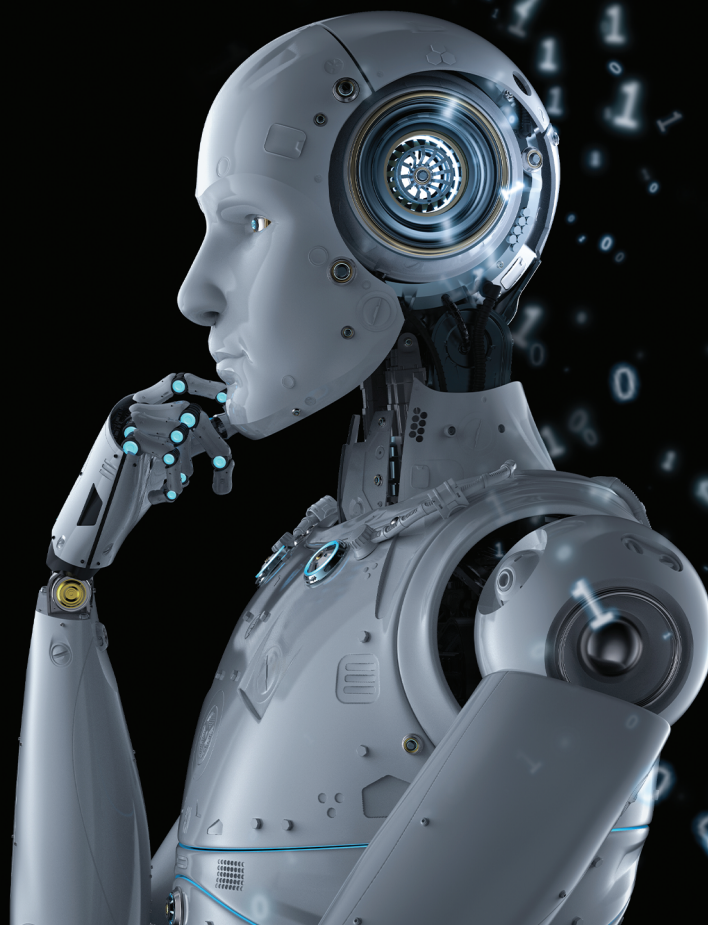


Chinese University

# BULLETIN

No.2, 2023

How AI and robotics  
reshape the world





Chinese University  
**BULLETIN**

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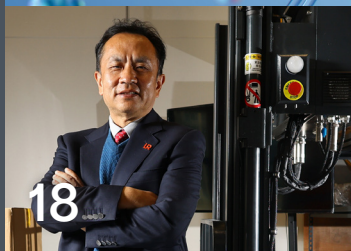
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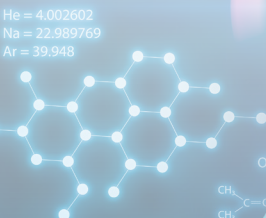
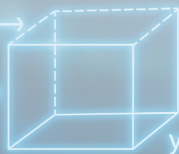


$a(bc) = (ab)c$

$a(b+c) = ab+ac$

$126 = 6xy$

$2x + 2v = 20$



$(100^2)a + 100b + c = 0$

$10000a + 100b - 5000 = 0$

$a_n = \frac{1}{2^{n-1}} = \frac{1}{2^{10-1}}$

$(x)(2x+3) = 90$

$\frac{a-b}{c-d} = \frac{b-a}{d-c}$   
 $\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$   
 $\frac{ab+ac}{a} = b + c$   
 $\sin 60^\circ = \frac{\sqrt{3}}{2}$   
 $\sqrt{3} = 4\sqrt{3}$   
 $f = \frac{R}{2}$   
 $a^2 + \frac{1}{2} + a^2 = 1.8$   
 $Cl_2 + Ca(OH)_2 \rightarrow CaCl_2 + CaClO_2 + H_2O$   
 $Sb_2 + 6H_2O \rightarrow 3Zn(OH)_2 + 2SbH_3$   
 $2Fe(OH)_3 \rightarrow 2Fe_2O_3 + 3H_2O$   
 $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$   
 $CH_3-CH(OH)-CH_2-CH_3$   
 $HO-CH_2-CH_2-CH_2-OH$   
 $CH_3-C(=O)-O-CH_3$   
 $a = 1, a \geq 0$   
 $(a+b) + (c+d) =$   
 $(a+b) - (c+d) =$   
 $(a+b)(c+d) =$   
 $(a-b)$

# Delving into the world of robotics and artificial intelligence

**R**obotics and Artificial intelligence (AI) have become increasingly hot topics in academia and industry. CUHK researchers are striving to leverage opportunities in these fields, with the aim of generating positive societal impacts.

Hong Kong plays a crucial role in driving AI and robotics development. Since October 2021, CUHK has established six InnoHK Centres. Alongside three Health@InnoHK Centres, the University also founded three AIR@InnoHK (artificial intelligence and robotics) Centres under InnoHK, a major initiative of the Hong Kong government to develop the city as a base for global research collaboration.

The second issue of the Bulletin features three AIR@InnoHK Centres – **the Multi-Scale Medical Robotics Center, the Centre for Perceptual and Interactive Intelligence, and the Hong Kong Centre for Logistics**

**Robotics.** From surgical robots to information-seeking conversational system and drone technologies for building inspection, the centres are striving to make these technologies available for the market. Some technologies have been licensed to start-ups set up by the centre's investigators. Their contribution to the advancement of robotics technologies, that are capable of making industrial processes easier, is highlighted in our feature stories.

The city is also at the forefront of developing AI technologies. To keep abreast with the latest global trends, the CUHK community makes all-out effort to explore possibilities that Generative AI (GenAI) can open up for teaching and learning. In this issue, we include a feature on GenAI in the context of university education, which discusses common ethical concerns such as plagiarism and academic integrity.

# Unleashing Hong Kong's innovation potential



Innovation has been taken as a continuum to achieve CUHK's strategic goals. Located at Hong Kong Science Park, the six InnoHK centres established by CUHK cover health, biomedicine, robotics and AI that enable the translation of research into tangible benefits and the delivery of innovation to the world. The AIR@InnoHK Centres intend to enhance efficiency in finance, health care, construction, logistics and advanced manufacturing. Its investigators aim to pursue research excellence with purpose and responsibility.

