



澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU



科技學院
Faculdade de Ciências e Tecnologia
Faculty of Science and Technology



不惑新航
揚帆追夢
SET SAIL ANEW ON
THE RUBY JUBILEE



澳門大學科技學院快訊

University of Macau

Faculty of Science and Technology

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FACULTY OF
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科技學院

Faculdade de
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目錄

Table of Content

- 3 院長寄語
Dean's Message
- 4 學院概況
Faculty at a Glance
- 6 新加盟教授
Newly Joined Professors
- 8 獲外部資助的研究項目
External Research Grants
- 10 科研設備
Scientific Equipment
- 12 科研進展
Research Progress
- 14 學院新課程 - 理學碩士學位(物聯網)
New Programme - Master of Science in
Internet of Things
- 15 學院新聞
Faculty News
- 20 獲獎消息
Awards by Student and Professor
- 24 人物故事
Story of Professor
- 26 畢業生故事
Story of Graduate
- 31 招生訊息
Admissions

院長寄語 Dean's Message



須成忠
Cheng-Zhong Xu

回顧過去數月，新冠疫情的反反覆覆，給大學及學院都帶來巨大挑戰。但在科技學院全體師生職員的協作努力下，學院的科研成果已獲本地及全球多方面認可：

- 在泰晤士高等教育 (Times Higher Education, THE) 公告的2022年世界大學排名中，澳大已上升至201-250位達到歷史新高，其中工程學的排名已由去年126-150位升至101-125位，計算機科學則由176-200位升至151-175位。
- 為滿足人才需求及數字經濟發展，學院將於2022/2023學年推出全新理學碩士學位(物聯網)課程，以培養學生學習物聯網工程的技能。
- 科技學院助理教授鍾俊文及其團隊研製身長僅三厘米、具有高敏捷性與可操控性的電子昆蟲機械人，成果獲《科學·機械人學》刊登。
- 在數學系副教授劉志指導下，兩支學生隊伍於「2021年美國國際大學生數學建模競賽」的交叉學科建模競賽奪得一等獎及二等獎，使澳大成為在該比賽唯一獲一等獎的院校。該比賽有2萬6千多支學生隊伍參加，獲一等獎的比率是7%，獲二等獎的比率18%。
- 科技學院副教授周建濤帶領的團隊研發出一項新的圖像篡改檢測技術算法，以此參加清華大學和阿里巴巴主辦的全球首個針對偽造證件類圖像的檢測比賽「安全AI挑戰者賽(第五期)」，與1,534支團隊切磋，奪得篡改賽道冠軍及檢測賽道季軍。團隊其後獲阿里巴巴邀請和贊助參與其創新研究計劃專案。
- 截至2021年10月，科技學院由全球各地招聘了7名全職教授，期望吸納精英學者，令學院的教研團隊繼續壯大，以優質教育服務學生。

學院將一如過往在國家及特區政府支持下，聚焦微電子、智慧城市物聯網、人工智慧、大數據及區域海洋等領域，致力提高教學及研究水準，創造令人矚目的成績。在科技領域上做到讓澳門人驕傲、內地人嚮往、世界人喜歡的學院。

In the past few months, the novel coronavirus (Covid-19) has brought challenges to the University and the Faculty. However, with the collaboration of all academic and administrative staff and students, Faculty's research results have been recognized locally and globally:

- In the 2022 World University Rankings announced by Times Higher Education (THE), UM's ranking is 201-250, reached a historical high. The ranking by subject: Engineering has risen to 101-125 from 126-150. Computer Science has risen from 176-200 to 151-175.
- In order to meet the demand for talents and the development of the digital economy, FST will launch the new Master of Science (Internet of Things) program in academic year 2022/2023, this Master's programme is designed to train students to learn IoT Engineering.
- A team led by Zhong Junwen, an Assistant Professor of FST, developed robotic insects that are only 3cm long with ultrahigh agility and a controlled trajectory. The study was published by *Science Robotics*.
- Under the guidance of Liu Zhi, an Associate Professor in the Department of Mathematics, two student teams won a first prize and a second prize, respectively, in the Interdisciplinary Contest in Modeling 2021 in the United States. The event was held concurrently with the Mathematical Contest in Modeling. 7 per cent of teams won a first prize and 18 per cent of teams won a second prize. UM is the only university in Macao that won a first prize in this event, which attracted over 26,000 teams from around the world.
- A team led by Zhou Jiantao, an Associate Professor in the FST, developed a new algorithm for digital image tampering detection. With this technology, the team competed with 1,534 teams FBA at the Security AI Challenger Contest (Season 5) co-organised by Tsinghua University and Alibaba. The team won the championship in the tampering track and a third prize in the detection track. In addition, the team was invited by Alibaba to participate in one of its innovative research projects.
- As of October 2021, FST has recruited 7 professors from all over the world. It is expected to attract more professional scholars so as to expand the teaching and research team, and serve students with high-quality education.

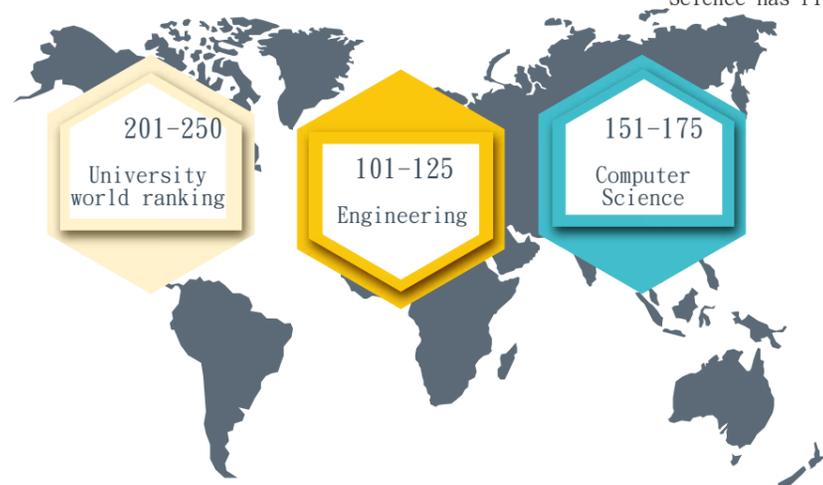
In the future, with the support of the Central and Macao SAR government, FST focus on the fields of microelectronics, smart city internet of things, AI, big data and regional oceans. Enhancing the research and teaching standards to the next level and creating more brilliant achievements, and it will become a faculty that makes Macao people proud, mainlanders yearn, and likeable university in the world.

學院概況 Faculty at a Glance

國際聲譽 International Recognition

澳門大學近年集中資源發展優勢研究領域，憑藉先進的科研設備及全球師生的協作努力，科研成果已廣泛見於權威學術期刊，並屢獲國家級及國際性獎項。在泰晤士高等教育 (Times Higher Education, THE) 公告的2022年世界大學排名中，澳大已上升至201-250位達到歷史新高，其中工程學的排名已由去年126-150位升至101-125位，計算機科學則由176-200位上升至151-175位。

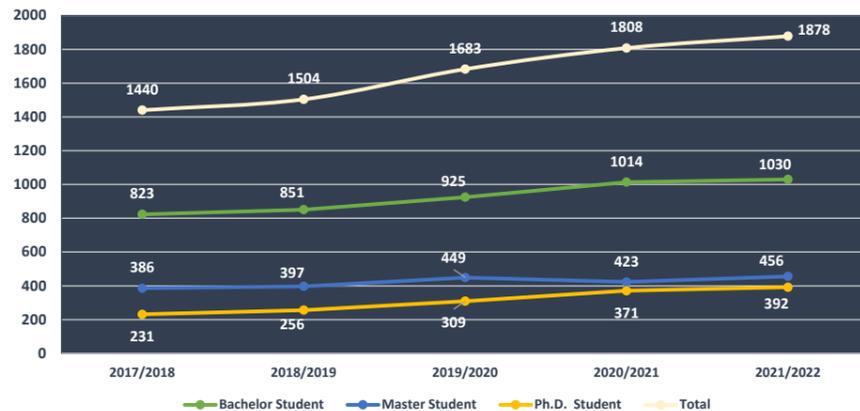
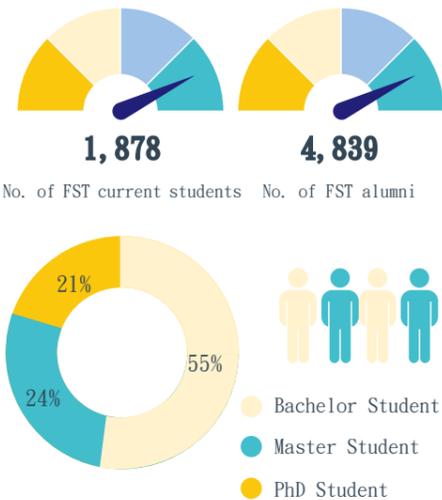
The University of Macau (UM) has concentrated resources on the development of advantageous research fields in recent years. With advanced scientific research equipment and the collaborative efforts of academic staff and students around the world, the university's scientific research results have been widely recognized by authoritative academic journals, and have won numerous national and international awards. In the 2022 World University Rankings announced by Times Higher Education (THE), UM reached a historical high and its ranking has risen to 201-250. The ranking by subject: Engineering has risen to 101-125 from 126-150. Computer Science has risen from 176-200 to 151-175.



學生人數 Number of FST Students

除著澳大不斷發展，科技學院學生人數過去數年不斷攀升。2017年至今，學生總人數已由1,440人升至1,878人，升幅達30%。其中博士生人數增幅最顯著，由2017年的231名增至本學年392名，增幅近70%。本科生及研究生人數皆呈上升趨勢，本科生及研究生增幅則為25%及18%。

In addition to the continuous growth of UM, the number of students in the Faculty of Science and Technology (FST) has been increasing over the past few years. Since 2017, the total number of students has risen for 30% from 1,440 to 1,878. Among them, the number of PhD students has increased significantly from 231 in 2017 to 392 in 2021, an increase of approximately 70%, while the growth rates of undergraduates and master students are 25% and 18%.



發表數量 Yearly Number of Publications

過去10年，科技學院的學術論文發表數量不斷倍增。根據Web of Science統計，科技學院的論文由2010年96篇升到2021年約680多篇，增幅為7倍。其中不少文章更在國際會議上奪最佳論文獎 (VRCAI 2018, APCCAS, 2019, APPEEC 2019, ICTA 2019, RFIC 2021, Socc, 2021)

In the past 10 years, the number of academic research papers published by FST has increased dramatically. According to statistics from Clarivate Analytic's Web of Science, the number of papers in the Faculty of Science and Technology rose 7 times from 96 in 2010 to around 671 in 2020. Many of these articles won the best paper awards at international conferences (APCCAS, 2019, Socc, 2021, VRCAI 2018, APPEEC 2019, ICTA 2019, RFIC, 2021)



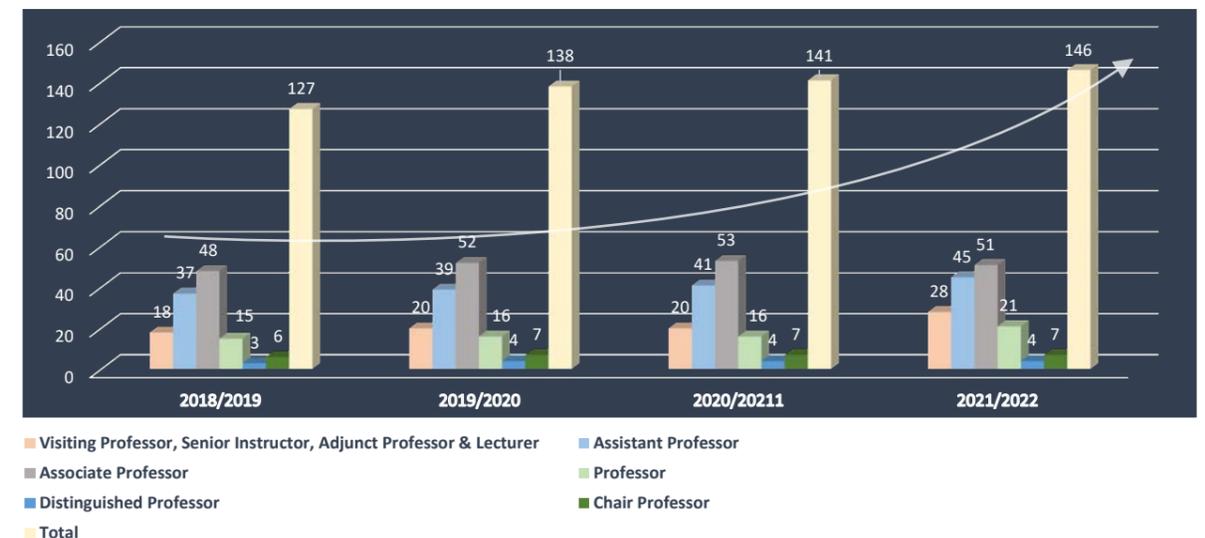
資料來源: Web of Science 統計, 截至2021年10月20日
Data Source: Web of Science Statistics, as at 20th Oct

Academic Year 學年

教學人員 Number of FST Academic Staff

科技學院擁有來自世界各地不同領域的優秀教學及科研人才。自2018年起，教學人數已由127名增至146名，升幅近15%。現時學院八成教學人員來自全球排名前100的知名大學，當中有1位英國皇家科學院院士，1位葡萄牙科學院院士，1位歐洲科學院院士，6位國際電機電子工程師學會 (IEEE) 會士及1位美國工業與應用數學學會 (SIAM) 會士。

FST has many outstanding teaching and research talents from all over the world. In 2018, the number of academic staff has increased nearly 15% from 127 to 146. More than 80% academic staff are from the top 100 renowned universities world-wide. 3 of them are the Members of Academy, 6 are IEEE Fellows and 1 is SIAM Fellow.



新加盟的學術成員

Newly Joined Academic Members

科技學院從全球各地吸納頂尖的學術精英，自今年3月起已在世界各地招募不同專業的教授任教。期望令學院的教研團隊繼續壯大，培養更多科研人才，創造更卓越的研究成果。

FST has recruited top academic elites from all over the world recent years. Since March 2021, professors from different countries have joined the team. It is expected that the Faculty's teaching and research team will continue to grow, so as to cultivate more scientific talents and create more outstanding research efforts.



