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Taking the Lead in Innovative and Impactful Education

PolyU Education 4.0: Putting Students in the Driving Seat with AI

Advancing National Priorities through Innovation, Education and Connection

The Hong Kong Polytechnic University Magazine

Contents

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President's Message

Jin-Guang Teng
President
The Hong Kong Polytechnic University

One of our enduring priorities is to sustain PolyU's leadership in cutting-edge research that delivers tangible benefits to society. Recently, this dedication was underscored when we secured funding support for four high-impact research projects in the third round of the Research, Academic and Industry Sectors One-plus (RAISe+) Scheme of the Government of the Hong Kong Special Administrative Region. Spanning critical areas from advanced manufacturing and quantum technology to cybersecurity and artificial intelligence, these projects demonstrate significant potential to address pressing real-world challenges, a true testament to the University's strength in research and knowledge translation.

Adding to this momentum, a PolyU scholar was recently honoured with the prestigious BOCHK Science and Technology Innovation Prize (BOCHK STIP) for pioneering contributions to photonic information systems. Over four consecutive years, seven PolyU scholars have garnered six BOCHK STIP awards, a remarkable achievement that reinforces our standing at the forefront of innovation and technology.

Parallel to our research endeavours, we continue to lead in delivering world-class education by introducing dynamic new programmes tailored to meet evolving societal needs. A prime example is our newly launched Master of Technology Entrepreneurship programme. This programme is carefully designed to equip students with the real-world skills for the creation of start-up companies and strategic mindset required to transform research outcomes and innovative ideas into successful ventures, nurturing the next generation of visionary leaders in the tech industry.

Looking ahead, PolyU will proudly celebrate its 90th anniversary in 2027, with a vibrant series of celebratory activities commencing in November 2026. To commemorate this milestone, we have launched the "90 Scholars for the 90th Anniversary" campaign to recruit 90 world-class academics over the next three years to further strengthen our academic excellence.

As we approach our 90th anniversary, let us build on the momentum of our achievements, embrace new opportunities, and champion bold and innovative ideas that will shape PolyU's next chapter and leave a lasting impact on society in the years to come.

PolyU Education 4.0:

Reimagining Healthcare Education through Innovation and Technology

Healthcare education stands at a critical turning point. The challenges facing global health systems are growing more complex, the shortage of medical professionals is deepening, and conventional teaching methods are failing to fully bridge the gap between theory and clinical reality. More effective approaches are no longer optional—they are essential.

Image generated with AI

A new era for healthcare pedagogy

Yet this moment of challenge coincides with a moment of extraordinary opportunity. Advances in technology and artificial intelligence (AI) are opening new pathways for training healthcare professionals who are not only technically competent but also empathetic, adaptable, and prepared for the unpredictability and fast pace of real-world practice.

The Hong Kong Polytechnic University (PolyU), through its Education 4.0 initiative—which integrates AI and smart technologies into a student-centred approach—has been at the forefront of this transformation. From immersive environments that place students inside lifelike clinical scenarios to AI systems that personalise every learner's journey, PolyU is demonstrating what the next generation of healthcare education can look like.

Immersive learning for real-world readiness

Central to PolyU's healthcare education approach is the Hybrid Immersive Virtual Environment (HiVE), the world's first large-scale mixed-reality hybrid classroom, located at the University's Industrial Centre (IC).

HiVE is a fully reconfigurable immersive space that can foster not only technical skills but also cultivate the humanistic qualities—empathy, composure, communication—that define excellent healthcare. PolyU professors have leveraged the innovative facility to teach in several powerful ways.

HEROCARE: Reducing fear and sedation in paediatric radiotherapy

Radiotherapy can be an intimidating experience for young children. Large machines, loud noises, and the requirement to remain perfectly still often necessitate sedation or general anaesthesia.

Led by Professor Shara Lee, Associate Professor of the Department of Health Technology and Informatics (HTI), in collaboration with the IC engineering team, HEROCARE addresses this real and difficult clinical challenge by using HiVE to simulate the treatment environment with a customised workflow for each child.

Children are gently introduced to calming experiences—such as stargazing—before gradually transitioning into a simulated treatment setting. By rehearsing the process in this safe, immersive setting, they become more prepared, calmer, and more cooperative during actual treatments. The programme also enhances the empathy and patient-centred competencies of future radiographers, providing them with hands-on experience that conventional classroom teaching cannot replicate.

The outcomes have been transformative. Among 81 paediatric patients, the programme achieved an 84.1% reduction in anaesthesia or sedation use, alongside measurable reductions in parental anxiety. The average treatment time per fraction decreased by over 83.3%, resulting in total estimated savings exceeding HKD 20.93 million for both hospitals and families.

HEROCARE was awarded the Silver Medal in the Nurturing Values and Ethics category at the QS Reimagine Education Awards 2024, and the Global Excellence Award and the Impact Catalyst Award at the Hong Kong Arts and Sustainable Design Association International Sustainable Design Awards 2025—recognising its dual impact on education and real-world healthcare delivery.

