits of his positively affecting humanity.

地震工程學之父 George W. Housner 對阮家榮影響甚深 (courtesy of Caltech Archives)

George W Housner, the father of earthquake engineering, had a profound influence on Yuen Ka Veng

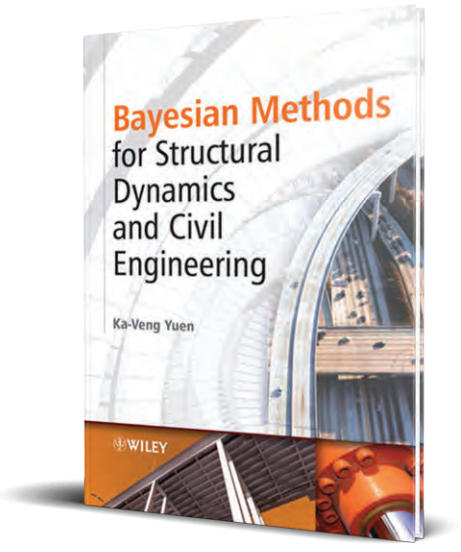
恩師影響一生

阮家榮研究範疇涉及貝葉斯分析、不確定性量化、系統識別、結構監測、可靠度分析和動力系統分析。師承結構動力學貝葉斯分析先驅 James Beck，世界地震工程學之父 George W. Housner 是他太師公。George W. Housner 一生很傳奇，一直堅持研究近百歲，去世後更把所有財產都捐給了學校，其治學態度對阮家榮有很大影響。

除了太師公，前輩們當年的提醒和幫助也改變了阮家榮的命運。1998 年，他即將從香港科技大學碩士畢業時到澳大科技學院求職，時任科技學院院長姚偉彬教授對他說：“現在對你來說是一個非常關鍵的時間，你應該考慮先完成博士學位再來應聘。”對於從小每科考 A、每年都拿獎學金的阮家榮，剛嘗試踏出社會便被拒絕，心裡當下少不免有挫敗感，但最後還是聽了建議到美國修讀博士學位。

研究引發關注

在美國深造期間，阮家榮與恩師 James Beck 發表了首篇在結構健康監測領域中探討如何選擇模型類別的方法的論文，成為美國土木工程師學會《工程力學期刊》歷史上發表過的幾千篇論文中引用次數最多的 10 大論文之一。後來他把十年的研究成果結集成書《Bayesian methods for structural dynamics and civil engineering》，掀起了結構動力學貝葉斯方法研究的熱潮，並成為結構動力學的經典讀物。他回憶道：“如果當年碩士畢業直接到澳大工作，我的職稱就只能是講師，也不會有後來的故事。我很明白姚教授的苦心，我至今一直感謝他當年的建議。”



阮家榮的專著掀起結構動力學貝葉斯方法研究的熱潮

Yuen Ka Veng's book on Bayesian methods for structural dynamics aroused tremendous interest in the field

用生命影響生命

人與人之間的互動對命運產生的微妙影響，令阮家榮深信“生命影響生命”，並以此信念踐行老師的職責：“一生人即使發了 200 篇論文，也不一定每份都能有很大的貢獻，但如果你能改變一個人，令他有更好的生活，這樣的滿足感對我來說更大。有學生曾說我令他對數學開竅，我聽後十分高興，我相信教育可以影響人的一生。”

多年來，阮家榮每年都會挑選一至兩名優秀研究生加以栽培，能成為他的“入室弟子”必是學術卓越的學生，不過其中也有特例。例如他的大弟子慕何青在澳大讀本科時學術成績並不是最頂尖，但阮家榮在課餘交流時發

阮家榮教授獲頒傑出青年學者獎
Prof Yuen Ka Veng, winner of the Young Investigator Award

現他很有想法，基於“畢竟做研究和唸書不一樣，唸書厲害不代表做研究厲害”的想法下，便將他收為研究生，更推薦他到加州理工學院和加州大學柏克萊分校分別交流半年，並跟從其師父 James Beck 學習。慕何青從澳大博士畢業後便到華南理工大學任教，短短一年半內便晉升為副教授。

2015 年，阮家榮與慕何青基於過往的研究基礎下，合作研究建立可靠的實時結構健康監測系統，奠定了重要的理論基礎，獲權威的《計算機輔助土木和基建工程》期刊發表，論文在同期期刊的 120 篇論文中引用次數排名第二。阮家榮用心對待學生，也用心啟發學生，因此教學多年來深受學生愛戴。在教導學術理論以外，他還重視應用與實踐，不時帶學生走出象牙塔做研究：在澳大舊校園時，他與學生一起全天候監測東亞樓長達 5 年，研究氣温、濕度等環境因素對結構長期行為的影響；師徒亦曾在強烈颱風天氣下，研究建築物的極端行為。他還鼓勵學生參加全國挑戰杯，為澳門贏得該比賽的首個一等獎 。

“我是一個有軍人紀律感的人”

高徒出自名師，阮家榮除了是結構動力學貝葉斯方法的領軍人物，還是澳大首位 35 歲前晉升的正教授，歷任該校土木及環境工程系主任、科技學院副院長（學術）、副院長（研究及研究生課程）、澳大創科公司行政機關成員和研究及發展事務辦公室學術顧問、2012 年獲選中華人民共和國科技部國家科技計劃專家庫及國家科技獎勵評審專家庫……能夠勝任不同的角色和工作，都離不開他長年的努力和對自己的嚴格要求。

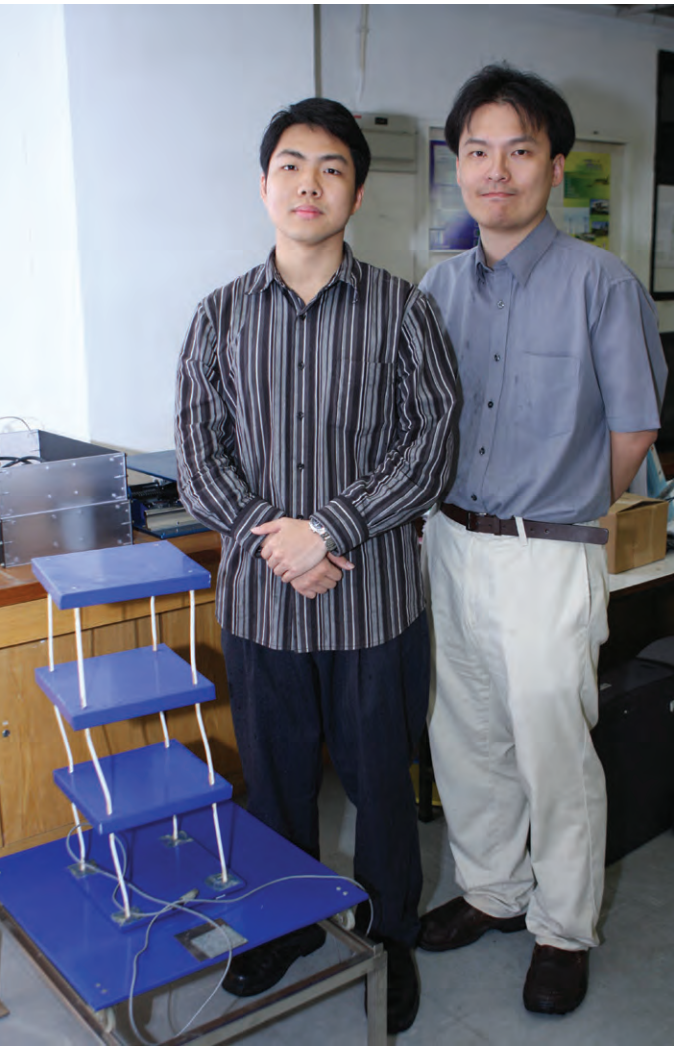
2008 年初，John Wiley & Sons 出版社與阮家榮洽談出書，要求他 24 個月內寫好，而他用了 15 個月便完成。在寫書期間，他剛當上土木及環境工程系主任，工作量大增，同時太太也懷了第二胎，在公在私都非常繁忙，他如何分配時間來做好每件事？阮家榮微笑道：“我是一個有軍人紀律感的人，會嚴格遵守定好的時間表，因為稍一鬆懈就會讓時間流走。如果給我 10 天時間完成工作，我一般會爭取 3 天完成，因為儘快做好每件事，多出來的時間可以把工作進一步完善，同時可避免意外的情況出現。”此外，他每星期都會跑步，一星期 30 公里，52 週風雨寒熱不改，“這些都是紀律，我跑了十幾年沒有停過 。”

