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香港理工大學

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Empowering Tourism with Technologies

PAIR Newsletter

ISSUE 9 - March 2024

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Prof. FAN Jintu
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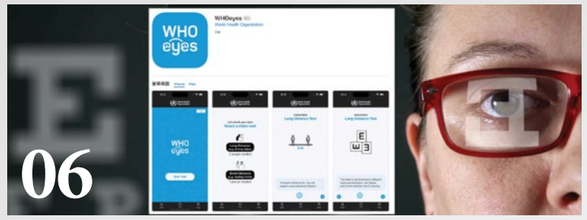

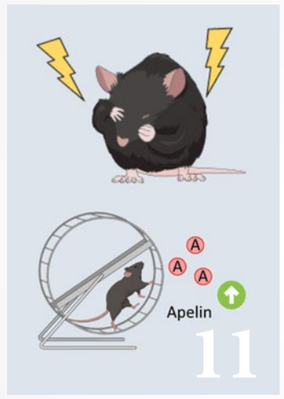

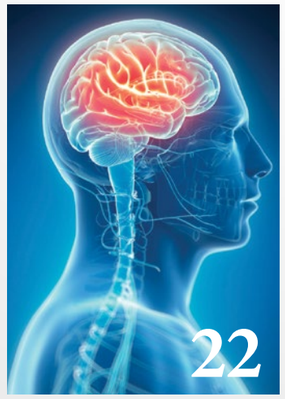

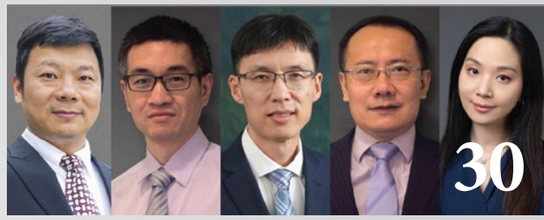

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PAIR Newsletter – Issue 9 – March 2024

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Chief Editor's Corner

Prof. CHEN Qingyan
Director of PolyU Academy for Interdisciplinary Research

The Year 2024 is moving quickly for PAIR. With the arrival of spring, we would like to take this opportunity to share with you some major updates in this newsletter.

In the previous issue (December 2023), we shared the establishment of a new research centre focusing on textiles for future fashion. PAIR steps into the new year with confidence and higher goals. On the first day of 2024, we announced the establishment of another new constituent unit, the Research Centre for Digital Transformation of Tourism (RCDTT).

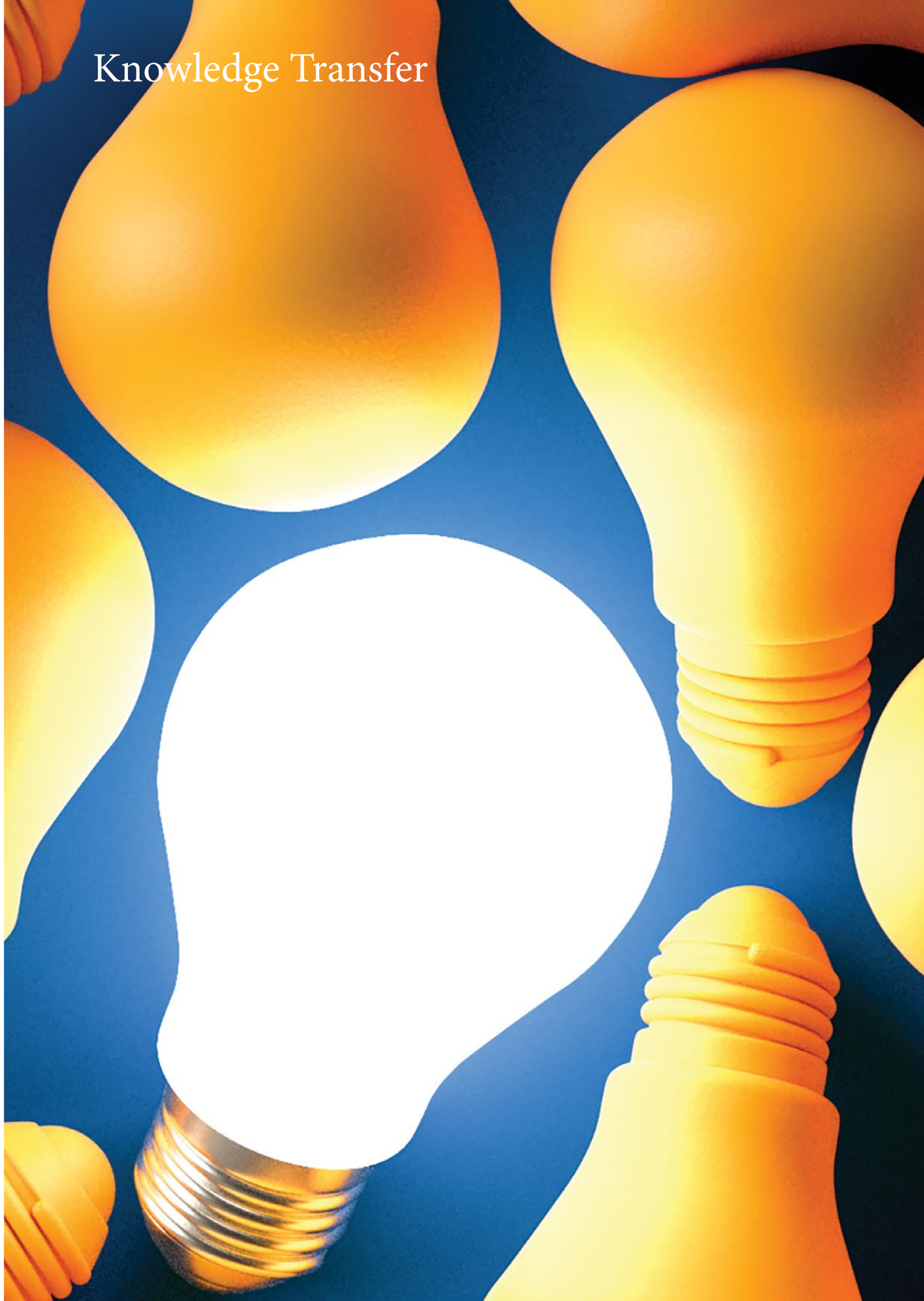
Over the past two years, PAIR has laid the foundations for interdisciplinary collaboration. With more new units joining the Academy and various initiatives falling into place, it is now time for us to build endurance and strength for a farther-reaching PAIR impact.

In this issue, the Feature Story section introduces you to the type of research that RCDTT is pursuing. Technology is revolutionising the travel industry, and RCDTT is determined to bring forth even more advanced technologies that will make the tourism sector greener and the traveller experience more satisfying. In addition, our dialogue with Prof. SO Kwok-fai, PAIR International Advisory Committee Member, will enlighten you on the Academy's direction for future development, particularly the research potential of Active Health and Chinese medicine, as well as the importance of incentives, young talents and public-oriented science communication. Meanwhile, our story on Prof. David SHUM Ho-keung, Dean of the Faculty of Health and Social Sciences, offers insights into his work, which applies neuropsychology and technology to mind-body interventions that address neurocognitive degeneration and mental health issues.

The Knowledge Transfer section highlights a number of ground-breaking PAIR-led innovations that have been successfully translated for adoption and use by industry and the wider community. These include WHOeyes, a mobile app for vision testing; colour management technologies that are used in over 100 million smart devices annually; and Cream Mate, a novel fungal-based fat replacer. We are very excited to share with you that Hotel ICON, PolyU's unique teaching and research hotel, will serve low-fat desserts made from Cream Mate on their regular menus starting from this month! This novel food formula not only makes sweet indulgences less fatty and healthier; it also benefits our guts and the environment.

Our Research Achievements section provides you with breaking science news about PAIR-led innovations for controlling myopia, combatting depression, and producing cleaner, greener plastics. The People section highlights outstanding PAIR scientists who have been honoured with distinguished titles and new projects awarded with external grants. The News & Events section gives an at-a-glance overview of the latest activities and happenings at PAIR, including a visit from the Chinese Manned Space delegation, and our newly launched Research Impact Video Series.

The first quarter of 2024 has been very fruitful and eventful for PAIR. We are thankful for your continued support. Many more PAIR-led events and activities will be organised in the coming months. These include a conference on acupuncture and TCM in May 2024 and a conference on floating solutions in December 2024. Do stay tuned to us on various online and offline channels for the latest conference announcements and other updates. Thank you very much, and I hope you enjoy reading issue 9 of the PAIR newsletter.

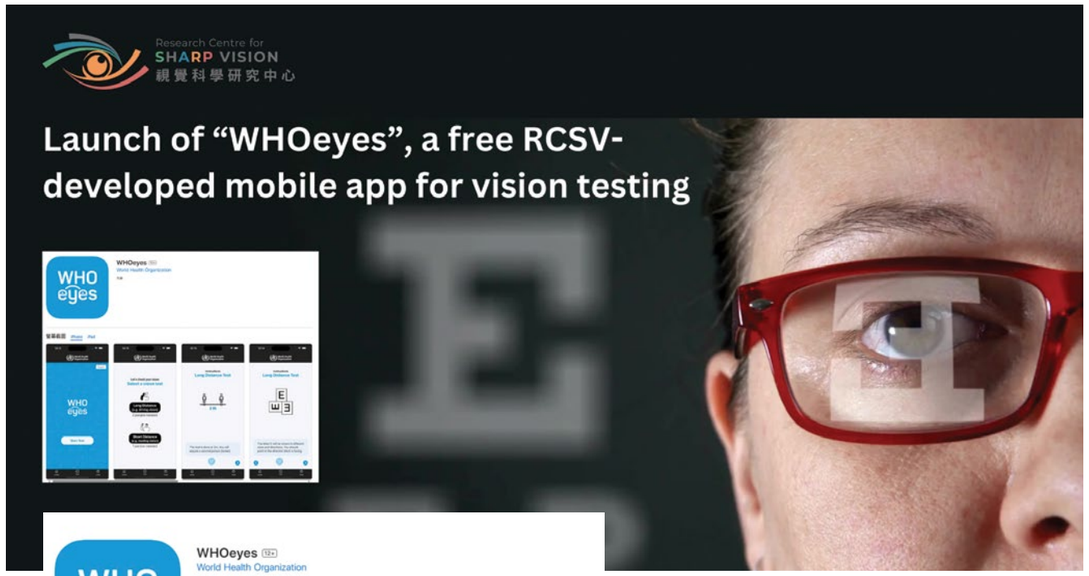


Launch of “WHOeyes”, a free RCSV-developed mobile app for vision testing

A mobile app for free vision testing called “WHOeyes”, developed by Prof. HE Mingguang, Director of the Research Centre for SHARP Vision (RCSV) and Chair Professor of Experimental Ophthalmology, was officially launched globally on World Sight Day (12 October 2023).

WHOeyes is the first vision-test mobile app endorsed by the World Health Organization. It can assess users’ visual acuity and provide advice for protecting vision. A user simply installs WHOeyes on a smartphone, looks into the phone’s camera, and follows the system instructions; the app then measures the user’s near vision and distance vision. The app is now available in six languages: Arabic, Chinese, English, French, Russian and Spanish.