HEROCARE utilises HiVE to enhance the physical and emotional well-being of paediatric cancer patients.

HiVE CPR Drill: Redefining large-cohort emergency skills training

Traditional cardiopulmonary resuscitation (CPR) training suffers from two fundamental limitations: it cannot replicate the chaos and psychological pressure of a genuine emergency, and classroom constraints mean only a handful of students can practise meaningfully in a session. The HiVE CPR Drill tackles both problems head-on.

Students enter not a classroom but a highly realistic simulation of Nathan Road depicting a mass casualty road traffic accident—complete with ambient street noise, realistic smells, visual chaos, and up to eight wireless manikins, each with individually configurable physiological conditions.

An entire cohort of 120 students can complete meaningful, hands-on CPR practice within a single 2-hour session—a scale of delivery that conventional training simply cannot match. Students must triage victims, perform CPR, manage bystanders, and sustain efforts under time pressure that mirrors an actual emergency response window. The system captures real-time performance data and provides each student with individual feedback on compression depth, rate, and interruptions.

Most significantly, these training sessions produced a statistically significant increase in willingness to perform chest compressions on a stranger. This shift in mindset is life-changing; in the critical minutes before paramedics arrive, it is often a bystander's readiness that saves a life.

Future enhancements will include an AI chatbot integrated with virtual characters, allowing students to practise verbal commands and leadership skills during the scenario.

Students are presented with a realistic emergency situation with real-time performance data under the HiVE CPRDrill.

High-fidelity simulation for advanced clinical training

Professor Shirley Ngai, Associate Head and Associate Professor of the Department of Rehabilitation Sciences (RS), whose pioneering contributions to allied healthcare education were recognised with the 2025 University Grants Committee Teaching Award and the PolyU President's Award for Outstanding Achievement 2025, has also been employing HiVE and VR/AR technologies to transport students into realistic hospital settings, working through clinical scenarios that give them an authentic sense of what practice looks and feels like before they ever set foot on a ward, bridging the gap between theory and the real-world.

Physiotherapy students receiving intensive training in a high-fidelity simulation ward

For students at a more advanced level, Professor Ngai has promoted high-fidelity simulation laboratories that offer more intensive training, where students work with sophisticated manikins whose vital signs can be adjusted in real time by instructors. These sessions demand clinical reasoning and on-the-spot decision-making under realistic pressure, while also allowing students to practise complex procedures and responses in a safe environment without risking harm to real patients.

Crucially, each simulation is followed by a structured debriefing, providing students with personalised feedback that supports continuous improvement. The combination of technological tools and staff guidance creates a training experience that is both immersive and pedagogically rigorous, ultimately contributing to improved patient care outcomes.

Immersive anatomy in the metaverse

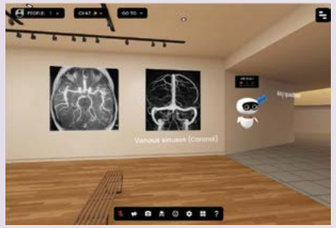
The "Metaverse Gallery for Brain Imaging Anatomy", developed under the leadership of Professor Helen Law, Associate Head and Associate Professor of HTI, is another powerful demonstration of immersive pedagogy.

Traditional online learning often presents content through flat screens, limiting engagement and collaboration. This "gallery" reimagines education by harnessing the metaverse to transform passive study into an active, three-dimensional adventure. Students can explore a dynamic digital space, moving beyond static diagrams to interact with educational content.

This space provides specialised hubs for complex subjects. For instance, students can walk through the medical imaging anatomy module, visualising the human body layer by layer in a way impossible in a textbook.

Interaction is further enhanced through an integrated AI chatbot, acting as a 24/7 guide to answer questions and provide instant feedback.

To reinforce concepts through play, the gallery also embeds interactive minigames that turn assessment into an engaging challenge. By combining exploration, conversation, and gamification within a persistent virtual world, this project demonstrates how the metaverse can drive deeper understanding and foster a genuine sense of presence and community in next-level online learning.



An area in the immersive "Metaverse Gallery for Brain Imaging Anatomy" about Magnetic Resonance Imaging

The AI advantage: personalised and adaptive pathways

Alongside immersive technologies, PolyU is advancing AI-driven learning systems that personalise education and support students more effectively. In healthcare education, where learners must master large amounts of complex information, AI can help students progress at their own pace while receiving timely feedback and targeted support.

Professor Ngai, in collaboration with a team at the Hong Kong University of Science and Technology, has developed an AI-powered tutoring system focused on areas such as anatomy and cardiopulmonary disease management.

The system provides real-time interactive feedback through quizzes and conversational learning, allowing students to ask questions and receive instant, tailored responses. A backend analytics engine tracks engagement patterns and learning progress, enabling the platform to adapt the content it delivers to each student's needs. Mobile learning applications further extend this flexibility, allowing students to access interactive educational resources at any time and from any location.