機會留給有準備的人

回想最初在台灣大學唸本科的日子，阮家榮坦言有壓力。大一上學期他被安排在童恩賢老師的微積分課，有學長知道後便告誡他：“你不用讀了，一定不合格的！”原來之前童老師的課每個學期都會“當掉”三分之二學生，全班 50 多名學生最終只有六、七人及格。阮家榮聽後並沒有放棄，反而傾力為學習做足準備，最後還拿了全班第一。

從小習慣在壓力大的環境下學習，阮家榮已養成不屈不撓的韌力和高抗壓能力，他說：“全歸功於母親從小的培養。”這兩項軟實力可謂“無價寶”，不僅陪他成長，也伴他走過兩段不得志的人生低潮期，讓他在逆境中仍保持樂觀心態面對，並用運動和讀書持續充實自己，為未來儲蓄能量。他說：“你準備好，機會就會來，如果機會來的時候，你沒有準備，就甚麼都做不了。”

做好準備再加上“幾乎不拒絕別人交付任務”的性格，一些機會總會主動找上。阮家榮覺得“這個世界沒有一步登天的事情，有些事總要積累。一步一腳印地走出來，從心出發，過一段時間就會發現自己和幾年前已經完全不一樣。”



阮家榮與大弟子慕何青的論文獲美國 Nova 科學出版社選錄於地震研究專書《Earthquake Engineering: New Research》.

'Earthquake Engineering New Research', a joint paper by Yuen Ka Veng and his student Mu Heqing, was selected for inclusion in a book published by the US Nova Science Publishers

阮家榮教授的第一位碩士研究生施袁鋒（左）現為四川大學副教授

Prof Yuen Ka Veng's first master's student Shi Yuanfeng (left) is now an associate professor at Sichuan University

A life-transforming Teacher

Yuen's own experience provides a good example of the importance of having a life-changing teacher. He specialises in earthquake engineering, specifically in Bayesian inference, uncertainty quantification, system identification, structural health monitoring, reliability analysis, and analysis of dynamical systems. His supervisor was the famous Prof James Beck, who in turn learned at the feet of Paul Jennings, California Institute of Technology's former provost and a student of the legendary George W Housner, the father of earthquake engineering. Housner's life has become part of the folklore of this discipline, and he remained an active researcher into his late nineties. When he died, he made a substantial donation to the Earthquake Engineering Research Institute of Caltech. Yuen was profoundly inspired by this tireless and selfless scholar.

He also benefited from the timely advice from an unlikely source. In 1998, on the eve of his graduation from a master's degree programme at the Hong Kong University of Science and Technology, Yuen came knocking on the door of UM's Faculty of Science and Technology for a job. To his surprise, the dean of the faculty, Prof Iu Vai Pan, gave him an unpalatable piece of advice: 'This is a critical moment in your life. You should consider finishing your PhD studies before you take up an academic post.' Yuen, who was always a straight-A student, was not accustomed to getting 'no' for an answer, and he left somewhat deflated. But he decided to heed the dean's wise counsel and headed to the US for his doctoral studies.

Research that Made His Peers Sit Up and Pay Attention

During his study at Caltech, Yuen completed a number of papers, including one paper he co-authored with his supervisor James Beck. The first in the field of structural health monitoring to discuss model class selection, the paper was ranked among the ten most cited papers, out of several thousand, published by the *Journal of Engineering Mechanics* of the American Society of Civil Engineers. In the years that followed, he compiled his key research results into a book titled 'Bayesian Methods for Structural Dynamics and Civil Engineering', arousing tremendous interest in his field. In fact, the book became a classic. Looking back, Yuen says that he is glad he didn't land a job at UM in 1998. With a master's degree, he couldn't have excelled beyond the post of lecturer, and would not have accomplished all the good things that followed. To this day, he is grateful to Prof Iu for his career-changing advice.

Life Is about Impact on Other Lives

Dynamics between people often produce unpredictable outcomes and uncanny effects. Yuen is a believer in 'one life impacting other lives'. This belief underlines his mission as a teacher. 'Even if you manage to publish 200 academic papers, they may not amount to much. But if you could change and improve a single life, the gratification would be far greater,' he says. 'I am especially happy when students come up to me and tell me that I have opened their eyes to the essence or magic of mathematics. Education is about changing lives.'

Over the years, it has been Yuen's practice to select one or two outstanding students as his mentees. These lucky individuals are, needless to say, typically academically gifted students. But there are exceptions. One of them is his student Mu Heqing, whose academic performance was not the most impressive. But in his after-class discussions with this student, Yuen discovered that Mu had other gifts; he had a mind of his own. Yuen trusted his instinct that 'doing research is a different kettle of fish from mere book learning'. Earning good grades is not the same as being a good researcher. Yuen decided to take Mu under his wing. Not only that, he recommended his mentee for two six-month exchange programmes that covered stints at both the Caltech and the University of California, Berkeley. The lucky student even had the privilege of studying under Yuen's former teacher James Beck. Upon earning his PhD at UM, Mu landed a teaching job at the South China University of Technology, where he was promoted to associate professor within 18 months.

In 2015, on the basis of their previous research collaboration, Yuen and Mu jointly created a system for real-time structural health monitoring, thus laying the foundation for a paper that was later published by the authoritative *Computer-Aided Civil and Infrastructure Engineering*. That paper was the second most cited among 120 others published by the journal in 2015 and 2016.

阮家榮教授是澳大首位 35 歲前晉升的正教授
Prof Yuen Ka Veng is the first scholar at UM to become a full professor before the age of 35

Yuen pours his heart into mentoring and inspiring his students, making him one of the most popular teachers in FST. He not only teaches theories, but also stresses the importance of application and implementation. Figuratively, he has taken his students out of the ivory tower. While on UM's former campus, Yuen and his students spent five years on all-weather monitoring of the condition of the East Asia Hall, studying the long-term structural effects of temperature, humidity, and other environmental factors. His team even observed the extreme behaviour of the building under severe storm conditions. At Yuen's urging, his student, Ms Kuok Sin-Chi, also took part in the National Challenge Cup, and won first prize, the first-ever such award by a Macao student.

阮家榮教授與其研究團隊
Prof Yuen and his research team

'I was born with military discipline'

Yuen is not just a leader in Bayesian methods for structural dynamics, he is also the first scholar at UM to become a full professor before the age of 35. He was the head of the Department of Civil and Environmental Engineering, associate dean (academic affairs) of the Faculty of Science and technology, associate dean (research and graduate studies) of the same faculty, a member of the Administrative Committee of UMTec Limited, and an academic advisor of the Research and Development Administration Office. In 2012, he was listed in the People's Republic of China's Science and Technology Programmes Expert Database, and in the National Science and Technology Award Panel Expert Database. Yuen is comfortable in assuming various roles and responsibilities, a result of his long years of self-discipline and hard work.