Prof. Hui Kong
Associate Professor
Department of
Electromechanical Engineering



Prof. Xu Jie
Associate Professor
Department of Civil and
Environmental Engineering



Prof. Li Li
Assistant Professor
Department of Computer and
Information Science



Prof. Li Luo
Assistant Professor
Department of Mathematics



Prof. Pedro Cheong
Assistant Professor
Department of Electrical
and Computer Engineering



Prof. Pengyang Wang
Assistant Professor
Department of Computer
and Information Science



Prof. Weihan Yu
Assistant Professor
Department of Electrical
and Computer Engineering

孔慧教授於2007年在南洋理工大學取得電氣與電子工程博士學位。

研究領域是：

- 自動駕駛
- SLAM
- 移動機器人
- 多視圖幾何
- 運動規劃的傳感和感知

徐杰教授於2007年在香港科技大學取得海洋環境科學博士學位。

研究領域是：

- 營養動態
- 富營養化
- 浮游生物
- 藻華
- 缺氧
- 海洋碳循環

栗力教授於2018年在美國俄亥俄州立大學取得電氣與計算機工程博士學位。

研究領域是：

- 聯合學習
- 設備學習
- 移動/雲計算
- 能源效率
- 分佈式系統

羅力教授於2017年在香港科技大學取得數學博士學位。

研究領域是：

- 線性和非線性偏微分方程的並行算法和高性能軟件
- 計算流體動力學（微流體、生物流體動力學、地球物理流動）
- 異構計算（GPU）

張子康教授於2015年在澳門大學取得電氣與電子工程博士學位。他曾於2018-2021年擔任澳大濠江學者。

研究領域是：

- 射頻/微波電路設計
- 雷達感應
- 諧波通訊系統
- 用於大規模MIMO的相控陣天線
- RFID 技術

汪澎洋教授於2021年在美國佛羅里達大學取得計算機科學博士學位。

研究領域是：

- 數據挖掘
- 大數據分析
- 機器學習

于維翰教授於2018年於澳門大學取得電氣與計算機工程博士學位。他曾於2018-2021年擔任澳大濠江學者。

研究領域是：

- 射頻、模擬和混合信號 CMOS 集成電路
- 邊緣人工智能微電子
- 工程教育

Prof. Hui Kong graduated from Nanyang Technological University, with a Ph.D. degree in Electrical and Electronic Engineering in 2007

His research interests are:

- Sensing and perception for autonomous driving
- SLAM
- Mobile robotics
- Multi-view geometry
- Motion planning

Prof. Xu Jie graduated from the Hong Kong University of Science & Technology with a Ph.D. degree in Marine Environmental Science in 2007

His research interests are:

- Nutrients
- Eutrophication
- Plankton
- Algal blooms
- Hypoxia
- Marine carbon cycles

Prof. Li Li graduated from the Ohio State University with a Ph.D. degree in Electrical & Computer Engineering in 2018

His research interests are:

- Federated Learning
- On-Device Learning
- Mobile/Cloud Computing
- Energy Efficiency
- Distributed System

Prof. Li Luo graduated from The Hong Kong University of Science and Technology with a Ph.D. degree in Mathematics in 2017

His research interests are:

- Parallel algorithms and high performance software for linear and nonlinear partial differential equations
- Computational fluid dynamics (Microfluidics, Biofluid dynamics, Geophysical flows)
- Heterogeneous computing (GPU)

Prof. Pedro Cheong graduated from the University of Macau with a Ph.D. degree in Electrical and Electronics Engineering in 2014

His research interests are:

- RF/Microwave Circuit Design
- Radar Sensing
- Harmonic Communication System
- Phased Array Antenna for Massive MIMO
- RFID Technology

Prof. Pengyang Wang graduated from the University of Central Florida with a Ph.D. degree in Computer Science in 2021

His research interests are:

- Data mining
- Big data analytics
- Machine learning

Prof. Weihan Yu graduated from the University of Macau with a Ph.D. degree in Electrical and Computer Engineering in 2018

His research interests are:

- RF, analog and mixed-signal CMOS integrated circuits
- Edge AI Microelectronics
- Engineering education



獲外部資助的研究項目

External Research Grants

科技學院的教學及研究人員的科研項目近年皆獲得不少資助。自2021年1月-10月已有眾多項目成功獲得澳門科學技術發展基金、國家自然科學基金及其他外部資助，資助總額達澳門元31,059,000

澳門科學技術發展基金 Macao Science and Technology Development Fund (FDCT)

No.	項目類型 Project Type	項目負責人 PI	項目名稱 Project Title	開始日期 Start Date	結束日期 End Date	資助金額 Amount
1.	一般科研項目 Regular Project	Cai Xiao Chuan	超彈性問題的並行區域分解法 Parallel domain decomposition methods for hyperelasticity problems	08/06/2021	07/06/2021	1,897,000
2.	一般科研項目 Regular Project	Chen Yang	利用丟番圖方程探索宇宙暗物質及其相關粒子物理 Exploring dark matter in the universe and related particle physics with Diophantine equations	08/06/2021	07/06/2023	886,000
3.	一般科研項目 Regular Project	Cheng Cheman	矩陣交換子的範數不等式 Norm inequalities of matrix commutator	18/07/2021	17/07/2023	208,000
4.	一般科研項目 Regular Project	Hu Guanghui	可壓縮流體高階數值方法的設計、分析與實現 Design, Analysis and Realization of High Order Numerical Methods for Compressible Flows	08/06/2021	07/06/2024	977,000
5.	一般科研項目 Regular Project	Kwok Chi Tat	採用鐳射表面處理，開發用於海洋和醫療應用的新型，耐用和抗菌的鐵基多成分塗層 Development of novel, durable and anti-microbial coatings fabricated by laser surface modification for marine and medical applications	08/06/2021	07/06/2024	1,372,000
6.	一般科研項目 Regular Project	Li Yong Jie	電動力學天平的改進及其在研究海洋氣溶膠中糖類有機物吸濕性及相應的應用 Modification of an Electrodynamic Balance and Application to Study Hygroscopic Behavior and Phase State of Saccharides in Marine Aerosols	01/10/2021	30/09/2024	1,775,000
7.	一般科研項目 Regular Project	Pun Chi Man	多媒體流中的隱私敏感物體圖元化研究 Research on Privacy-sensitive Objects Pixelation in Multimedia Streaming	08/06/2021	07/06/2023	830,000
8.	聯合項目 Joint Projects (Mainland)	Shim Hojae	澳-穗城市水環境新興鹵代有機物(EOHs)污染及其生物轉化研究 Contamination assessment and bioremediation of emerging organohalides in urban water environment of Macau and Guangzhou	01/10/2021	30/09/2024	1,800,000
9.	一般科研項目 Regular Project	Sun Haiwei	關於變分數階導數節省內存和快速計算的研究與應用 On memory-saving fast algorithms for the variable-order fractional derivatives: exploring and applications	08/06/2021	07/06/2024	975,000
10.	一般科研項目 Regular Project	Tam Kam Weng	基於多模態共振結構的先進超高频識別標籤和閱讀器研究及其工業應用 Research on Multi-Mode Resonance (MMR) Structure for Advanced UHF RFID Tag and Reader and; Its Industrial Applications	01/10/2021	30/09/2023	751,000
11.	聯合項目 Joint Projects (Mainland)	Tam Lap Mou	新型耐蝕耐磨機械合金化塗層的制備及海洋環境服役性能研究 Fabrication of novel corrosion- and wear-resistant mechanically alloyed coatings and their service performance in marine environment	01/10/2021	30/09/2024	1,800,000
12.	一般科研項目 Regular Project	Vong Chi Man	醫學影像小樣本的深度模糊學習關鍵技術及其於COVID-19新冠肺炎影像分析驗證 The key technology of deep fuzzy learning for small samples of medical images and its application in COVID-19 image analysis and verification	26/02/2021	25/02/2023	2,073,000

The research projects of the academic members of FST have received certain funding in recent years. Since 2021, many research projects have successfully obtained the Macao Science and Technology Development Fund, the National Natural Science Foundation of China and other external funding. The total amount of funding is approximately MOP 31,059,000

13.	聯合項目 Joint Projects (Mainland)	Xiao Chuan Cai	臨床驅動的人體心臟多物理可計算建模和高性能演算法研究 Clinically Driven High Performance Algorithms for Multi-physics Simulation of Cardiac Dynamics	01/10/2021	30/09/2024	1,900,000
14.	一般科研項目 Regular Project	Yen Jerome	FPGA 高速資產走勢預測與風險管理系統 FPGA Based High Speed Asset Movement Prediction and Risk Management System	08/06/2021	07/06/2023	1,769,000
15.	一般科研項目 Regular Project	Zeng Qiang	自旋玻璃和非交換概率中的高斯性質 Gaussianity in spin glasses and noncommutative probability	08/06/2021	07/06/2024	924,000
16.	一般科研項目 Regular Project	Zhong Junwen	壓電駐極體式可穿戴運動感知與觸覺反饋器件及其人機交互應用研究 Research on Piezoelectret-Based Wearable Motion Sensing and Haptics Feedback Device and Its Human-Machine Interactivity Application	01/10/2021	30/09/2024	1,437,000
17.	聯合項目 Joint Projects (Mainland)	Zhong Junwen	多維溫-觸覺回饋柔性器件及其人機交互應用研究 Research on multi-dimensional thermal-haptics feedback flexible device and its human-machine interaction applications	01/10/2021	30/09/2024	1,800,000
18.	聯合項目 Joint Projects (Mainland)	Zhou Jiantao	基於人工智慧的兒童孤獨症譜系障礙表型輔助診斷技術及應用 Phenotype based ASD Diagnosis using Artificial Intelligence Technology	01/10/2021	30/09/2024	1,580,000
19.	聯合項目 Joint Projects (Mainland)	Zhu Lei	新型電磁波調控陣列理論及其在聚焦陣天線中的應用 Theory of Novel Electromagnetic-Wave Manipulated Array and Its Applications in Focusing-Array Antennas	01/10/2021	30/09/2024	1,600,000
總額 Total (MOP)						24,611,000

其他外部資助 Other External Research Grants

No.	項目類型 Project Type	項目負責人 PI	項目名稱 Project Title	開始日期 Start Date	結束日期 End Date	資助金額 Amount
1.	粵港澳聯合實驗室	Hu Guanghui	粵港澳數據驅動下的流體力學與工程應用聯合實驗室	01/01/2021	31/12/2023	5,000,000
2.	廣東省自然科學基金面上項目	Chen Long	基於隸屬度Lasso模糊聚類的噪聲醫學圖像柔性分割	01/01/2021	31/12/2023	100,000
3.	廣東省自然科學基金面上項目	Chen Yiyang	隨機矩陣與正交多項式中若干相關問題的研究	01/01/2021	31/12/2023	100,000
總額 Total (RMB)						5,200,000 (Around MOP 6,448,000)

全澳最大型 智能超算中心

The Largest Super Intelligent Computing Centre in Macau



隨著人工智能迅速發展、數據總量的增長以及新興產業發展需求，市場對計算機運算能力的需求急劇增加。新興產業如自動駕駛、智慧金融及智慧健康等對運算能力及速度的要求則更高。澳門大學去年建成及投入使用的智能超算中心(Super Intelligent Computing Centre, SICC)是澳門迄今最大型的智能超算中心，單一集群最高運算率可達每秒2萬2千億次。內含DGX系列、GPU計算平台及華為雲多套計算平台，為科創企業及眾多科研項目提供設備及強大的算力支撐，協助澳門乃至粵港澳大灣區發展成為智慧城市。

強大算力支撐多個研究領域

智能超算中心的落成為眾多科研項目提供高效運算支援，當中包括重點研究項目，如「自動駕駛巴士測試平台」中的交通數據分析、路面數據生成和人工智能的深度學習；「機器人智能作業系統研發」中的機器人數據訓練及場景模擬。中心也滿足了不同領域的運算需求，如智慧金融中的數據感知分析、互聯互通及智能化決策服務；疫情防控中的患者軌跡追蹤、疫情動態監測分析及公共衛生監測評估；醫學影像中的影像數據智能分析以提高醫生閱片的速度和準確度；病理圖片中惡性區域分割以計算惡性細胞數量；風暴潮研究中的惡劣天氣模擬和分析，以了解城市對自然災害的韌性。



DGX系列具備4台DGX-A100、1台 DGX-2、NetApp 210TB SSD及2.16PB HDD運算速度達每秒2萬2千億
The DGX series has 4 DGX-A100, 1 DGX-2, NetApp 210TB SSD & 2.16PB HDD. The computing speed reaches 220 billion/s

智能超算中心配備多套先進計算平台，由三個部份組成：

1) DGX系列：由4台DGX-A100、1台 DGX-2及快速存儲設備NetApp 210TB SSD及2.16PB HDD等組成。五台DGX系列超級電腦共有16張NVIDIA V100 GPU卡以及32張NVIDIA A100 GPU卡，每台DGX在深度學習算力上能超越傳統大型超算中心水平，運算速度共達22 PEFLOPS (22×10^{15})，即每秒可作2萬2千億次的浮點運算，中心具備高速快閃存儲系統NetApp 210TB SSD及超大存儲系統2.16PB HDD以支援各類型的數據分析，所有系統皆連上高速可用性的網路交換機，讀寫速度達每秒達200Gb，可快速地完成運算任務。另一方面，系統採用可擴展的架構，模型的複雜度和規模將不受傳統架構限制，可解決未來更複雜的人工智能難題。

Due to the rapid development of Artificial Intelligence, the growth of total amount of data and the needs of continuous improvements and innovation of industries, the demand for computer computing power has increased sharply. Industries such as autonomous driving, smart finance and smart health have higher standards for computing power and speed. The Super Intelligent Computing Centre (SICC) was built and put into use last year which is the largest intelligent supercomputing center in Macau. With a maximum computing rate of 2.2 trillion per second in a single cluster. DGX series, GPU computing platform and Huawei Cloud, provide key equipment and powerful computing power to technology enterprises and support many scientific research which assists Macau and the Guangdong-Hong Kong-Macao Greater Bay Area develop as smart cities.

The establishment of SICC has provided efficient computing support for many scientific research projects, including traffic data analysis, road data generation and deep learning of artificial intelligence in the project of 'Autonomous Bus Testing Platform'; Robot data training and scene simulation in the project of 'Robot Intelligent Operating System'. The center also meets the computing needs of different fields, such as data perception analysis, interconnection and intelligent decision-making services in Smart Finance; patient trajectory tracking in epidemic prevention and control, epidemic dynamic monitoring and analysis, and public health monitoring and evaluation; medical imaging Intelligent analysis of image data to improve the speed and accuracy of doctors' judgement; segmentation of malignant regions in pathological pictures to calculate the number of malignant cells; severe weather simulation and analysis in storm surge research to understand the resilience of cities to natural disasters, etc.

SICC is equipped with multiple sets of advanced computing platforms, which are mainly composed of three parts: 1) DGX series: It consists of 4 DGX-A100, 1 DGX-2 and fast storage equipment NetApp 210TB SSD and 2.16PB HDD. There are a total of 16 NVIDIA V100 GPU cards and 32 NVIDIA A100 GPU cards in the five DGX series supercomputers. Each DGX can surpass the level of traditional large-scale supercomputing centers in terms of deep learning computing power, with a total computing speed of 22 PEFLOPS (22×10^{15}), it can perform 2.2 trillion floating-point operations per second. The center is equipped with a high-speed flash storage system NetApp 210TB SSD and a super large storage system 2.16PB HDD to support various types of data analysis. All systems are connected to a high-speed network, the speeds of read and write are up to 200Gb per/s. On the other hand, the system adopts a scalable architecture, and the complexity and scale of the model will not be limited by the traditional architecture, which can solve more complicated AI problems in the future.

完整的雲服務架構，可供多個用戶同時使用

2) 華為雲：智能超算中心的華為雲提供超過 5,000 個計算核心、48 台伺服器及16個圖形處理器(GPU)，並配備超大記憶體10TB的計算伺服器及600TB容量。提供虛擬數據中心(VDC)、彈性雲服務器(ECS)、雲硬盤(EVS)等，資源能分配到多個研究小組上，亦可讓用戶搭建客制化平台。



華為雲 Huawei Cloud

3) GPU計算平台：在算力領域上，傳統中央處理器(CPU)的計算能力難以滿足日益發展的人工智能，現時中心採用的寒武紀圖形處理器(GPU)計算平台適用於人工智能的訓練負載，可提升速度。此計算平台由12台GPU 服務器及48個GPU搭建。中心具備溫度濕度自動調節系統、後備電源、備份系統、自動警報系統等，為用戶提供穩定可靠的環境。

為「產學研」發展帶來新動力

澳大科技學院、智能超算中心由人工智能與機器人研究中心及智慧城市物聯網國家重點實驗室共同成立。除支持科研外，服務已擴展至教學及人才培養，目前已供澳大智慧城市物聯網國家重點實驗室、協同創新研究院、微電子研究院及科技學院多位師生使用。2021年4月，澳大學生代表運用中心設備，在清華大學和阿里巴巴主辦的“安全AI挑戰者賽”中，與全球1,534個團隊相互切磋，最終獲冠軍及季軍的佳績，印證中心對教學水平的提升。未來中心將繼續為本地科研及教學提供技術支撐，期望能加速「產學研」發展，以科技創新推動本地經濟多元化，加強澳門在人工智能、健康醫療、環境科學等領域的水平，為智慧澳門及大灣區注入新動力。智能超算中心現開放予公眾使用，請掃右方二維碼申請。

2) HUAWEI CLOUD: an intelligent supercomputing center, provides more than 5,000 computing cores, 48 servers and 16 graphics processing units (GPUs), and is equipped with a 10TB computing server with large memory and a 600TB capacity. Provide virtual data center (VDC), elastic cloud server (ECS), cloud hard disk (EVS), etc. Resources can be allocated to multiple research groups, and users can also build customized platforms.