## Quick Facts on CUHK Research and Innovation

QS

World University Rankings

12<sup>th</sup>  
in Asia



47<sup>th</sup>  
in the world

THE

Times Higher Education  
World University Rankings

6<sup>th</sup>  
in Asia



53<sup>rd</sup>  
in the world

74%



CUHK research rated  
as world-leading or  
internationally excellent

(Research Assessment Exercise 2020, UGC)

Reuters' Asia Pacific's Most Innovative  
Universities

26<sup>th</sup>  
in Asia Pacific

1<sup>st</sup>  
in Hong Kong

Most Patents  
Granted University in  
consecutive years

5

(Since 2017-18)

In 2022–23

481+

Patents filed

260+

Patents granted

78

Licences granted

Total numbers to date

4100+

Patents filed

1700+

Patents granted

1100+

Inventions

71+

Technology start-up companies

158+

Student start-up projects

20

Social enterprises

263

Community-based  
knowledge transfer projects

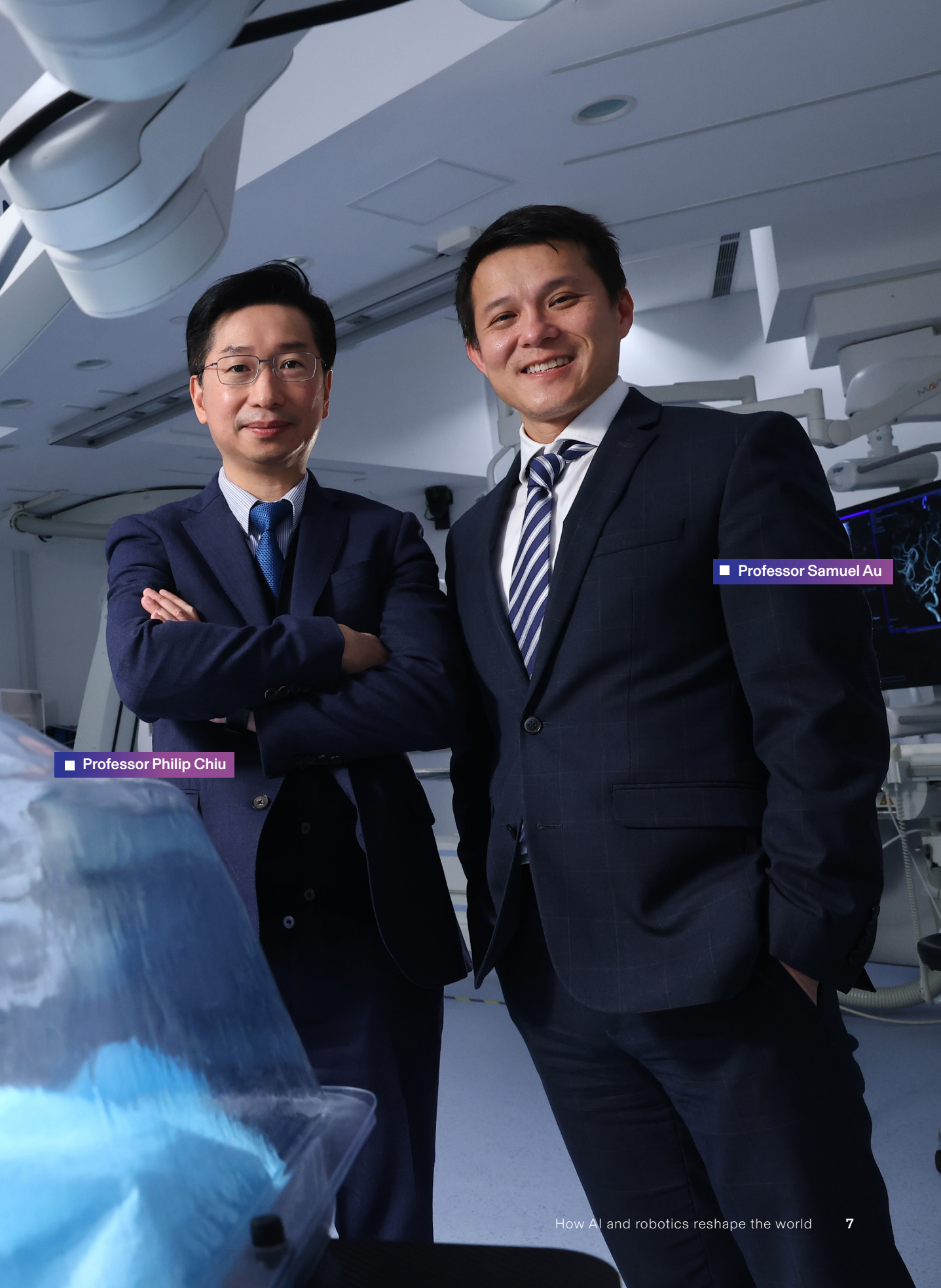
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1

# When medicine meets engineering

Surgeons and engineers join hands to develop novel medical robots that directly benefit patients





■ Professor Samuel Au

■ Professor Philip Chiu



Doctors and engineers speak their own professional languages, and their paths seldom cross. At CUHK, however, a team of surgeons and engineers have managed to develop a synergy that is advancing robotic-assisted surgical procedures and therapeutic methods.

Their track record in advancing surgical robotics technology has earned them InnoHK funding support from the Hong Kong government and secured HK\$470 million to establish the Multi-Scale Medical Robotics Center (MRC) in April 2020.

### The trailblazer in medicine and engineering

"CUHK was the first to introduce minimally invasive surgery in Hong Kong in 1990," says CUHK Department of Surgery Professor Philip Chiu Wai-yan, Co-Director of the MRC. Since then, the department

has kept improving and broadening the application of minimally invasive surgeries.

The department utilises a robotic surgical system which enhances the performance of minimally invasive surgery with stable, precise robotic arms for delicate surgical procedures deep inside our bodies.

"We introduced the first da Vinci® Surgical System in 2005, followed by an advanced version in 2008," says Professor Chiu. "But we are not engineers. We don't have a clue if any engineering innovation can be applied to medical treatment."

He started to search for a like-minded engineer partner. He knew Professor Samuel Au Kwok-wai's outstanding work in the US through the alumni network.

Professor Au, the founding team member of the da Vinci Single-Site surgical platform and da Vinci ION platform, who has spent almost two decades in the



medical robotics industry, comments, "Robots help surgeons overcome their physical limitations and enhance their performance, producing better and more consistent surgical outcomes and opening up new, complex procedures. However, I know the gap between a research prototype and a commercial product is bigger than often imagined. This is particularly true for medical device development."

Attracted by the CUHK community's embrace of interdisciplinary research, Professor Au returned to Hong Kong and joined the Department of Mechanical and Automation Engineering in 2016, and subsequently became the Co-Director of the MRC.

"A medical robotics research team requires not only top-notch doctors to come up with innovative ideas for utilising technology to enhance surgical outcomes, but also excellent engineers to turn the doctors' ideas into reality and ensure the stable performance of the robots," says Professor Au.

## One-stop platform for development of useful medical products

Positioned to enable translational research and productisation of novel surgical robotics technologies, "the MRC is a thriving med-tech innovation ecosystem where world-leading clinicians, engineers and industry collaborators work together to drive the development of medical robotics that could benefit patients with deeper reach, greater precision and lower costs," says Professor Chiu.

As part of the med-tech translation ecosystem, the MRC is within 15 minutes' drive from Prince of Wales Hospital and CUHK Medical Centre, CUHK's two teaching hospitals, and on-campus medical and engineering faculties. Located at Hong Kong Science Park, the 12,000-square-foot MRC covers a spectrum from basic research to prototype and product development, as well as preclinical trials and physician training, and clinical application in hospitals.