The design of WHOeyes is based on the conventional eye chart assessment used in clinical settings. The app has been tested for accuracy and is suitable for users aged 8 years and over.



Cutting-edge colour management technologies for smart devices

A team led by Prof. Tommy WEI Minchen, Management Committee Member of the Photonics Research Institute (PRI) and Professor in the Department of Building Environment and Energy Engineering (BEEE), has developed a series of colour management technologies that enable digital displays, imaging devices and extended reality (XR) to capture and reproduce colours more faithfully, thereby enhancing user experience. These cutting-edge technologies have been successfully commercialised and widely adopted by social media, imaging systems and manufacturers of LED lighting products, smartphones and drones. Over 100 million high-end smart devices worldwide are powered by the technologies every year.

The technologies include:

A six-channel RGBACL (Red, Green, Blue, Amber, Cyan and Lime) lighting module and control algorithm

Aiming to enhancing the colour presentation of LED lighting systems, the algorithm can quickly adjust the colour appearance of human facial skin captured by different cameras. This technology has been used by a famous manufacturer of cinema lighting fixtures and in the production of several Hollywood movies and TV series.

Solutions for capturing and displaying colours on video and image shooting equipment

These include the use of artificial intelligence (AI) technology to detect human faces in the frame and to optimise the colour appearance of skin.

Chips with built-in AI-powered white balance algorithm

These technologies ensure more faithful colours in photos and videos taken with digital cameras under different environments. They have been adopted by world-class smartphone and XR device manufacturers.

Other related solutions

These include technologies for colour processing of images dominated by a single colour in telephoto and macro shooting; colour tuning during image processing; colour capture and reproduction of high dynamic range (HDR) scenes; and ensuring the colour consistency of displays used in various devices, as well as a self-adjusting colour algorithm for mixed-reality headsets.

RiFood-developed fungus-based fat replacer enables healthy low-fat indulgences

AkkMore™, a novel formula of fat replacer developed by the Research Institute for Future Food (RiFood), has been used in the production of low-fat food products including low-fat ice cream of 3% fat content.

The innovation was developed by the team led by Dr Gail CHANG Jinhui, RiFood Core Member, and was awarded silver medal at the 2022 Special Edition of the Geneva International Exhibition of Inventions. AkkMore™ is produced from natural fungal sources, and has been tested for its effectiveness in bringing a number of health benefits, including preventing obesity and other metabolic diseases, enhancing gut health, modulating the immune response, and reducing anxiety.

The research team is now working on "Cream Mate", an AkkMore™-based cream substitute. Cream Mate enables cream products to contain less fat, to be able to be frozen for long time, and to extend shelf-life while holding sensory appeal comparable to traditional cream. The use of Cream Mate helps reduce calorie and the consumption of dairy products in the desserts, as well as the amount of food waste due to expiration. This helps food producers to make their production more sustainable and economical.

In addition, RiFood is collaborating with Hotel ICON on the use of Cream Mate in preparing reduced-fat desserts to be served on the hotel regular menus, which are available starting today (1 March).

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PolyU Academy for Interdisciplinary Research 香港理工大學高等研究院

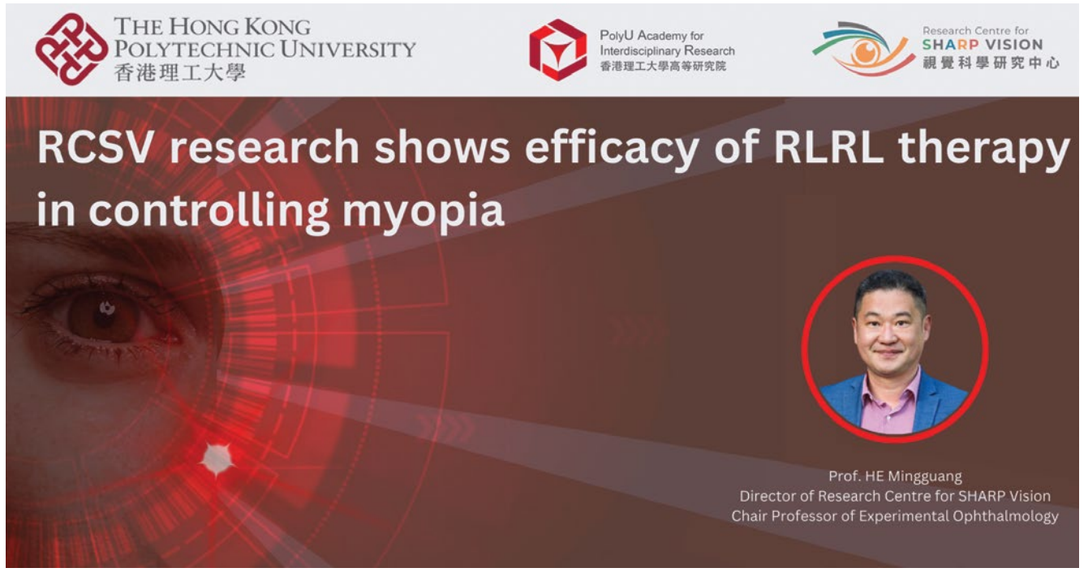
RiFood Research Institute for Future Food 未來食品研究院

3 GOOD HEALTH AND WELL-BEING

RCSV research shows efficacy of RLRL therapy in controlling myopia

Research conducted by Prof. HE Mingguang, Director of the Research Centre for SHARP Vision (RCSV) and Chair Professor of Experimental Ophthalmology, has proved that repeated low-level red-light (RLRL) therapy can significantly slow the progression of myopia in children, and can even reverse short-sightedness.

Myopia was considered an irreversible process of axial growth. However, Prof. He found that the axial elongation of children receiving RLRL therapy was 70% less than that of children wearing normal spectacles. Furthermore, multiple clinical studies have demonstrated axial length shortening in up to 40% of RLRL-treated children one month after the therapy.

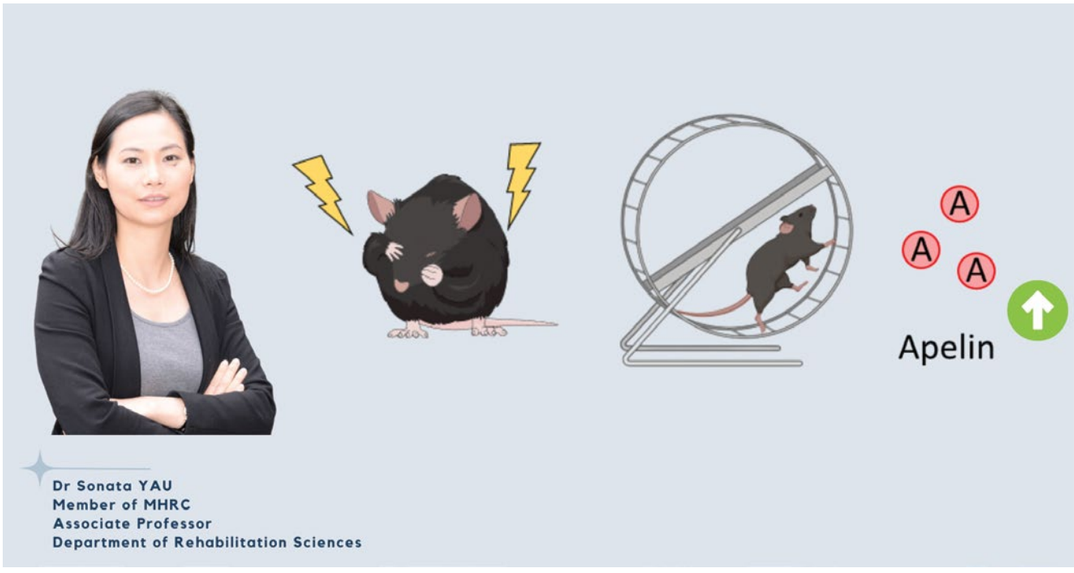


3 GOOD HEALTH AND WELL-BEING

MHRC study reveals that apelin mediates the antidepressant effects of physical exercise

A study conducted by Dr Sonata YAU, Member of the Mental Health Research Centre (MHRC) and Associate Professor in the Department of Rehabilitation Sciences, revealed that apelin, a muscle-secreted peptide, is important for mediating the antidepressant effects of physical exercise.

Sarcopenia, a muscle ageing condition, is strongly correlated with geriatric depression, but the exact muscle-brain crosstalk is not well understood. Previous research has shown that apelin is linked to sarcopenia and is also associated with hippocampal neuroplasticity and antidepressant effects. Using a mouse model of chronic unpredictable stress, Dr Yau and her research team showed that stressed mice exhibited lower apelin expression levels in the hippocampus, which could be restored by a 4-week programme of physical running. Knockout of apelin specifically in skeletal muscles reduced the antidepressant effects of exercise, whereas overexpression of muscle apelin elicited antidepressant effects. This research shines a light on the potential role of apelin in mediating the crosstalk of the muscle-brain axis, and holds important implications for understanding stress-related disorders.



3 GOOD HEALTH AND WELL-BEING

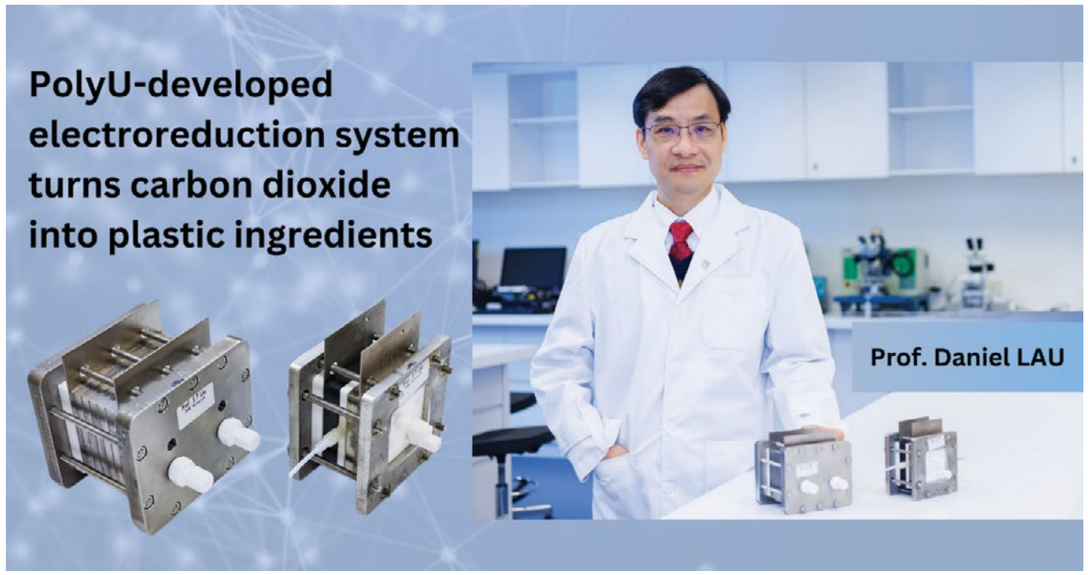
Research Achievements

PolyU-developed electroreduction system turns carbon dioxide into plastic ingredients

Prof. Daniel LAU—Associate Director of the Photonics Research Institute (PRI), Management Committee Member of the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE), Director of the University Research Facility in Materials Characterization and Device Fabrication (UMF), Head of the Department of Applied Physics (AP) and Chair Professor of Nanomaterials—and his research team have developed a durable, highly selective and energy-efficient carbon dioxide (CO2) electroreduction system that can convert CO2 into ethylene for industrial purposes. Ethylene is a primary ingredient in plastics and chemical fibres. The team's research was recently published in Nature Energy and won a Gold Medal at the 48th International Exhibition of Inventions Geneva in Switzerland.