3) GPU computing platform: the computing power of the traditional central processing unit (CPU) is difficult to meet the increasing development of artificial intelligence. The Cambrian graphics processing unit (GPU) computing platform currently used by the center is suitable for artificial intelligence training load, speed can be increased. This computing platform is built by 12 GPU servers and 48 GPUs. The center is equipped with automatic temperature and humidity adjustment system, backup power supply, backup system, automatic alarm system to provide users with a stable and reliable environment.

SICC was jointly established by FST, the Centre for Artificial Intelligence and Robotics and the State Key Laboratory of Smart City Internet of Things (SKL-IoTSC). In addition to supporting scientific research, the service has been extended to teaching and talent training, and is currently used by many teachers and students in SKL-IoTSC, the Institute of Collaborative Innovation, the Institute of Microelectronics and FST. In April 2021, FST students used the central equipment to compete with 1,534 teams around the world in the 'Security AI Challenger Tournament' hosted by Tsinghua University and Alibaba. They eventually won the first and the third prizes. In the future, the center will continue to provide technical support for local scientific research and teaching. It is expected to accelerate the development of 'industry-university-research', promote the diversified development of the local economy through technological innovation, and strengthen Macao's level in artificial intelligence, healthcare, environmental science and other fields. Bringing new force into the development of smart Macau and the Greater Bay Area. SICC is now opened for public, please scan below QR code for application.



澳大智能超算中心
SICC of UM



申請使用及了解詳情
Application for use &
more details

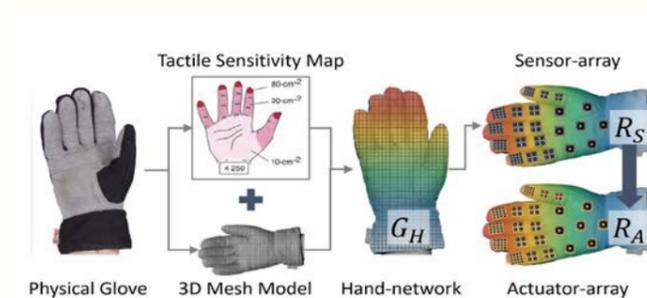
科研進展 Research Progress

澳大學者成功研發高敏捷電子昆蟲機械人 UM researcher develops robotic insects with ultrahigh agility



鍾俊文教授及其研究
Prof. Zhong Junwen and his research

鍾俊文教授於2020年加入澳大，目前是科技學院機電工程系助理教授和澳大人工智能機器人研究中心成員。2016年他在華中科技大學獲取電氣科學與工程博士學位，畢業後在加州大學伯克利分校和日本理化學研究所開展研究工作。近年在國際知名雜誌發表學術論文50餘篇，所發表文章總引用超過4,000次。目前主要進行柔性機電系統的研究，其中包括柔性機器人、柔性傳感器及執行器的開發與研究。



利用智能手套傳遞觸覺，令感覺更真實
Using smart gloves to transmit the sense of touch

現時全球各地皆面臨新型冠狀病毒的挑戰，疫情下採取的社交距離政策，加速令線上社交成為主流。而鍾教授正在研究的“智能手套”具有柔性傳感器和執行器可幫助傳遞人體感覺、訊息和觸覺，令身處不同地方的兩個人也能感受到對方，可感受到握手甚至擁抱的感覺。鍾教授表示現時虛擬實景體驗往往更重視視覺與聽覺，觸覺的普及性及技術相對地沒有很成熟。這個“智能手套”剛好補充了這個缺口。鍾教授說：「它全是柔性，比較輕薄，具有運動感知與觸覺回饋功能，大大增強了用戶的臨場感，令感覺更真實更實在。」

另一項研究則是有關柔性傳感器及執行器的陣列，傳感器可以探測人的脈搏，因此利用算法，可以幫助探測潛在疾病。假設兩人年齡、身高、體重都相近，當兩人都患有同樣疾病時，脈搏理應比較相似。鍾教授又以閱歷深厚的中醫師來比喻，指出經驗越豐富，就像數據庫內存就越大，越容易分析出病因。

Prof. Zhong Junwen joined UM in 2020, he is currently an Assistant Professor in the Department of Electromechanical Engineering of FST and one of the members of the Centre for Artificial Intelligence and Robotics. In 2016, he obtained a PhD degree in Electrical Science and Engineering from Huazhong University of Science and Technology, after that, he continued his research work at the University of California, Berkeley and the Japanese Institute of Physics and Chemistry. In recent years, he has published more than 50 academic papers in internationally renowned journals, with a total of more than 4,000 citations. At present, he mainly focuses on the research of flexible electromechanical systems, including the development and research of flexible robots, flexible sensors and actuators.

Coronavirus disease (COVID-19) has become one of the largest challenges for the world. The COVID-19 social distancing policy has accelerated the popularity of the online communications, a ‘smart gloves’ that developed by Prof. Zhong which has flexible sensors and actuators that can transmit sensations and the sense of touch to others. It means that people can feel each other even in different places, they can feel the sense of handshake or even a hug. Prof. Zhong shared that the current technology for visual AR in sight and hearing is far more mature compared with the sense of touch. The “smart glove” can be a research for building up this technology. Prof. Zhong says, “The glove is flexible, thin and light, with motion perceptions and tactile feedback functions, which greatly enhances user’s sense of presence and makes the feeling more real and genuine.”

Another research is about flexible sensors and actuator arrays. Sensors can detect human pulse, so using algorithms can help to detect potential diseases. ‘In the case of two people are similar in age, height, and weight, their pulses should be relatively similar when two of them suffers from the same disease.’ Prof. Zhong says. “We use an experienced traditional Chinese medicine doctor as an example, the more experienced he has, the richer data and larger memory of the database, the easier it is to identify different cases.” Prof. Zhong shares.



運用傳感器測出跑步前後的脈搏
Using sensors to measure pulse before and after running



利用電子蟑螂參與搜救及偵測
Using electronic cockroach in searching or rescuing

受大自然中敏捷爬行昆蟲的啟發，鍾俊文的團隊研製了身長僅有3厘米、具高敏捷性與可操控性的電子昆蟲機械人，能在搜索和救援過程中記錄及傳輸有價值的信息。此項研究發表於機械人領域最頂級的國際期刊《科學·機械人學》。這是首次有澳門學者的研究獲該期刊刊登，大灣區高等院校的文章獲該期刊刊登的數量亦不足10篇。

自然界中，運動敏捷的動物往往具有生存優勢。研製與自然昆蟲一樣敏捷的電子昆蟲是研究小型機械人的一個基礎挑戰。在快速運動過程中，小型機械人需同時擁有優秀的轉彎能力，普通昆蟲可通過分泌粘液來改變腳與地面之間的摩擦力，從而實現快速運動。類似的策略同樣適用於電子昆蟲，但不同的是，是次研究通過調整機械人腳部與於地面間的靜電力來實現高敏捷性和控制運動軌跡。電子昆蟲的相對向心加速度達到28身體長度/秒²，性能勝於目前所有已知的柔性機械人以及普通昆蟲。團隊已進行過多種應用演示，成功證實了電子昆蟲的優秀性能，包括能在5.6秒內通過一個120厘米長的迷宮以及攜帶一個180 mg的氣體傳感器探測氣體洩漏。

此外，研究團隊也研製了由電池驅動的無線版本的電子昆蟲，可以在36.9秒內走完27.9厘米長的“S”型路徑。這種機械人的重要潛在應用在，當地震等災難發生後，大量電子昆蟲可以攜帶傳感器在廢墟中敏捷地快速移動，並在搜索和救援過程中記錄和傳輸有價值的信息。相關論文在《科學·機械人學》刊登，題目為“柔性機械人擁有的靜電腳掌賦予其高敏捷性與可操控性”是澳門大學、清華大學以及加州大學伯克利分校的合作成果。

從本科選擇讀化學到博士選擇了電氣科學與工程，鍾教授表示正因為過去擁有化學的背景，對化學材料及器件研發都比較熟悉，對後來理解及掌握物理電學提供良好基礎。他勉勵學生們好好建立基礎知識，有穩扎的根基才能站得更高走得更遠。在機電工程的領域中，他建議先仔細思量才付諸行動，這樣才能事半功倍。對於選擇任教於澳大，鍾教授表示作為內地與國際的橋樑，澳大是一所十分特別的大學。除了學術相對自由外，過去中央及澳門政府的支持也令澳大獲得很多額外優勢和資源，他也可以心無旁騖地投入研究中。未來，鍾教授希望能招攬更多人才，建立更優秀的研究團隊，為創建更多柔性機電系統而努力前行。

Full paper 全文可瀏覽：<https://robotics.sciencemag.org/content/6/55/eabe7906>

Inspired by agile insects in nature, a research team led by Prof Zhong Junwen, assistant professor in FST and a member of the Centre for Artificial Intelligence and Robotics (CAIR) of UM, has developed robotic insects that are only 3cm long with ultrahigh agility and a controlled trajectory. The study has been published in *Science Robotics*, the top journal in the field of robotics. This is the first time that a research study by Macao scholars has been published in this journal. So far, the journal has published less than ten papers from higher education institutions in the Guangdong-Hong Kong-Macao Greater Bay Area.

In nature, animals that are fast and agile often have a survival advantage. A key fundamental challenge in this study is to develop insect-scale soft robots with ultrahigh agility and good trajectory control comparable to those of real agile insects, and the technical difficulty lies in achieving a fast linear moving speed while maintaining the capability of the robots to make turns. In nature, insects with flexible bodies can dynamically tune the friction force with secretions between their feet and the ground to improve locomotion. In this study, Prof Zhong’s team emulated similar schemes by adjusting the electrostatic force between the robot’s feet and the ground to achieve both ultrahigh agility and a controlled trajectory. The soft robots developed by the team can reach a highest relative centripetal acceleration of 28 body-length/s², which is better than that of common insects. Through a series of demonstrations, the team has proved that the soft robots can pass through a 120cm-long track in a maze within 5.6 seconds and carry a 180mg on-board sensor to record a gas concentration route map.

Furthermore, the team has also developed an untethered version of the soft robot, which is battery-powered and can complete a 27.9cm-long S-shape path in 36.9 seconds. An important potential application for such robots is that after a disaster such as an earthquake, a large number of these robots can carry sensors that can move swiftly through the rubble and record and transmit valuable information during the search and rescue process. The related paper was published on *Science Robotics*, titled ‘Electrostatic Footpads Enable Agile Insect-scale Soft Robots with Trajectory Control’, is the result of collaboration between UM, Tsinghua University, and the University of California, Berkeley.

From studying Chemistry in undergraduate programme to Electrical Science and Engineering in a Ph.D. programme, Prof. Zhong said because of his background in chemistry in the past, he was familiar with the research and development of chemical materials and devices which turned into an advantage for studying Electrical Science and Engineering. Therefore, he encouraged his students to better build up their basic knowledge first. Only with a solid foundation can help them reach their full potential. Prof. Zhong also shares, ‘In the field of Electromechanical Engineering, everything should be carefully examined before we act, then twice as much can be accomplished with half the effort.’ In regards of teaching in UM, Prof. Zhong said Macau is a ‘bridge’ to connect Mainland and the international, UM is a very special university. In addition to academic freedom, the supports from the central government and the Macau government have given UM a lot of additional resources and advantages. He can also devote himself to research without distraction. In the future, he wishes to recruit more potential talents, establish a better research team, and work hard to create more flexible electromechanical systems.

理學碩士學位(物聯網)課程

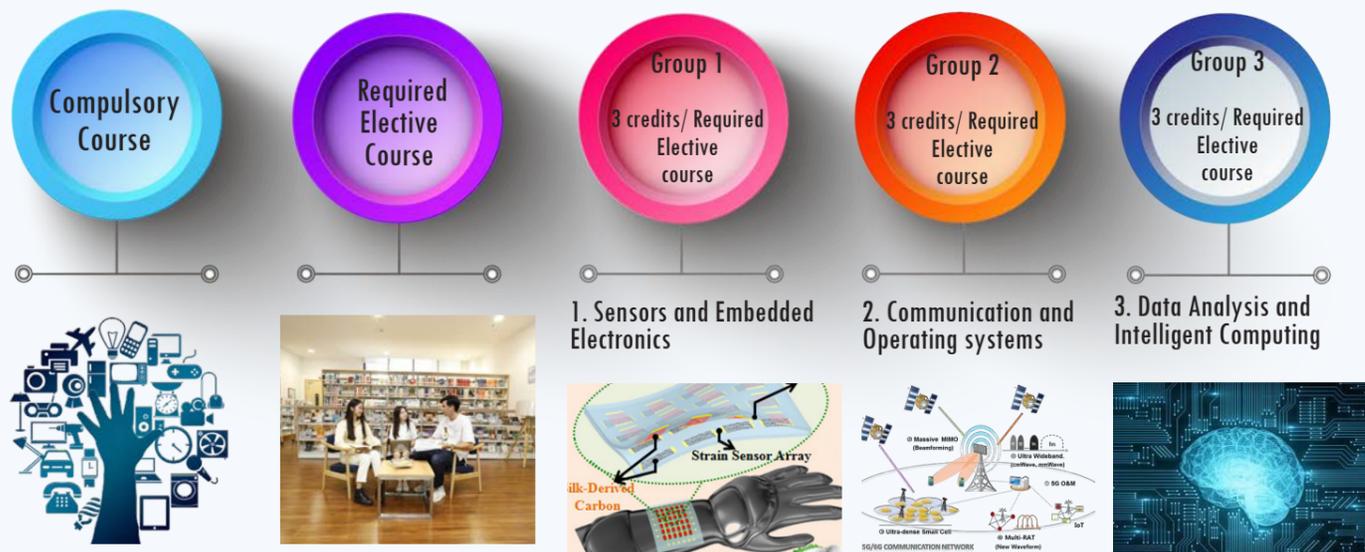
Master of Science in Internet of Things

理學碩士學位(物聯網)課程旨在培訓學生學習物聯網工程,包括應用機率及統計、傳感器和嵌入式電子、物聯網通信與操作系統、數據分析與智能計算等。課程將重點通過項目或實習進行培訓,讓畢業生能具備高級物聯網工程職業所需的知識和技能。本課程提供了項目報告與實習及報告的模式,以加強培訓學生在物聯網與實際工程上的應用。

The MSc (Internet of Things) course aims to develop students' skills in IoT engineering, including application probability and statistics, sensors and embedded electronics, IoT communication and operating systems, data analysis and intelligent computing, etc. The course will focus on training through projects or internships, so that graduates can have the required knowledge and skills for advanced IoT engineering careers. This course provides project report and internships and report to strengthen students' abilities in the application of the Internet of Things and practical engineering.