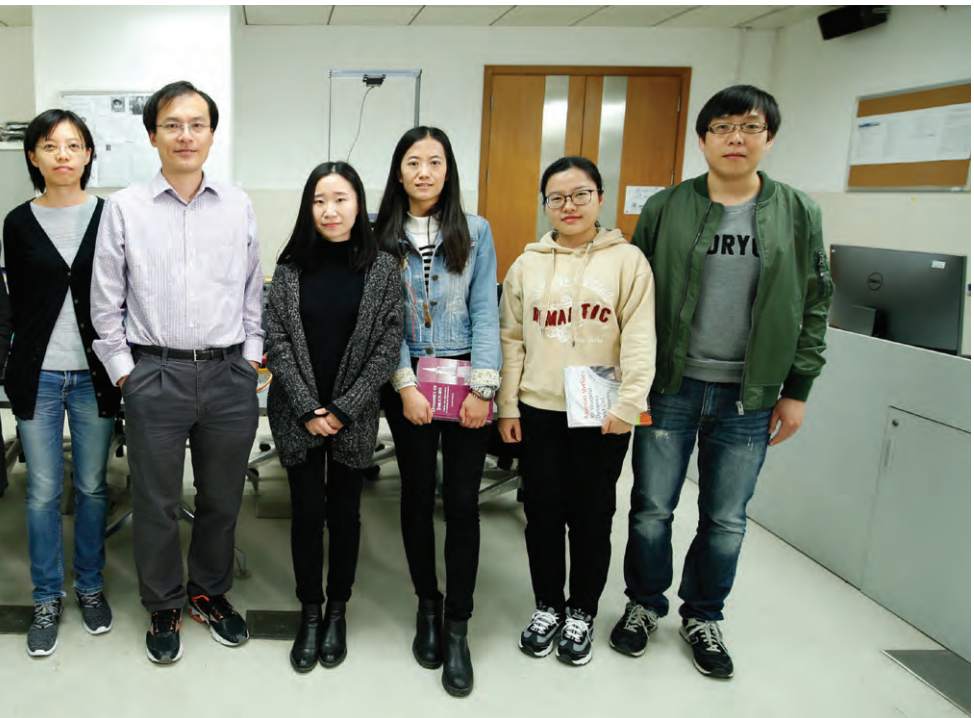
In 2008, John Wiley & Sons discussed a book project with Yuen, asking him to finish his manuscript within 24 months. However, he took just 15 months to complete the book-writing. At that time, he had taken on the role as the head of the Department of Civil and Environmental Engineering, with an onerous increase in administrative work. On top of that, his wife was pregnant with their second child. Both domestically and professionally, Yuen's plate was full. But he took it all in stride. He says, smiling, 'I am a man with military discipline, and will adhere strictly to a pre-set time-table. If I slacken my pace, precious time will be lost. If I am given ten days to finish an assigned task, my target is to get it done within three days. By getting it done ahead of time, I earn extra time to make sure that the job is done to perfection. This will give me the cushion to deal with the unexpected.' To keep himself in shape, he jogs 30 kilometers a week, 52 weeks a year, rain or shine. This is part of his personal discipline regimen which he has followed religiously for over a decade.

Opportunity Favours the Prepared

Yuen looks back with fondness on his undergraduate years in Taiwan. Pressure was palpable. In his first year, Yuen was assigned to study calculus under Prof Tong Un-Hien. Senior students warned him against taking his course: 'Forget about studying under him. You are bound to fail,' they said. It is true that Tong was notorious for flunking up to two thirds of his students. Out of a class of 50-plus students, only six or seven would make the grade after two semesters. But Yuen was undeterred. He poured himself into the coursework and rose to the challenge, emerging triumphant as the top-ranked student in the course.

All his life, Yuen has learned to cope with pressure. He is practically pressure-proof from years of domestic discipline summed up in two things: resilience and a refusal to admit defeat. 'Thanks to my mother, I have acquired soft power in these two forms,' he says. 'They were part of my growing up, and part of what got me through my low ebbs in life. I project positivity in adversity. Besides, I use sport and reading to enrich myself, to keep myself primed for the bigger challenges of the future.' He adds, 'When you are prepared, opportunity will come knocking. But if you are unprepared, it may knock, but you won't be there to answer the door.'

Being prepared, and never turning down an assigned task, are two characteristics which invite opportunity. In Yuen's view, there is no such thing as an easy victory. Triumph takes time, and is earned step-by-step. Above all, the desire to win must come from within. In the fullness of time, that will make all the difference in the world.



澳大人愛回家：阮家榮教授
UM Members Return to Their Hometown: Prof Yuen Ka Veng

人生三把鑰匙
犯罪學專家劉建宏教授

A Criminologist with Three Keys to His Life

文 Text ｜黃首豪 Saohou Wong
圖 Photo ｜李思、部分相片由受訪者提供 Manuel Reis, with some provided by the interviewee

如果人生有 3 把可以打開新階段的鑰匙，你會在甚麼時候使用？澳門大學社會學系教授劉建宏把握每個開鎖機會，從生產輪胎工人踏上成功之路，成為國際知名的犯罪學學者，2016 年獲美國犯罪學學會授予“ 弗裡達 · 艾德勒傑出學者獎 ”；去年更獲國際刑事司法最具權威的學術組織美國刑事司法科學學會授予 2018 年度“格哈德 O.W. 米勒獎”（Gerhard O. W. Mueller Award）的傑出貢獻獎，表彰他在比較犯罪學和國際犯罪學領域長年的傑出貢獻。

If you were in possession of three keys that can each open the door to a new phase in life, would you know when to use them? Prof Liu Jianhong from the University of Macau's (UM) Department of Sociology is one man who clearly does. He had a steep climb up the ladder of success – from the floor of a tyre factory to the academic podium as an internationally renowned scholar of criminology. Winner of multiple awards, he received the 2016 Freda Adler Distinguished Scholar Award from the American Society of Criminology. Last year, he won the 2018 Gerhard O W Mueller Award, from the most authoritative body on the relevant discipline, the Academy of Criminal Justice Sciences, in recognition of his outstanding and longstanding contributions to comparative criminology and international criminology.

人生第一把鑰匙

時間撥回 1966 年，生於寧夏的劉建宏在 11 歲時遇上文革，所有學校停課了。無所事事又聯群結黨的小孩自然喜歡惹事生非，小學五年級的劉建宏也不例外。他愛逞強，也會與別的小孩打架，最嚴重一次更被人捉到保衛部（等於現時的警察局），就這樣劉建宏荒廢了 3 年光陰。14 歲那年，學校復課，劉建宏重新回到校園，但他不是重讀小五，而是直接跳級讀初中二年級。

畢業後的劉建宏獲安排到寧夏橡膠廠生產輪胎，在 24 小時輪班工作的環境下，劉建宏覺得這輩子不能只待在橡膠廠生產輪胎，就決心在下班的時間自修，用 4 年的時間自學整個中學階段的數學、物理、化學，文學，歷史等。

一條看似普通不過的輪胎，由原料到成品要經過“高温 ”、“高壓 ”及“硫化（與硫磺產生化學反應）”等多番工序，才能讓輪胎的韌性、強度、抗磨及抗腐蝕性達到要求。劉建宏在輪胎廠的日子時刻裝備自己，就像輪胎經歷多番工序達到出廠標準。