Another initiative is the Learning Activity Management System (LAMS) with generative AI, led by Professor Wong Chi-ming, Associate Professor of HTI, which has been utilised by medical laboratory students.

Rather than delivering identical content to every student, LAMS constructs personalised, syllabus-aligned learning pathways while preserving staff oversight. Staff define learning outcomes and approve materials, and the system recommends targeted resources, provides real-time progress dashboards, and enables students to study independently, collaborate with peers, or receive AI-guided tutoring—all under teacher supervision.

Post-survey evaluations show that over 84% of students rate LAMS's effectiveness positively, with real-time progress tracking emerging as the most valued feature. In one course, *Cells in Health and Diseases*, students who used LAMS achieved significantly higher average final scores than those who did not, further underscoring the platform's effectiveness.

By integrating knowledge across different healthcare domains and academic years, LAMS also addresses a critical need: ensuring students can recap and synthesise interdisciplinary insights essential for informed clinical decision-making.

AI-powered platforms enhance students' understanding of healthcare.

Shaping the healthcare leaders of tomorrow

The initiatives outlined here represent more than incremental improvements—they signal a fundamental shift in how healthcare professionals are trained. By combining immersive simulation with AI-driven personalisation, PolyU is producing graduates who are not only clinically skilled but emotionally resilient, ethically grounded, and ready to lead in complex, high-pressure environments.

As healthcare systems worldwide contend with mounting demands, the lessons emerging from these innovations carry relevance far beyond any single institution. They point towards a future in which technology does not replace the human heart of healthcare education but amplifies it—ensuring that every student is better prepared, every patient is better served, and the gap between the classroom and the clinic continues to close.

PolyU Education 4.0:

Putting Students in the Driving Seat with AI

PolyU Education 4.0 is redefining learning and teaching through a student-centred, AI-enabled approach that is driving innovation across disciplines. From the Department of Applied Social Science's partnership-based pedagogy to the Department of Land Surveying and Geospatial Science's discipline-specific tools, the initiative combines University-wide platforms with tailored solutions to meet diverse learning needs.

Image generated with AI

Over 170 years ago, the English cleric and scholar John Henry Newman argued in his classic work *The Idea of a University* (1852) that education must extend beyond the mere transmission of facts or preparation for a profession. It should educate students to question, judge, and seek truth. That ideal remains strikingly relevant today. While artificial intelligence (AI) can now deliver instant answers, access alone does not foster understanding, wisdom or sound judgment.

Today, a more pressing challenge has emerged: not the scarcity of knowledge, but its overwhelming abundance. As information floods every screen, the question is no longer how to obtain, but how to interpret, evaluate, and apply it with purpose. What if students could move beyond receiving knowledge to shaping how they learn? This vision lies at the heart of PolyU Education 4.0 (PolyU E4.0), a student-centred model that redefines learning and teaching through the integration of AI and smart technologies, and a more personalised experience.

From learners to co-creators

University students are digital natives nowadays, reshaping how learning happens. Educators must rethink teaching to engage and empower them through technology. Creating flexible learning environments that work across disciplines and support diverse needs anytime and anywhere remains a key challenge in higher education. To address this, Dr Rodney Chu, Senior Lecturer in the Department of Applied Social Sciences (APSS), and his team have developed a technology-mediated pedagogy to enhance learning and teaching outcomes.

True to the vision of PolyU E4.0, which places students at the centre of the learning experience, Dr Chu's pedagogy moves beyond the traditional model of attending lectures and absorbing content. Instead, students are encouraged to work critically with AI tools and smart technologies, contribute to course design, and generate new ideas as they take greater ownership of their learning.

"We want students to move beyond being passive learners in the classroom and instead apply what they learn in real-world contexts, making meaningful contributions to the communities and issues they care about," Dr Chu says.

A key component of this approach is the Student-Staff Partnership (SSP) model, which focuses on shared responsibility and flexibility across disciplines. It promotes collaborative, community-based learning and redefines the roles of both students and educators. Within this model, students take an active role in shaping knowledge and contributing both within and beyond the classroom. As Dr Chu notes, the aim is for students to be more than "a learner sitting in the classroom", encouraging them to make meaningful contributions even outside scheduled learning.

TIMS framework that keeps the approach adaptable

A key strength of this pedagogy lies in its flexibility within a clearly defined framework. It is supported by the TIMS framework—Technology Integration, Interdisciplinary Collaboration, Multimodal Assessment, and Student-Staff Partnership—which provides clear direction while allowing adaptability across disciplines.

Dr Chu notes that different disciplines require different approaches. Social science may involve fieldwork, while computer science may not. Rather than imposing a one-size-fits-all model, this framework accommodates such differences, enabling students to see the relevance of their learning in context. It also supports educators using AI purposefully, ensuring learning rather than being used without clear value.