課程計劃

Programme Curriculum



物聯網導論
Introduction to Internet of Things

高等應用概率及統計
Advanced Topics in Applied Probability and Statistics

項目報告
Project Report

實習及報告
Internship and Report

射頻識別原理與應用
RFID Principle and Applications

應用於物聯網的進階集成電路設計
Advanced Integrated Circuit Design for Internet of Things

應用於物聯網的嵌入式系統
Embedded Systems for Internet of Things Applications

計算機網絡和互聯網
Computer Networks and Internet

高等電訊學專題
Advanced Topics in Telecommunications

通信系統建模及理論分析
Modeling and Theoretical Analysis for Communication Systems

高等物聯網專題
Advanced Topics in Internet of Things

雲計算
Cloud Computing

數據挖掘與決策支持系統
Data Mining and Decision and Support Systems

人工智能原理
Principles of Artificial Intelligence

大數據處理與分析
Big Data Processing and Analysis

應用於智能物聯網的優化
Convex Optimization for Internet of Things Applications

物聯網數據分析
Data Analysis for Internet of Things

互聯網保密技術及密碼學
Internet Security and Cryptography

為完成本課程並取得30學分,學生須修讀:
兩門必修科目(佔6學分)、在3組內選擇6門選修科目(佔18學分),當中須至少在各組中選讀一門,以及“項目報告”(佔6學分);或

兩門必修科目(佔6學分)、在7組內選擇7門選修科目(佔21學分),當中各組須至少選讀一門,以及“實習及報告”(佔3學分)

Students must take:

- 2 compulsory courses to obtain 6 credits, 6 required elective courses from Group 1-3, of which students are required to take at least one course from each of the option to obtain 18 credits, and 'Project Report' to obtain 6 credits, or

- 2 compulsory courses to obtain 6 credits, 7 required elective courses from Group 1-3, of which students are required to take at least one course from each option to obtain 21 credits, and 'Internship and Report' to obtain 3 credits.

學院新聞

Faculty News

澳大科技學院辦畢業成果展促產學研合作

UM FST exhibits graduation projects to promote academia-industry collaboration



科技學院舉辦“2021年澳門大學科技學院畢業設計院長榮譽榜頒獎典禮暨項目展覽”,展出25件不同領域的入圍作品,多元呈現學生的學習成果。澳大希望透過此活動為學界與業界創造交流平台,促進新一代產學研合作,推動科技成果產業化。



副院長王百鍵
Wong Pak Kin,
Associate dean
(Academic Affairs)

澳大科技學院學術事務副院長王百鍵致辭時表示,為促進本澳多元發展,科技學院一直致力科研人才的培養。是次展覽的目的除了嘉許表現優秀的學生外,更為擴大企業與本地院校的交流創造良好互動,增加雙方共同合作機會,提升產學研合作的效益。展覽自2012年開辦至今,已展出數百件作品。未來將繼續透過此類活動推廣創新科技,汲取業界意見不斷進步,讓社會各界更了解學生的科技與創意成果。

經過學院嚴格遴選,共40位來自土木及環境工程系、電腦及資訊科學系、電機及電腦工程系、機電工程系和數學系的優秀學生獲嘉許,共25件作品入圍,內容橫跨不同領域包括水質研究、文物保育、環境及水力工程、電腦圖學與視覺計算、軟件工程、機器學習、建築設計、電力工程及人工智能等。近百名企業管理層、政府人員、業內人士、教授及學生聚首一堂,共同見證科技學院畢業生4年來的科研成果。

出席展覽的嘉賓包括:交通事務局局長林衍新、地球物理暨氣象局局長梁永權、郵電局資訊科技發展處處長李廣亮、經濟及科技發展局科技應用及支援處處長陳祖榮、教育及青年發展局素質保證處處長岑曉東、萬高信息科技有限公司行政總裁李志文、易研信息科技有限公司技術總監歐陽志威、澳門土木工程實驗室資訊中心主任李錦堅、銀河娛樂集團設備管理高級副總裁陳志邦、金沙中國有限公司人力資源副總監伍家愉、澳門電力股份有限公司執行委員會首席顧問岳宗斌及澳門生產力暨科技轉移中心高級經理林濤。

FST recently held the Dean's Final Year Project List Presentation Ceremony and Project Exhibition 2021. The event exhibited 25 selected projects to showcase the students' learning achievements. Through this event, the university hoped to create a platform for academia-industry exchange, enhance academia-industry collaboration, and promote technology transfer.

According to Prof. Wong Pak Kin, Associate Dean (academic affairs) of FST, in order to promote the diversification of Macao's industries, FST attaches great importance to the training of scientists and researchers. In addition to commending outstanding students, this exhibition provided a platform for interactions between companies and local institutions, also, to increase opportunities for collaboration and enhance the effectiveness of academia-industry collaboration. Hundreds of student projects have been exhibited since the exhibition was first launched in 2012. Wong added that the FST would continue to promote technological advances through similar activities, and would continue to listen to the feedback from industry to make continuous progress, so that the community could better understand the technological achievements and creative projects of its students.

Following a rigorous selection process, a total of 40 outstanding students from various departments in the faculty, namely the Department of Civil and Environmental Engineering, the Department of Computer and Information Science, the Department of Electrical and Computer Engineering, the Department of Electromechanical Engineering, and the Department of Mathematics, were awarded for a total of 25 projects that covered a wide range of fields, including water quality, cultural heritage conservation, environmental and hydraulic engineering, computer graphics and visual computing, software engineering, machine learning, architectural design, power engineering, and artificial intelligence. Nearly 100 corporate management team members, government officials, industry practitioners, professors, and students attended the event to celebrate the scientific achievements of FST graduates.

Guests attending the opening ceremony included Lam Hin San, director of the Transport Bureau; Leong Weng Kun, director of the Meteorological and Geophysics Bureau; Lei Kuong Leong, Head of the Division of Information Technology of CTT; Chan Chou Weng, head of the Technology Application and Support Division of the Economic and Technological Development Bureau; Sam Hio Tong, head of the Division of Quality Assurance of the Education and Youth Development Bureau; Lei Chi Man, chief executive officer of InfoMacro Information Technology Limited; Ao leong Chi Wai, chief technology officer of eRS Information Technology Ltd; Lei Kam Kim, director of the Center of Informatics of Civil Engineering Laboratory of Macau; Chan Chee Pong, senior vice president of facilities management of Galaxy Entertainment Group; Candy Ng, associate director of human resources of Sands China Limited; Benjamin Yue, principal advisor of Companhia de Electricidade de Macau; and Liem Tao, senior manager of the Information System and Technology Department of the Macau Productivity and Technology Transfer Center.

澳大世界排名、工程學及計算機科學排名皆創新高 UM's world rankings, Engineering and Computer Science all set new highs



澳門大學近年集中資源發展優勢研究領域，憑藉先進的科研設備及全球師生的協作努力，大學的科研成果已廣泛見於權威學術期刊，並屢獲國家級及國際性獎項。在泰晤士高等教育 (Times Higher Education, THE) 公告的2022年世界大學排名中，澳大已上升至201-250位達到歷史新高，其中工程學的排名已由去年126-150位升至101-125位，計算機科學則由176-200位升至151-175位。

今年是澳門大學創校40週年，在中央政府、澳門特區政府的支持下，由創校時的數百名學生升至目前的一萬多人。大學在人才培養、研究和社會服務的領域也取得了眾多成果。未來，大學將着力加強科研成果的轉化，開展更多跨學科、跨領域的科研與教學，加快培養特區乃至大灣區發展所需要的本地人才。

千五學子畢業！澳大繼續創造優秀科研及培育人才 UM graduates 1,500 students, University will continue to produce outstanding research and nurture talent



澳門大學於6月19日舉行2021年畢業典禮。行政長官兼澳大校監代表、社會文化司司長歐陽瑜期盼澳大在未來繼續創造更多優秀科研成果，培養更多愛國愛澳人才，助力澳門經濟適度多元發展。歐陽瑜在澳大校董會主席林金城、校長宋永華，副校長許敬文、馬許願、葛偉、蘇基朗等陪同下主持典禮。大學議庭成員、校董會成員、教務委員會成員、政府官員、社會賢達、教職員、學生代表出席見證；同時還有親友於大學校園的三個直播區觀禮，未能親臨現場的畢業生和親友亦透過線上直播參與。應屆學士學位課程的畢業生有1500多名，分別來自人文學院、工商管理學院、教育學院、健康科學學院、法學院、科技學院及社會科學學院，當中有117名來自不同學院的優秀學生完成榮譽學院的榮譽課程。

UM has concentrated resources on the development of advantageous research fields in recent years. With advanced scientific research equipment and the collaborative efforts of academic staff and students, the university's scientific research results have been widely recognized by authoritative academic journals, and have won numerous national and international awards. In the 2022 World University Rankings announced by Times Higher Education (THE), UM reached a historical high to 201-250. The ranking by subject: Engineering has risen to 101-125 from 126-150. Computer Science has risen from 176-200 to 151-175.

With the support of the Central and SAR Macao Governments, the number of students has risen from hundreds of students at the time of its founding to more than 10,000 at present. This year marks the 40th anniversary of the founding of UM. In the future, UM will focus on strengthening the transformation of scientific research results, carry out more cross-disciplinary and cross-field research and teaching, and accelerate the training of local talents needed for the development of Macao and the Greater Bay Area.

UM held the Congregation 2021 on 19 June. Secretary for Social Affairs and Culture Ao Ieong U, representing the chief executive and UM chancellor at this year's ceremony, expressed hope that the university would continue to produce outstanding research results and nurture talent who love China and Macao to facilitate moderate economic diversification of Macao. Ao Ieong U officiated at the ceremony in the company of UM University Council Chair Lam Kam Seng, UM Rector Yonghua Song, and Vice Rectors Michael Hui, Rui Martins, Ge Wei, and Billy So. Representatives of the University Assembly, University Council, and Senate, as well as government officials, prominent members of the community, UM faculty and staff, and student representatives also witnessed the ceremony. Companions of graduates attending the ceremony watched the live streaming of the event at three locations on campus, while graduates and their families and friends who were unable to attend the ceremony in person participated in the event online. This year, more than 1,500 students of bachelor's degree programmes, from the Faculty of Arts and Humanities, Faculty of Business Administration, Faculty of Education, Faculty of Health Sciences, Faculty of Law, Faculty of Science and Technology, and Faculty of Social Sciences, received their graduation certificates. Among these students, 117 have completed the Honours Programme offered by the Honours College.

澳大與港科大廈大開展大灣區海洋科學考察 UM makes marine research expedition to GBA with HKUST and Xiamen University



澳大團隊在澳門青洲塘碼頭登船出發
海洋科學考察
The UM team embarks at Doca Da Ilha Verde

澳門大學與香港科技大學港澳海洋研究中心、廈門大學於8月28日開展粵港澳大灣區夏季海洋綜合性科學考察，圍繞澳門海域、珠江河口、南海北部陸架上升流等海區作深入調查。是次為澳門首次參與的考察，亦是澳大啟動澳門投身大灣區災害防治及周邊海域海洋研究的重要一步，將為澳門海洋功能區劃及海域規劃提供數據分析及決策支撐，以實現澳門海洋生態環境的可持續發展，並助力澳門及大灣區多元發展。

是次考察由澳大智慧城市物聯網國家重點實驗室和區域海洋研究中心，聯同港澳海洋研究中心和廈門大學共同開展，獲海事及水務局支持，參與科研人員共有23名。澳大團隊在澳門青洲塘碼頭登船出發，澳大校長宋永華表示，因應澳門特區政府對海洋利用、海洋防災減災與海洋環境保護的挑戰及重大需求，澳大高度重視區域海洋的科學發展及人才培養，鼓勵學科交叉，於科研戰略佈局中重點建設區域海洋新興研究領域。為了盡快提升研究水平更好服務澳門發展需要，大學不斷拓展和海內外相關機構的合作。

UM, Hong Kong University of Science and Technology's (HKUST) Centre for Ocean Research in Hong Kong and Macau, and Xiamen University (XU) jointly launched a summer marine research expedition to the Guangdong-Hong Kong-Macao Greater Bay Area today (28 August). This is the first time that a university in Macao has participated in marine scientific research. This expedition aims to promote disaster prevention and control and marine function research for the sustainable development of Macao's marine ecosystem. It also hopes to provide data analysis and decision-making support for Macao's marine spatial planning and to promote diversified development of Macao and the Greater Bay Area.

The expedition was jointly organised by UM's State Key Laboratory of Internet of Things for Smart City and Centre for Regional Oceans, HKUST's Centre for Ocean Research in Hong Kong and Macau, and XU, with 23 researchers participating. It represented an important step in UM's efforts to initiate marine research in waters surrounding Macao. Yonghua Song said that in order to address the challenges faced by the Macao SAR government in the use of the ocean, marine disaster prevention and control, and protection of the marine environment, UM has always attached great importance to the development of regional oceanology and the training of professionals in the field. The university encourages interdisciplinary research and has identified regional oceanology as a key emerging research field. In order to enhance its research capability to better serve the needs of Macao, the university has been constantly expanding its collaboration with institutions in China and abroad.

澳大參與科技基金重點研發項目啟動禮及匯報在研項目進展 UM participated into the FDCT's Launch Ceremony of Funding Scheme for Key R&D Projects and the Summary Session on Key Research Project 2020



科學技術發展基金於2021年9月16日在澳門科學館會議廳舉行「2020年重點研發項目啟動禮暨在研重點項目匯報會」。澳門大學多個項目研究團隊皆獲邀出席。會上澳大介紹3個新獲資助重點研發項目及匯報3個在研項目階段性進展，吸引近200人出席，共同推動澳門科技產業發展及科研成果轉化。啟動禮及匯報會令各團隊有機會向公眾介紹研究的細節及成果，加深了公眾對獲資助項目的開展情況及階段性研究進展，未來將有幫促進本地科技產業及科研發展。

The Science and Technology Development Fund (FDCT) held the 'Launch Ceremony of Funding Scheme for Key R&D Projects and the Summary Session on Key Research Project 2020' in the conference hall of the Macao Science Center on September 16, 2021. Many research teams of the University of Macau were invited to attend. At the ceremony, UM introduced 3 newly funded key R&D projects and reported on the progress of 3 on-going research projects which attracted nearly 200 participants to join. The event helps to promote the development of Macao's science and technology industry and the transformation of scientific research results. The ceremony and summary session has given the research teams an opportunity to introduce the details and achievements to general public and will help promote the development of local technology industry and scientific research.

澳門大學、中科院深圳先進院及深理工辦雙邊研討會深化粵澳人才科研合作
UM, Chinese Academy of Sciences' s research institute, and Shenzhen University of Technology hold forum to promote collaboration in talent development and scientific research



雙方為聯合粵港澳人機智能協同系統聯合實驗室揭牌
Both parties unveiled the joint laboratory of Guangdong-Hong Kong-Macao human-machine intelligent collaboration

澳門大學與中國科學院深圳先進技術研究院（中國科學院深圳理工大學（籌））首次舉辦雙邊研討會並進行粵港澳人機智能協同系統聯合實驗室揭牌儀式，標誌著雙方合作關係邁向新高度。會上，雙方於就聯合培養人才、資訊技術及生命科學等議題展開深入討論，期望依託彼此優勢力量，深化粵澳合作，將粵港澳大灣區建設成為具有國際競爭力的科技成果轉化基地。

為期兩天的研討會由澳大協同創新研究院主辦、澳大科技學院及健康科學學院協辦。澳大科技學院院長及協同創新研究院代院長須成忠表示，澳大與先進院在人才培養及科研方面的合作早在2019年拉開序幕。當時雙方已簽署聯合培養博士生協議，並建立人工智能與機器人聯合實驗室，聯培計劃開始至今吸引不少博士生參加。科研上，澳大近年多個重點研發計劃皆與先進院合作，如澳大自動駕駛巴士測試平台項目，共同促進更多創新性合作研究。

UM and Shenzhen Institute of Advanced Technology (SIAT) of the Chinese Academy of Sciences (CAS) recently held their first forum, showing that the partnership has reached a new level. During the forum, both parties had in-depth discussions on launching joint training programmes, information technology, life sciences, and other related topics. Both parties expressed hope to combine their strengths to deepen cooperation between Guangdong and Macao, in order to develop the Guangdong-Hong Kong-Macao Greater Bay Area into a leading international centre for technology transfer.