Conventional ethylene production generates significant carbon emissions. The research team adopted the method of electrocatalytic CO2 reduction to convert carbon dioxide into ethylene using green electricity, providing a more environmentally friendly alternative and stable ethylene production.

The team is working to promote this emerging technology in order to bring it closer to mass production, with the aim of closing the carbon loop and ultimately achieving carbon neutrality. This innovative PolyU project was conducted in collaboration with the University of Oxford, the National Synchrotron Radiation Research Centre of Taiwan and Jiangsu University.



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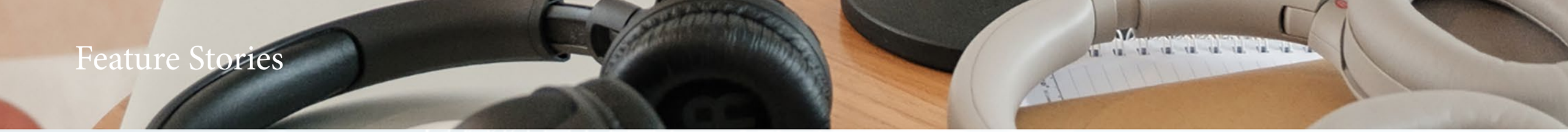


PAIR establishes new research centre to empower tourism with technology

The emergence of disruptive innovations such as blockchain, 5G, machine learning and artificial intelligence has expedited the digital transformation of multiple industries and public services. As part of the broader economy, the tourism sector must actively adjust to these new paradigms by embracing technology and fostering innovation.

Digital tourism is emerging as an attractive solution that is shaping the industry's future. To "go sustainable", the industry has to "go smart": it is time to "go digital".

"Going smart for sustainable development" is a hot topic in almost every sector, including the travel industry. Green awareness and changing traveller demands are simultaneously shaping developments in the industry. Airlines, hotels and travel agencies are searching for novel approaches to improve business operations and offer travel experiences in ways that fulfil travellers' needs, support the economy, and preserve environments and cultures. At its core, sustainable tourism cares for people and the planet. Digital tourism is emerging as an attractive solution that is shaping the industry's future. To "go sustainable", the industry has to "go smart": it is now time to "go digital".

Digital tourism in the new era of smart cities

Digital tourism refers to the use of technology to modernise the operation of travel businesses and their interactions with customers. The use of technology in the travel industry is not entirely new, and it is all around us.

Airlines use mobile check-in apps to reduce passenger boarding time. Travel platforms leverage analytics to offer travel deals. Expedia, an online travel agency, recently introduced a ChatGPT plugin on its platform for online enquiries and seamless trip bookings. Meanwhile, social media are major sources of cool places to geotag and tips for avoiding travelling pitfalls.

However, there is so much more than these. The sector is aiming for "advanced" travel tech—"smart" technologies that support a sharing economy and intelligent automation in the industry. These technologies include engineering innovations to help reduce carbon emissions from hotel and flight operations, the Internet of Things (IoT), and big data that improve tourism forecasting and business intelligence.

Quality education and research that drive successful tourism and hospitality

With over 40 years of excellence, the PolyU School of Hotel and Tourism Management (SHTM) is among the world's leading academic institutions in the field of hospitality and tourism. SHTM has claimed the top spot in the "Hospitality and Tourism Management" category of ShanghaiRanking's Global Ranking of Academic Subjects 2023 and in the "Tourism & Services" category of the University Ranking by Academic Performance 2022/23, as well as the second place in the "Hospitality & Leisure Management" in the QS World University Rankings by Subject 2023.

SHTM's excellence is not limited to educational offerings on campus and at Hotel ICON (PolyU's unique teaching and research hotel). The School values research—its Hospitality and Tourism Research Centre brings together SHTM academics, partner institutions, and executives in industry for research that is bridging the gap between theory and practice in the field.

Helping tourism and hospitality to go digital has become a niche area of expertise. As the sector firmly upholds the "go digital" motto, a practical question is "how to go digital". To most tourism and hospitality business organisations, particularly small- and medium-sized enterprises (SMEs), there is not a clear strategic plan or adequate talent and resources for executing a cost-effective digital transformation.

How can we better keep track of travellers' satisfaction? What kinds of travel options do young people prefer? Are "eco" hotels really as green as they claim? What type of travel tech is needed to address industry needs? The answers to these questions and many others require systematic investigation. PolyU is poised to seek the solutions via interdisciplinary research.

New research centre to drive tourism's digital revolution, drawing on PolyU's interdisciplinary expertise

PolyU is poised to seek the solutions via interdisciplinary research.

On the first day of 2024, PolyU proudly announced the establishment of the Research Centre for Digital Transformation of Tourism (RCDTT). Established under the PolyU Academy for Interdisciplinary Research (PAIR), the new constituent unit marks the Academy's expansion with an even wider research scope. RCDTT will lead research on optimising travel experiences and achieving sustainability by digitally transforming tourism and related businesses. The ultimate goal is straightforward: to improve the lives and well-being of global citizens, as travel is a basic human need. RCDTT's research will help to inform the way forward for tourism and hospitality as they go digital.

Synergy between disciplines and sectors sparks innovations and new insights. RCDTT will bring together scholars from various PolyU schools and departments in addition to SHTM, providing expert and technical knowledge from diverse fields: computing, logistics and maritime studies, applied mathematics, building environment and energy engineering, industrial and systems engineering, accounting and finance, management and marketing, design, land surveying and geo-informatics, and others. The Centre will also engage extensive stakeholders in Hong Kong, the Greater Bay Area (GBA) and countries across the world, in developing research solutions and promoting good practices for digitalising the travel industry.

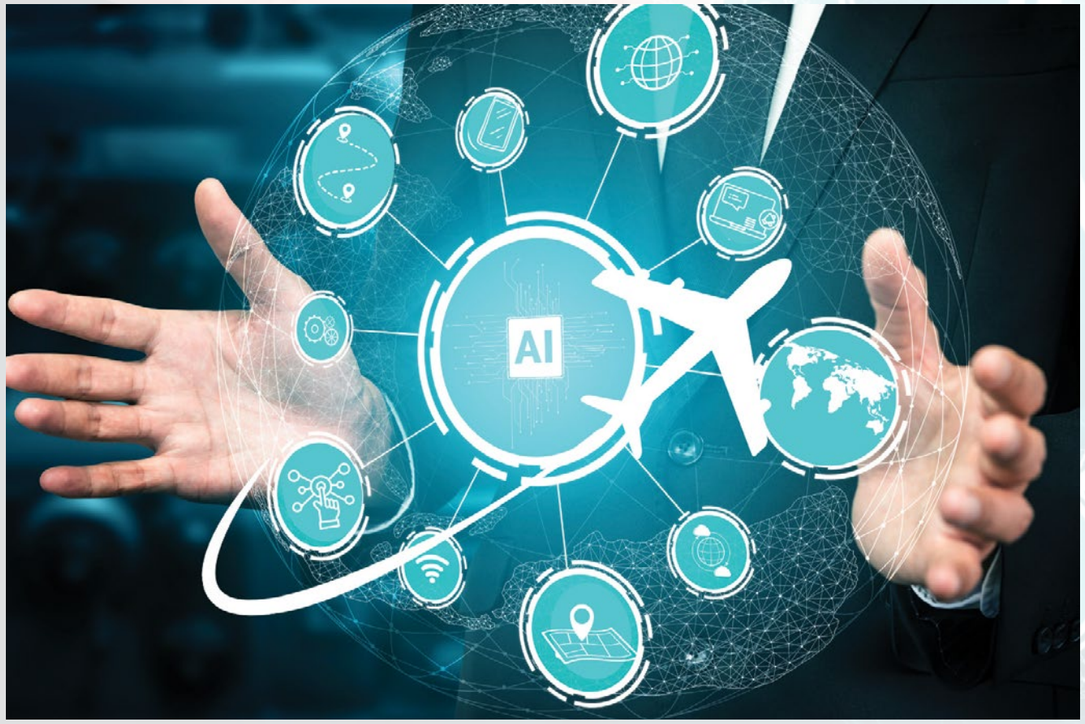
RCDTT hopes to reshape tourism and hospitality business operations, destination governance, and international collaboration for inbound and outbound tourism, propelling the sector towards a better "digital future".

Travel tech for better business operations and traveller experience

RCDTT will spearhead interdisciplinary research by looking closely at two core areas. In the first area, Digital Tourism Decision-making and Monitoring, RCDTT aims to develop a cloud-based digital monitoring system for the sustainable development of the tourism and hospitality industry in the Greater Bay Area (GBA). A particular emphasis will be placed on the forecast, monitoring and management of carbon emissions in the industry. RCDTT seeks to provide new solutions including an automated and self-adapting system for forecasting tourism demand and associated carbon emission; a digital twin system for monitoring carbon emission from hotels; a system for supporting decision-making in relation to environmental sustainability management by hotels; and a web-based simulation toolbox providing policy interventions for sustainable tourism development. The team will also develop real-time indexes for measuring tourism sentiment and tourist satisfaction.

The second area, Artificial Intelligence-driven Business and Experience, aims to develop business processes and experience product innovations based on artificial intelligence-generated content (AIGC) and robotics. This area involves the use of artificial intelligence and machine learning algorithms to automate and optimise various aspects of the tourism industry, such as customer service, data analysis, and personalised recommendations. RCDTT's innovations will include a system for assessing customer acceptance and business returns on smart hotel initiatives; technologies that provide user-oriented immersive tourism experiences; a neuromonitoring system which helps understand tourists' feedback using indicators of the human brain and behaviour; an intelligent platform that generates video content for tourism marketing; and AI and robotics for improving business operation efficiency and consumer experience.

By forging the collaborative efforts of PolyU and extensive stakeholders in the above areas, the Centre hopes to reshape tourism and hospitality business operations, destination governance, and international collaboration for inbound and outbound tourism, propelling the sector towards a better "digital future".