VAT: using generative AI to extend learning support

One of the most visible implementations is the Virtual Assistant TIMS (VAT), a generative AI chatbot, launched in early 2024 as generative AI expanded in education. VAT does not replace educators. Instead, it supports their work by giving students immediate access to tools such as lecture summaries, podcasts, multimodal search, and instant Q&A.

Early performance data is encouraging, with strong engagement metrics. VAT responds in about 11 seconds, and its answers are, on average, 16 times more detailed than the students' original questions. Students also engage in sustained exchanges, averaging 10.9 interactions per session. These interactions generate valuable insights into students' learning needs and interests, which are used to refine courses and teaching approaches based on what they are asking and exploring.

As a result, students receive faster and more detailed support, while staff gain a clearer understanding of learning needs—turning student activity into continuous improvement.

Students shaping the platform and the learning community

The platform becomes more impactful when students contribute not only as users, but as partners. To date, around 50 students from different departments have been recruited as campus partners, helping to develop the platform and support their peers. This ensures the tools remain student-centred in both design and use.

Student helper to co-develop an immersive learning platform outside the classroom

In the 2025/26 academic year, 12 student helpers from six departments across four faculties and schools co-produced more than 70 podcasts. This scale of collaboration shows that when students help create content, learning becomes more connected, diverse, and aligned with real academic interests.

"What is especially meaningful about this model is that it helps build a learning community beyond individual cohorts," Dr Chu says. "Students contribute through peer mentoring—for example, fourth-year students support newcomers—and some graduates even continue to stay involved."

Recognition through QS Awards, other awards in Asian regional competitions, and academic conferences suggests that this approach is more than a short-term initiative. It is developing into a flexible model that can be applied more widely. International collaborators—with partners such as Goldsmiths, University of London, and the University of Toronto—reinforce a shared view: students thrive as co-creators, and this benefits the wider academic community.

Department-led innovation: student-centred AI in geomatics

While PolyU E4.0 provides a strong foundation for transformation, it continues to evolve across disciplines, with departments adapting its principles to their unique contexts. Different disciplines are developing customised approaches that reflect their own teaching methods and learning cultures. While the core principles remain consistent, each discipline applies them in ways that suit its subject and students.

A clear example can be seen in the Department of Land Surveying and Geospatial Science (LSGS). Under the leadership of Professor Chen Wu, Chair Professor of Satellite Navigation and Head of LSGS, the department is taking a thoughtful and forward-looking approach to AI integration into both teaching and research.

Geomatics is built on spatial data, spanning field measurements, camera imaging, remote sensing, and geographic information systems. In this context, AI is not simply an added tool, but a natural evolution in how data is collected, analysed, and applied. LSGS recognises that future professionals will need to be as fluent in AI as they are in traditional geomatics methods.

This perspective shapes how students learn. AI is embedded in the learning process, with a strong emphasis on critical engagement and responsible use. Students are encouraged to question AI-generated outputs, examine underlying assumptions, and apply them thoughtfully in real-world geospatial contexts. Used as a supporting tool rather than a substitute for thinking, AI enables learning to become an active process of experimentation, analysis, and informed judgement.

Ethics, integrity, and responsible innovation

Students are introduced not only to AI tools, but also to the ethical framework governing their use. As spatial data can be sensitive, topics such as privacy, data security, and compliance with relevant policies and regulations are treated as core components of the curriculum. Academic integrity is also clearly defined. When students use AI in their work, they are expected to acknowledge and reference it appropriately. AI is positioned as a supporting tool—for developing ideas and enhancing analysis—instead of replacing critical thinking.

Through this approach, students develop more than technical skills. They learn to practise responsible innovation, recognising that professional capability includes judgement as well as technical output.

GeoAI Mentor: turning answers into exploration

This approach is already visible across the curriculum. Eighteen of LSGS's 33 subjects now include AI elements, giving students regular opportunities to shape their learning.

A prime example is GeoAI Mentor, which transforms access to Hong Kong's government-backed Common Spatial Data Infrastructure (CSDI) portal—a smart city platform launched in 2022 that centralises spatial data from Hong Kong government departments, such as transportation, land use, and water management. While the core infrastructure is in place, CSDI has faced challenges with data accessibility for non-specialists.

Instead of navigating complex systems or following fixed workflows, students can ask questions in natural language and generate analyses with visualisations via GeoAI Mentor. This shifts the role of the learner. Students define their own lines of inquiry rather than simply follow instructions. In this way, GeoAI Mentor becomes less a tool that delivers answers and more a platform for exploration, supporting deeper and more active engagement.