The two-days forum was hosted by UM' s Institute of Collaborative Innovation (ICI) and co-organised by the Faculty of Science and Technology (FST) and the Faculty of Health Sciences (FHS). According to Prof. Xu Chengzhong, dean of the FST and interim dean of the ICI, the collaboration between UM and SIAT began in 2019 with the signing of an agreement on the launch of a joint training programme for doctoral students. Both parties have also established a joint laboratory of artificial intelligence and robotics. So far, the joint programme has attracted many doctoral students. In scientific research, UM has collaborated with SIAT in a number of key research projects in recent years (such as the autonomous driving testing platform) to jointly promote innovative collaborative research.

澳門大學、中科院與南方海洋實驗室合辦海洋發展研討會
UM, CAS, SML-Zhuhai co-organise seminar on ocean development



澳門大學於6月17日與中國科學院海洋研究所及珠海的南方海洋科學與工程廣東省實驗室共同舉辦“第二屆海洋科技創新與可持續發展戰略研討會”，藉此發揮彼此研究優勢，深化粵港澳大灣區合作，共同推進現代海洋產業基地建設。

研討會結合線上及線下形式於澳大舉行，參與人數超過100人，近20名海洋專家就海洋防災減災能力、碳中和背景下的海洋環境與氣候和藍色命運共同體與可持續發展等前沿議題展開深入討論。

UM, the Institute of Oceanology of the Chinese Academy of Sciences (CAS), and the Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai) (SML-Zhuhai) on 17 June co-organised the second conference on marine science and technology innovation and sustainable development strategy. Held in a format that combines online and in-person elements, the event took place in UM' s Research Building and attracted over 100 participants.

During the event, nearly 20 scholars of oceanography had in-depth discussions on issues such as marine disaster prevention, marine environment and climate in the context of carbon neutrality, the world as a community connected by oceans, and sustainable development. The event is expected to build on each institution' s research strengths, deepen cooperation in the Guangdong-Hong Kong-Macao Greater Bay Area, and jointly build a centre for the modern marine industry.

澳大科技學院舉辦內地生暑期研習活動促進人才培養及交流
UM FST organizes a summer study activity for mainland students to promote talent development



為充分展示出澳大科研優勢及拓展學生視野，科技學院於7月21日舉辦內地生暑期研習活動，十多名來自內地高校的優秀學生代表獲邀參與，期望學生更了解各領域的前沿研究，激發創新思維，成為未來大灣區仍至國家發展的原動力。

學生分別來自電子科技大學、西安交通大學、天津大學、寧夏大學、東南大學、大連海事大學、中國科學院大學、長沙理工大學、華中科技大學及北京信息科技大學。暑期研習活動為期三天，內容豐富充實。除參觀澳大校園外，學生還參與由學院院長須成忠教授主持的自動駕駛技術講座、學術討論及參觀國家重點實驗室及眾多科技學院實驗室，藉此感受澳大的學術氣氛及科研實力。參與活動的學生表示對澳大學習環境及師資早有所聞，今次親身參觀澳大校園和實驗室後更是讚嘆不已。也有學生表示對澳大的科研領域如智能駕駛，機械人及智能系統等十分感興趣，期望未來能在澳大升讀博士學位。

To indicate the advantages of UM' s scientific research and expand students' horizons, the Faculty of Science and Technology (FST) held a summer activity for mainland students on 21st July. More than 10 outstanding student representatives from mainland universities were invited. It is expected that students will have a better understanding of cutting-edge research in various fields and become the driving force behind the development of the Greater Bay Area and China in the future.

Students are from the University of Electronic Science and Technology of China, Xi' an Jiaotong University, Tianjin University, Ningxia University, Southeast University, Dalian Maritime University, University of Chinese Academy of Sciences, Changsha University of Science and Technology, Huazhong University of Science and Technology and Beijing Information Technology University. The summer activity lasted for three days, except for visiting the UM campus, students also participated in self-driving technology lectures which organized by Dean Xu Cheng-Zhong, academic discussions and visiting the State Key Laboratories and laboratories in FST to experience the university' s studying atmosphere.

The students who participated in the activity shared that they had heard about the UM' s learning environment long time ago, and they were impressed after visiting the campus and laboratories this time. Some students also said that they are interested in the research field such as intelligent driving, robotics and intelligent systems, and wish to apply for the doctoral degree in UM in the future.

澳大科技學院與新生們一同迎接新學年
FST held the 2021/2022 first lecture to welcome a new academic year with freshmen



澳大科技學院於8月16日為本科生舉行了2021/2022學年學院第一講、迎新會及學系介紹，超過160名本科生及教授參與，共同迎接新篇章。因應疫情發展，科技學院院長須成忠、副院長王百鍵及一眾學院管理層以線上形式向新生展開第一堂課，同時也寄語學生挑戰與機遇並存，把握當下在澳大的時光，培養獨立思考和創新能力，為實現充實理想的人生做準備。

迎新會上，須院長介紹了澳大的辦學特色、國際排名及聲譽、來自世界各地優秀的師資團隊、前沿研究及三個國家重點實驗室等重要研究平台。他表示大學近年取得了飛躍的發展，期望作為粵港澳大灣區的一份子，未來可為灣區乃至國家培養更多高水平人才。同時，須院長勉勵學生們疫情期間應充分利用澳大內外的資源，加強自身專業能力及競爭力，及早裝備自己，追求更遠的目標，成為積極向上、意志堅定、努力不懈、具有國際視野和競爭力的人才。

FST held the first lecture, orientation and department sharing of the academic year 2021/2022 for undergraduates on 16 August. More than 160 undergraduates and professors participated, marking the beginning of a new chapter. In response to the latest epidemic prevention measures, the first lecture was conducted online. The Dean of FST, Prof. Xu Cheng-Zhong, the Associate Dean Prof. Wong Pak Kin and the management team encouraged students that challenges and opportunities coexist with Covid-19, students should grasp and treasure the time at UM to develop their professional skills and competitiveness.

Dean Xu introduced UM' s quality education, international rankings and reputation, excellent research members from all over the world, cutting-edge research and three state key laboratories. He said UM has achieved rapid development in recent years. As a member of the Guangdong-Hong Kong-Macao Greater Bay Area, UM will cultivate more high-level talents for the Bay Area and the country in the future. At the same time, Dean Xu encouraged students to make good use of UM' s resources during the epidemic, to strengthen professional capabilities and competitiveness and become more determined person with international visions.

獲獎消息

Awards by Student and Professor

澳大校長宋永華獲國家科技進步二等獎

UM Rector Yonghua Song receives second prize of State Scientific and Technological Progress Award



宋永華校長
Rector Song Yonghua

國家科學技術獎勵大會今(3)日在北京隆重舉行，習近平、李克強、王滄寧、韓正等黨和國家領導人出席並向獲獎代表頒獎。澳門大學校長宋永華作為第一完成人的項目“含高比例新能源的電力系統需求側負荷調控關鍵技術及工程應用”獲2020年度國家科學技術進步獎二等獎。

宋永華牽頭的項目提出了靈活負荷調節能力跟隨發電變化的新路徑，形成了創新的理論、方法和發明了關鍵技術，領導研發了含高比例新能源電力系統需求側負荷調控系統，規模化成功應用於中國11個省市電網並出口國外，形成的成果對國家實現「雙碳」戰略目標具有重要的支撐作用，亦可應用於澳門低碳城市建設。

澳門首位學者獲國際自動識別與移動技術獎

UM scholar becomes the first in Macao to receive international automatic identification and mobility award



譚錦榮教授
Prof. Tam Kam Weng

澳門大學科技學院電機與電腦工程系教授譚錦榮獲全球最大的國際自動識別與移動技術協會(Association for Automatic Identification and Mobility—AIM Global)頒發《泰德威廉斯獎》(TED WILLIAMS AWARD)，是該會今屆6項工業獎獲獎人士中唯一的澳門專家學者。譚錦榮長期從事無線通訊領域的研究，並在射頻識別技術、微波傳感器等領域享有國際聲譽。2014年起先後當選英國工程技術學會會士、英國特許工程師、英國工程技術學會特許工程師評審委員會委員、美國電氣和電子工程師協會射頻識別技術議會副主席、歐盟訪問教授學者獎學金獲獎者；曾獲澳門科學技術獎的自然科學獎、技術發明獎和科技進步獎三獎；是澳門特別行政區政府認可技術委員會委員、澳門特別行政區政府無線電輻射安全研究顧問。發表論文200餘篇，國內外發明專利5項。

An award ceremony for winners of the 2020 State Scientific and Technological Progress Award was held today (3 November) in Beijing. Party and state leaders, including Xi Jinping, Li Keqiang, Wang Huning, and Han Zheng attended the ceremony and presented the awards to the winners or their representatives. The project titled 'Key Technologies and Applications of Demand-side Load Regulation of Power Systems with a High Proportion of New Energy Sources', of which University of Macau (UM) Rector Yonghua Song is the first author, won a second prize of the State Scientific and Technological Progress Award for the year 2020.

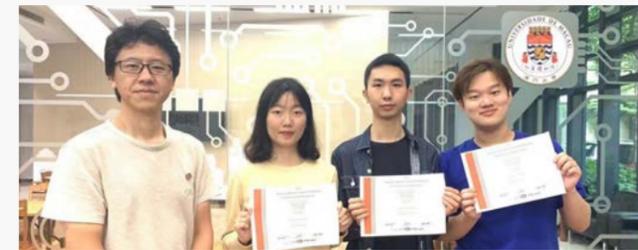
Rector Song's team achieved a number of breakthroughs with their award-winning project: They proposed a new pathway for flexible load regulation capacity to follow the changes in power generation; they developed innovative theories and methods; they invented key technologies; they built a demand-side load regulation system containing a high proportion of new-energy-based power systems. Not only has this system found extensive applications in China and abroad (it has been successfully used in the power transmission grids in 11 provinces and cities in China), but it is also expected to play a major role in supporting China in the realisation of its 'Dual Carbon' goals (which refer to China's two climate goals announced by President Xi at the 75th session of the United Nations General Assembly in September 2020) and in supporting Macao's low-carbon development strategy.

Prof Tam Kam Weng in the Department of Electrical and Computer Engineering, Faculty of Science and Technology (FST), University of Macau (UM), has received the Ted Williams Award from the Association for Automatic Identification and Mobility - AIM Global, the world's largest organisation in automatic identification and mobile technology. Of the six industrial award recipients for 2020, Prof Tam is the only one from Macao.

Prof Tam is dedicated to the study of wireless communication, which has earned him an international reputation in the fields of RFID technology and microwave sensors. He has received numerous honours and has been serving in various important positions in the industry since 2014. He is a fellow of the Institution of Engineering and Technology, a chartered engineer of the United Kingdom, a member of the Institution of Engineering and Technology's review committee for chartered engineers, vice president of the Institute of Electrical and Electronics Engineers (IEEE) Council on RFID, and a recipient of a scholarship from the European Union for visiting professors. In addition, Prof Tam has received various awards from the Macao Science and Technology Development Fund (FDCT), namely the Natural Science Award, the Technological Invention Award, and the Science and Technology Progress Award. He also serves as a member of the Technical Accreditation Committee and a consultant for radiation safety research of the Macao SAR government. He has published more than 200 papers and obtained a total of five patents, in China and abroad.

澳大學生於美國國際大學生數學建模競賽奪一等獎

UM students win first prize at MCM/ICM 2021

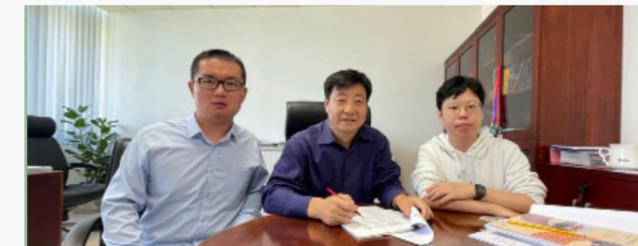


(左起) 劉志、黃思琦、葉俊文及楊光普
(From left) Liu Zhi, Huang Siqi, Ye Junwen, and Yang Guangpu

澳大兩支學生隊伍於“2021年美國國際大學生數學建模競賽(MCM/ICM)”中的交叉學科建模競賽(ICM)奪得一等獎及二等獎，獲獎率分別為7%及18%，是全澳唯一獲一等獎的高校，是次比賽吸引全球2萬6千多支學生隊伍參加。澳大自2015年參賽以來，在這項賽事已累計獲得超過10個獎項。是次比賽共吸引來自全球如美國、英國、德國、加拿大、澳洲等20多個國家和地區共26,112支隊伍參賽。一等獎獲獎隊伍由工商管理學院黃思琦、葉俊文及社會科學學院楊光普組成；二等獎獲獎隊伍則由科技學院潘世傑、陳煜華及工商管理學院林宇欣組成，兩組隊伍皆由澳大科技學院數學系副教授劉志指導。

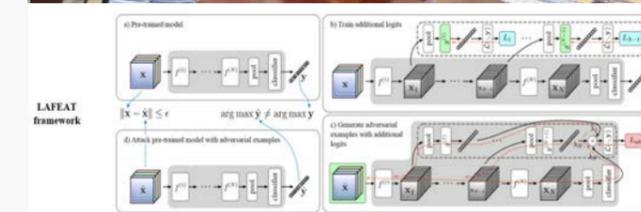
澳大自動駕駛技術於頂尖會議發表並獲國際AI賽亞軍

The autonomous driving technology of UM won the 2nd prize in the international algorithm competition and the result was published in the top conferences



于雲瑞(右起)、須成忠和高希彤
Yu Yunrui (from right), Xu Cheng-Zhong and Gao Xitong

Xu Cheng-Zhong, Dean of FST, Yu Yunrui and Gao Xitong, scholars from the UM and the Shenzhen Institute of Advanced Technology of the Chinese Academy of Sciences (SIAT), jointly proposed a new loss function that can use model features and New loss function to improve the LAFEAT method of model robustness evaluation, which achieves the best result in all model robustness evaluations in recent years. Papers were published in the international top conference in the field of AI, with a selection rate of only 4.59%. By using this algorithm, UM-SIAT team has participated into an international algorithm competition recently, namely 'CVPR Security AI Challenger' organized by the University of Illinois, Tsinghua University and Ali Security. The UM-SIAT team competed with total 1,681 teams around the world and won the 2nd prize, marking UM as the only winning team of Macao.



澳大科技學院院長須成忠、澳大及先進院學者于雲瑞和高希彤聯合提出了一種通過添加新的分支高效利用模型特徵和解決浮點數計算誤差影響的新型損失函數，提升模型魯棒性評估的方法LAFEAT，並在所有的模型魯棒性評測中達到目前最好的效果。論文以最高級別形式在人工智能領域公認的頂尖會議-國際計算機視覺與模式識別會議上發表，該會議的論文錄取率僅為4.59%。憑借此算法為核心，澳大和先進院團隊研發了一款攻防軟件並參加了由美國伊利諾大學、清華大學和阿里安全聯合組織「CVPR安全AI挑戰者賽」，與全球共1,681個團隊相互切磋，最終獲第二名的佳績，是全澳唯一獲獎的高校。

以深度學習為首的人工智能技術的推動下，自動駕駛技術近年取得飛猛進的發展，深度學習技術已經深入融入到自動駕駛的感知層，決策層與控制層等眾多領域。但同時當前深度學習模型面臨著嚴峻的魯棒性問題的挑戰，例如自動駕駛的視覺感知系統容易受到對抗樣本的惡意攻擊、對圖像數據添加、人類難以通過感官辨識到的細微擾動等，皆可令模型做出錯誤的判別。錯誤感知對運行中自動駕駛車輛帶來極大的安全隱患。因此，建立有效的模型魯棒性評估機制是打造真正安全可行的自動駕駛系統必不可少的基石。為此，澳大和先進院聯合提出了一種通過添加新的分支高效利用模型特徵和解決浮點數計算誤差影響的新型損失函數，提升模型魯棒性評估的方法LAFEAT，並在所有的模型魯棒性評測中達到目前最好的效果。

Driven by AI and deep learning, autonomous driving technology has achieved rapid development in recent years. Deep learning has been integrated into the field of perception, decision-making and the control of autonomous driving. However, the current deep learning models are facing severe robustness issues, the visual perception system of autonomous driving is vulnerable to malicious attacks from adversarial samples, adding image data, and subtle disturbances that are difficult for humans to recognize through the senses, etc., which can make the model make wrong judgments. Therefore, establishing an effective model robustness evaluation mechanism is an indispensable cornerstone for building a truly safe and feasible autonomous driving system. In response to this issue, UM and SIAT proposed a new loss function that efficiently utilizes model features and solves the effects of floating-point calculation errors by adding new branches to improve model robustness evaluation method LAFEAT, and achieves it in all model robustness evaluations. The result has been published in Computer Vision and Pattern Recognition (CVPR), a top conference in the field of Artificial intelligence.