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Professor Chiu explains that first-hand comments from professional users are a crucial part of the translation ecosystem. "Doctors have rich clinical experience. They can tell you what the problems of the existing medical technology are and suggest directions for improvement. Engineers possess the technical expertise to offer technological solutions and fix the issues, and let doctors verify the adjustment. The MRC is the missing piece between driving surgical robotics technology forward and applying it clinically."

Professor Au adds: "Beyond lecture-style discussion, it allows surgeons to explain animal or cadaver anatomy more effectively to engineers while it also lets engineers validate their initial conceptual prototypes on animal or cadaveric models. At the end, all these activities will facilitate engineers to iterate their hardware prototypes quicker, ultimately leading the creation of clinically relevant medical products for real human use."

The MRC is also well connected with top-notch local and overseas universities. "Our collaborators include ETH Zurich, Imperial College London and Johns Hopkins University," notes Professor Chiu.

## Unique features

The Hybrid Operating Room in the MRC Lab, equipped with MRI and Robotic-Assisted C-Arm X-ray Imaging System (Artis Zeego) machines, enables real-time intra-operational medical imaging during surgical robotic intervention R&D. The only one of its kind in Asia, the facility is fully dedicated to R&D and pre-clinical evaluations of new surgical robots and medical devices via live animal and cadaver studies.

Over the past three years, more than 70 researchers and practitioners, including 20 to 30 engineers and up to 20 surgeons from CUHK's Department of Surgery, have been engaging in research work in the centre.

## Dreams come true

The MRC supported local startup company, Cornerstone Robotics (CSR) to translate their innovations into clinically relevant products. Having undergone years of collaborative research, repeated evaluations, modifications, intensive animal and cadaver tests, and simulated surgery, the Sentire C1000 Endoscopic Surgical Robotic System of CSR—the most complicated such platform developed in Hong Kong—went through clinical testing last year. The MRC offered pre-clinical evaluation support services for CSR as a part of the translation ecosystem.

With the support of the MRC team, the Sentire system has been successfully used for over 30 surgeries at Prince of Wales Hospital during the clinical trial, including prostatectomy, colorectal resection, hernia repair and gastric fundoplication, with satisfactory results and no reported patient discomfort. Among them, the colorectal resection was accomplished within one hour, a stark contrast to traditional open abdominal surgeries which last between several hours.

From the surgeon's perspective, Professor Chiu says, "I don't see any difference in the performance and capabilities between the existing surgical platform and our robotic platform, which comes with significantly decreased costs."

During his trip to Hong Kong in 2022 to celebrate the 25<sup>th</sup> anniversary of the city's return to Chinese rule, the Sentire system was selected as one of the top seven innovations presented to President Xi Jinping. Xia Baolong, Vice Chairman of the 13<sup>th</sup> Chinese People's Political Consultative Conference and Director of the State Council's Hong Kong and Macao Affairs Office, also paid a visit to the MRC, in April 2023.

After a brief introduction by Professor Chiu and Professor Au, Mr Xia even operated the robotic platform himself. "Mr Xia was thrilled that Hong Kong has developed robots with cutting-edge technology and encouraged us to continue advancing the

Greater Bay Area and even across mainland China," recalls Professor Au.

## In the pipeline

"Currently, the Sentire system is going to be used in clinical trials in Beijing, Shanghai and Zhejiang," remarks Professor Au.

In the long run, the MRC plans to simplify surgery and enable surgeons to perform more complex procedures by offering the surgical robotic platform at a lower cost and in a smaller size.

Besides endoscopic surgical robots, the MRC's research teams are also spearheading a magnetic-guided endoluminal robotic platform and image-guided robotic interventions.

The magnetic-guided endoluminal robotic platform, which enables the use of miniature tools and micro-/nanorobotics in the human body, is a promising solution to ensuring active remote control with high precision. The MRC aims to further establish Hong Kong as a centre of innovation in gut and vascular disease research, and use these revolutionary technologies to fight diseases that are among the most important challenges in minimally invasive medicine.

Image guidance complements surgical robotics, with detailed real-time imaging information serving as visual feedback for the surgeon, and also as direct observation for the robotic control system. With multi-modal visual assessment and precise surgical tool manipulation, the technology can achieve its ultimate aim of improved procedural workflow, surgeon ergonomics and patient outcomes.

Professor Au concludes: "The MRC is an important milestone in the development of surgical robotics in Hong Kong. I look forward to seeing more high-quality research and development outcomes through the center, and their translation so they impact patient lives and the community."



The MRC is a thriving med-tech innovation ecosystem where world-leading clinicians, engineers and industry collaborators work together to drive the development of medical robotics that could benefit patients with deeper reach, greater precision and lower costs.



**Professor Philip Chiu**

**Co-Director,  
Multi-Scale Medical Robotics Centre**

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2

# An intelligent vision for health

Harnessing AI to bring better healthcare



■ Professor Helen Meng





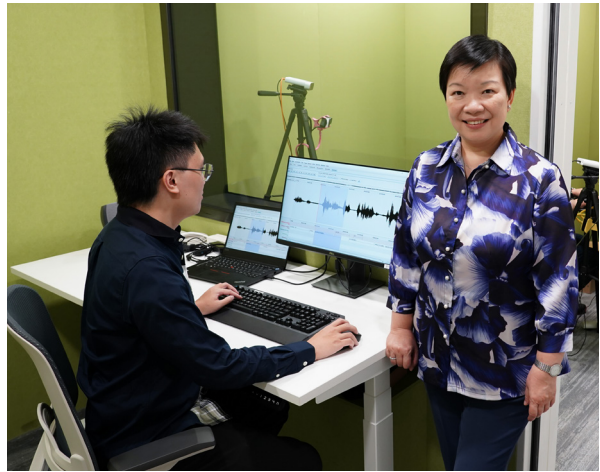
Over the years, Professor Helen Meng Mei-ling has contributed heavily to the worlds of electrical engineering and computer science. Having received all her degrees from the Massachusetts Institute of Technology, she returned to her hometown in the 1990s and began to develop her academic career at CUHK. Since then, it has continued to flourish, and she has served as Associate Dean (Research) of the University's Faculty of Engineering as well as Chairperson of the Department of Systems Engineering and Engineering Management. Currently, she is Patrick Huen Wing Ming Professor of Systems Engineering and Engineering Management at the University.

These days, Professor Meng continues to be curious about matters in the world of information technology, and is particularly interested in AI's potential to improve communication between people, as well as between people and machines: "Communication by speech and language is quintessentially human. The speech signal carries rich information about what we mean, who we are, how we feel, as well as encoding subtle information about our education, our health and cognition." With that in mind, she has been looking to develop AI in ways that "enable machines to communicate using speech and language" and broaden the social impact of her research.

Professor Meng is a scholar well-recognised for her work in speech and language technologies, an indispensable field under the rapidly expanding arena of AI. She is well aware of how AI presents the potential to transform our society: "AI has great potential in making significant impact on society. Since the establishment of CUHK's Faculty of Engineering in 1991 until the present day, we have always focused on this field, built up solid capabilities and nurtured wonderful talents."