AI-Tutor and IntelliPBL: smarter learning support

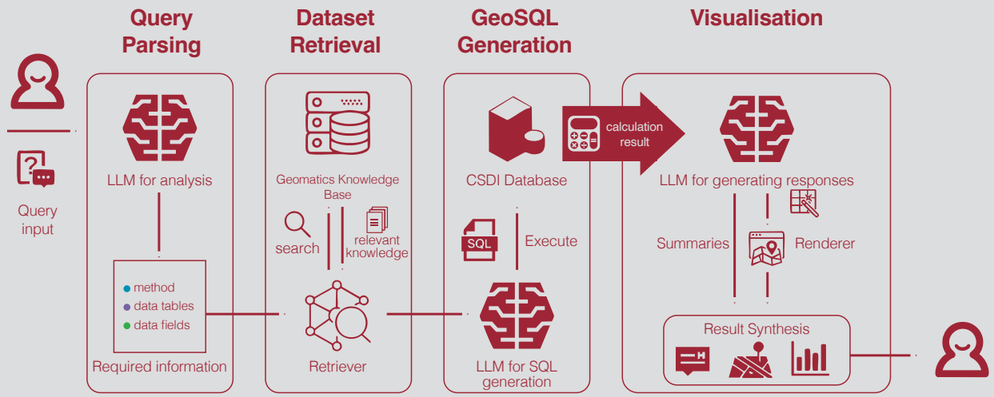
Alongside GeoAI Mentor, LSGS offers the Spatial Data Science AI-Tutor, an LLM-powered education platform developed with the Department of Computing. This tool acts as a 24/7 learning companion, providing support across key areas of geomatics. Drawing on textbooks, research publications, and course materials, it delivers responses grounded in reliable domain knowledge. It also allows students to learn at their own pace—revisiting topics, testing ideas, and seeking guidance beyond class time.

LSGS further strengthens collaborative learning through IntelliPBL, an AI-powered platform for cross-disciplinary project management and authentic assessment. While group projects offer strong learning value, they can also present challenges in coordination and participation. To address this, IntelliPBL uses a survey informed by Myers-Briggs Type Indicator (MBTI), a personality-type framework, to form balanced teams with complementary strengths.

In group projects, IntelliPBL supports teamwork from planning to completion through scheduling, milestone tracking, and risk identification. An AI-powered chatbot provides instant feedback and preliminary reviews before final teacher assessment, allowing students to refine their work iteratively. Already used in several courses, including a Service-Learning subject, IntelliPBL helps create a more responsive, student-driven environment where learners share ownership and build teamwork skills alongside subject knowledge.

Taken together, these initiatives point to a clear direction for education. Rather than replacing teaching, PolyU E4.0 encourages the use of AI to extend and enrich learning. It equips students not only to live with AI, but to think with it—to question outputs, consider ethical implications, and apply knowledge responsibly.

In doing so, students grow as learners and as socially responsible professionals and future leaders, who are ready to contribute, co-create, and apply knowledge in ways that advance innovation and benefit society.



From natural language query to geospatial insight, GeoAI Mentor streamlines complex workflows into accessible, visual reports.

Elevating the Art of Hospitality: A Look Inside Asia's Leading Tourism Education

From its humble beginnings in 1979, PolyU's School of Hotel and Tourism Management has evolved into a global centre of excellence in hospitality and tourism education and research. By fusing innovation with empathy-driven talent and utilising Hotel ICON as a "living laboratory", it remains at the cutting edge of the industry.

Dress Orange Day is organised annually by SHTM to celebrate the World Tourism Day championed by UN Tourism. On this occasion, SHTM staff and students wear orange, the School's colour, to demonstrate their unity and support for global tourism, and take part in the "Dress Orange Fashion Show"—a vibrant showcase of creativity, diversity, and talent that brings the School community together.

In ancient Greece, the concept of *Philoxenia*—literally "friend to the stranger"—described a spirit that elevates hospitality from mere service to forging profound human connections. This ethos of embracing the unknown with grace remains the animating force behind the hospitality industry's enduring success and serves as the foundational principle for PolyU's School of Hotel and Tourism Management (SHTM). Over its 47-year history, SHTM has evolved into a global cradle for hospitality leaders, transmitting ancient tradition into modern excellence.

The global hotel and tourism sector has faced a period of relentless volatility, from the challenges of the pandemic to the disruptive emergence of artificial intelligence (AI). Yet, amid these trials, Asia has emerged as the world's hospitality powerhouse, fuelled by rising affluence, a growing openness to new experiences, and an infrastructure boom. Positioned at the heart of this regional ascent, SHTM has become a leading force in innovation, navigating these trials with a focus on high-impact solutions.

The architect of a global vision

For 26 years, Professor Kaye Chon —Dean and Chair Professor of SHTM; Walter & Wendy Kwok Family Foundation Professor in International Hospitality Management—has served as the visionary architect of the School's transformative rise.

Professor Kaye Chon

- Dean and Chair Professor, School of Hotel and Tourism Management
- Walter & Wendy Kwok Family Foundation Professor in International Hospitality Management

Early in his deanship, Professor Chon led the School to realise its foundational mandate, "Leading Asia in Hospitality and Tourism", before swiftly propelling the institution towards a more audacious global horizon: "Leading Hospitality and Tourism".