澳大圖像篡改檢測技術獲國際AI賽冠軍 阿里巴巴贊助參與研究專案

FST's image tampering detection technology wins championship at international AI competition, team sponsored by Alibaba to participate in research project



周建濤教授(右)及其獲獎博士生吳海威
Prof. Zhou Jiantao (right) and his PhD student Wu Haiwei

澳大科技學院教授周建濤教授的團隊成功研發出一項新的圖像篡改檢測技術算法，並以此參加由清華大學和阿里巴巴主辦的全球首個針對偽造證件類圖像的檢測比賽“安全AI挑戰者賽(第五期)”，與全球1,534個團隊相互切磋，最終獲得篡改賽道冠軍及檢測賽道季軍佳績，是全澳唯一獲獎的高校。此外，團隊更獲阿里巴巴邀請和贊助參與其創新研究計劃專案，促進科研成果轉化，共同推進產學研發展。



左圖是被篡改證件及證書而右圖則是檢測結果
A tampered ID card (left) their testing results (right)

比賽中，澳大對圖像的篡改以及檢測流程進行了詳盡的分析及提出了新的篡改算法—通過交替真假區域以及添加自適應性噪聲來生成難以通過感官辨識到的偽造圖像；同時也提出了新的檢測算法—基於深度學習技術，使用融合了空間通道感知模組的多網路架構對偽造圖像進行篡改區域的定位檢測。此算法運用了澳大智能超算中心(SICC)所提供的GPU超級計算機，以秒級單位對輸入圖像進行檢測。澳大團隊的檢測演算法可於0.5秒內對被篡改圖像進行偽造區域定位。

澳大學者在國際頂尖雲計算技術會議上奪最佳論文獎

UM Scholar won the Best Paper Award at the International Top Cloud Computing Technology Conference



徐歡樂(右起)、須成忠和羅樹添
Xu Huanle(from right), Xu Cheng-Zhong and Luo Shutian

粵港澳人機智能協同系統聯合實驗室及澳門大學與中國科學院深圳先進技術研究院聯合培養的博士生羅樹添、科技學院院長須成忠及人工智能與機器人研究中心助理教授徐歡樂在日前舉行的第十二屆國際計算機協會雲計算研討會(ACM Symposium on Cloud Computing, SoCC, 2021)中唯一奪最佳論文獎，是迄今為止中國(包括港澳地區)唯一獲獎的學者。獲取錄的論文均來自全球知名大學和研究機構，如斯坦福大學、加州大學伯克利分校、普林斯頓大學、微軟研究院等。

A team from the University of Macau (UM), led by Prof. Zhou Jiantao in the Faculty of Science and Technology, has successfully developed a new algorithm for digital image tampering detection. With this technology, the team competed with 1,534 teams from around the world at the Security AI Challenger Contest (Season 5) co-organised by Tsinghua University and Alibaba. The team won the championship in the tampering track and a third prize in the detection track, making UM the only university in Macao to have received awards in this event. In addition, the team has been invited by Alibaba to participate in one of its innovative research projects, which will help to promote the commercialisation of scientific research results and academia-industry collaboration.

In recent years, with the popularisation of photo editing applications, a large number of forged images have been used to spread rumours, fabricate news, or illegally obtain economic benefits. Against this backdrop, image tampering detection technology has been widely adopted to detect forged images in fields such as media, justice, and criminal investigation. In order to improve the existing detection technology and promote the application of image forensics technology, Tsinghua University and Alibaba jointly held the world's first tampering detection contest for image forgery on certificates and ID cards.

During the competition, UM conducted a detailed analysis of image tampering and the detection process, and proposed a new tampering algorithm by alternating true and false areas and adding adaptive noise to generate forged images that are difficult to detect through the senses. In addition, UM proposed a new detection algorithm based on deep learning technology. The algorithm adopts a multi-network architecture that integrates spatial channel perception modules to recognise the tampered area of a forged image. It uses the GPU supercomputer provided by UM's Super Intelligent Computing Center (SICC) to detect the input image in seconds. The team's detection algorithm can locate the forged area of a tampered image within 0.5 seconds

Luo Shutian, a PhD student from the joint laboratory of Human-Machine Intelligent Collaboration System in the Guangdong-Hong Kong-Macao Greater Bay Area and the student of the joint training programme between the University of Macau and the Shenzhen Institute of Advanced Technology of the Chinese Academy of Sciences, Prof. Xu Cheng-Zhong, Dean of the Faculty of Science and Technology and Xu Huanle, an Assistant Professor in the Centre for Artificial Intelligence and Robotics, won the Best Paper Award in the 12th ACM Symposium on Cloud Computing (SoCC, 2021). They are the only scholar who has won the award in China (including Hong Kong and Macau) so far. Other accepted papers are from world-renowned universities and research institutions, such as Stanford University, University of California, Berkeley, Princeton University, Microsoft Research, etc.

澳門大學科技學院頒授年度優秀教學獎及研究卓越獎

FST presents the 2020/2021 Teaching Excellent Award and Research Excellence Award



劉志、黃錫榮、院長須成忠、張一博及郝天偉(左起)
Prof. Liu Zhi, Vong Seak Weng, Prof. Xu Cheng-Zhong, Prof. Zhang Yibo and Prof. Hao Tianwei (from left)

科技學院於4月7日頒授2020/2021學年年度「優秀教學獎」及「研究卓越獎」予四位教授。經過學院相關管理委員會的遴選，「優秀教學獎」由數學系副教授劉志及電腦及資訊科學系副教授張一博奪得，而「研究卓越獎」則由數學系教授黃錫榮及土木及環境工程系助理教授郝天偉獲得。獎項旨在表揚他們言傳身教、力臻完美的教學以及在科研上精益求精、砥礪創新的精神，為澳大及科技學院提升教學科研水平，同時為師生們樹立良好榜樣。

數學系副教授劉志自2012年在澳大任教，他開設並教授「數學建模」課程，過去帶領多位學生參與全國性數學建模競賽，與全國數萬支隊伍較量並獲二等獎。教學上，劉教授鼓勵學生之間協作學習，他的課程吸引眾多數學系以外的學生。同時，劉教授更獲邀到多間本地中學授課及分享數學建模，為澳大及數學教育作出貢獻。

電腦及資訊科學系副教授張一博自2013年加盟澳大。研究內容涵蓋生物特徵辨識、模式識別、圖像處理和醫學圖像分析。張教授在學生意見問卷中，皆獲得一致好評。而在張教授的指導下，多位本科生在畢業設計項目上皆獲得不俗的成績。而在他的研究團隊的碩士生畢業後也能找到理想的職業。

數學系教授黃錫榮自1996年在澳大擔任教學助理，現已是正教授的他研究分數階微分方程的數值方法，這種數值方法描述了許多物理問題中的非局部現象。黃教授研究了幾種加權方法，可用於導出具有高階精度的數值方案及非均勻網格上以解決初始奇點問題。此外，他還為多線性系統開發了一些張量分裂方法，為該領域提供了新的框架。黃教授在Web of Science中發表約90篇，其中5篇屬高引用率文章。當中17篇在排名前3%的期刊上發表，6篇在排名前5.8%及7.6%的期刊上發表，在數學領域屬高質及高產量。他的研究為澳大及科技學院帶來更深的影響力及國際聲譽。

土木及環境工程系助理教授郝天偉在2017年加入澳大，他致力於循環經濟的節能水處理和採礦，以及為水和城市可持續發展而重新設計環境基礎設施。他開發了一種基於顆粒污泥的高速率鹽水廢水處理技術，該技術可以實現比傳統處理技術高6倍的處理效率。此外，他目前的研究致力於通過高價值的物料/產品回收將廢水處理的範式從被動處理轉變為有利處理。郝教授有近28篇SCI期刊出版物，其中16篇成功在排名前1%的期刊中發表，而當中的23篇屬於A類(Q1)。

FST presents the 2020/2021 'Teaching Excellent Award' and 'Research Excellence Award' to 4 professors on April 7. The 'Excellent Teaching Awards' were presented to Prof. Liu Zhi, Associate Professor in the Department of Mathematics (MAT) and Prof. Zhang Yibo, Associate Professor in the Department of Computer and Information Science (CIS). The 'Research Excellence Awards' were presented to Prof. Vong Seak Weng, Professor in the Department of Mathematics (MAT) and Hao Tianwei, Assistant Professor in the Department of Civil and Environmental Engineering (CEE). The award aims to commend them for their ever-improving teaching standards, and contribute to the quality and innovation of scientific research. They successfully enhance the quality of teaching and researching of UM and FST.

Prof. Liu Zhi in MAT has taught at UM since 2012. He initiated and taught the mathematical modelling course and led students to participate into the national mathematical modeling competition. They competed with tens of thousands of teams across the country and won the second prize. Prof. Liu encourages collaborative learning among students, and his courses attract many students from other majors besides Mathematics. At the same time, Prof. Liu was invited to teach and share mathematical modeling in local high schools, making an important contribution to the promotion of UM and Mathematics education.

Prof. Zhang Yibo Bob in CIS joined UM in 2013. His research covers biometric recognition, pattern recognition, image processing and medical image analysis. Prof. Zhang received high scores in the student feedback questionnaire. Under the guidance of Prof. Zhang, student achieved numerous accolades in their final year projects. For the master students who graduated from his research team also found their ideal careers.

Prof. Vong Seak Weng in MAT who joined UM as a teaching assistant in 1996. He focused on energy-efficient water treatment and mining for the circular economy, as well as re-designing environmental infrastructures for water and urban sustainability. He has developed a granular sludge-based high-rate saline wastewater treatment process that can achieve 6-fold higher treatment efficiency than conventional treatment technologies. His current research is devoted to shifting the paradigm of wastewater treatment from passive to favorable treatment through high-value material/product recovery. Prof. Vong has 90 papers published on *Web of Science*, and 5 of them are highly cited papers. Among them, 17 papers were published in the top 3% journals, and 6 articles were published in the top 5.8% and 7.6% journals. These works are high quality in the field of Mathematics.

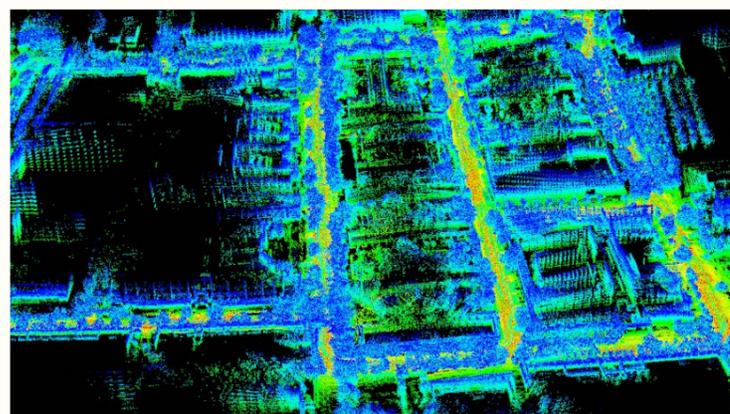
Prof. Hao Tianwei in CEE joined UM in 2017. He focused on energy-efficient water treatment and mining for the circular economy, as well as on re-designing environmental infrastructures for water and urban sustainability. He has developed a granular sludge-based high-rate saline wastewater treatment process that can achieve 6-fold higher treatment efficiency than conventional treatment technologies. Moreover, his current research is devoted to shifting the paradigm of wastewater treatment from passive to favorable treatment through high-value material/product recovery. Prof. Hao has 28 SCI journal publications, of which 16 were successfully published in the top 1% of journals, and 23 of them belonged to Category A (Q1).

專訪 孔慧教授 Story of Professor Hui Kong



孔慧教授於2021年加入澳門大學，目前擔任科技學院機電工程系、計算機與信息科學系副教授和智慧城市物聯網國家重點實驗室的研究成員。2007年他在新加坡南洋理工大學 (NTU) 獲電氣與電子工程獲博士學位，過去曾在多個國家及大學進行教學及研究，包括南京理工大學、麻省理工學院、俄亥俄州立大學、法國巴黎烏爾姆的高等師範學院等。

他的研究主要是有關於自動駕駛和自主移動機器人的傳感和感知以及高精定位。孔教授解釋目前全球衛星定位系統(GPS)雖然很普遍但卻沒有很精準，更可能出現10米或以上的定位誤差。若要令自動駕駛巴士自行轉彎、避開障礙物、繞道前行或保持在固定路段上行駛，則需使用GPS及其它的傳感器高精定位方法予以輔助。人在駕駛時主要依賴視覺，因為人腦的神經網絡能夠處理視覺輸入，以協助我們了解周圍物體的深度和速度。為了令巴士更人性化地識別路況及作出即時反應，孔教授目前正研究運用神經網絡處理視覺輸入，同時結合視覺感知系統如激光雷達、毫米波雷達、高精攝像頭所收集的數據，令巴士可以清晰自己的定位。另一方面，透過視覺感知系統，收集及創建龐大多樣化的數據庫，令巴士可以進行深度學習。期望可令自動駕駛巴士先行感知路段、障礙物、交通燈；第二步理解道路狀況，自行判定巴士自身所在位置；最後則令巴士作出‘因果推理’，自行作出反應，以應對多變複雜的路況。但研究上還是要面臨不少挑戰，孔教授說：「縱使擁有龐大的數據庫，但開放道路上的實際環境仍然是非常複雜，隨時都可能遇到不可預測的狀況。若巴士面對過去從沒有面對的新場景時，很難進行‘因果推理’。」雖然自動駕駛仍存在不少挑戰，但孔教授表示腦科學、人機共融、互聯互通是未來的趨勢，細小如自動吸塵器、看護機器人，大至工業機器人都將滲透未來社會，而這些發展都離不開傳感器的感知及高精定位。



激光雷達視角的地圖
A map from the perspective of lidar

Prof. Kong Hui joined the University of Macau in 2021 and currently serves as an Associate Professor in the Department of Electromechanical Engineering and Department of Computer and Information Science of the Faculty of Science and Technology and a research member of the State Key Laboratory of Smart City Internet of Things. In 2007, he obtained a PhD degree in Electrical and Electronic Engineering from Nanyang Technological University (NTU) in Singapore. In the past, he has taught and conducted research in many countries and universities, including Nanjing University of Technology, Massachusetts Institute of Technology, Ohio State University and École normale supérieure (Paris), etc.