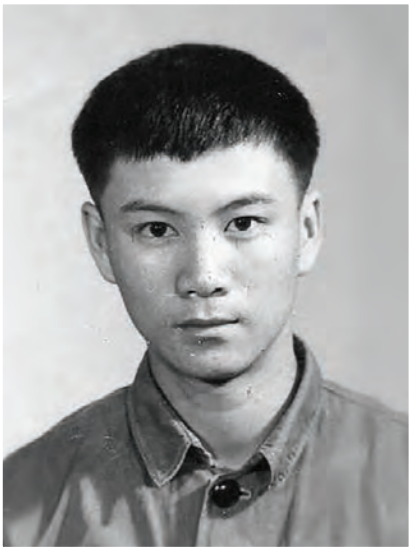
劉建宏認為只要努力學習就可以獲得領導推薦上大學的機會。“當時上大學要得到工廠領導推薦，因此大家都要參加廠內考試。我記得當時其他考生還在回答第一份考卷，我已經答完了所有四份考卷，可是工廠沒有推薦我上大學，因為我成績好而調派到子弟學校當中學老師。”

當了中學教師兩年，劉建宏終於等到鯉躍龍門的機會。1977 年，時任國務院副總理鄧小平恢復停止了十年的高考，劉建宏與上百萬青年如過江之鯽般參加高考。劉建宏帶著“千錘百鍊出深山，烈火焚燒莫等閒 ”的心態，在十年的艱辛中打造出改變自己命運的鑰匙，劉建宏終如願考上大學，開啟人生新一頁。劉建宏形容：“77 級，78 級入大學的一代人是一個奇蹟！”

他原本是個理科生

劉建宏教授在學術界屢獲殊榮，曾當選眾多國際著名犯罪學組織的領導，也創建了亞洲犯罪學專家最重要的學術交流平台——亞洲犯罪學學會。著作同樣豐盛，曾獨著、主編及合編書籍 29 本，發表雜誌文章 71 篇（其中 SSCI ／ Scoupus 學刊文章達 48 篇）及書籍章節 36 篇。

劉建宏教授年輕時在橡膠廠工作時的照片
Prof Liu in his salad days as a tyre factory worker



劉建宏教授大學畢業後到寧夏大學任物理教師
Prof Liu as a physics teacher at Ningxia University

這位犯罪學家原來本科是物理，他解釋道：“當時有句口號‘學好數理化，走遍天下都不怕’，所以我就報考物理系。”因應潮流修讀物理系，畢業後劉建宏卻認為物理有很大限制。“物理學太古老，能發揮的空間相對較少，一個年輕人如果沒有高級別的實驗室進行實驗，很難有成功的機會。儘管畢業後獲安排到寧夏大學教物理，我還是想尋找另一個機會。”

人生第二把鑰匙

劉建宏由沒路可走的輪胎技工搖身一變為大學物理老師，追求卓越的心一直驅使他不斷在學術上求進。劉建宏說：“經歷文革後，我對社會、政治等議題有所思考，在大學教了兩年物理，我就去報考南開大學哲學系碩士班。”這次轉換人生跑道，劉建宏遇到前所未有的機遇。1979 年中美建交，中國與美國關係在上世紀 80 年代迎來最友好的時光，劉建宏說：“當時南開大學邀請很多美國專家講課，讓我認識社會學，其後在 1988 年考獲全額獎學金赴美留學。”

劉建宏在美國如飢似渴般拼命吸收知識，由理工生蛻變為哲學學生，再轉到社會學，花了十年時間轉了個大彎，劉建宏依然沒有找到自己真正感興趣的學科，但是這十年的努力為他打造了第二把開啟人生新一頁的鑰匙。在美國留學的日子，劉建宏直到完成博士資格考試才認識犯罪學，他回憶道：“美國紐約州立大學奧爾巴尼分校被稱為犯罪學的搖籃，在耳濡目染下，我到寫論文的階段才找到自己的終身志向，就是犯罪學。”這次劉建宏的鑰匙終於打開了那個對的寶箱。

之後他留在美國潛心研究犯罪學，在美國羅德艾蘭學院從 1992 年開始，用 10年時間由助理教授升到終身正教授。回顧這段歷程，劉建宏認為是追求卓越的心讓他沒有停下來。在記者前往他辦公室訪問前一天，劉建宏參加澳門大學宋永華校長就職典禮，訪問中他有點激動地對記者說：“宋校長在就職禮上講到‘一所大學必須要有夢想，才會不斷追求卓越。’這句話正好用來演繹自己多年來走出焦土試煉的意志，如果沒有追求卓越的心，可能現在只是個生產輪胎的工人！”

重返亞洲，人生第三把鑰匙

2007 年美國金融危機浮現，這年劉建宏透過美國富布萊特計劃來到澳大當訪問學者，其後被院長郝雨凡教授邀請留下來。劉建宏追求卓越的心讓他決定走出工作了 15 年的舒適圈，由美國回到亞洲。

劉建宏當時看中澳大的發展前景，更看中犯罪學在亞洲的機遇， 他解釋：“當今犯罪學理論都是以美國的研究為基礎，但這些理論能否在亞洲成立

是可以討論，例如東西方對監獄的研究就有不同；西方較著重研究如何有效管理監獄，而東方就著重研究如何感化罪犯，讓他們重建新生，因此亞洲犯罪學研究是充滿發揮空間。”

2009 年劉建宏聯合近 50 個來自 14 個亞洲國家與地區的專家學者，以澳大為基地建立亞洲犯罪學會，並在同年擔任《亞洲犯罪學雜誌》主編。在他主編下，《亞洲犯罪學雜誌》在今年成為亞洲第一本也是唯一一本收錄於《社會科學引文索引》（SSCI）的犯罪學期刊。

劉建宏一個重要的工作是發展可以符合東西方的犯罪學理論：“社會學家會說學習過程與環境會影響犯罪行為；政治學家則認為社會衝突、剝削、壓迫，不平等會引起犯罪；犯罪學家已經提出了很多種犯罪學理論，但我的一個主要貢獻是提出《關係主義理論》。關係主義理論以文化差異為邏輯起點，把犯罪的原因理論與社會對犯罪的反應如刑事司法制度理論統一起來，解釋犯罪和跨文化的刑事司法制度的差異，而現存的西方理論忽視跨文化的重要差別，往往假定西方環境下發展出來的理論會適用於全世界。劉建宏提出建立亞洲犯罪學的概念就是針對批判這種流行的假定。關係主義理論從對跨文化差異的分析中得出關係主義司法制度與個人主義司法制度的深刻差異。這個理論已經發表，並得到一些著名犯罪學家的讚揚。劉建宏目前正在繼續深化這個理論，使這個強調亞洲和非西方國家社會文化特點重要性的理論更加完善。

劉建宏續說：“犯罪學是個永續研究，具有重要的實踐意義。”劉建宏希望，未來在國際發表重大理論的同時，也可以對澳門社會作出貢獻，“過去澳門政府和澳大法學院的合作較多，未來我也希望可以有更多機會與政府就預防犯罪上合作，為澳門社會服務。”

(左一) 劉建宏教授當選國際犯罪學會委員會主席

Prof Liu (1st from left) elected president of the Scientific Commission of the International Society for Criminology

Unlocking Life's First Door with His First Key

Born in Ningxia, Liu was swept up in the tumultuous Cultural Revolution at the tender age of 11. With all schools shut down, idle children fell into small gangs, picking fights and causing trouble. Liu, then a fifth-grader, was no different. In one serious episode, he was taken to the Social Protection Department (now the Police Station). When he reached age 14, schools reopened. He did not resume his fifth grade studies, but leapfrogged to the eighth grade, because those in the younger age groups needed to be assigned to lower grades.

After leaving school, Liu was assigned to work in a tyre factory in Ningxia. But he refused to spend the rest of his life trapped in the 24-hour shift cycle of a tyre-production labourer. Boldly, he decided to teach himself the entire secondary school syllabus for mathematics, physics, chemistry, literature, history, as well as other subjects after work, which took him four years to complete.