Steering the School through a series of defining milestones, Professor Chon oversaw the 2011 debut of Hotel ICON—Asia's first full-scale teaching and research hotel—and cemented SHTM's status as a global powerhouse. For nearly a decade, the School has held the top spot in "Hospitality and Tourism Management" in the ShanghaiRanking Global Ranking of Academic Subjects, an achievement further bolstered by being ranked No. 1 in Hong Kong for "Hospitality and Leisure Management" in the 2026 QS World University Rankings.

For Professor Chon, however, true leadership is a mindset rather than a metric. "Leading, to me, is not just being ranked number one," he notes.

> Leading means pioneering every aspect—education and research—with a new paradigm of thinking.
>
> Professor Kaye Chon

This proven formula rests on a quartet of strengths: world-class academic staff, talented students, deep-rooted industry partnerships, and the vital backing of PolyU.

An Asian model takes shape

Central to Professor Chon's vision was the "Asian Paradigm"—a rejection of "pouring new wine into old bottles".

When he first joined PolyU, Professor Chon recognised that while Asia's tourism sector was surging, its educational models remained tethered to Western blueprints. "There were no institutions here to rival the renowned programmes in the United States or Switzerland. We needed our own model," he recalls. This led to the development of a curriculum uniquely attuned to the nuances of the Asian market, ensuring SHTM graduates possess a perspective that is both globally sophisticated and regionally expert.

The School's "dream team" of nearly 100 full-time academics includes 18 of the world's top 2% most-cited scientists in the ranking compiled by Stanford University in 2024, making SHTM a true hub of hospitality talent. Globally recruited, these scholars do more than teach; they empower a student body that now hails from 52 nations and regions. This is particularly transformative for Hong Kong's brilliant yet traditionally modest students. Though historically influenced by cultural norms of humility and a scarcity of local role models—when industry leadership was largely dominated by European expatriates—these students are now inspired to claim their place at the forefront of the global arena.

At its heart, SHTM is driven by a vibrant community spirit. The School takes pride in cultivating an environment where unity, collaboration, and harmony thrive between staff and students. By upholding these values, the School breathes life into PolyU's broader mission of shaping socially responsible professionals and leaders who step into the world with a deep sense of pride and belonging.
This academic rigour is matched by an unprecedented level of industry synergy. SHTM pioneered an admission process where hotel

As a proud tradition of SHTM, all staff members come together to extend a warm and heartfelt welcome to students on the first day of school.

general managers co-interview candidates, a practice rooted in the philosophy that these industry leaders are the ultimate users of the school's graduates. This creates a sense of genuine professional ownership that is deepened by high-level mentorships and internships. Professor Chon likens this collaborative ecosystem to a master chef inviting a VIP guest into the kitchen, "Guests love the food because they helped create it." Today, the industry champions SHTM graduates not merely as employees, but as their own.

This commitment to immersion culminated in PolyU's support for Hotel ICON—a campus landmark, a "living laboratory", and one of the only nine Hong Kong hotels to earn One MICHELIN Key in the inaugural 2025 MICHELIN Guide Hotel Selection. When visitors see Hotel ICON, they see the School, Professor Chon notes. "It is our most powerful advertisement, drawing students and scholars from across the globe to Hong Kong."

Learning that lives

The inception of Hotel ICON was an ambitious move, as the concept was untested in Asia. However, visionaries like Professor Chon and then-PolyU President Professor Poon Chung-kwong championed the project with unwavering faith. Their conviction was established in a singular goal: to instil students with the confidence that comes from professional mastery.

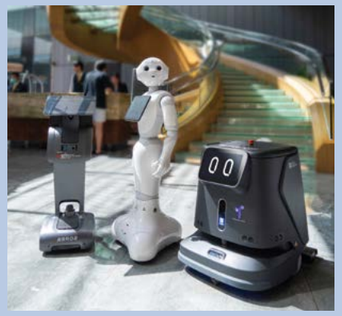
Today, Hotel ICON stands as a global benchmark for hospitality education. Its creation required a total pedagogical overhaul, seamlessly integrating live hotel operations into a large number of distinct subjects across all degree levels. In this environment, textbooks are complemented by real-time data. Students studying revenue management analyse live financial figures—data typically guarded as trade secrets. As Professor Chon notes, "Other hotels won't show you. This is confidential." Meanwhile, accounting students test their financial projections against the unpredictable, high-stakes realities of a five-star operation.

The living laboratory in motion

For Professor Chon, a world-class institution lies in its ability to translate theory into industry-wide transformation.

> Research is not just about publishing a paper; it is about creating impactful solutions.
>
> Professor Kaye Chon

As a living laboratory, Hotel ICON enjoys the experimental freedom corporate hotels lack, turning guest pain points into hospitality triumphs.



Hotel ICON introduces smarter guest experience solutions, delivering personalised services that enhance comfort and overall satisfaction.

A premier example is the abolition of the traditional minibar—a primary source of dissatisfaction due to billing disputes. Reimagining it as a complimentary gesture, the hotel added a witty sign: "You are not seeing double, the minibar is free." When students noted competitors were copying the idea, Professor Chon was undeterred, "That is exactly why we built this hotel. Let them copy; it forces us to remain innovative."