His research is mainly related to the sensors and perception of autonomous mobile robot and high-precision sensor positioning. Prof. Kong explained that although the current global satellite positioning system (GPS) is very common but also not very accurate, it is more likely to have 10 meters positioning error or even more. To make autonomous buses turn on their own, avoid obstacles, make detours, or stay on fixed roads, GPS and other sensor high-precision positioning methods are assisted are required. People mainly rely on vision when driving, because the neural network of the human brain can process visual input to help us understand the depth and speed of surrounding objects. In order to make buses more humanely recognize road conditions and react in real time, Professor Kong is currently studying to imitate the operation of the human brain, using neural networks to process visual input, and combining visual perception systems such as lidar, millimeter-wave radar, and high-precision cameras. The data allows the bus to clearly position itself. On the other hand, through the visual perception system, a huge and diverse database is collected and created, so that the bus can perform in-depth learning. It is expected that the autonomous bus will be able to perceive road sections, obstacles, and traffic lights first; the second step is to understand the road conditions and determine the location of the bus itself; finally, the bus can understand and react on its

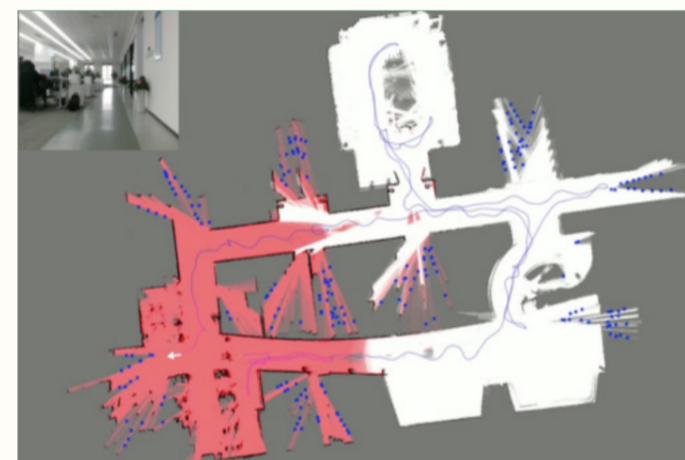


自主探索機器人
Active Mapper

但研究上還是面臨不少挑戰，孔教授說：「縱使擁有龐大的數據庫，但開放道路上的實際環境仍然是非常複雜，隨時都可能遇到不可預測的狀況。若巴士面對過去從沒有面對的新場景時，很難進行‘因果推理’。」雖然自動駕駛仍存在不少挑戰，但孔教授表示腦科學、人機共融、互聯互通是未來的趨勢，細小如自動吸塵器、看護機器人，大至工業機器人都將滲透未來社會，而這些發展都離不開傳感器的感知及高精定位。

孔教授另一研究方向是自主探索機器人，目前所有的移動機器人的自主導航都離不開高精地圖，但高精地圖的繪製以及更新需要經驗的機器人操作員通過遙控機器人在要導航的場景內收集數據，然後再離線繪製地圖，中間可能還需要手動編輯，因此這些都需要很高的人力成本。目前孔教授及其團隊正在努力通過探索機器人實現高精地圖的繪製及其更新，進而取代理人力，節省成本。除此之外，探索機器人還可以被部署於危險場景來代替人類完成任務，諸如危險環境中的搜救或者火星探索等任務。

提及選擇任教於澳門大學，孔教授表示澳大是一所十分國際化的大學，不少教職員都從海外回流澳門，具備國際視野。他也樂見部份學生立志以研究為目標，對此孔教授十分欣賞地說：「做研究不能急功近利，這是一個漫長的過程，需要本著初心，堅持實踐，我十分欣慰能有這種志同道合的學生。」未來在澳大，孔教授表示希望能建立一支更優秀的研究隊伍，培養更多優秀人才，為本地乃至國家創造更多科研成果。



自主探索機器人在繪製地圖
Active Mapper is conducting indoor mapping

Prof. Kong also shared the challenges of the research, 'Although there is a huge database, the actual situations on the roads is still very complicated, and the autonomous vehicle may encounter unpredictable conditions at any time. If the vehicle faces unpredictable situations that has never shown up in the scenarios in the past, it is difficult for it to react.' Although there are still many challenges in autonomous driving, Prof. Kong said that brain science, human-machine integration, and interconnection are the trends in the near future, as small as automatic vacuum cleaners, nursing robots, and as large as Industrial robots will be adopted in the future, and these developments are inseparable from sensor perception and high-precision positioning.

Another research of Prof. Kong is autonomous exploration for search and rescue robots. At present, the autonomous navigation of all mobile robots is inseparable from high-precision maps, but the drawing and updating of high-precision maps requires experienced robot operators to navigate the scenes through remote control robots. Collect data internally, and then draw the map offline. Manual editing may be required in the middle, so these require high labor costs. At present, Prof. Kong and his team are working on the drawing and updating of high-precision maps through exploration robots, thereby replacing manpower and saving costs. In addition, exploration robots can also be deployed in dangerous area to replace humans in completing tasks, such as search and rescue in dangerous area or Mars exploration tasks.

In regards of choosing to teach in the University of Macau, Prof. Kong said that UM is a very international university which has many academic staff have returned to Macau from overseas and have international perspectives. He is also pleased to see that some students are determined to start their careers as researchers. 'Research is a long process and it has to be persist. I am very pleased to have these like-minded students.' He says. In the future at UM, Prof. Kong wishes to build a better research team, cultivate more outstanding students, and create more scientific research results for the local community and the country.

2020/2021

畢業生故事 Story of Graduate



土木及環境工程系林菲兒
Alice Lin - Department of Civil and Environmental Engineering

成功利用機器學習計算方法分析澳門水質 - 土木及環境工程系林菲兒

Using machine learning calculation methods to examine water quality in Macau
Alice Lin in the Department of Civil and Environmental Engineering



林菲兒與指導老師高亮(右一)及張平(左一)合照
Alice Lin and her mentors Gao Liang(left) and Zhang Ping

澳門水塘是本地居民的飲用水源之一，了解自然過程對水塘的影響，將有助水質的監測。林菲兒是2020/2021學年土木及環境工程系優秀本科畢業生，她的畢業設計項目是運用機器學習的方法對澳門水塘水質進行預測。預測自然過程中水質有否變化，如某類物質過剩，海藻或有機物質爆發等。項目採用機器學習方法包括相關支持向量機(SVM)、遺傳算法(GA)、網格搜索(GS)和敏感性分析評估了2008年1月至2019年4月的化學需氧量(COD)和總溶解固體(TDS)含量。對比傳統用直接抽樣方式檢驗，用人工智能的方法就可預測未來數月的變化，把機器學習應用於水質預測也是十分新穎研究方法。她的畢業設計作品更獲選成為「最佳優秀作品項目」之一。

林菲兒中學曾參與科技學院舉辦的暑期研習營，對土木印象深刻，因此升讀大學時也優先選擇澳大。性格積極開朗的林菲兒大學四年參與過各式各樣的比賽、研討會及學生會，也走訪過不同地方交流。她說：「澳大除了環境優美，學習資源也很豐富。學生有很多出國交流的機會，可以全方位磨練和提升自己。」提及畢業設計項目最大的收穫就是有機會閱讀大量相關文章，融合自己的想法，腳踏實地，一步一步完成研究目標。未來她將繼續在澳大升讀碩士，延續澳大的學習之旅。

The water in Main Storage Water Reservoir of Macau (MMR) is one of the sources of drinking water for Macao residents. Examining the impact of natural processes on MMR water quality could help to monitor the water quality. Lin Fei I, Alice is one of the 2020/2021 outstanding undergraduate graduates in the Department of CEE, her final year project (FYP) is about using machine learning calculation methods to predict the water quality of Macao's reservoirs. It predicts whether there any changes of water quality during natural processes, such as surplus of organic material or algal bloom. The machine learning methods used in the project include support vector machines (SVM), genetic algorithms (GA), grid search (GS), and sensitivity analysis. Alice's project evaluated the chemical oxygen demand (COD) and total dissolved solids (TDS) content from January 2008 to April 2019. Compared with traditional sampling methods, artificial intelligence methods can predict changes in the next few months. The application of machine learning calculation methods to water quality prediction is also a very innovative research method. Her graduation project was selected as one of the awardees of 'Best Project Award'.

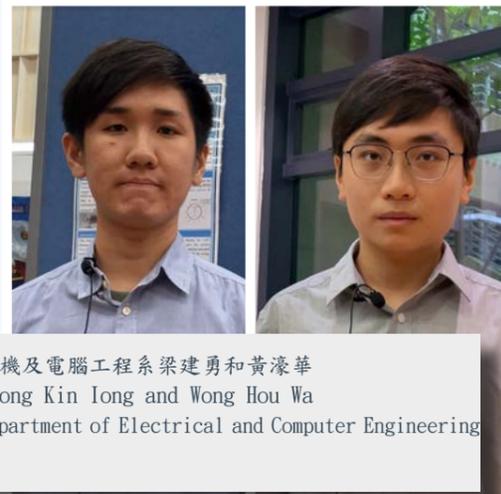


林菲兒獲頒發最佳優秀作品項目獎
Alice received the 'Best Project Award'

Alice had participated into the summer camp and was deeply impressed by Civil Engineering. The years in UM, she participated in various competitions, seminars and student unions and visited many countries. 'Except for the beautiful environment, UM has rich learning resources for us. There are many exchange opportunities so that we can improve ourselves in every aspects.' 'The largest achievement in completing FYP is having opportunities to read a lot of articles which help to improve my ideas, and to complete my goals step by step.' Alice says. She will continue to pursue a master's degree and continue her learning journey at UM in the coming future.



電腦及資訊科學系古樹權及鍾旭熙
Ku Su Wa and Chong Lok Hei
Department of Computer and Information Science



電機及電腦工程系梁建勇和黃濠華
Leong Kin Long and Wong Hou Wa
Department of Electrical and Computer Engineering

研究數學熱傳導方程 - 數學系廖倪徵

A Study on Heat Equation - Liao Nizheng in the Department of Mathematics



廖倪徵是2020/2021學年數學系優秀本科畢業生，他的畢業設計作品獲選成為「最佳優秀作品項目」之一。作品是對數學熱傳導方程進行研究，內容包括其物理背景、數學模型的推導、數值方法的設計與分析，以及用C++語言編寫算法的數值實驗。廖倪徵解釋說：「利用氣體及固體的數學熱方程模型，可以計算到鐵傳熱及空氣傳播(如冷氣或暖氣)的速度，例如需要多少分鐘才可以令一塊鐵提升至某溫度或多久可以令一間房間變冷或暖。」作品為熱傳導方程背後的物理機制提供更好的理解。與熱傳導方程相關的經典理論結果也得到了數值結果的重新推導和證實，例如穩定性和收斂性。

Liao Nizheng is one of the 2020/2021 outstanding graduates in the Department of Mathematics. His final year project is about heat conduction equation which covers its physical background, the derivation of mathematical model, the design and analysis of numerical method, as well as numerical experiments by coding the algorithm with C++ language. 'Using the mathematical heat equation model, it can calculate the speed of iron heat transfer and air propagation (such as air-conditioning or heating). It can also calculate the duration of making a certain space cooler or warmer.' Liao NiZheng explains. Through this research, the physical mechanism behind the heat equation is well understood, classical theoretical results related to heat equation, e.g., the stability and convergence are confirmed by the numerical results. The code developed in this work would be used for further study.



機電工程系林慧怡及梁嘉杰
Lam Wai I and Leong Ka Kit
Department of Electromechanical Engineering



數學系廖倪徵
Liao NiZheng
Department of Mathematics

由最初被澳大的環境吸引，到後來發現澳大師資十分優越，與老師們共處，令他獲益良多，也學會了獨立完成一篇學術論文。廖倪徵說：「我學會很多對未來有用的編程技巧、物理知識等，同時也釐清很多現實問題，這些技巧皆是透過親身實踐來提升。」四年教育不光在學術上，在獨立思考、為人處世態度乃至價值觀方面都令廖倪徵獲益匪淺。由最初只重視結果、只求考試表現優良，現在的他卻更重視過程，樂於探索及探尋箇中原因，對數學及自己的未來也有了新認知。未來他將在澳大升讀碩士，全力以赴為未來準備。

創造粵語普通話互譯的翻譯器 - 電腦及資訊科學系鍾旭熙及古樹樺

Creating a translator for Cantonese - Mandarin translation

Chong Lok Hei and Ku Su Wa in the Department of Computer and Information Science



鍾旭熙及古樹樺(右)
Chong Lok Hei and Ku Su Wa (right)

粵語是中國的方言，目前主要在港澳、廣東省及部份地區使用，儘管粵語和普通話很相似，但要準確翻譯粵語還是存在不少挑戰。不少以普通話為母語的人在閱讀粵語文本時遇到了障礙。相較於其他普遍性較高、資源較豐富的語言，粵語沒有豐富的數據，因為粵語很少以文字形式在正式文本上使用，因此無法利用數據開發基於機器學習的系統。2020/2021學年電腦及資訊科學系的優秀本科畢業生古樹樺及鍾旭熙注意到市場的這種需求，特意以此為畢業設計作品的題目，二人在黃輝教授的指導下運用沒有並行數據的雙語詞典神經機器翻譯模型「Candarín」、反向翻譯和雙重學習等方法，成功創造出粵語和普通話兩種語言的互譯器，解決了粵語翻譯的問題。務求方便大眾使用，兩人更設計出易於使用的網頁及手機版本，他們的畢業設計作品獲選成為「最佳優秀作品項目」之一。



鍾旭熙及古樹樺(右)獲頒發最佳優秀作品項目獎
Two of them received the 'Best Project Award'

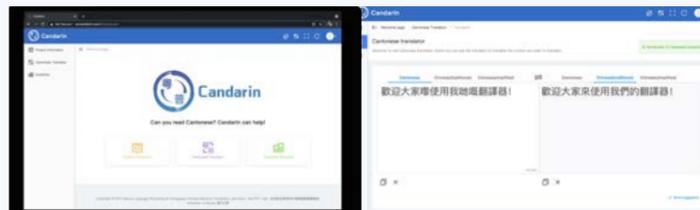
提及在澳大四年的收穫，古樹樺分享說：「本科除了帶給我最新科技資訊與技術學習之外，還有的是強大的人際網絡。在澳大，我認識了很多志同道合的朋友和優秀教授。」鍾旭熙則表示：「在澳大融洽的學習環境中，我結識了很多朋友和教授，他們給予我支持鼓勵，每當遇到困難，他們經驗的分享和諄諄教誨，都讓我感到很窩心。其次，我也培養了自我管理的能力，懂得適當安排和管理時間，都令我受益匪淺。」未來，古樹樺期望能夠從事教育工作令澳門學生都獲得正確的電腦知識。鍾旭熙則表示他在自然語言處理上很有興趣，未來他將繼續深入研究。

Liao NiZheng was first attracted by UM's environment, and later he discovered the UM academic staff are knowledgeable and very professional. Liao NiZheng said that he has benefited a lot from cooperating with professors in his graduation project, and he also learned to complete an academic thesis independently. 'During the preparation process, I have developed programming skills and physics knowledge that could be very useful in the future, at the same time I have clarified many practical problems. These abilities are all improved through hands-on practices in this project.' Liao NiZheng says. Four-year in UM has also changed Liao NiZheng's life and values. He was used to focus on the outcomes and only seek good grade in the exam. Now he pays more attention to the process and willing to explore more and find out the reasons behind, he is having a new understanding of not only Mathematics but also his own life. In the near future, he is going to study a master degree in UM and will continue his journey of exploration in Mathematics.

Cantonese is a dialect of China which mainly used in Hong Kong, Macau, Guangdong Province and other regions. Although Cantonese is very similar to Mandarin, there are still many challenges in accurately translating Cantonese. Many native Mandarin speakers have encountered obstacles in reading Cantonese texts. Compared with other languages with higher ubiquity and richer resources, Cantonese is a low resource language with sparse data that cannot support to create neural machine translation models, because Cantonese is rarely used in formal article. Ku Su Wa and Chong Lok Hei, the 2020/2021 outstanding undergraduates in the Department of Computer and Information Science, realized this problem, and therefore, used it as the topic of their graduation project. Under the guidance of Professor Derek Wong, they used bilingual dictionary neural machine translation system 'Candarín' without parallel data, back-translation and dual learning. By these approaches, they successfully solved low resource problems in Cantonese. In order to make it easier for the use of general public, they even designed an easy-to-use website and mobile version. Their graduation project was selected as one of the best projects.