## Across disciplines

One project that speaks to Professor Meng's fascination with AI and communication involves



designing conversational interfaces both for human-machine interactions (like chatbots) and interactions between humans moderated by a machine. This could help address challenges arising from one of Hong Kong's biggest structural problems – our ageing population. Given that some seniors with health issues have difficulty communicating their needs, the need for aids on this front is paramount; however, the lack of suitable AI applications for Cantonese speakers proves an obstacle.

Professor Meng is leading a Theme-based Research Project that aims to develop spoken language technologies that can analyse spoken languages in order to enable automated screening of neurocognitive disorders. She believes that healthcare can achieve an impressive level of semi-automation through AI. "Healthcare services present strong demands for specialised and skilled manpower support, for example in disease screening, diagnoses and monitoring," she says. "Technology may partially automate the workflow in healthcare services and offer scalability to serve a wider population, where trained professionals can focus on the people who really need their support." This streamlining, she suggests, can lead to "more timely and scalable health service offerings, which can also lower costs and enhance affordability."

"We collaborate closely with colleagues across disciplines: medicine, nursing, linguistics, psychology and speech, to design experiments," says Professor Meng. Exploring and harnessing the full potential of AI requires a broad church of knowledge. She sees the collegial atmosphere in CUHK to be extremely beneficial to research. "If I may be a little bit immodest," she says with a chuckle, "you won't find many universities elsewhere that have the expertise to look at speech technology, healthcare and neurological health simultaneously."

This close cooperation among researchers from different fields also means that AI solutions they co-develop have broader applicability to society. "Our hope is to develop AI technologies to advance technological equity," says Professor Meng. "We stand ready to adapt our technologies to directly benefit users with our own cultural backgrounds and usages in our cultural contexts."

## Beyond academia

Situated in the heart of the Hong Kong Science and Technology Park, the Centre for Perceptual and Interactive Intelligence (CPII), where Professor Meng is director and a principal investigator, was established in 2020. The Centre is supported by

the InnoHK Scheme from the Hong Kong SAR Government. Its research focus is developing and harnessing the potential of AI to improve our daily lives, with an emphasis on "the sectors of healthcare, urban services and reindustrialisation". Its continuing research into these technologies ensures a high level of capability in fields as diverse as clothing design and industrial processes, and furthers Hong Kong's ongoing evolution as a "smart city".

For Professor Meng, this represents a major step forward. "When one conducts research in engineering, the aim is to develop technologies that will solve problems," she says. "Research in the university may reside mainly in academic circles. To connect our research outputs with real users, we need to bridge the gap, which requires significant efforts in applied research, development, engineering, technology transfer and entrepreneurship." Such efforts can now be supported by public funding provided to InnoCentres, of which CPII is a prime example. "Our previous goal was to publish our work in top venues, in the hope that members from industry would adopt some of our work and develop it further. But with InnoHK funding, we are now able to push beyond academic publications and create new opportunities for our industry, our economy and for the talents we have nurtured."



One of the research projects of CPII, led by Professor Meng, aims to help individuals with speech impairments due to neuromotor disorders by using AI to reconstruct their disordered speech. This allows them to ease their communication with caretakers, family and friends, and thus enhance social inclusion for the individual. Their technology for disordered speech reconstruction was awarded first prize at the Hong Kong Science and Technology Park's SciTech Challenge in 2021.

Another of Professor Meng's research projects at CPII concerns conversational AI. Her team participated in DialDoc@ACL in 2022, an international challenge that encourages the building of open-domain document-grounded question-answering systems (a technology similar to chatbots). The system developed by the Centre ultimately received top prize from the Challenge's organisers, further demonstrating the progress the CPII has made since its founding. The subsequent emergence of further chatbots such as ChatGPT in late 2022 has aroused global interest in their great potential, and it has also opened up new opportunities for the CPII, spurring the team to further research such technologies. Professor Meng is eager to have even more people benefit from its continuing research into AI. "The applicability of the CPII's results in R&D is not confined to any particular sector or geography," she says.

So what next for the centre? Recently, a collaborative project between Professor Meng's team and Vietnam's VinUniversity received a grant from the Bill & Melinda Gates Foundation's Global Grand Challenges 2023 initiative. This year's theme is to catalyse the use of equitable AI to support low-and middle-income countries, and the collaboration between CPII and VinUniversity aimed to develop generative AI technologies for gynecological healthcare in Vietnam. In this and many aspects, the professor notes, the burgeoning field of AI in Hong Kong, along with CUHK's continuing support, bodes well for further digital transformation and technological equity for the future of Hong Kong and beyond.



**Our hope is to develop AI technologies to advance technological equity. We stand ready to adapt our technologies to directly benefit users with our own cultural backgrounds and usages in our cultural contexts.**