An ordinary rubber tyre may look simple. But multiple steps are necessary to manufacture one, from high-temperature heating, pressurisation, and sulfurisation, before it passes the test for resiliency, strength, wear-resistance, and anti-corrosiveness. In his factory days, Liu often reminded himself that, he too, must undergo the vigorous process of being tempered and molded into market-ready condition.

At that time, the only way to get into university is through recommendation by the work unit. In the only selection exam held in the factory, Liu was the first to finish all four exam papers, when others were still struggling with one. However, he was not recommended for college but was instead transferred to the school run by the factory.

After two years as a high school teacher, Liu's lucky break finally came in 1977, when the then Vice Premier of the State Council Deng Xiaoping reinstated the college entrance examinations that had been mothballed for ten years. Millions of young people commenced a mad stampede to take the public exams. Liu, too, leaped at the opportunity. In doing so, he unleashed his dream that had been dormant and suppressed for a decade. He summed up that moment poetically, 'Like tempered steel, hidden and unused / I burned with a desire

to be of use.' By gaining admission into the university, he cut the key that opened the door to a new life. 'Those that got admitted into universities in 1977 and 1978 saw the opportunity as a miracle,' says Liu.

From a Science Major to a Major Force in Criminology

Liu has won a clutch of awards and honours. He has been elected to many famous international criminological bodies. Notably, he also founded the most important scholastic exchange platform in Asia for criminologists--the Asian Criminological Society, of which he is the president. He is a prolific writer, with 29 books to his credit as author, editor, or co-editor, 71 journal papers (of which 48 are SSCI/Scoupus indexed), and 36 book chapters.

Liu's undergraduate major was physics. Back then, students were sold on this slogan 'Learn well your math, physics, and chemistry, and you can go anywhere without fear or insecurity.' Liu too found himself in the grip of this fever and picked physics. Post-graduation, he discovered, to his disappointment, that career options in physics were severely limited. Physics was old school, with little room for career development. Without a lab for high-grade research, success was hopelessly beyond reach. Though offered a post to teach physics at Ningxia University, Liu turned his mind to an alternative career path.

Cutting a Second Key to Life

Proud though he was in making a quantum leap from humble tyre factory worker to lofty physics professor, Liu was far from content. He felt a different inner drive.

'Having come through the social upheaval of the Cultural Revolution, I had thought long and hard about various social and political issues,' he says. 'After two years of teaching physics, I decided to change horses midstream and applied for an MA programme in philosophy of science.' Liu thus took a drastic turn--to a road not yet travelled, where he found unprecedented opportunities. In 1979, China and the United States established diplomatic relations, ushering in a honeymoon period between the two countries. 'Nankai University invited many American experts to deliver talks, giving me a chance to get to know sociology,' he says. 'In 1988, I earned a full scholarship to study in the US.'

Driven by his hunger for knowledge, Liu switched from being a science student to a philosophy of science major, and then spent an additional ten years on another detour into sociology. But even then, academically, he still had not found his true love. This ceaseless search, however, led him to cut his second key that finally opened the door to a new opportunity. During his stay in the US, it was not until after he completed his PhD degree that he began to develop a romance with criminology. 'The State University of New York at Albany was known as the cradle for criminology. That whiff of intellectual excitement lured me into my lifelong interest in this discipline, just when I was writing my thesis,' he recalls. Discovering criminology was his second key, the key to a veritable treasure chest.

He stayed in the US to dig deeper into criminology. He joined Rhode Island College in 1992, and spent 10 years there climbing the rungs

from assistant professor to tenured full professor. But academic security alone did not satisfy him. He wanted more. He still burned with a desire to excel himself. The day before our interview, Prof Liu attended the inauguration ceremony for UM's new rector Yonghua Song. He was visibly moved by what Rector Song said in his official speech, 'A university must be driven by its dream, and feed its soul on excellence.' This apt statement captures the essence of his own life journey. Had he not embarked on his scorched-earth pursuit of self-actualisation, he would probably still be toiling away in a tyre factory in his native Ningxia.

The Third Key - Returning to Asia

In 2007, the US was in the throes of a financial crisis. That same year, Liu came to UM as a visiting Fulbright Scholar. Near the end of his term, Faculty of Social Sciences Dean Prof Hao Yufan invited him to stay. That was how Liu left his comfort zone in the US where he had been ensconced for the past 15 years. By staying, he traded America for Asia.

劉建宏教授在墨西哥舉行的國際會議發表演講

Prof Liu gives a speech at an international conference in Mexico

劉建宏教授與斯德哥爾摩犯罪學獎得主 Robert Sampson 教授合照

A group photo of Prof Liu and Stockholm Prize in Criminology recipient Robert Sampson

In scanning UM's growth prospects, Liu can see that there is a rich vein of opportunity for Asian criminology. He puts it this way, 'Current criminological theories are invariably based on American research and model. Whether these theories apply to the Asian context is open to question. Case in point: East and West differ significantly in prison studies. In the West, they focus on how to manage the prisons effectively. In the East, they care more about how to rehabilitate the inmates, to prepare them for a new life. That's why I feel there is plenty of elbow room for criminological studies to grow in Asia.'

In 2009, together with 50 experts and scholars from 14 Asian countries, Liu founded the Asian Criminological Society, with UM as its home base. That same year, he became the editor-in-chief of the *Asian Journal of Criminology*, which this year became the first and only journal on criminology in Asia to be included in the Social Sciences Citation Index (SSCI).

An important part of Liu's work is in developing criminological theories that are applicable to both East and West. 'Sociologists are fond of saying that socialisation and the environment have an impact on human behaviour. Political scientists, on the other hand, like to say that social conflict, exploitation, oppression, and inequality are the true causes of crime,' he says, 'Criminologists are never short of criminological theories. As for me, I believe that one of my principal contributions is in advancing a 'relational approach' to the study of criminal behaviour.' This is a new Asian paradigm which is predicated on the logic of cross-cultural comparisons. Existing theories in the West have largely ignored the importance of cultural differences on the study of crime and criminal justice, based as they are on the unchallenged assumption that theories gestated in the Western environment are universally applicable. Liu's new relationalism perspective takes issue with this prevalent assumption. It posits that the relational approach explains criminal behaviour and society's reaction to criminal behaviour, of which the criminal justice system is one example, in ways that Western individualistic perspectives alone cannot. Since being published, his theory has been lauded by some famous criminologists. Liu is busy working to refine his theoretical model, so that it can better highlight the cultural perspectives of Asian and other non-Western societies.

In bringing the interview to a close, Liu stresses that criminology is a work-in-progress and a never-ending pursuit, with enormous import for application. He hopes that by introducing this new paradigm internationally, it will make contributions locally. In the past, he points out, there has been relatively significant cooperation between the Macao government and the UM Faculty of Law. In the future, he says, 'I hope we will enjoy more cooperative opportunities with our government on crime prevention in service of Macao.'