「Candarín」的網頁版及手機版
The webpage and app of Candarin

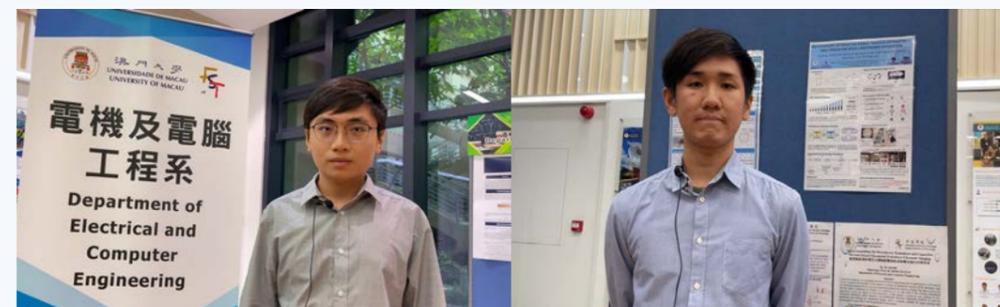


In regards of the achievements of the four years at UM, Ku Su Wa shares, 'Except for teaching me the latest technical knowledge and information, UM also helps to develop my relationships with others. At UM, I have met many like-minded friends and great teachers.' Chong Lok Hei also says, 'In this harmonious learning environment, I have met many new friends and professors. They have given me a lot of help and encouragement. Whenever I encounter difficulties, they will sincerely help me and it makes me feel very warm. Also, I have developed the ability of self-management, and know how to arrange and manage my time appropriately.' In the future, Ku Su Wa hopes to work in an educational institution so that Macau children can acquire computer knowledge from an early age. Chong Lok Hei also shared that his interest regarding natural language processing was deepened through his graduation project, and he will continue to conduct in-depth research in the future.

成功設計非對稱線圈進行電力傳輸 - 電機及電腦工程系梁建勇和黃濠華

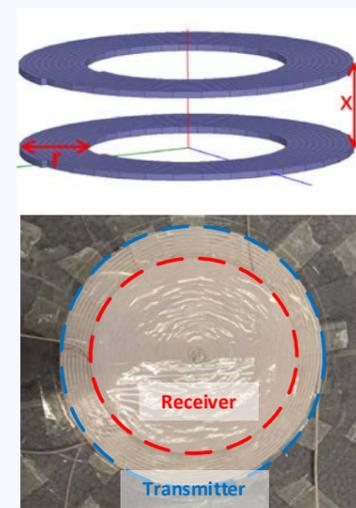
Successfully designed asymmetrical coils for power transmission

Leong Kin Iong and Wong Hou Wa in the Department of Electrical and Computer Engineering



黃濠華與梁建勇(右)
Wong Hou Wa and Leong Kin Iong

隨著充電市場的急速擴展，現時無線充電技術已得到廣泛的應用。然而市面上大部分的無線充電產品都是使用對稱線圈進行電力傳輸，對於一些空間受限而又想引用無線充電技術的設備卻是一種限制。為了解決這個問題，2020/2021學年的電腦及電機工程系優秀本科畢業生梁建勇及黃濠華以非對稱線圈進行電力傳輸作為畢業設計作品的題目。他們在作品中研究和測試了線圈尺寸、線圈間距和線圈形狀等因素，還透過充電效率和充電電流等實驗來驗證線圈的效能。兩人最終成功在自動導引車(AGV)上驗證非對稱線圈的設計理論。針對整個充電系統，兩位更設計了保護系統令整個充電過程更安全。



對稱(上)及不對稱線圈(下)
Symmetrical Coil (above) and Asymmetrical Coil (below)

二人設計的非對稱線圈能達到傳統對稱線圈大致相同的效率，然而影響無線充電效率的因素有很多，因此要在保持充電效率下，將相同線圈轉換為不同線圈是一個挑戰。梁建勇分享說：「在計算線圈的互感值時我們遇到最大的挑戰，最初在計算非對稱線圈時使用了錯誤的理論，直到實測時才發現問題，以致進度落後，幸好兩人齊心協力一路堅持，最後終於找到適合的理論。」談及大學四年的收穫，梁建勇及黃濠華說：「澳大獨一無二的書院生活和活動，令大家可以與來自世界各地的人交流，認識多元文化，更認識到一班志同道合、一起並肩作戰的朋友。」澳大師資優良，同時擁有國家重點實驗室、充沛的資源和設備，也令學生有更多機會展現才能。未來梁建勇將爭取考取相關專業資格牌照，進一步提升自己實力。黃濠華將升讀碩士，並參加世界職業技能競賽，豐富閱歷，繼續挑戰自己。

With the rapid expansion of the charging market, wireless charging technology has now been widely used. However, most of the wireless charging products in the market are still using symmetrical coils for power transmission, which is a limitation for devices with limited space and also want to use wireless charging. In order to solve this problem, Leong Kin Iong and Wong Hou Wa, 2020/2021 outstanding undergraduates of the Department of Electrical and Computer Engineering, used asymmetrical coils for power transmission as the topic of their graduation project. They studied different factors such as coil size, coil spacing and coil shape in their works, and verified the effectiveness of the coil through experiments such as charging efficiency and charging current. The two finally succeeded in verifying the design theory of asymmetric coils on an automated guided vehicle (AGV). For the entire charging system, the two even designed a protection system to make the entire charging process safer.



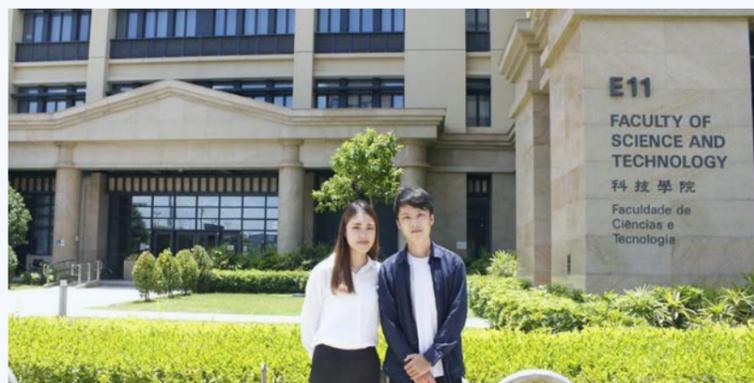
黃濠華與梁建勇(右)獲頒發最佳優秀作品項目獎
Wong Hou Wa and Leong Kin Iong received the 'Best Project Award'

With the rapid expansion of the charging market, wireless charging technology has now been widely used. However, most of the wireless charging products in the market are still using symmetrical coils for power transmission, which is a limitation for devices with limited space and also want to use wireless charging. In order to solve this problem, Leong Kin Iong and Wong Hou Wa, 2020/2021 outstanding undergraduates of the Department of Electrical and Computer Engineering, used asymmetrical coils for power transmission as the topic of their graduation project. They studied different factors such as coil size, coil spacing and coil shape in their works, and verified the effectiveness of the coil through experiments such as charging efficiency and charging current. The two finally succeeded in verifying the design theory of asymmetric coils on an automated guided vehicle (AGV). For the entire charging system, the two even designed a protection system to make the entire charging process safer.

運用摩擦堆焊製造用於海洋的不銹鋼耐腐蝕和耐磨塗層 - 機電工程系林慧怡及梁嘉杰

Fabrication of corrosion and wear resistant coatings via friction surfacing for marine applications

Lam Wai I and Leong Ka Kit in the Department of Electromechanical Engineering



林慧怡及梁嘉杰(右)
Lam Wai I and Leong Ka Kit (right)

現時不銹鋼被廣泛應用在淡水中及海水中，作為最常用不銹鋼類型之一，AISI304具有耐腐蝕性，在淡水中較耐用。但在海水中則需要考慮鹽的濃度，若不銹鋼長時間浸泡在海水中或船體等難以清潔的位置，可能會因為水中氯化物引發腐蝕。此外，AISI304的摩擦學性能較差，在腐蝕條件下，會發生粘附和磨料磨損，造成表面損傷，加速腐蝕並縮短不銹鋼的使用壽命。考慮到成本等因素，表面塗層是實現高耐腐蝕性和耐磨性的有效替代方案。林慧怡及梁嘉杰是2020/2011學年機電工程系的優秀本科畢業生，兩人的畢業設計作品正是運用摩擦堆焊製造出能應用於海水的耐腐蝕層和耐磨塗層。當摩擦堆焊應用在低於熔化溫度下，基於熱/塑性變形製造高性能鎳基塗層於AISI304不銹鋼上。摩擦堆焊經過優化，即可產生無缺陷、厚且冶金結合的塗層。其次，二人對摩擦堆焊塗層的微觀結構、耐腐蝕性和耐磨性使用了掃描電子顯微鏡/電子背散射衍射、電化學測試和球盤磨損等方式進行研究。他們的作品成功獲選成為「最佳優秀作品項目」之一。

Stainless steels are commonly used in fresh water and sea water. AISI 304, as one of the most frequently used types of stainless steels, are corrosion resistant and perform well in freshwater. However, as AISI 304 being used under seawater, salt concentration also needs to be considered as chloride may initiate the pitting corrosion. If stainless steel is immersed in seawater for a long time, it may cause corrosion due to chloride. Furthermore, the friction capacity of AISI 304 are poor, under corrosive conditions, the adhesive and abrasive wear will occur causing surface damage, accelerating the corrosion and shortening its service lifetime. One of the cost effective method is using surface coating to achieve high corrosion and wear resistances. Lam Wai I and Leong Ka Kit are 2020/2021 excellent undergraduates in the Department of Electromechanical Engineering. Their final year project is about fabrication of corrosion and wear resistant coatings via friction surfacing for marine applications. When friction surfacing is used below the melting temperature, a high-performance nickel-based coating is made on AISI 304 stainless steel based on thermal/plastic deformation. Friction surfacing is optimized to produce defect-free, thick and metallurgical bonding coatings. On the other hand, two of them were using several methods, such as scanning electron microscope/electron backscatter diffraction, electrochemical testing and ball-disk wear to study the microstructure, corrosion resistance and wear resistance of the friction surfacing coating. Their work was successfully selected as one of the Best Projects.



林慧怡及梁嘉杰獲頒發最佳優秀作品項目獎
Lam Wai I and Leong Ka Kit received the 'Best Project Award'

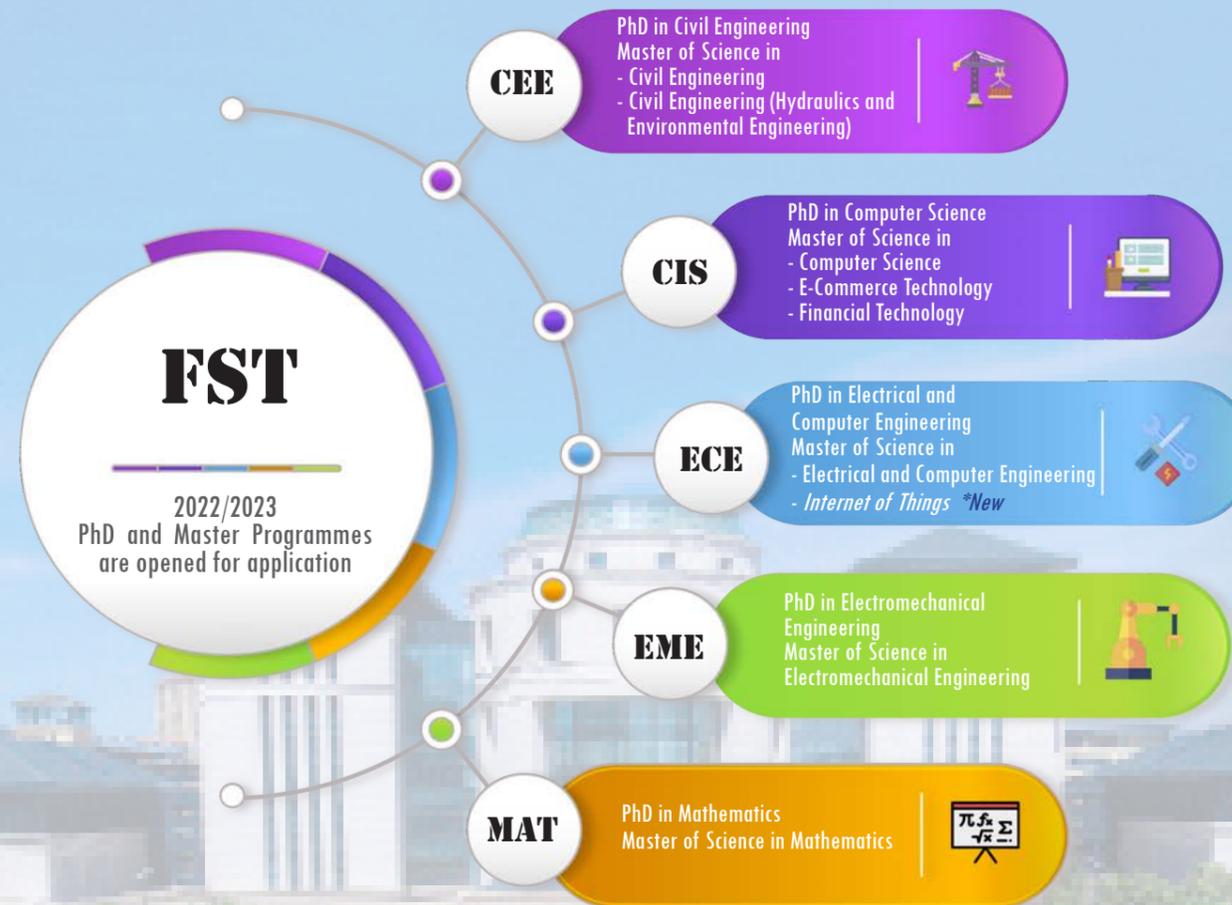
林慧怡及梁嘉杰提及畢業設計作品最大挑戰是相關研究相對複雜，需要花費較多時間和精力去研讀新內容，以更好地表達摩擦堆焊的效果。另外，二人同時也要處理各項分工及其他研究的難題，梁嘉杰表示：「儘管準備的過程十分艱辛，但能夠深入體驗、親自動手、實地操作及收穫書本上沒有的知識，都覺得十分難能可貴。」過去四年，兩人也曾參與由澳大提供的交換生計劃。到瑞典留學半年期間，深深地感受到外國與別不同的學習文化，令他們獲益匪淺，也豐富了他們的大學生涯。未來他們將一邊在澳大升讀機電工程系碩士，另一方面則積極尋找更多機會實踐自身能力。



本地企業管理層與兩人討論作品原理

The management of local enterprise discuss about the FYP with two of them
Lam Wai I and Leong Ka Kit mentioned that the biggest challenge of this project are that the research in this area is relatively complicated, it takes time to study and reflect the result of friction surfacing. 'Although the preparation process is very difficult, they find it very valuable to have such learning experiences that could not be acquired in books.' Leong Ka Kit says. In the past four years, they also participated into the exchange program provided by UM. During the six months of studying in Sweden, they can felt the different learning cultures in foreign countries, which benefited them a lot and enriched their university life. In the future, they will study a master's degree in UM and seek development opportunities in their future path.

2022/2023學年博士及碩士課程招生
Application of PhD and Master's Degree Programmes



Application Period (Academic Year 2022/2023)

PhD Programmes:
To be admitted in 1st Semester :
29 October 2021 to 28 February 2022 (2nd batch)

To be admitted in 2nd Semester :
2 May 2022 to 29 July 2022 (3rd batch)

Master's Degree Programmes:
15 October 2021 to 28 February 2022

More details about PhD programmes



More details about Master's degree



Application:





澳門大學
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科技學院
Faculdade de Ciências e Tecnologia
Faculty of Science and Technology

Issue 3 March - November 2021 Newsletter

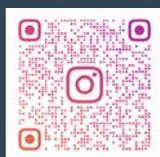
澳門大學科技學院快訊

如有任何疑問, 請聯絡科技學院林小姐
Please contact Alice Lam for any inquiries
聯絡方式/Contact details: alicewmlam@um.edu.mo

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