About the Research Centre for Digital Transformation of Tourism (RCDTT)

Established under the PolyU Academy for Interdisciplinary Research (PAIR), RCDTT is a new constituent unit dedicated to research on the digital transition of tourism. The RCDTT management team includes:

Director

Prof. SONG Haiyan
Associate Dean and Chair Professor of Tourism in the School of Hotel and Tourism Management

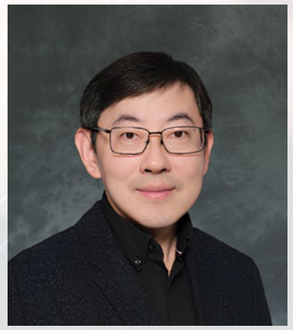
Co-Director

Prof. LI Qing
Head and Chair Professor of Data Science in the Department of Computing

Associate Directors

Dr WANG Dan
Associate Professor in the School of Hotel and Tourism Management

Prof. LI Mimi
Professor in the School of Hotel and Tourism Management



Prof. WANG Dan
Professor in the Department of Computing

A dialogue with Prof. SO Kwok-fai, PAIR International Advisory Committee Member, on embracing active health: Implications for interdisciplinary research and development

Active Health is a new conceptual model for improving human health. The idea of Active Health emphasises individual responsibility in making informed choices about exercise, diet, lifestyle, etc., for attaining health holistically. It has emerged as an attractive conceptual framework for public health systems worldwide. For example, China explicitly underscores the role of Proactive Health in its Healthy China 2030 Plan; Singapore has introduced the Active Health initiative, which provides a range of science-backed technologies and services to citizens; and the United Kingdom launched the Change4Life in the early 2000s as a national behavioural change programme to prevent obesity.

Knowing is one thing; doing is another. Health literacy is one thing; health action is another. The attainment of active, holistic health requires knowledge about health and translation of this knowledge into health decision-making. What kinds of superfoods should we eat? Why and for how long should we run? Are there any ways to improve our sleep?

Active Health is an interdisciplinary field, requiring systematic, coordinated scientific knowledge of the interactions among foods, environments and humans. The field represents an interesting and rich area for researchers, holding profound theoretical and practical importance. In this issue of the newsletter, Prof. SO Kwok-fai, PAIR International Advisory Committee Member, expounds on Active Health and sheds light on its potential in PAIR's interdisciplinary research development. Prof. So is a pioneer in the field of neural regeneration with a focus on vision recovery and proactive factors against depression, including exercise, light and wolfberry.

Shifting from passive health to active health: Need for ownership in gauging one's health

Good Health and Well-being comprise a core area of PAIR's research. Under this theme, the Academy has set up constituent research units covering future food, smart ageing, sports and technology, Chinese medicine, mental health, sharp vision, etc. What can be done by PAIR to take our health research further?

I believe that Active Health, or Preventive Health, is a very important area to which we can pay more attention. These concepts encompass all populations in society and are highly relevant to the current efforts at PAIR. The Academy may consider establishing Active Health as a new research theme, or even setting up a unit dedicated to this area.

The idea of "yang sheng"—preserving our bodies for the sake of strong health, disease prevention and longevity, as well as developing lifestyle habits conducive to it—is very suitable for the Chinese population context.

In approaching Active Health research, I think there are three directions which PAIR can explore. The word "active" emphasises a person's ownership and self-driven behaviours in caring for his/her health. These include exercise, food, and health preservation.

First of all, many chronic diseases are associated with a lack of physical activity. We all know that exercise is good for our brains, hearts, and vascular and liver health. But the benefits are more than these. The human skeletal muscles, for example, make up a very important endocrine organ, producing endocrine factors that reduce the risks of a wide range of issues, such as inflammatory conditions, metabolic syndromes including diabetes, neurodegenerative disorders, etc. We need empirical evidence for the health benefits of physical activity. This requires research on the specific type and duration of exercise suitable for various age groups, so that our understanding can be translated to encourage exercise behaviours in the community.

The same lens should be applied to the other two directions—food, and health preservation. The substances we take into our body directly affect our functioning. What should we eat, what should we avoid, and what should we take from the perspective of traditional Chinese medicine? Thus, all research on Active Health is really rich and down-to-earth. The idea of "yang sheng"—preserving our bodies for the sake of strong health, disease prevention and longevity, as well as developing conducive lifestyle habits—is very suitable for the Chinese population context. I trust that Active Health will stand out as a very appealing area to everyone, with ample funding potential. There is a need for PAIR to explore further the importance of traditional Chinese medicine in modern health research.

Sunshine makes us happy, but why and how?

PAIR researchers have made remarkable strides in vision research. In particular, the PolyU-patented Defocus Incorporated Multiple Segments (DIMS) spectacle lens, which can slow down myopia progression by 60% in children, is now available on the market. Our research on repeated low-level red light (RLRL) therapy has demonstrated efficacy in slowing down and even reversing myopia. Apart from myopia control, what other areas can PAIR researchers explore more extensively?

One interesting area which PAIR can investigate further is the use of light for subthreshold depression. I think it is particularly important in modern times when suicide cases in Hong Kong are reaching an alarming peak. People with subthreshold depression may be unaware of their conditions, or reluctant to take antidepressant drugs owing to side effects and mental health stigma. In this regard, PAIR may look into the potential of light therapy in treating depression. This is one interdisciplinary field which PAIR can consider.

One interesting area which PAIR can investigate further is the use of light for subthreshold depression.

The human eye is linked not only to vision, but also to our emotions and brains. At Jinan University, my teammates and I successfully demonstrated the efficacy of light therapy in reducing depression and anxiety symptoms in a college student sample. We have already worked out the underlying biological mechanism, and have built a light box for therapeutic use. Going forward, PAIR can explore these benefits of light in addition to myopia control, and may even consider collaboration with us.

New drugs and treatments take time to develop

In health research, a clinical trial is a lengthy process. At the same time, universities now highly value research commercialisation, i.e., the generation of commercialisable products, services and solutions from research. It takes years to turn findings from fundamental mechanistic research into health interventions. What are some important considerations on the part of the university management in evaluating and encouraging research success?

In measuring research impact and excellence, there are many other aspects including international collaborations, patenting and industry partnerships which university management should also consider.

The commercialisation of clinical research takes time. However, giving credit at various stages of clinical trials is very important. As an example, in my work on stem cell drugs for knee arthritis, the funding body provides research teams with funding after each phase of the trials. No doubt, we all wish to complete all three phases of clinical trials with success —but the idea is that each phase of research is an accomplishment that deserves recognition.

Resources are the limit? Grow the pie.

PAIR is growing fast. The Academy now has 18 constituent research units and anticipates that more will be established, covering diverse research fields. University research largely depends on injections of government funding. However, centralised resources are limited. This may dilute the resources available to each unit. What is your advice? How can PAIR better leverage the opportunities in the Greater Bay Area (GBA) in addressing this need for resource?

Universities can explore ways to attract funding—not only from governments, but also from external bodies—to support research ideas and initiatives in which the donors and universities share common values, whether projects or new research units.

Make the pie bigger! PAIR certainly has the prerequisites to achieve this. Universities can explore ways to attract funding—not only from governments, but also from external bodies—to support research ideas and initiatives in which the donors and universities share common values, whether projects or new research units. Using Active Health as an example, there is one large charitable foundation in Hong Kong providing significant funding to support a new health institute which focuses on vaccine research. As I shared earlier, preventive medicine is equally important. PAIR's thematic research on Good Health & Well-being is in fact an entity in which philanthropy and government have common interest. PAIR may bring several existing research units together to work on Active Health research, or even set up a new unit dedicated to this.

Another key issue is the need for effective governance. The allocation of resources at PAIR should not operate like a distribution of funding where every unit gets an equal share. Rather, there should be an incentive system aimed at encouraging well-performing units to do more, as well as an exit mechanism for underperforming units. This is crucial for PAIR's organisational health.

In growing the pie, one possible solution is to collaborate with Mainland China on science and technology through hosting and operating State Key Laboratories (SKLs) in Hong Kong. The Ministry of Science and Technology (MOST) of China has an SKL scheme. It funds Hong Kong universities as they submit applications for setting up SKLs in order to carry out studies that are in line with the Nation's technological development and strategic objectives. Each of the SKLs represents a niche research area. This is a very attractive opportunity for PAIR. The Academy should consider its competitive edge and may engage several PAIR research units to collaborate in identifying its research niche and emerging research areas for SKL applications. In addition, the Academy should consider doing research supported by the Ministry of Education (MOE) of China. Both approaches are important recognitions of PAIR.

Young people and recognitions matter

To date, PAIR has implemented several flagship programmes. They include a fellowship scheme for appointing a select number of top scholars outside PolyU to contribute to PAIR; a young fellowship scheme for appointing outstanding PhD graduates as Research Assistant Professors to pursue interdisciplinary research at PAIR units; knowledge-sharing activities (e.g., distinguished lectures, seminars, conference); and an industry engagement programme. What is your advice about PAIR initiatives? What can we do better?

Attracting new blood to the team is of high importance. As PAIR expands, this requires more manpower and innovations. Certainly, the Academy must ensure that these new participants are of high quality and are provided with good compensation packages for their efforts.

The Nation has placed great emphasis on young talent development. The National Natural Science Foundation of China (NSGC), for example, has established the Excellent Young Scientists Fund and the National Science Fund for Distinguished Young Scholars, both of which are open to Hong Kong applicants. PAIR may encourage its researchers to apply for competitive schemes like these, or may even recruit top research talents who have already been bestowed with distinguished titles. The Academy may also invite young researcher awardees of these types of fellowships or talent programmes in Mainland China and overseas to come to PAIR for knowledge sharing and presentation of lectures. Forging closer, wider networks with researchers in Mainland China and abroad is beneficial to PAIR's long-term development.

Another area for enhancement is PAIR's communication with the community. I'm referring not just to the communication of science using technical terms within the academic community, or communication of research to the industry, but also communication about PAIR outputs to the general public in layperson's terms. Doing so will help society better understand how PAIR research relates to and impacts them. This can be achieved through greater visibility on public media channels, such as social media, press, etc. Such efforts may help attract potential donors, too.

Finally, I highly recommend setting up more research awards. These prizes might not entail large amounts of money. But recognition matters. In this regard, PAIR needs to identify what the Academy values and set up prizes that reward outstanding performance in these areas. There may already be similar research prizes at the university level. Additional internal prizes exclusive to PAIR researchers would provide additional incentives, and help convey a clear message to PAIR members about what the Academy firmly embraces and values.

Brain matters: How sharper minds bring happier lives

Human higher-level cognition is probably what makes Homo sapiens special. While we do share some similar mental functions with animals, capacities such as language, reasoning and social cognition are unique to humans. The human mind is so powerful that it is the root of civilisation, making developments like knowledge, economy, science and technology, law, culture, etc., possible. Human cognition is a captivating topic in the fields of psychology, philosophy and neuroscience, attracting researchers and theorists who seek to unveil the complexity of human mind.

To rehabilitation scientists, understanding how the brain works is more of a practical concern, with huge implications for human health and well-being. Our knowledge of the impacts of brain injuries, ageing, and environments on our mental functions helps inform approaches to delaying dementia, improving memory, and restoring movement and language functions.

At PolyU, Prof. David SHUM Ho-keung—Yeung Tsang Wing Yee and Tsang Wing Hing Professor in Neuropsychology, Chair Professor of Neuropsychology and Dean of the Faculty of Health and Social Sciences—has been probing the human brain throughout his entire career. With over 30 years of experience, the world-renowned researcher studies human memory, as well as the assessment and rehabilitation of higher-level cognitive functions in normal and brain-injured persons. At PAIR, he is the Associate Director of the Research Institute for Smart Ageing (RISA) and Member of the Mental Health Research Centre (MHRC).