人為甚麼犯罪？澳大犯罪學專家告訴你
UM Criminologist Tells You Why People Commit Crimes

Alexandr Svetlicinii 於第四屆金磚國家法律論壇發表演說

Prof Alexandr Svetlicinii speaks at the IV BRICS Legal Forum hosted by the Association of Lawyers of Russia

金磚國家 —— 架橋而非造牆

BRIC(k)S Is for Building Bridges, Not Walls

文 Text | Alexandr Svetlicinii

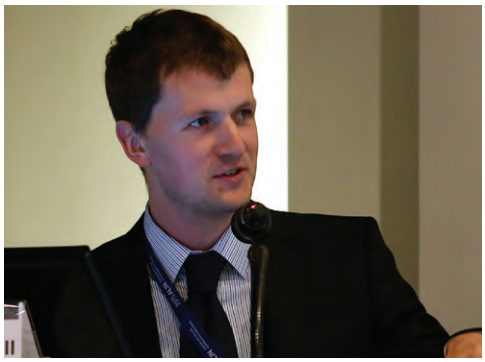
金磚國家網絡大學成員

英文「BRICS」（「金磚國家」）一詞是巴西、俄羅斯、印度、中國和南非五個國家英文首字母的縮寫。「BRIC」（「金磚四國」）最初是用來指代巴西、俄羅斯、印度和中國這四個冉冉升起的新興經濟體。2011 年南非成為金磚國家一員之後，這些成員國家將其合作機制定位為「對話合作平台」，並定期召開政府間各種級別的會議。 2015 年，來自金磚國家的一流大學代表達成了「北京共識」，決定成立「金磚國家大學聯盟」。 2016 年，它們朝這個方向邁進了一步，同意成立金磚國家網絡大學。金磚國家網絡大學第一次全體會議於 2016 年 4 月 6 日 至 9 日在葉卡捷琳堡舉行。2017 年金磚國家網絡大學成員學校齊聚鄭州，參加由華北水利水電大學承辦的新一屆大會。目前，金磚國家網絡大學的成員包括 9 所巴西大學、11 所中國大學、 12 所印度大學、12 所俄羅斯大學和 12 所南非大學。

配合研究推新法律課程

澳門大學不屬於金磚國家網絡大學成員，但已朝著推動與金磚國家相關的研究和教育的方向邁出了關鍵的一步。在 2016/17 學年春季學期，來自澳大法學院的教授 Rostam J Neuwirth、助理教授 Alexandr Svetlicinii 和高級講師 Denis De Castro Halis 組成了 「金磚國家與全球治理討論」 學術團隊。三位教授共同開設了碩士課程：「國際貿易法高級課程：金磚國家商法」，詳細介紹了在金磚國家開展業務要注意的法律事宜。新課程採用了幾種創新的教授和學習方法。首先，該課程由三位教師同時在課堂上共同教授，目的是發討論並在金磚國家法律專業知識領域形成互補。教師們採用了本校教與學優化中心（CTLE）提供的包括 UMMoodle 和 PollEverywhere 在內的各種教學技術。課程選擇的教室是 CTLE 的交互式學習空間，那裡配有音頻和視頻（AV）錄製設備，更方便課程開展。課程中錄製的視聽材料給學生提供了多元的學習模式。學生可在課前觀看短視頻課程，以便課堂上進行更深入的討論。多個教員進行團隊教學的同時，學生也進行小組學習。課程的評分沒有採用傳統的期末考試的形式，而是以小組項目為基礎進行評分。該項目要求學生合作進行法律研究。學生們將分別組成五人小組，小組內各組員代表一個金磚國家，針對法律合作的不同話題進行討論。每個隊伍都準備了精彩的演講，對金磚國家在各個法律領域的經驗和挑戰進行了總結。在最後一堂課上，學生小組舉辦了模擬金磚國家法律論壇，各金磚國家的「代表」共同參與討論，並就法律合作的未來方向達成一致。

新課程中的團隊教學和小組學習經驗已在澳門大學校內外進行了重要宣傳。 2017 年，我在由香港中文大學主辦的第七屆國際研究交流與學院發展大會上展示了該新課程。 2017 年 4 月 19 日，課程教授團隊在由副校長（學術）倪明選教授主持的 CTLE 教學與學習創新沙龍上介紹了該課程的主要特色。 2017 年 5 月 4 日，在澳大人文學院院長靳洪剛教授主持的「人文學院春季教職員工專業發展研討會」上，金磚國家課程的團隊教學經驗被重點介紹。



作者簡介 ABOUT THE AUTHOR

***Alexandr Svetlicinii** 博士是澳門大學法學院助理教授，同時擔任國際商法（英文）碩士研究生項目副主任，以及教與學優化中心的學術顧問。*

Dr Alexandr Svetlicinii is an assistant professor in the University of Macau (UM) Faculty of Law, where he also serves as the associate programme coordinator for the Master of International Business Law in English Language and an academic advisor in the Centre for Teaching and Learning Enhancement.

澳大法學院的金磚國家法律學者（左起）：Alexandr Svetlicinii, Rostam J Neuwirth, Denis De Castro Halis 和他們的新書《金磚國家全球合作律師手冊》（牛津大學出版社於 2017 年發行）

BRICS legal scholars from the UM Faculty of Law (from the left): Alexandr Svetlicinii, Rostam J Neuwirth, Denis De Castro Halis pose with their new book *The BRICS-Lawyers' Guide to Global Cooperation*, published by Cambridge University Press in 2017

研究金磚國家新書引關注

這種合作工作形式在法律研究領域也取得了顯著成果。與來自金磚和金磚以外國家的學者進行合作，Rostam J Neuwirth、Alexandr Svetlicinii 和 Denis De Castro Halis 共同編輯了《金磚國家全球合作律師指南》一書。此書由劍橋大學出版社於 2017 年下半年出版。該書的各章節討論了金磚國家在貿易、投資、競爭、知識產權、能源、爭端解決、金融監管等領域現有的和未來潛在的合作。新書一經發行就迅速引起了學術界的關注，《金磚五國法學雜誌》，《復旦公共行政評論》，《國際貿易法律規範》，《波切夫斯通電子法學雜誌》等刊物都對該書發表了評論。

2017 年 6 月，Neuwirth、Svetlicinii 和 Halis 老師在南美洲訪問厄瓜多爾基多的西蒙・玻利瓦爾安第斯大學和昆卡的阿蘇艾大學時發表了他們對於金磚國家的相關研究，同時在墨西哥的墨西哥城出席法律與社會協會的年會時也進行了發表。2017 年 9 月，澳門法學院金磚國家法律學者出席了由復旦大學在上海舉辦的金磚國家第二屆國際發展與治理研討會，主題為「金磚國家國際援助發展」。2017 年 12 月，他們還參加了俄羅斯律師協會在莫斯科舉辦的第四屆金磚國家法律論壇，Alexandr Svetlicinii 老師在會上還發表了題為「競爭法的全球碎片化：採納還是轉化？」的演講。論壇通過了「莫斯科宣言」，強調了一系列的計劃，比如建立金磚國家法律智囊團，為上海和新德里已經設立的爭議解決中心建立金磚國家仲裁員小組，出版金磚國家法律研究雜誌，以及在法律合作領域的其他重要舉措。

澳門特區政府已經果斷踏上了作為中國與葡語國家經濟合作平台的發展道路，並決定加入中國的「一帶一路」倡議。因此，對於金磚國家的相關研究和合作對澳門意義重大，因為所有金磚國家在上述舉措中都發揮著重要作用。

Members of the BRICS Network University

The term BRICS is an acronym referring to the countries of Brazil, Russia, India, China and South Africa. Originally, it appeared as 'BRIC' to highlight the promising emerging economies of Brazil, Russia, India, and China. After being joined by South Africa in 2011, the BRICS countries have qualified their institutional setting as a 'dialogue and cooperation platform' and organised regular meetings among different levels of governments. In 2015, the leading universities from the BRICS countries adopted the Beijing Consensus, which resulted in a decision to establish a BRICS Universities League. In 2016, they took the next step in that direction and agreed to set up the BRICS Network University. The first general conference of the BRICS Network University was held in Yekaterinburg between 6 and 9 April, 2016. In 2017, the BRICS Network University members gathered in Zhengzhou, hosted by the North China University of Water Resources and Electric Power. Today the BRICS Network University consists of 9 universities from Brazil, 11 universities from China, 12 universities from India, 12 universities from Russia, and 12 universities from South Africa.