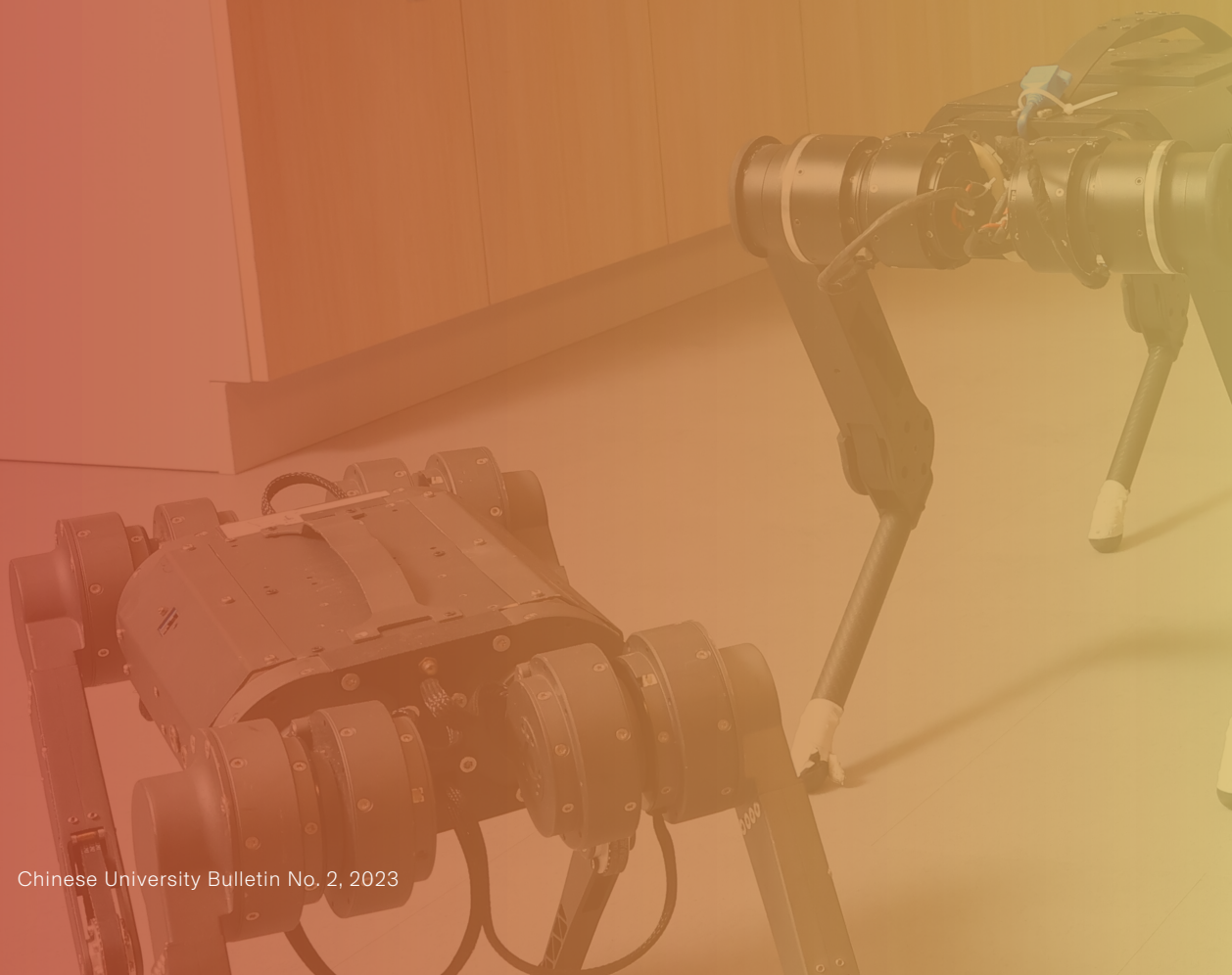
**Professor  
Helen Meng**

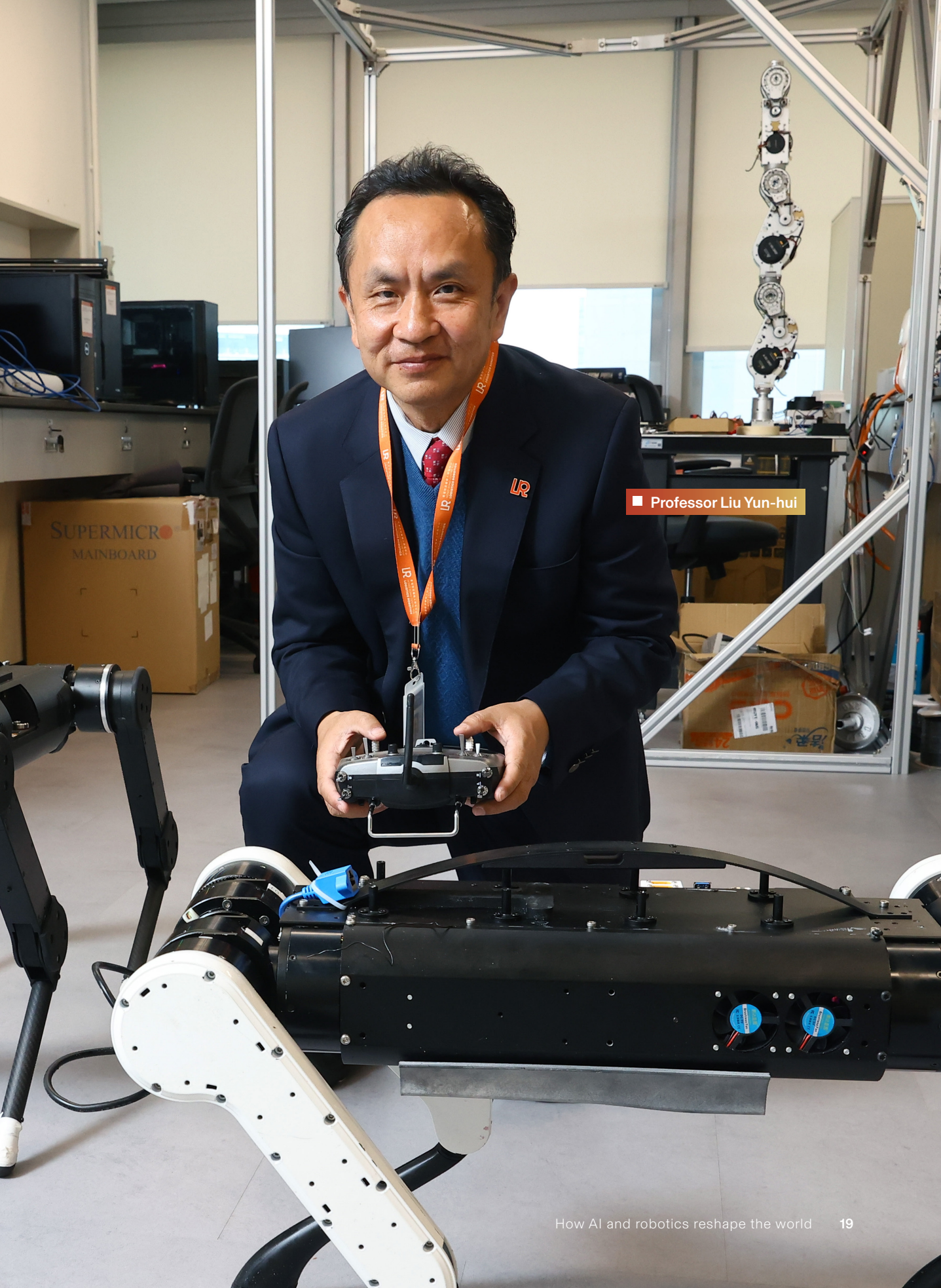
**Director,  
Centre for Perceptual and  
Interactive Intelligence**

# 3

## Robots for the workplace

Partnering with industry to identify ways technology can raise efficiency and safety





■ Professor Liu Yun-hui



Members of the Hong Kong Centre for Logistics Robotics

Two years ago, Professor Liu Yun-hui and Professor Fei Chen from the Hong Kong Centre for Logistics Robotics at CUHK visited a metal recycling plant in Yuen Long, a messy environment filled with smells of waste.

"They were rather bad working conditions," recalls Professor Liu, Director of the Centre. "The workers were picking up small aluminium pieces from piles of scrap metal by hand for recycling, which was tedious physical work. It was difficult for the plant to hire enough workers.

A leading scholar from CUHK's Department of Mechanical and Automation Engineering (MAE), Professor Liu and his robotics team had been invited by the plant owner to see how robots could help make operations more efficient. "We went on to visit many other recycling factories in the New Territories. The more we saw, the more we believed there was great potential for getting robots to do the job," he says. "At the same time, some companies in the recycling industry were interested in collaboration. So we started to develop the technology."

Building on technologies including grasping and sensing, which the Centre's team had been researching for years, they invented an intelligent, high-speed solid-waste sorting system. Using eight such systems, the plant in Yuen Long, processing 150 tonnes of scrap metal a day, is able to save more than 70 per cent of its costs compared to deploying workers for the same task. It can recover its investments in the systems in 11 months.

The technology has been licensed to SOTA Robotics, a start-up set up earlier this year by Professor Chen. The company is Hong Kong's first provider of automated robotic waste sorting solutions.