"Forgetting to remember": When prospective memory declines

A major area of Prof. Shum's research is human memory—a faculty of the mind that encodes, preserves and recovers information. To date, scientists have dissected memories into different categories based on duration (e.g., sensory, short-term, long-term memories), functions (e.g., episodic, semantic, procedural memories) and other features. Prof. Shum's memory research focuses on prospective memory (PM)—the ability to remember to carry out planned actions or intentions, and to do things in the future.

"Remembering to remember" is a very important executive function, helping us to perform daily tasks safely and effectively. If PM fails, we may "forget to remember" things like turning off a stove, settling a payment, restocking household items and many "to-do" items which we had intended to accomplish. PM functions are impaired in early stages of dementia-related disorders. PM seems to decline with age, according to the research literature. But there is hope. Scientists have been trying to understand the condition better. Even more importantly, they are looking for ways to slow it down or even reverse it.

'Remembering to remember' is a very important executive function, helping us to perform daily tasks safely and effectively.

Building clinical evidence for memory rehabilitation

Prof. Shum has been working on interventions and practices targeted at PM training and assessment for various populations, including older adults, stroke survivors and schizophrenia patients. He and his teammates from PolyU and abroad seek to establish solid evidence of the efficacy of these trainings, and develop novel interventions aimed at specific aspects of PM. The researchers concluded in a systematic review that PM performance in older adults can be significantly and immediately improved by PM training.

The uses of technology and gaming for PM assessment have also been explored. In one study on stroke survivors, Prof. Shum and his team designed a Virtual Reality Prospective Memory Shopping Task (VRPMST), a videogame-like task which requires participants to perform shopping-related tasks (e.g., purchasing food items, collecting a receipt) in a virtual shopping centre. The application was found to be sensitive in measuring PM impairments in participants, highlighting the role of VR technology in rehabilitation science. In another study focusing on persons with traumatic brain injury (TBI), a board game activity with embedded PM tasks was found effective in improving participants' awareness of their PM functions. Self-awareness, i.e., an accurate appraisal of one's actual PM ability following brain trauma, is an integral step in TBI rehabilitation. To improve PM, a patient needs to know how good his/her PM is.

Schizophrenia impairs the ability not only to recall important events in the past (retrospective memory), but also to carry out scheduled actions in the future (PM). Implementation intention, i.e., the translation of goals into actions ("if …, then …"), is a pathway through which PM performance is affected, although the underlying neuroscience remains unclear. In this regard, Prof. Shum and his teammates have located the brain activation patterns associated with implementation intention, and have demonstrated that focused training can bring lasting PM improvements in patients with schizophrenia.

The neuroscience of sadness and loneliness: Mind-body connection built into human brain

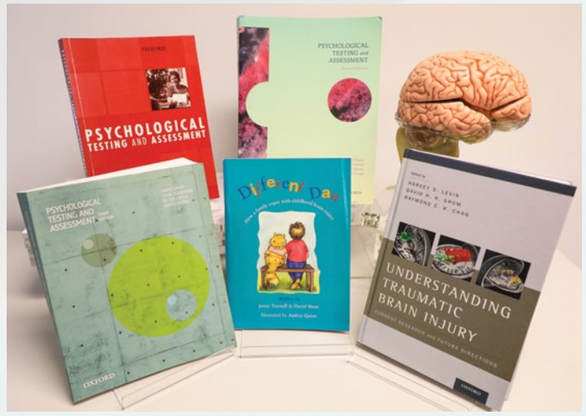
Well-being, particularly in young people and older adults, is another major area of Prof. Shum's work. His neurological approach to understanding mental health is very "focused"—identifying the neural correlates of negative emotions (e.g., depression, anxiety, loneliness) and deciphering the links among mind, body and environment. Prof. Shum is now leading intervention projects at the Mental Health Research Centre (MHRC) and the Research Institute for Smart Ageing (RISA) that focus on specific domains of human cognitive functions. He is interested in the neuronal underpinnings of mood problems among older adults in particular.

"Loneliness harms us more than we thought. It affects our body. It affects our brain too."

Loneliness harms us more than we thought. It affects our bodies—according to existing research, loneliness may increase the risk of a heart attack by more than 40%. It affects our brains, too, increasing the risk of cognitive decline and early-onset dementia. Therefore, at RISA, Prof. Shum and his team have been trying to clarify the relationship between loneliness and the human mind, particularly in relation to specific aspects of executive functions and social cognition functions. They are seeking to identify the underlying mechanisms in order

to mitigate cognitive decline.

Feeling sad and anxious increases one's risk for dementia. Poor emotional self-regulation, which is linked to impaired prefrontal cortex (PFC) function, may underlie subclinical depression and anxiety symptoms and their progression to the clinical level. At MHRC, Prof. Shum and his team are examining the use of neurofeedback training based on electroencephalography (EEG) or functional near-infrared spectroscopy (fNIRS) to teach emotional self-regulation to older adults with subclinical depression and anxiety. Through neurofeedback trainings targeted at the PFC, the team hopes to enhance not only the mood of older adults, but also their cognition.



Holistic health intervention informed by "brain-specific" knowledge

Neuroscience and neuropsychology, which concerns the physiological processes of human behaviour and cognition, may appear to be narrow fields of study. In fact, our "specific" understanding of the mind-body connection helps inform strategies for attaining "holistic" health.

At RISA, Prof. Shum has been leading a project which uses multimodal intervention with three components—psycho-cognitive training, physical exercise, and healthy diet—to improve the overall health of older adults. Elderly adults will be provided with brain-training computer games with educational contents on mental health, emotional regulation and social relationships, a combination of resistance training and aerobic exercises, as well as nutritional advice on a "brain-healthy" diet and follow-up monitoring by professionals. The researchers will look into the changes in all three components of health, before and after the multimodal intervention, and collect relevant neuroimaging data.

Teddy bears are not for kids only; elders need their plush toys, too

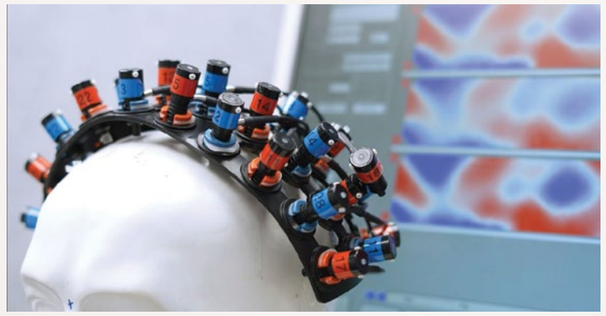
Many of us owned teddy bears in our childhoods, and some of us may still have these bears, cuddling them in our sleep. Psychologists have demonstrated that owning stuffed animals increases children's interest in reading, reduces the level of pain after surgery in children, encourages prosocial behaviour among young adults, and enhances social cohesion and socialisation among older adults living in nursing homes. A research project by Prof. Shum and his team demonstrated the benefit of toys for older people in long-term residential care.

Teddy bears are not for kids only; elders need their plush toys, too.

The emotional needs of the elderly in long-term care are often overlooked. For older adults with difficulties in speech and communication, including those affected by dementia, their voices may go unheard, and their needs may be misunderstood. Having trouble in finding the word to express intentions and needs is very frustrating. As a result, the elderly may become unconfident, anxious, depressed, or even withdrawn.

In a ten-week intervention study, Prof. Shum's team compared the efficacy of a plush toy and PARO for reducing agitation and medication use among older adults diagnosed with dementia in long-term care. PARO is a cute-looking, soft, interactive robotic seal for therapeutic use. The results have provided new insights into the power of soft toys and social robots.

Caring for people



In May 2022, a study by Prof. Shum and his team was published on the *BMC Psychiatry* journal and came under the spotlight of Hong Kong's press media. The team had performed a large-scale telephone survey of over 3,000 local residents. They found that more than 10% of the respondents had exhibited post-traumatic stress disorder (PTSD) symptoms during the fourth wave of the COVID-19 pandemic. The figure, according to the researchers, could reach 30–40% in the fifth wave.

After these findings were shared with the public, Prof. Shum appeared on various radio and television programmes, calling for the general public to pay closer attention to changes in their own bodies, feelings, behaviour and socialising activities, as well as to seek help from professionals if such symptoms began to affect daily functioning.

Prof. Shum's numerous research publications and other public and research engagements, on matters of concern to everyone, underscore his determination to improve lives and to give back to Hong Kong, his hometown.

Going home and giving back

Over the years, Prof. Shum has been awarded over 25 national and international competitive grants by funding bodies in Australia and Hong Kong. He has published 4 books, 1 edited book, 8 book chapters, over 310 refereed journal articles, and 6 encyclopaedia entries. He also serves on the editorial board of international journals including *Neuropsychological Rehabilitation, Brain Impairment,* and *PsyCh Journal*.

The year 2018 marked an important turning point in Prof. Shum's scholarly path. After 30 years of overseas sojourn in Australia, Prof. Shum decided to return to Hong Kong and join PolyU as Dean of the Faculty of Health and Social Sciences. Before that, he had served for five years as Dean (Research) of the Health Group at Griffith University.

Currently, in addition to multiple roles at PolyU, Prof. Shum represents PolyU on the board of the Hospital Authority, contributing to the development of Hong Kong's healthcare system. In steering PolyU's strategic developments, he is determined to utilise his knowledge of and experience gained in promoting interdisciplinary collaboration in Australia, and to contribute to the optimisation of the healthcare system and the management of university education, research and services in Hong Kong.

Ten PAIR academics among world's most highly cited researchers

The Hong Kong Polytechnic University (PolyU) has achieved the third highest number of researchers named on the list of "Highly Cited Researchers 2023" by Clarivate Analytics among universities in Hong Kong. A total of 15 PolyU academics (including two former PolyU scholars) have been recognised on the list, and ten of them are PAIR members.

This year, a total of 6,849 researchers from 67 countries and regions across a diverse range of research fields have received the designations. The list identifies the most influential scholars from around the world, determined by their production of multiple highly cited papers that rank in the top 1% by citations for their field(s) and publication year in the Web of Science citation index over the past decade.