Alexandr Svetlicinii 於金磚國家發展及治理國際研討會發表演說，討論金磚國家的競爭法及政策合作

Prof Alexandr Svetlicinii speaks on competition law and policy cooperation of BRICS countries at the International Symposium on Development and Governance in the BRICS

澳大法學院的金磚國家法律學者參加第二屆金磚國家發展及治理國際研討會

BRICS legal scholars from the UM Faculty of Law take part in the Second International Symposium on Development and Governance in the BRICS 'International Development Aid in the BRICS'

Launching a New Course to Support Research

Although formally outside the BRICS Network University, the University of Macau has made decisive steps towards promoting BRICS-related research and education. In the spring semester 2016/2017, a team of academics from the UM Faculty of Law formed a research circle, 'The Global Governance Debate and the BRICS Countries', consisting of Rostam J Neuwirth (full professor), Alexandr Svetlicinii (assistant professor), and Denis De Castro Halis(senior instructor). Jointly, they have developed Advanced Issues of International Trade Law: Business Law in the BRICS Countries, a course for master's students dedicated to legal aspects of doing business in the BRICS countries. The new course featured several innovative teaching and learning methods. First, the course was co-taught by a team of three instructors who were present in the classroom at the same time in order to stimulate discussion and complement each other's expertise on the laws of particular BRICS countries. The instructors took advantage of various educational technologies supported by the Center for Teaching and Learning Enhancement (CTLE), including UMMoodle and PollEverywhere. The class was conveniently hosted in one of the CTLE Interactive Learning Spaces – classroom equipped with audio and video (AV) recording. The AV materials generated by the course allowed it to be offered in a blended learning format where the students watch short video lectures before each class and then come prepared for a more in-depth discussion. While the instructors were team teaching, the students were team learning also. Instead of a conventional final examination, the grading of the course was based on the result of a group project, which required students to engage in collaborative legal research. The students were organised in groups of five (each member representing one of the BRICS nations) and worked on various issues of legal cooperation. Each team prepared a colourful presentation summarising the experiences and challenges of each BRICS country in various legal

Alexandr Svetlicinii 出席西南科技大學的金磚國家法律全球合作研討會
Prof Alexandr Svetlicinii attends the Seminar on the BRICS Legal Global Cooperation

fields. During the last class, the student teams staged a mock BRICS Legal Forum, where the 'delegates' from BRICS nations debated and agreed on future directions for legal cooperation.

The team teaching and team learning in the new course have received significant publicity at UM and beyond. In 2017, Alexandr Svetlicinii presented the new course at the seventh Annual International Research Exchange & Faculty Development Conference hosted by the Chinese University of Hong Kong. On 19 April 2017, the instructors presented the main features of the course at the CTLE Teaching and Learning Innovation Salon, chaired by UM's Vice Rector for Academic Affairs Prof Lionel Ni. On 4 May 2017, the team teaching experience of the BRICS course was featured in the Faculty of Arts and Humanities Spring Staff Professional Development Workshop, chaired by the FAH Dean Prof Hong Gang Jin.

New Book on BRICS Countries Attracting Interest

This collaborative work has also produced visible results in the field of legal research. In collaboration with scholars from BRICS countries and beyond, Rostam J Neuwirth, Alexandr Svetlicinii, and Denis De Castro Halis have co-edited the book 'BRICS-Lawyers' Guide to Global Cooperation', which was published by Cambridge University Press in late 2017. Each chapter of the new book discusses the actual and potential cooperation of BRICS countries in various fields, including, among others, trade, investment, competition, intellectual property, energy, dispute resolution, and financial regulation. The new book has quickly attracted attention in academic circles being reviewed in the *BRICS Law Journal, Fudan Public Administration Review, International Trade Law & Regulation,* and *Potchefstroom Electronic Law Journal.*

In June 2017, Neuwirth, Svetlicinii, and Halis presented their BRICS-related research in South America while visiting the Andean University Simon Bolivar in Quito (Ecuador), the University of Azuay in Cuenca (Ecuador) and attending the Annual Meeting of the Law & Society Association in Mexico City (Mexico).

In September 2017, the BRICS legal scholars from UM Faculty of Law attended the Second International Symposium on Development and Governance in the BRICS 'International Development Aid in the BRICS' hosted by Fudan University in Shanghai. In December 2017, the BRICS legal scholars from the UM Faculty of Law attended the Fourth BRICS Legal Forum in Moscow hosted by the Russian Association of Lawyers, where Svetlicinii delivered a talk titled 'Global Fragmentation of Competition Law and BRICS: Adaptation or Transformation?' The Moscow Declaration adopted at the forum features plans to establish a BRICS legal think-tank, BRICS panel of arbitrators for the dispute resolution centres already established in Shanghai and New Delhi, publication of a BRICS legal research journal, and other important initiatives in the field of legal cooperation.

As the Macao SAR Government has decisively embarked on the path of developing the region as a platform for economic cooperation between China and Portuguese-speaking countries and decided to join China's Belt and Road Initiative, the BRICS-related research and cooperation will only increase in significance for Macao as all of the BRICS countries have an important role to play in the above mentioned initiatives.

應用智慧城市技術於殘障人士生活

Applying Smart City Technology to Barrier-free Living Environments

文 Text ｜黃承發 Alfred Wong
圖 Photo ｜由作者提供 Provided by Alfred Wong

黃承發博士（右四）與研究團隊
Dr Wong Seng Fat (4th from right) and his research team

近年來有數據及研究表明，人口老齡化的趨勢在不斷上升。公共設施中無障礙設施對於殘障人士和行動不便人士的日常生活極為重要。與此同時，智慧城市技術乃現今社會發展的重要方向。可惜的是，能應用智慧城市技術於優化殘障人士生活的研究及產品並不多。因此，我與研究團隊以人因工程結合智慧城市技術，研發一個創新、實用和便利的智能輪椅，對於改善殘障人士智慧出行及生活有著很大的意義。

Recent statistics demonstrate that Macao's aging population is growing at a steady pace. Barrier-free public facilities are considered to be crucial to the lives of the disadvantaged and people with mobility impairments. Smart city technology is important to social development, but unfortunately, there is a lack of research studies in this field which contribute to the creation of barrier-free living environments. With this in mind, our research team has applied research outcomes in smart city technology to the design of an innovative and convenient smart wheelchair, a practical product whose aim is to help the disadvantaged and the elderly in their daily lives.

作者簡介 ABOUT THE AUTHOR

澳門大學機電工程系助理教授，英國皇家特許計量及控制學會會士及英國特許屋宇工程師學會工程師及會士。擔任多個社會團體及工程學會的領導，包括澳門智慧城市聯盟協會理事長。

Wong Seng Fat is an assistant professor in the Department of Electromechanical Engineering. He is a fellow of the Institute of Measurement and Control (InstMC) and a chartered fellow of the Chartered Association of Building Engineers (CABE). As an active member of the local community, Dr Wong has served in leadership positions in different societies and engineering associations, including the executive director of the Smart City Alliance Association of Macau (SCAAM).