"We do a lot of investigations in the market to identify the demand for robotics in different industries," Professor Liu says. "We often go out to talk to industrial leaders in Hong Kong and the Greater Bay Area to understand their needs. Sometimes they come to us with special requests like the recycling plant. When we see a potential demand, we explore the technology for commercialisation."

## Pooling expertise

The Centre, founded in 2020 under the Hong Kong government's InnoHK initiative, focuses on the research and development of robotics and artificial intelligence technologies for the "future workplace" as well as innovative solutions to pressing problems in the logistics industry, a key pillar of Hong Kong's economy, such as manpower shortages and soaring labour costs. The University of California, Berkeley contributes research.

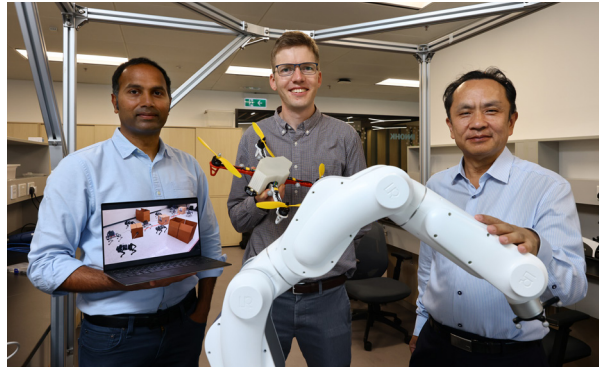
The Centre runs four research programmes: robust sensing and perception; human-robot collaboration; smart manipulation robots; and unmanned logistics vehicles. They are steered by 20 principal investigators: 15 engineering professors from CUHK and five from UC Berkeley.

The head of the Centre, Professor Liu has long established himself in the field of logistics robots, his signature innovation being the world's leading vision-based autonomous forklift. Hundreds of projects have been deployed around the world by VisionNav Robotics, a global manufacturer of autonomous industrial vehicles he set up with some of his students. Professor Liu has also helped developed China's largest smart warehouse for Cainiao, a logistics company owned by e-commerce giant Alibaba, in the city of Wuxi. It deploys automated guided vehicles developed by Professor Liu's team, including smart forklifts and sorting robots.

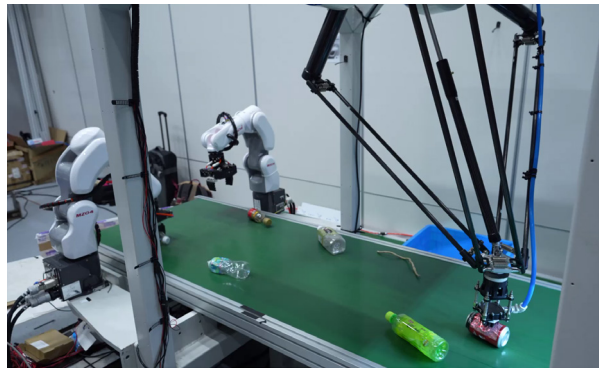
## Smart building inspections

Apart from the waste sorting start-up, the Centre has just launched another company, CU-Tech Limited, which provides building inspection services using unmanned systems technology, commonly known as drones.

Professor Chen Benmei and Professor Chen Xi from the Department of MAE, who developed the system, note that there is a sizeable demand for efficient building inspection services in Hong Kong, where about 60% of private buildings are older than 30 years.



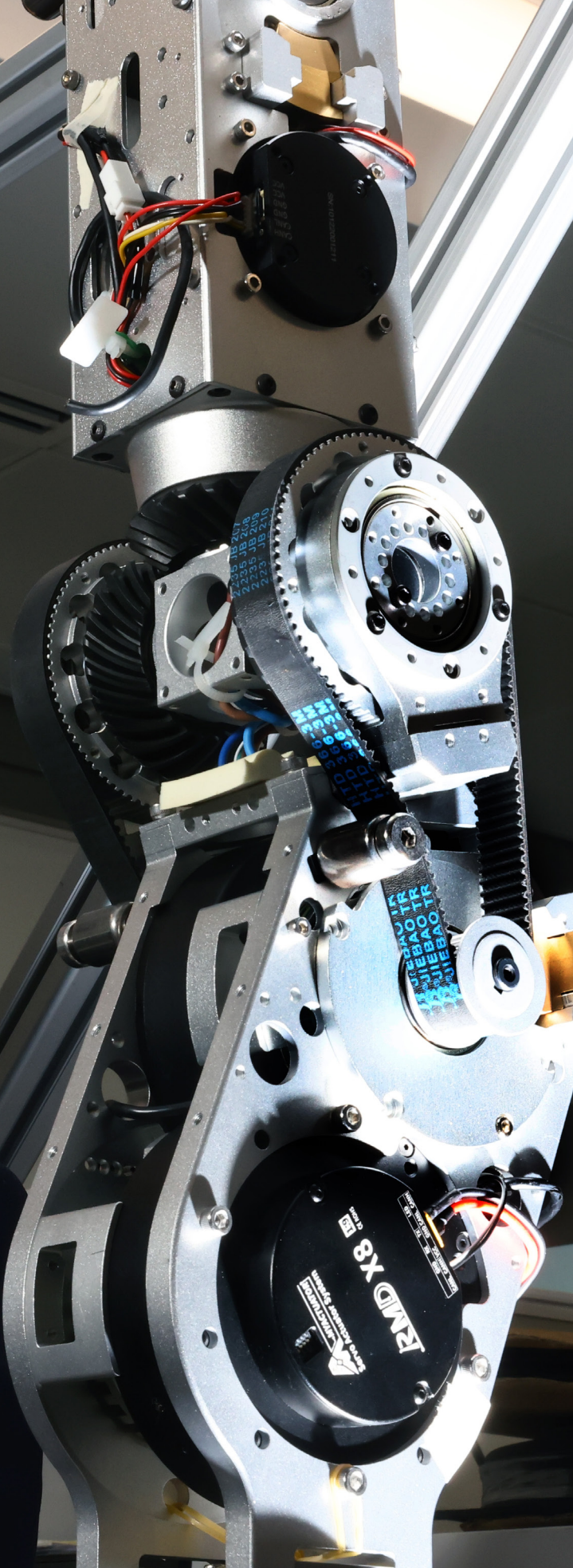
(From left) Professors Koushil Sreenath and Mark Mueller from UC Berkeley came to meet their CUHK collaborators in July



A solid-waste sorting system developed by SOTA

Professor Chen Xi says: "Traditionally, the industry needs to erect scaffolding and send workers at heights to identify, with the naked eye or hand-held tools, defects on the exteriors of a high-rise. But drones can do a much more accurate, faster and safer inspection. This will be the key step in collecting data for building owners to decide whether repair works are needed."

The automated inspection and information system can first plan a flight path for the cooperative drones, with algorithms written by the team, to conduct a comprehensive survey of a building's facades within a shorter period of time than existing systems on the market, which rely on human control. When operating with three drones, the system can save at least two-thirds of the time to conduct a fully autonomous inspection, compared to a single-drone manual operation.