The named PAIR researchers are (in alphabetical order by last name):

Name	Title and Affiliated PAIR Constituent Research Unit
Prof. Daniel LAU Shu-ping	Associate Director of Photonics Research Institute (PRI) Management Committee Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (SCRI)
Prof. LI Gang	Associate Director of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) Management Committee Member of Photonics Research Institute (PRI) Member of Research Institute for Intelligent Wearable Systems (RI-IWEAR) Member of Research Institute for Sustainable Urban Development (RISUD)
Prof. LOH Kian Ping	Member of Photonics Research Institute (PRI)
Prof. Geoffrey SHEN Qiping	Management Committee Member of Research Institute for Sustainable Urban Development (RISUD) Member of Research Institute for Land and Space (RILS) Member of Otto Poon Charitable Foundation Smart Cities Research Institute (SCRI)
Prof. WANG Zuankai	Member of Research Institute for Sports Science and Technology (RISports) Member of Research Institute for Intelligent Wearable Systems (RI-IWEAR)
Prof. Tom WU Tao	Member Photonics Research Institute (PRI)
Prof. YAN Feng	Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) Associate Director of Research Institute for Intelligent Wearable Systems (RI-IWEAR) Member of Photonics Research Institute (PRI) Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) Member of Research Institute for Sustainable Urban Development (RISUD) Member of Research Institute for Sports Science and Technology (RISports)
Dr ZHANG Xiao	Member of Research Institute for Advanced Manufacturing (RIAM) Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE)
Prof. Jerry YAN Jinyue	Management Committee Member of Research Institute for Sustainable Urban Development (RISUD) Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE)
Dr HUANG Bolong	Member of Research Institute for Intelligent Wearable Systems (RI-IWEAR) Member of Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE)

Prof. TAO Xiaoming elected as Full Foreign Member of European Academy of Natural Sciences

Congratulations to Prof. TAO Xiaoming, Director of the Research Institute for Intelligent Wearable Systems (RI-IWEAR), on her election as a Full Foreign Member of the European Academy of Natural Sciences. Headquartered in Hannover, Germany, the Academy promotes contacts and exchange of information among its members. Currently, a total of 50 scientists from China have been appointed as full members.

Two PAIR projects receive Smart Traffic funding to enhance bridge monitoring and parking management

Two innovative projects led by PAIR researchers were awarded total funding of around HK$17.36 million from the Smart Traffic Fund of the HKSAR government.

The project "Digital Twin-based Long-span Bridge Health Monitoring", led by Prof. XIA Yong, Management Committee Member of the Research Institute for Artificial Intelligence of Things (RIAIoT), Member of the Research Institute for Sustainable Urban Development (RISUD) and Professor in the Department of Civil and Environmental Engineering, aims to develop a digital twin-based long-span bridge health monitoring platform, which will be applied to the Tsing Ma Bridge.

Another project, "Blockchain-enabled Cyber Physical System for City-wide Parking Management", led by Dr TSANG Yung-po, Member of the Research Institute for Advanced Manufacturing (RIAM) and Research Assistant Professor in the Department of Industrial and Systems Engineering, aims to utilise Web 3.0 and blockchain technology to enable intelligent access control at car parks, as well as AI to evaluate the supply of and demand for parking spaces.

Dr Daphne CHEUNG receives CES 2024 Innovation Award

Congratulations to Dr Daphne CHEUNG, Member of the Research Institute for Smart Ageing (RISA) and the Mental Health Research Centre (MHRC), for receiving the Consumer Electronics Show (CES) 2024 Innovation Award in the "Accessibility & Ageing Tech" category.

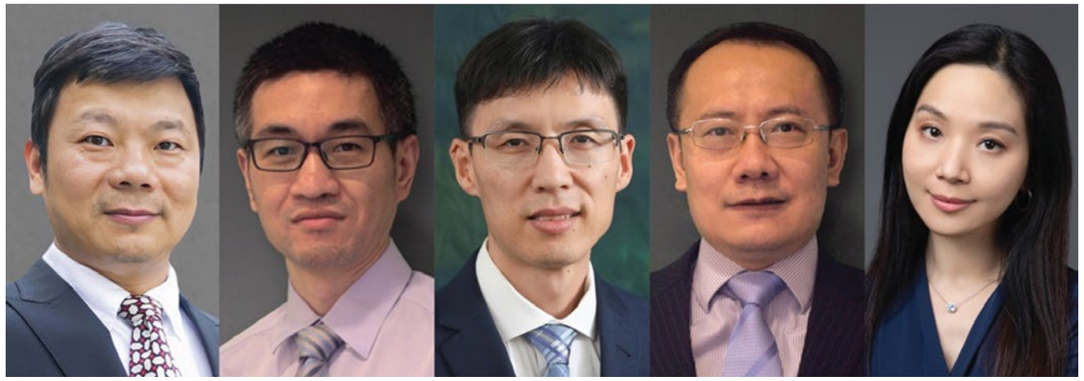
Since 2008, Dr Cheung and her team have been developing and testing music interventions for older adults with cognitive impairment. The team worked with engineers, music therapists and users to develop a Standalone Therapeutic Music-with-Movement System, which integrates technology with conventional psychosocial intervention. The system is now being used in more than 50 care institutions in Hong Kong.

Dr ZHANG Xiao receives national outstanding impact award

Dr ZHANG Xiao, Member of the Research Institute for Advanced Manufacturing (RIAM) and the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE), and Assistant Professor in the Department of Mechanical Engineering, has received the "2023 China Rising Stars in Science and Technology – Outstanding Impact Award".

The "China Top Ten Rising Stars in Science and Technology Award", launched by ScholarSet in 2015, aims to recognise outstanding young scholars in China for their remarkable achievements in scientific research and in promoting the transformation and popularisation of scientific research outcomes. The election of the top ten rising stars, as well as winners of special prizes, was based on public and experts' votes.

PolyU tops RGC Research Impact Fund exercise, with five projects led by PAIR researchers



Five PolyU projects have been granted total funding of HK$20.9 million from the Research Impact Fund (RIF) 2023/24 of the Research Grants Council (RGC). The funded projects are led by PAIR researchers and cover diverse research areas. A total of 14 projects were supported in this year's exercise, and PolyU has the highest number of funded projects among local universities.

The RIF supports universities in undertaking impactful and translational research projects, and in developing research collaborations with government departments, business and industry, and research institutes. Successful projects are granted funding of up to HK$10 million per project for a period of three to five years.

Project	Project Coordinator
Development of Bacterial Pseudaminic Acid-based Vaccine to Combat Infections Caused by Multidrug Resistant Bacteria	Prof. CHEN Sheng Member of the Research Institute for Future Food (RiFood), and Head and Chair Professor of Microbiology in the Department of Food Science and Nutrition
Digital Twin-enabled Intelligent Assessment and Maintenance of Offshore Wind Turbine Structures in a Life-cycle Context	Prof. ZHU Songye Leading Member of the Research Institute for Artificial Intelligence of Things (RIAIoT), Member of the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) and Research Institute for Sustainable Urban Development (RISUD), Associate Head and Professor in the Department of Civil and Environmental Engineering
An AI-enabled Geospatial Platform for Smart Facility Management and Smart Mobility of People with Disabilities	Dr LIU Xintao Member of the Research Institute for Land and Space (RILS), RISUD, Research Institute for Intelligent Wearable Systems (RI-IWEAR), Otto Poon Charitable Foundation Smart Cities Research Institute (SCRI), and Associate Professor in the Department of Land Surveying and Geo-Informatics
Durable Low-carbon Asphalt Pavement Built with Recycled Waste Polyolefin Plastics through Reactive Extrusion	Prof. LENG Zhen Associate Director of the Research Centre for Resources Engineering towards Carbon Neutrality (RCRE), Member of RILS and RISUD, and Professor in the Department of Civil and Environmental Engineering
Developing a New Generation of Pressure-controlled Wearable Soft Braces to Improve the Efficiency and Compliance in Treating Adolescent Idiopathic Scoliosis	Prof. YIP Yiu-wan Joanne Management Committee Member of RiFood, Member of the Photonics Research Institute (PRI) and the Research Institute for Sports Science and Technology (RISports), Associate Dean and Professor in the School of Fashion and Textiles

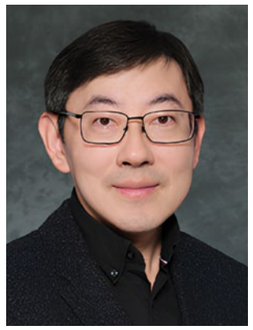
ADoPAIR appointed as Endowed Professor in Chinese Culture and Creative Design

Congratulations to Prof. Lilly LI, Associate Director of PolyU Academy for Interdisciplinary Research (PAIR) and Professor in the School of Fashion and Textiles, on her appointment as Cally Kwong Mei Wan Professor in Chinese Culture and Creative Design.

Prof. Li focuses on the integration of culture, creative design and technology through design thinking. Her research efforts drive industry innovation through an interdisciplinary approach. Prof. Li has secured over 70 research projects, resulting in innovative, cutting-edge technologies and products. These innovations have been widely adopted for commercial applications, contributing to a total knowledge transfer value exceeding HK$350 million.

The Endowed Professorship Scheme aims to recognise outstanding PolyU academics and their contributions. Endowed professors are provided with extra resources to continue their excellent work in research and teaching.

Prof. WANG Dan named ACM Distinguished Member



Prof. WANG Dan, Associate Director of the Research Centre for Digital Transformation of Tourism (RCDTT) and Member of the Research Institute for Artificial Intelligence of Things (RIAIoT), Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) and Research Institute for Sustainable Urban Development (RISUD), has been named a 2023 Distinguished Member of the Association for Computing Machinery (ACM) for his contributions to data-driven applications and platforms for cyber-physical energy systems.

A total of 52 computing professionals have received the 2023 ACM Distinguished Member designation. The 2023 inductees were selected by their peers for work that has advanced computing, fostered innovation across various fields and improved computer science education.

Prof. Raymond WONG elected as Foreign Member of European Academy of Sciences

Congratulations to Prof. Raymond WONG Wai-yeung, Executive Committee Member of the Research Institute for Sustainable Urban Development (RISUD), Associate Director of the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE), Member of the Research Institute for Intelligent Wearable Systems (RI-IWEAR) and the Research Institute for Sports Science and Technology (RISports) and Dean of the Faculty of Science, on his election as a Foreign Member of the European Academy of Sciences (EurASc) in the Chemistry Division!

EurASc is a renowned international association dedicated to advancing scientific knowledge and promoting scientific excellence and collaboration. This esteemed recognition is a testament to Prof. Wong's remarkable research achievements and his outstanding contributions to the field of chemistry around the world.

People

Two PAIR scholars bestowed HKAES Fellow honour

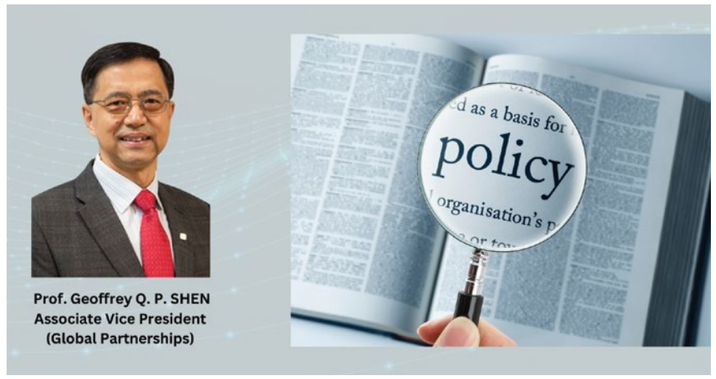
Congratulations to Prof. WANG Zuankai, Associate Vice President (Research and Innovation) and Member of the Research Institute for Intelligent Wearable Systems (RI-IWEAR) and the Research Institute for Sports Science and Technology (RISports), and Prof. Jerry YAN Jinyue, Chair Professor of Energy and Buildings, Management Committee Member of the Research Institute for Sustainable Urban Development (RISUD) and Member of the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE), on their election as 2023 Fellows of the Hong Kong Academy of Engineering Sciences (HKAES), in recognition of their outstanding achievements in the field of science, engineering and technology for the benefit of society.