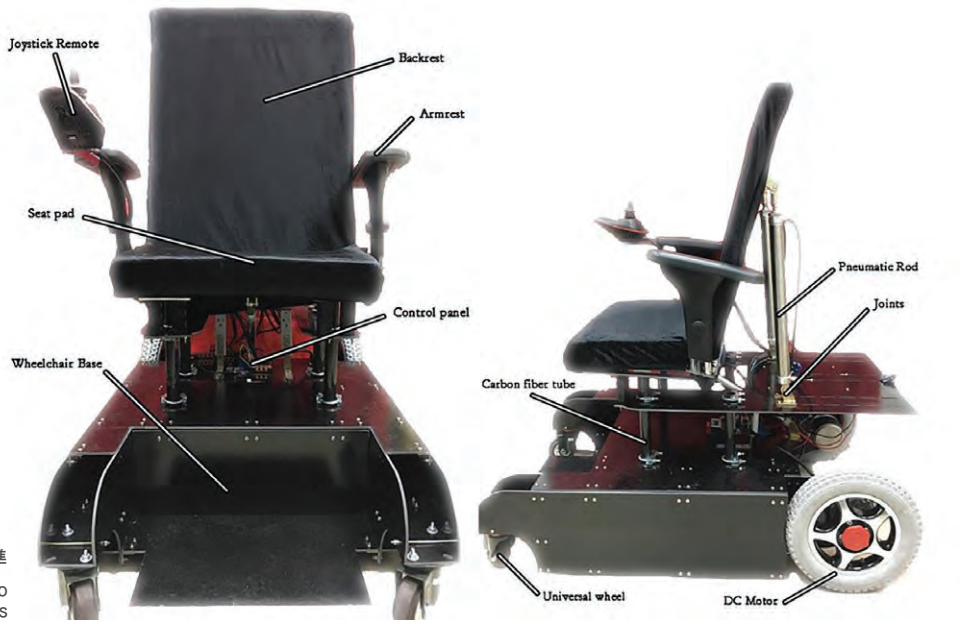
創新多功能智能電動輪椅

研究以人因工程為設計理念，結合人工智能算法，設計出一款創新多功能的智能電動輪椅，滿足殘障人士及長者優化出行的需求。同時，智能輪椅可以運用智能手環、腦電波控制和手機移動應用控制，增加使用的方便度及不同需要。

研究內容主要圍繞三個方面進行：智能輪椅多種控制方案的設計、產品功能設計以及產品外觀設計。產品外觀設計是符合人體工程學，結合澳門人的人體數據特徵標準。產品功能設計，基於目前市場已經有的產品功能，增加輔助起身和坐立功能，以不同的智能使用姿勢，方便使用者的生活需要以及降低他們因長期同一坐姿而產生一系列的身體健康問題。產品多種控制方案的設計乃使用 Myo 智能手環、腦電波控制器和手機移動應用程式，以切合使用者不同的使用需要及因應環境作出配合。

智能手環適合本澳需要

研究團隊通過 Myo 智能手環設備的手勢控制將用於智能電動輪椅。然而，現時的 Myo 智能手環只限制於 5 種不同的手勢。因此，為了滿足不同使用者的需求，研究團隊開發出更多的手勢控制，以配合智能輪椅的多功能控制。另外，手勢識別的準確性也需要提高，這是由於原設計是給外國人使



智能輪椅產品外觀設計結合澳門人的人體數據特徵標準

The design of the chair is ergonomic and takes into consideration the human anatomy of Macao residents

用，他們的手臂肌肉與亞洲人不同，故相同的手勢，系統識別出來的準確性有所差異。為此，研究團隊研究基於 Akaike 信息準則的自回歸方法，以及基於強度分析的小波方法和 Hilbert-Huang 變換方法，對從肌肉表面肌電圖提取的信號進行分析，並且使用機器學習技術預測手勢，包括遺傳算法—反向傳播神經網絡算法，粒子群優化—反向傳播神經網絡算法，支持向量機方法和極限學習機算法，以達至 Myo 智能手環適合本澳殘障人士及長者使用需要。

智能輪椅控制系統

這以人因工程為設計理念，結合人工智能算法，設計出來的創新多功能的智能電動輪椅，會配合壓力分佈分析系統及肌電信號，收集本澳殘障人士及長者在出行及生活上的壓力分佈數據及肌電數據，以便給予政府及公共設施機構在設計相關的建築物及設施，如巴士站、公園等，有著更科學的數據得以優化，配合澳門智慧城市落地使用在本澳殘障人士及長者生活上。

未來我與研究團隊將以失能老人長時間使用輪椅後的壓瘡問題為選題依據，通過研究失能長者的壓瘡成因，結合人工智能學習算法，擬合人體壓瘡形成的“壓力 - 時間”函數 F(t)。並基於該函數，建立智慧輪椅非線性控制系統模型。最終目標是設計一種可以通過深度學習演算法，預防壓瘡併發症的智慧輪椅控制系統。

Multifunction Intelligent Electric Wheelchair

Designed with human factors engineering and ergonomic concepts in combination with artificial intelligence (AI) algorithms, our innovative multifunction Intelligent Electric Wheelchair can satisfy the needs of the disadvantaged and the elderly with mobility impairments. The chair can be controlled via three methods: muscle signal control (EMG), brain wave control (EEG), and mobile application.

Our research study has three core components: the multi-control methods of the Intelligent Electric Wheelchair, innovative function design, and appearance design. The design of the chair is ergonomic and takes into consideration the human anatomy of Macao residents. The smart wheelchair allows a variety of seating positions so users can adopt different postures. This function helps to improve users' health by preventing them from staying in the same posture for too long. Different control methods, including Myo armband, EEG, and mobile applications, can benefit different users according to their individual needs in different environments.

Adjust Gesture Armbands to Meet Local Needs

Gestural control methods enabled by Myo armband equipment may be used to control the Intelligent Electric Wheelchair. However, this feature is currently limited to five different gestures, including wave in/out, spread, double tap, and fist. In the future, we plan to develop more gestures to fulfill specific needs of different users. In addition, the armband was originally designed for Western operators, whose arm muscles are different than those of Asians. Thus, the accuracy of gesture recognition on the armband require further adjustment to meet the needs of Macao residents. To improve

優化重型車輛監測路面情況技術以降低交通意外分析於第 22 屆馮如杯中獲特等獎
Dr Wong receives an Outstanding Award at the 22nd 'Feng Ru Cup' College Students Academic and Scientific Works Competition

學生向社會各界介紹輪椅的設計概念

Students explain the design concepts of the wheelchair

the armband's gesture prediction function, the research team studied the autoregressive method by the Akaike information criterion, Wavelet method in intensity analysis, and the Hilbert-Huang transform method. The team also extracted significant factors from surface electroMyography of muscles and used them to predict gestures, with the help of various machine learning techniques, including Genetic Algorithms – Back Propagation Neural Network method, Particle Swarm Optimisation – Back Propagation Neural Network method, Support Vector Machine method, and Extreme Learning Machine method. This allows the Myo armband to be used by the disadvantaged and the elderly in Macao.

智能輪椅有助改善殘障人士的出行和生活

The smart wheelchair aims to provide convenience for disabled people in their everyday life

Intelligent Wheelchair Control System

This Intelligent Electric Wheelchair has been designed with ergonomic concepts and AI algorithms to provide different innovative functions. The chair can collect data from the user's body, such as pressure mapping data of various seating postures and EMG signal. The data can help to improve the design of buildings and facilities which the SAR government or public departments may construct in the future. For example, public facilities, such as bus stops or parks, can be enhanced with the help of this scientific data, which will ultimately improve the quality of life of the disadvantaged and the elderly by using smart city technology.

Wheelchairs can easily create pressure ulcers in elderly users because they demand long periods of sitting time. In order to solve this problem, based on the pressure data of human body surface, in the future our team will use machine learning algorithms and neural network algorithms to derive a mathematical model for the prediction of pressure ulcers. Based on this model, our research team will develop an intelligent wheelchair nonlinear control system. Our ultimate goal is to create an intelligent wheelchair control system that uses deep learning algorithms to prevent pressure ulcers.

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