After the inspection, the system will generate digital models and reports evaluating the building's structural and thermal performance with the assistance of artificial intelligence. Compared to the traditional method of deploying workers, the system can lower the inspection cost by at least a third and minimise human-related safety risks.

The team is in talks with government departments and private property management companies about using their services.

### 'Power suits' give workers a boost

Where robots cannot replace humans, scientists can still come up with ways to make them work closely together. A project led by Professor Liao Wei-hsin, aims to develop a lightweight, economical robotic exoskeleton for workers in different sectors. Worn over the torso and upper legs, the exoskeleton supports the spine and helps lift heavy loads and prevent lower back pain and injury.

"Lower back pain is the number one occupational injury among industrial workers worldwide," says Professor Liao, chair of the Department of MAE.

"Exoskeletons could be widely applied among workers



One of the exoskeleton models being developed by the Centre



who need to carry heavy loads, such as airport workers, construction workers and hospital nurses, but there is still a lot of room for further research and improvement to make an exoskeleton comfortable to wear and easy to move around in."

While models developed by companies in Germany, Japan and the US are available, a cheap, flexible generic solution is still lacking, Professor Liao notes. The models being developed by his team are built with a magneto-rheological series elastic actuator he invented, which can generate large controllable braking torque while consuming little energy. They also provide assistance with asymmetrical bending that involves axial twisting, a feature that is lacking in most existing products. His team is investigating the needs of customers while improving the designs. It aims to develop a series of new exoskeletons by 2025.

## Robots in the future

Looking ahead, Professor Liu says the Centre will consolidate its position as a key robotics technology developer while catering to the needs of Hong Kong's service industry.

The Centre has been developing technology to build robots that can take up tasks such as serving dishes in restaurants and folding blankets in hotel rooms. It is discussing collaboration possibilities with many business partners.

Robots could also go into people's homes, he adds: "I imagine that in 20 years, every family will have a robot to help around the home with tasks such as cleaning the floor, cooking and washing. Having a robot at home could be as common as owning a private car."

But robots will not be able to take over from humans completely, he cautions. "Human muscles are unique. Presently there is no material available to build robots that is as lightweight as human muscles while outputting the same level of energy.

"What core technology we should develop, and how we define a robot: these are things we are constantly thinking about."



“

We often go out to talk to industrial leaders in Hong Kong and the Greater Bay Area to understand their needs. When we see a potential demand, we explore the technology for commercialisation.

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**Professor  
Liu Yun-hui**

**Director,  
Hong Kong Centre for  
Logistics Robotics**

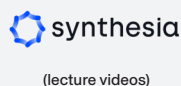


# GenAI and the future of university education

Artificial intelligence (AI) technologies are penetrating almost all aspects of our lives, from smart home devices to customer service chatbots to learning assistance. Generative AI (GenAI) has been hotly discussed in the education sector due to its potential in teaching and learning. CUHK believes that it is crucial for teachers and students to embrace and become acquainted with AI to optimise their work.

ChatGPT, a GenAI system that simulates human conversation, has rapidly been widely adopted since its public release in late 2022. GPT stands for "Generative Pre-trained Transformer", and the system uses natural language processing models to learn from large text datasets and internet data. It can generate a compelling, coherent output in response to a question or prompt in the teaching and learning processes.

## AI tools for educators (general)



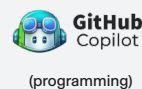
(lecture videos)



(AI content detection)



(slides)



(programming)



(images)



(workflow)

## AI tools for educators (research)



(AI research)



(search peer-reviewed sources)



(search citations and context)



(powerful research optimisation tools)



(query PDFs directly)

(Courtesy of Professor Irwin King, Chair of CUHK's Department of Computer Science and Engineering)

As GenAI in education is an emerging topic, teachers and students need continuous interdisciplinary discussion and collaboration to identify the best practices and navigate this evolving tech wave. CUHK's Centre for Learning Enhancement And Research (CLEAR) has initiated the AI in Education project, in partnership with five other local higher educational institutions, to build a collaborative community of seasoned educators and technical experts who can provide practitioners with the necessary support and resources to leverage AI tools for innovative pedagogy.

Dr Christopher See of the Faculty of Medicine leads the AI for Education Community of Practice at CUHK. He has developed the Artificial Intelligence Support System (AISS) chatbot to teach anatomy. It allows for two-way conversations with students, both answering their questions about anatomy and asking questions, while providing instant feedback. Participants said it increased their confidence in their anatomical knowledge. In their qualitative feedback, students reported that they were more comfortable making

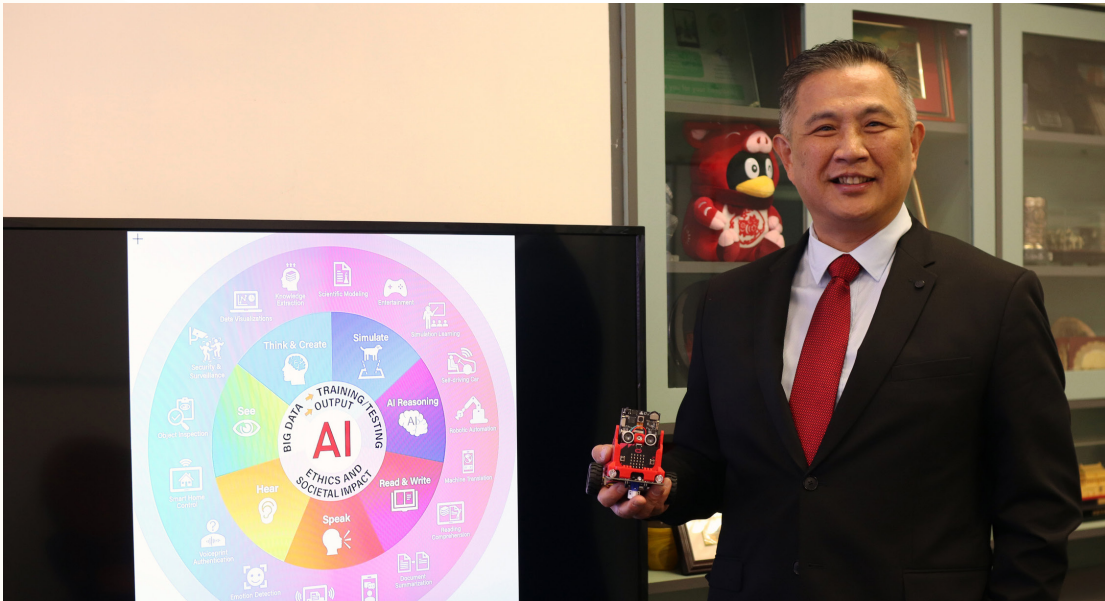
mistakes conversing with the AI compared to conversations with human teachers.

Despite the promising potential of GenAI in education, challenges such as academic integrity and ethical considerations require ongoing dialogue among cross-disciplinary experts. The Generative AI Insights conference and Policies and Practices for GenAI in Education: From Pedagogical Innovation to AI Plagiarism seminar took place in June and August 2023 respectively. The events gathered top scholars from diverse disciplines to explore the possibilities and challenges brought by rapidly evolving AI technologies in the education sector.