HKAES is a professional engineering organisation in Hong Kong. Elected fellows are recognised leaders in their professions with distinguished achievements in engineering sciences and their applications. A total of 13 engineering experts received the prestigious honour this year.

PolyU scholar secures Strategic Public Policy Research Funding to drive cross-regional cooperation in GBA construction industry

Congratulations to Prof. Geoffrey Q. P. SHEN, Associate Vice President (Global Partnerships), Chair Professor of Construction Management of the Department of Building and Real Estate (BRE), Management Committee Member of the Research Institute for Sustainable Urban Development (RISUD), and Member of the Otto Poon Charitable Foundation Smart Cities Research Institute (SCRI) and the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE), on receiving the funding from the Chief Executive's Policy Unit's Strategic Public Policy Research Funding Scheme (SPPRFS) 2023/24, being the only institution receiving such support this year.

The project "Policy Framework for Cross-Regional Cooperation Strategies in the Greater Bay Area's Construction Industry" has received HK$3.96 million funding for a period of 36 months. Focusing on development opportunities for the GBA under the National 14th Five-Year Plan, the research examines three strategic areas — talent cooperation, project management cooperation and regulatory cooperation. It aims to provide effective guidance and identify appropriate strategies enable government departments and the industry to promote high-quality cooperation within the construction industry across the GBA.

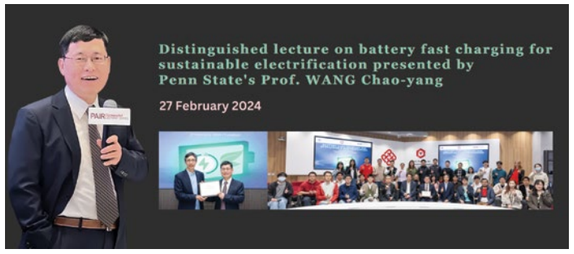


News & Events

Distinguished lecture on battery fast charging for sustainable electrification presented by Penn State's Prof. WANG Chao-yang

Prof. WANG Chao-Yang of The Pennsylvania State University delivered the 13th PAIR Distinguished Lecture titled "Battery Fast Charging for Sustainable Electrification" on 27 February 2024. The hybrid lecture attracted over 230 participants joining in person and online from more than 20 countries and regions across Australia, Asia, Europe and North America. It was also broadcast live on multiple social media platforms, captivating online viewing audience of over 13,100.

The lecture commenced with a welcome speech video by Prof. CHEN Qingyan, Director of PAIR, followed by a brief speaker introduction by Prof. LI Ping, Dean of the Faculty of Humanities, Sin Wai Kin Foundation Professor in Humanities and Technology and Chair Professor of Neurolinguistics and Bilingual Studies.



In his presentation, Prof. Wang first gave some background information about the economics of battery fast charging for electric vehicle (EV), pointing out the importance of fast charging in enabling EV affordability and sustainable electrification. He then highlighted the current challenges in fast battery charging at all temperatures and presented the asymmetric temperature modulation (ATM) approach. The ATM method enables 10-minute fast charging of energy-dense Li-ion batteries at any temperature (even at -60°C) while still delivering remarkable cycle life. Next, he presented the novel thermal management concepts for extremely fast charging in both extreme cold and hot conditions and emphasised the need for battery technology that enables both fast-charging and high-temperature stability. To conclude, Prof. Wang believed that the future of battery technology lies in Lean Energy Storage Systems (LESS) coupled with ubiquitous fast charging, which can provide affordable and safe mobile energy. This would require research development to bring forth a new paradigm of battery design and thermal management without having to trade-off between fast charge, safety, lifetime, and cost.

A question-and-answer session moderated by Prof. Li followed. The audience had a fruitful discussion with Prof. Wang.

Fellow of Chinese Academy of Engineering delivers lecture on biomanufacturing of functional tissues and organs

Prof. YANG Huayong, Dean of the Faculty of Engineering at Zhejiang University and Fellow of the Chinese Academy of Engineering, delivered the 12th PAIR Distinguished Lecture, titled "Biomanufacturing of Functional Tissues and Organs: Exploration and Progress", on 2 January 2024. The hybrid lecture attracted over 130 participants joining in person and online from more than 20 countries and regions across Australia, Asia, Europe and North America. It was also broadcast live on multiple social media platforms, captivating a viewing online audience of over 14,500.

The lecture commenced with a warm welcome address by Prof. CHEN Qingyan, Director of PAIR, followed by a brief speaker introduction by Prof. WANG Zuankai, Associate Vice President (Research and Innovation) of PolyU. In his presentation, Prof. Yang highlighted the urgent need for tissue/organ biomanufacturing that has arisen from the shortage of donations for organ transplantation. He detailed several challenges in the in vitro manufacturing of tissues/organs, particularly in relation to accurate design, precise fabrication, and functional induction. These challenges underscore the great need for new methods of tissue/organ manufacturing. Next, Prof. Yang described the roadmap for biomanufacturing development and shared specific examples of the research progress in 3D bioprinting. In concluding his presentation, Prof. Yang shared his insights on future directions for biomanufacturing, as well as some significant accomplishments in the field by his team at Zhejiang University.

A question-and-answer session moderated by Prof. Wang followed. Both the online and on-site audiences had a fruitful discussion with Prof. Yang.

PAIR seminar on Chinese medicine conducted successfully

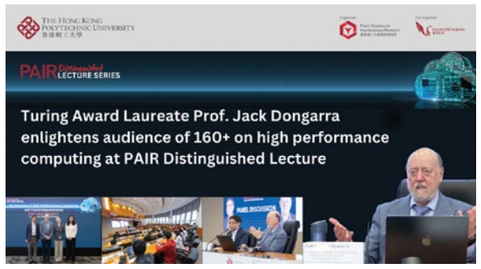
Prof. CHE Chun-tao, Harry H.S. Fong Professor of Pharmacognosy in the College of Pharmacy, University of Illinois Chicago (UIC), and Director of the World Health Organization Collaborating Centre for Traditional Medicine, delivered a hybrid PAIR seminar titled "Challenges and Opportunities for Chinese Medicine Research" on 1 December 2023. The seminar attracted over 200 participants joining onsite and online from over 30 countries and regions in Asia, Europe and North America. It was also broadcast live on multiple social media platforms and viewed by an online audience of over 16,500 in total.

The seminar commenced with a warm welcome address by Prof. CHEN Qingyan, Director of PAIR, setting the stage for an enlightening session. Prof. Che then took the floor, shedding light on the scientific hurdles in the development of Chinese medicine, particularly in regard to the quality, safety, and efficacy of herbal products. He emphasised that these challenges can be transformed into opportunities for international collaborative research, ultimately meeting the growing demand for top-notch Chinese medicine products.

A question-and-answer session moderated by Prof. WONG Man-sau, Director of the Research Centre for Chinese Medicine Innovation (RCMI), followed the lecture. The seminar reached its climax with a panel discussion joined by experts from local universities and industry. Panellists included Prof. Karl TSIM Wah-keung, Director of the Center for Chinese Medicine Research and Development and Director of HKUST Shenzhen Center for Chinese Medicine at The Hong Kong University of Science and Technology (HKUST); Prof. ZHANG Hongjie, Director of the Chinese Medicine – Teaching and Research Division of Hong Kong Baptist University (HKBU); Prof. Clara LAU, Associate Director of the Institute of Chinese Medicine at The Chinese University of Hong Kong (CUHK); and Mr Harry YEUNG, Chairman of the Modernized Chinese Medicine International Association Foundation (MCMIA). The audience had a stimulating exchange with Prof. Che and the panellists.

Turing Award Laureate Prof. Jack DONGARRA enlightens audience on high-performance computing

The 10th PAIR Distinguished Lecture, "An Overview of High-Performance Computing and Future Requirements", was delivered by Prof. Jack DONGARRA, 2021 A. M. Turing Award Laureate and University Distinguished Professor of Computer Science, University of Tennessee, USA, on 6 December 2023 and achieved massive success! The hybrid lecture attracted over 160 participants joining in person and online from more than 50 countries and regions in Australia, Asia, Europe and North America. It was also broadcast live on multiple social media platforms and viewed by an online audience of over 12,000 in total.



The lecture commenced with a warm welcome address by Prof. CHEN Qingyan, Director of PAIR, and a brief speaker introduction by Prof. CAO Jiannong, Dean of the Graduate School, setting the stage for Prof. Dongarra's inspiring presentation. Prof. Dongarra explained that computing now pervades all aspects of society. Cloud vendors are pursuing breakthroughs in computer architectures such as processors, accelerators, interconnects and operating systems, with a view to achieving high-performance computing. He noted that countries worldwide are in a race to build top exascale supercomputers. Prof. Dongarra also pointed out that the emergence of artificial intelligence and machine learning is driving advances in software and hardware. To conclude the lecture, he emphasised that the hardware for high-performance computing is constantly evolving, and a new generation of software libraries and algorithms is needed for effective and reliable dynamic, distributed, and parallel computing.

A question-and-answer session moderated by Prof. Cao followed the presentation. The audience and Prof. Dongarra had a thought-provoking and fruitful discussion, exchanging views on a variety of issues in computing development.

Renowned Chinese medicine scholar discourses on acupuncture development in PAIR Distinguished Lecture

Prof. LAO Lixing, Professor and President of the Virginia University of Integrative Medicine (VUIM), USA, delivered the 11th PAIR Distinguished Lecture, titled "Acupuncture in the United States: From Exploration to Accessibility", on 8 December 2023. The hybrid lecture attracted over 140 participants joining in person and online from more than 18 countries and regions across Australia, Asia, Europe and North America. It was also broadcast live on multiple social media platforms to a combined online audience of over 12,500.

The lecture commenced with a warm welcome address and brief speaker introduction by Prof. CHEN Qingyan, Director of PAIR. Prof. Lao's presentation then followed. He outlined the differences in acupuncture between the past and present, and between the East and West. Next, he described the rapid development of acupuncture in the United States, explaining how acupuncture as a therapeutic intervention gained acceptance by the public and mainstream healthcare systems. Additionally, he underscored the significance of research endeavours that encompass clinical studies, collaboration and dissemination and are driving evidence-based acupuncture. In concluding his presentation, Prof. Lao shared his insights on the future direction of acupuncture research, citing a number of research priority areas as set forth by a national complementary and integrative health centre in the United States.

A question-and-answer session moderated by Prof. Daniel MOK Kam-wah, Associate Director of the Research Centre for Chinese Medicine Innovation (RCMI), followed the lecture. The panel discussion was joined by Dr ZHANG Shi Ping, Associate Professor, Teaching and Research Division of Hong Kong Baptist University, and Dr LIN Wai Ling, Professional Consultant, School of Chinese Medicine at The Chinese University of Hong Kong. Prof. Lao and the panellists engaged in a productive discussion with the audience on various crucial topics in acupuncture practice, including quality assurance, research challenges and funding opportunities.