Research also identified a gap in tourism data: long-haul flights arriving hours before standard check-in. To support exhausted travellers, Hotel ICON created the Timeless Lounge, a sanctuary to shower and recalibrate. This human-centric approach extends to technology; the Hotel pioneered RFID key cards and intelligent motion sensors that maximise energy efficiency by keeping only essential power running when guests leave the room.

The digital frontier

While post-pandemic theories centred on a fleeting "new normal", Professor Chon remained sceptical of temporary behavioural shifts. To him, the true permanent transformation is a systemic digital evolution—one driven by labour shortages, technological leaps, and a tech-native generation.

To lead this shift, PolyU probably became the first university globally to require an Artificial Intelligence and Data Analytics course for all students. SHTM has further strengthened this commitment by drawing on the insights of the Research Centre for Digital Transformation of Tourism, ensuring that innovation remains grounded in high-impact research.

The School's curriculum is equally disruptive, featuring the world's first Master of Science in AI in Hospitality and an undergraduate specialism in smart tourism. By merging high-tech literacy with the ancient spirit of hospitality, SHTM ensures its graduates stay ahead of the curve, not merely reacting to the future, but actively engineering it. As Professor Chon notes, this forward-thinking approach is "transforming the industry completely".

Expanding the landscape of service talent

Beyond the traditional tourism sector, SHTM graduates have become the sought-after talents and leaders of service for the world's most prestigious brands. "We are not just selling products; we are selling human services," Professor Chon explains. From luxury retail and insurance to high tech and world-class hotels, SHTM talent is highly valued for their unique ability to blend high-tech efficiency with high-touch empathy.

At SHTM, the entrepreneurial spirit is lived, not merely taught. Such a culture of innovation inspires students to look beyond traditional employment towards actively shaping the future. "They are thinking of starting their own ventures," Professor Chon observes. By bridging the ancient virtue of *Philoxenia* with innovative research, SHTM does more than teach a discipline; it empowers a new generation to lead and redefine the global service landscape.

As a long-standing tradition of SHTM, graduates, together with the Dean and faculty members, march into the Jockey Club Auditorium to the sound of a pipe band playing ceremonial music, celebrating their academic achievements and the beginning of a new chapter.

Taking the Lead in Internationalising Education

PolyU is transforming its higher-education ecosystem, and elevating Hong Kong's appeal to international students

Education used to be considered a destination; something with a formal structure, and conducted in a particular location. Today, it's a journey, and rapid technological innovation is re-drawing the learning map, presenting students with a nearly infinite range of choices to chart their own paths.

As home to five universities in the world's top 100, Hong Kong is at the forefront of this transformation. The Government of the Hong Kong Special Administrative Region (HKSAR) is actively pursuing a vision of turning the city into an international hub for post-secondary education by promoting the "Study in Hong Kong" brand and expanding admission quotas for non-local students.

Internationalisation is also a core focus for PolyU, and its 2025/26-2030/31 Strategic Plan emphasises the importance of attracting more top students from the Chinese Mainland and around the world. The University is already rolling out a host of impactful initiatives. They include ensuring that all undergraduates graduating in or after the 2027/28 academic year participate in at least one non-local learning experience, and enhancing partnerships with overseas institutions for exchange and study opportunities.

> Our goal is to become an innovative world-class university that plays a significant role in the global educational landscape. We have already seen a substantial increase in the number of overseas students applying to our undergraduate programmes, reaffirming the University's potential as an important study abroad destination for international students.
>
> Professor Jin-Guang Teng, PolyU President

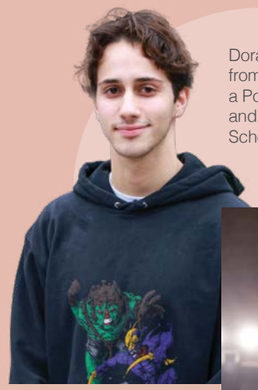
Making world-class education as accessible as possible

PolyU is determined to make top-notch programmes and rewarding university experiences as accessible as possible through a range of undergraduate support programmes, such as the PolyU Entry Scholarship. While many are available to local and non-local students who demonstrate academic and non-academic excellence, others have been created to foster a diverse learning environment that attracts students from around the world.

Through scholarships like the Belt and Road Scholarship offered by the HKSAR Government, together with donor contributions that established the Tan Siu Lin Foundation Belt-and-Road Entry Scholarship and the China Merchants Belt and Road Scholarship, the University is empowering students to pursue their studies and build lasting cultural connections.

These scholarships have drawn students from neighbouring South Korea, Indonesia, and Malaysia, and as far afield as Rwanda and Kyrgyzstan. They include PolyU Entry Scholarship and Belt and Road Scholarship awardee Dora Saylikoglu from Türkiye, who majored in Physics. He was captivated by PolyU's unique integration of artificial intelligence (AI) into the physics programme. He vividly recalls the moment he discovered the programme, and realised "almost no other institution could match it, and I thought, why wouldn't I take advantage of that?"