Among the speakers was the seasoned AI expert Professor Irwin King, Chair of CUHK's Department of Computer Science and Engineering. He is also the Director of Centre for ELearning Innovation and Technology (ELITE), and the Principal Investigator of The Knowledge and Education Exchange Platform (KEEP) and VeriGuide, software that aims to tackle the problem of plagiarism with its similarity detection capabilities.



Dr Christopher See of the Faculty of Medicine has developed the AISS chatbot to teach anatomy (Courtesy of Dr See)



Professor Irwin King, Chair of the Department of Computer Science and Engineering, has led several projects that involve AI: the AI Media Analytics Framework, the AI Interview System, Virtual Teaching and Learning, and VeriGuide (Courtesy of Professor King)

Professor King mentioned the powerful capabilities of GPT-4, including more advanced image inputs as well as greater reliability and nuance. He also remarked on the common fear about academic integrity among teachers. “A more effective strategy is to have the AI walk you through the writing process step by step, coming up with outlines, arguments and ideas. The ideas are computer-generated while the prose is the student’s own,” he said. He advised that faculty members could ask students to evaluate the prompts they give GPT and bring something of themselves into their assignments. “What’s more important is to use AI to think with you, not for you.”

He revealed two AI projects KEEP is working on: AI-based assessment and an AI interview system. Both of them leverage the technologies of natural language processing, video analysis, data analytics and data encryption. The AI Served Assessment Platform (ASAP) aims to relieve teachers’ workload

by automating the learning evaluation process, shortening the time taken by course review. The AI interview system Tellus offers intelligent insights and personalised assessments. “The system reduces the time and effort of analysing interviews. It helps identify key attributes while comparing candidates,” he said. “Students can use it as an educational tool, while administrative staff can use it for hiring and student admissions.”

He also mentioned that VeriGuide can help uphold academic integrity in the age of AI. “Claiming others’ work or ideas as your own, including content generated by AI, is plagiarism. Traditional plagiarism involves evidence such as online sources and academic journals. Using AI to plagiarise doesn’t leave the same type of evidence.” To help teachers detect AI-assisted plagiarism in assessments, Professor King’s team will launch an upgraded version of VeriGuide, which will integrate an AI writing detection feature.

# What counts as human-generated content?

Human writing with **AI corrections** for spelling and grammar

The Observatory **predicts** that Super Typhoon Saola will be closest to Hong Kong on Saturday and has **said** it will issue a storm warning **in** the next couple of **days**.

"As Saola may interact with Tropical Cyclone Haikui, located to the east of Saola, the **subsequent** movement of Saola **has** rather high uncertainty," the Observatory said.

**100.0%**

Percentage of the Paragraphs Likely Generated by AI



## Details

[Go Back](#) >

Chunk	Score	Is the Prediction Correct?
The Hong Kong Observatory warned that Super Typhoon Saola may come to the city on Saturday. There is uncertainty in predicting the storm's path due to its interaction with Tropical Cyclone Haikui, located east of Saola. The Observatory will monitor the situation closely and provide public warnings over the next few days.	AI	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
If a storm is expected to hit, protect your property by securing loose objects. Stay informed by checking the Hong Kong Observatory website or social media accounts. Take necessary precautions and stay safe!	AI	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>



To encourage sensible and critical use of AI tools among students, CLEAR, the Information Technology Services Centre and ELITE will arrange workshops on the use of GenAI in education. The University has also prepared the Guidelines on the Use of Artificial Intelligence Tools in Teaching, Learning and Assessments. This is not only intended for educational purposes, but also to further students' future professional development and advancement, so they can thrive in the AI era.

The guidelines encourage students to learn and use AI tools responsibly and ethically. As a general principle, they are expected to complete all coursework and formative and summative assessments independently, without the use of AI tools or other forms of unauthorised assistance, unless specifically permitted. Proper use of the tools

includes refining their prompts for more sophisticated outcomes and cross-checking the outcomes with reliable sources. The guidelines will be reviewed and updated as needed to reflect changes in technology and best practices, and other relevant developments.

AI literacy and soft skills such as creativity and critical thinking are core to higher education. "As a pioneer in machine learning and artificial intelligence research, we will continue to leverage our edge and use innovative and breakthrough technologies to optimise our teaching strategies and course content. Students that are equipped with digital knowledge and creativity will be primed for success in tomorrow's economy," said Professor Rocky S. Tuan, Vice-Chancellor and President of CUHK.



# Appointments

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## University officers and senior staff



Ms Elaine Tam Yi-lam



Mr Benjamin Meunier



Professor Kwan Mei-po

		Name	Period
New	Director of the Office of Student Affairs	Ms Elaine Tam Yi-lam	3.4.2023—2.4.2026
	Librarian	Mr Benjamin Meunier	6.4.2023—5.4.2026
	Head of Chung Chi College	Professor Kwan Mei-po	1.8.2023—31.7.2027
Re-appointed	Pro-Vice-Chancellor/ Vice-President (Education)	Professor Poon Wai-yin	1.5.2023—30.4.2026
	Vice-President (Administration)	Mr Eric Ng Shu-pui	1.5.2023—30.4.2026
	Pro-Vice-Chancellor/ Vice-President (Research)	Professor Sham Mai-har	1.8.2023—31.7.2026

## Emeritus professors

10.1.2023



Professor Max Meng Qinghu  
Department of Electronic Engineering

6.5.2023



Professor Yung Wing-ho  
School of Biomedical Sciences

1.6.2023



Professor Icy Lee Kit-bing  
Department of Curriculum and  
Instruction

1.8.2023



Professor David Christopher Ahlstrom  
Department of Management



Professor Juliana Chan Chung-ngor  
Department of Medicine and  
Therapeutics



Professor Chan Lai-wan  
Department of Computer Science and  
Engineering



Professor Chen Zhenyu  
School of Life Sciences



Professor Timon Du Chih-ting  
Department of Decisions, Operations  
and Technology



Professor Fung Tung  
Department of Geography and  
Resource Management



Professor Hui Sai-chuen  
Department of Sports Science and  
Physical Education



Professor Kwan Yiu-wa  
School of Biomedical Sciences



Professor Leung Ho-fung  
Department of Computer Science and  
Engineering



Professor Leung Seung-ming  
Department of Educational Psychology



Professor Ng Ho-keung  
Department of Anatomical and  
Cellular Pathology



Professor Shaw Pang-chui  
School of Life Sciences



Professor Tam Hong-wing  
Department of Sociology



Professor Xu Yangsheng  
Department of Mechanical and  
Automation Engineering



Professor Yu Chun-ho  
Department of Imaging and  
Interventional Radiology



Professor Zee Chung-ying  
The Jockey Club School of Public  
Health and Primary Care



Professor Zhang Jian  
Department of Chinese Language and  
Literature



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low quality

Extremely  
high quality

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Please circle as appropriate.

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at all

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useful

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**3. How likely is it that you would recommend *The Chinese University Bulletin* to a friend or colleague?**

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at all

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likely

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The Chinese University of Hong Kong

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