Nobel Laureate Prof. Thomas C. SÜDHOF delivers neuroscience lecture

The Mental Health Research Centre (MHRC) and the Department of Rehabilitation Sciences (RS) jointly organised a Nobel Laureate lecture on 13 December 2023. Delivered by Prof. Thomas C. SÜDHOF, Nobel Laureate in Physiology or Medicine (2013), the lecture titled "The Molecular Architecture of Synapse Formation" attracted over 1,000 online attendees from 17 countries and regions. The event was also broadcast live on multiple platforms, including YouTube, Bilibili, Weibo, WeChat and CSTCloud, drawing an impressive audience of over 15,000.

In the lecture, Prof. Südhof described the recent progress in understanding how selected trans-synaptic interactions guide and shape the formation of synapses and thereby control the molecular logic of neural circuits. A question-and-answer session moderated by Prof. Hector TSANG, Interim Director of MHRC, Chair Professor and Head of the RS Department, and Dr Sonata YAU, Associate Professor in the RS Department, followed the lecture. The audience and Prof. Südhof had a thought-provoking and fruitful discussion, exchanging views and knowledge in the field of neuroscience.

China Manned Space delegation visits PolyU

On 30 November 2023, PolyU welcomed the China Manned Space delegation to the PolyU campus. The delegation shared their aerospace journeys with 700 PolyU students and faculty members during a meet-and-greet event at the Jockey Club Auditorium.

At the event, the delegation delivered presentations on their experiences in manned space missions. They also had an exchange on aerospace technologies, astronaut training, and life in space with the PolyU community. The discussion was joined by PAIR researchers. They included Prof. YUNG Kai-leung, Sir Sze-yuen Chung Professor in Precision Engineering, Chair Professor of Precision Engineering, Associate Head of the Department of Industrial and Systems Engineering, and Director of the Research Centre for Deep Space Explorations (RCDSE); and Prof. WU Bo, Fiona Cheung Professor in Spatial Science, Associate Head (Research) of the Department of Land Surveying and Geo-Informatics, and Associate Director of RCDSE.

Since 2010, PolyU has been participating in the Nation's space exploration programmes and collaborating with the China Academy of Space Technology to develop and manufacture sophisticated space instruments. PolyU researchers have participated in the Nation's lunar exploration missions, including Chang'e-3, Chang'e-4 and Chang'e-5, as well as the Mars exploration project Tianwen-1.

RCRE successfully holds international conference on waste management

The 11th International Conference on the Environmental and Technical Implications of Construction with Alternative Materials (WASCON2023) was successfully held 13–16 December 2023 at PolyU. The conference was jointly organised by the Research Centre for Resources Engineering towards Carbon Neutrality (RCRE), the Department of Civil and Environmental Engineering (CEE) of PolyU, and the International Society for the Environmental and Technical Implications of Construction with Alternative Materials (ISCOWA).

Under the theme of "Innovative Valorization of Alternative Materials and Waste towards Circular Construction", the conference brought together about 300 participants from academia, industry, and the public sector around the world. The conference included over 160 paper presentations on the latest developments in the recycling of wastes to produce sustainable construction materials.

PAIR launches Research Impact Video Series, showcasing solutions to societal challenges

PAIR is pleased to present the brand-new *PAIR Research Impact Video Series*. The series invites PAIR researchers to share their latest research achievements and solutions to major challenges in society.

In the first episode, Ir Prof. POON Chi-sun, Director of the Research Centre for Resources Engineering towards Carbon Neutrality (RCRE), Michael Anson Professor in Civil Engineering, Chair Professor of Sustainable Construction Materials, and Head of the Department of Civil and Environmental Engineering, introduces his team's research on Eco-Blocks, a green concrete made from construction, demolition and other discarded waste. Prof. Poon also shares his team's application of carbon curing technology to improve concrete performance, and their use of valorisation technology to produce low-carbon construction materials from waste glass. At RCRE, Prof. Poon and his collaborators are conducting fundamental and impactful research on the recycling of woody waste, waste glass, incineration ashes and other materials. (*https://www.youtube.com/watch?v=cakPnf4HccI&t=3s*)

RCMI hosts public lecture on long COVID

The Research Centre for Chinese Medicine Innovation (RCMI) organised a public lecture titled "Long COVID in Canada: CANCOV, RECLAIM & Long COVID Web" on 12 January 2024. The hybrid lecture was delivered by Prof. Angela CHEUNG, Professor of Medicine from the University of Toronto. It attracted about 100 participants in person, and was broadcast live on social media platforms to a combined online audience of over 12,600.

In his opening remarks, Prof. CHEN Qingyan, Director of the PolyU Academy for Interdisciplinary Research (PAIR), emphasised the global significance of long COVID as a research topic. Next, Prof. Cheung gave a comprehensive presentation on the definition, mechanisms, prevention, and management of long COVID, and shared experiences and insights gained from the CANCOV, RECLAIM, and Long COVID Web projects conducted in Canada. The lecture was followed by a question-and-answer session moderated by Dr Daniel MOK, RCMI Associate Director, fostering an engaging and productive discussion.

Former Olympic diving gold medallist WANG Xin speaks at Distinguished Elite Athletes Seminar

The Research Institute for Sports Science and Technology (RISports) organised the inaugural Distinguished Elite Athletes Seminar on 24 January 2024, in collaboration with the Department of Biomedical Engineering, PolyU–Samaranch Sports Development Centre and PolyU–HKSI Research Centre.

In the seminar, titled "Never Stop Dreaming–from Olympic Champion to Research Scholar", Ms WANG Xin, former Olympic diving gold medallist, shared with nearly 100 participants from PolyU, sports and related industry her journey from an Olympian to a research scholar. Ms Wang is currently a Sports Advisor for RISports and a PhD student at PolyU. She won a Gold Medal in women's 10 m synchro platform and a Bronze medal in women's 10 m platform at the 2008 Beijing Olympics. She is also a gold medal winner in other international sports competitions including World Championships, Asian Games, Universiade and FINA Diving World Cup.

PAIR units support International Symposium on Reclamations Using Local Dredged Sediments

Two PAIR units, including the Research Institute for Land and Space (RILS) and the Research Institute for Sustainable Urban Development (RISUD), supported the International Symposium on Reclamations Using Local Dredged Sediments held on 26 January 2024.

The Symposium, co-organised by the Department of Civil and Environmental Engineering (CEE) and the Geotechnical Division of the Hong Kong Institution of Engineers (HKIE), brought together over 260 participants for knowledge exchange and discussions on practical, eco-friendly and sustainable solutions to land scarcity issues. The event was also supported by the American Society of Civil Engineers (ASCE) Greater China Section, the Hong Kong Geotechnical Society (HKGES) and the Institution of Civil Engineers Hong Kong Association (ICE HKA).

PAIR research projects shine in RGC Collaborative Research Fund 2023/24 exercise

In the Collaborative Research Fund (CRF) 2023/24 exercise of the Research Grant Committee (RGC), nine PolyU projects were granted a combined HK$55.491 million from the Collaborative Research Project Grant (CRPG), placing PolyU first among Hong Kong universities in the amount of CRPG funding awarded; and two PolyU projects were granted a total of HK$9.435 million from the Young Collaborative Research Grant (YCRG). Among them, eight CRPG projects and both YCRG projects are led by PAIR researchers.

Name of Principal Investigator	Title(s) and Constituent Research Unit(s)	Research Project	Amount (HK$)
PAIR projects supported by CRPG			
Prof. XIA Yong	Management Committee Member of RIAIoT Member of RISUD and RCDSE	Towards future climate-resilient sea-crossing bridges via intelligent learning of long-term real monitoring data	5,056,919
Prof. YANG Mo	Member of PRI and RISports	High-resolution single-cell multi-omics: Joint profiling of multiple types of biomolecules in the same single cell	6,412,248
Prof. CHEN Jianli	Member of RILS	Multi-sensor monitoring, geophysical interpretation and prediction of sea level rise in Hong Kong	6,567,108
Dr TAN Youhua	Member of RISA and RCSV	The roles of mechanically heterogeneous local niches within primary tumors in metastatic organotropism	5,985,252
Prof. CAO Jiannong	Director of RIAIoT Management Committee Member of RISUD Member of RiFood, RI-IWEAR, RISE, RISA and SCRI	Heterogeneity-aware collaborative edge AI acceleration	7,364,305
Prof. WANG Yuhong	Member of RILS, RISE, RISUD and RCRE	Improving the health and stability of roadside trees in compact urban development through novel road systems and tree root "training"	5,407,780
Dr CHENG King Yip Kenneth	Member of RiFood and RCMI	White adipose tissue (fat) dysfunction in ageing and its related metabolic diseases: New insights and therapeutic potential	8,166,029
Dr ZHAO Jiong	Member of RIAM	Scalable two-dimensional polymorphic ferroelectrics towards in-memory processing	4,100,714
PAIR projects supported by YCRG			
Dr Bolton CHAU	Associate Director of MHRC	The role of the human frontopolar cortex in complex decision making: Neural network modelling, aging, and enhancement	4,591,504
Dr LIU Liang	Member of RIAIoT	Sensing in 6G cellular networks	4,843,318

RCMI to hold international research conference on acupuncture and TCM in May 2024

The Research Centre for Chinese Medicine Innovation (RCMI) and the Society for Acupuncture Research (SAR) are organising the "SAR/RCMI PolyU Research Conference", scheduled for 23–25 May 2024 at The Hong Kong Polytechnic University.

With the theme of "Bridging the Two Worlds: Engaging Traditional Chinese Medicine in Modern Health Care", the Conference will provide a platform on which researchers from various healthcare professions and disciplines can share, explore and develop novel research hypotheses and strategies for acupuncture and traditional Chinese medicine (TCM). The primary objective of this Conference is to construct a robust bridge between the East and West for advancing the scientific understanding and evidence-based clinical applications of acupuncture and TCM. It also aims to bridge basic mechanisms and precision clinical medicine, as well as ancient wisdom and modern technology. This fusion will not only honour the rich heritage of TCM, but also pave the way for its evolution in the modern healthcare landscape.

Register by 26 March 2024 to enjoy the early-bird rate! (*https://iccreg.com/sar-rcmi2024/index.html*)

PAIR research units to co-organise World Conference on Floating Solutions in December 2024

The Research Institute for Land and Space (RILS), the Research Institute for Sustainable Urban Development (RISUD), the Research Institute for Future Food (RiFood) and the Department of Civil and Environmental Engineering (CEE) will organise the 4th World Conference on Floating Solutions (WCFS 2024), 2–4 December 2024 on the PolyU campus. The conference is supported by the Civil Engineering and Development Department (CEDD), the Agriculture, Fisheries and Conservation Department (AFCD) and the Drainage Services Department (DSD) of the HKSAR Government and The Hong Kong Institution of Engineers (HKIE) Structural Division.

The theme of this year's WCFS is "Floating solutions for sustainable ocean development and blue economy". Abstract submissions are now invited for key topics including architecture, climate change, environmental enhancement, food security and food sustainability, innovation and technology, renewable energy, urban planning, as well as policy, social acceptance and legal matters. For details, please refer to *https://events.polyu.edu.hk/wcfs2024/*. All abstracts must be submitted to wcfs.2024c@polyu.edu.hk.