Image generated with AI



Dora Saylikoglu from Türkiye was awarded a PolyU Entry Scholarship and a Belt and Road Scholarship.

Dora on the catwalk at the "Threads of Unity: Belt and Road Fashion Show" during the PolyU Chinese Culture Festival 2025

He has found inspiration at PolyU's Aerospace Innovation Research Summit, and been impressed by the University's contribution to China's space programme, including multiple lunar sample return missions. "Space is going to be the next huge thing; anyone could play a role in it," says the aspiring rocket scientist, whose full scholarship means he can focus on his studies without any major financial worries.

PolyU students are even allowed to hold more than one scholarship concurrently within an academic year, provided the total value does not exceed their annual tuition fee, plus an allowance of HK$60,000. There are also special subsidies for exchange programmes, to enhance professional knowledge, support personal growth and unleash everyone's true passions and full potential.

An innovative curriculum for the AI era

PolyU's constantly evolving curriculum is designed to address changing societal needs, such as the emergence of AI and the global shift towards adopting smart technologies. It has helped propel the University to 50th place in the latest QS World University Rankings, sending a loud and clear signal to international students that a PolyU education is world-class and future-driven.

In September 2022, PolyU was probably the world's first university to make AI education compulsory for all undergraduates. More recently, the University is transforming learning and teaching by embedding AI and new technologies into a student-centred approach that fosters innovation and prepares students for the AI-driven age.

According to Professor Cao Jiannong, Vice President (Education), the AI-empowered curriculum embraces a future where technology supports interactive, flexible, and personalised learning.

"We are not replacing the human element of teaching; we are enhancing it. We are giving teachers and students new power to learn, to create, and to thrive," the internationally renowned computing and data science scholar says.

Cultivating a "global perspective"

Recognising the importance of cultivating a "global perspective" in an interconnected world, the institution is extending its educational partnership network at both the undergraduate and postgraduate levels. Recent examples include agreements with many top-tier universities in the Chinese Mainland for dual PhD degree programmes.

PolyU is also expanding non-local study opportunities with leading universities around the world. Recently, a delegation led by President Teng travelled to the United Kingdom to strengthen academic and research collaborations with several world-renowned institutions, including the University of Cambridge and the University of Oxford.

The productive visit culminated in the signing of five memoranda of understanding for new student mobility partnerships, marking a significant milestone in PolyU's internationalisation journey. PolyU students now have the chance to immerse themselves in the Oxbridge collegiate tutorial system, benefit from personalised academic mentoring, attend world-class lectures, and participate in college events, enriching both their academic and cultural experiences.

Unlocking new life experiences

International students are looking for more than wisdom; they are also seeking a new life experience. With over 14,000 non-local students in the 2025/26 academic year, the University is committed to helping them find it.

Flagship programmes like the PolyU Summer Institute and PolyU International Summer School foster early engagement and sustained interest, so global high school and undergraduate students immediately feel comfortable in a new cultural environment.

On arrival, the PolyU Envoy Programme pairs student ambassadors with first-year non-local undergraduates or inbound exchange students, to facilitate their transition into PolyU. Over 150 ambassadors from 27 regions are currently serving as peer mentors, offering advice, guidance and facilitating two-way cultural dialogue.

Dedicated facilities like The Global Student Hub are ideal venues for hosting student events and student-initiated activities such as cultural galas, music and drama performances, exhibitions, and team-building activities. They provide opportunities for local and non-local students to get together, to share and to learn, and, in turn, embrace diversity and better integrate into university life.

Christelle Natalie Chua, a first-year School of Design student hailing from Indonesia, was drawn by PolyU's strong reputation in design and emphasis on professional, industry-relevant skills. Coming from Surabaya, she also longed for an opportunity to broaden her worldview and engage with a diverse community. "I wanted to experience a different lifestyle, meet people from various cultures, and develop my soft skills," she says.

Christelle has submerged herself in campus life as a committee member of the Indonesian Student Association, and recently participated in an Indonesian Cultural Night,

The Envoy Programme is designed to enrich the university experiences of new non-local students.

showcasing her heritage with fellow participants through performances. "It was a fruitful experience that boosted my confidence and enhanced my interpersonal skills," she says.

Living in Hong Kong has also been a highlight. The beautiful harbour is a favourite retreat, offering a place to enjoy breath-taking views, unwind, and socialise with friends. "Studying in Hong Kong, especially at PolyU, has broadened my horizons and equipped me with the skillsets to make a real difference," she says.

A native of Indonesia, Christelle wants to meet people from different cultures at PolyU.

Christelle (back row, second right) performed in the Indonesian Cultural Night.

New paths to wisdom

These initiatives are part of PolyU's ongoing efforts to enhance its educational offerings, support student growth, and cater to the demands of industry and society. Like thousands of other students, Christelle and Dora are using them to create their own paths to learn, grow, and give back through the rich fabric of opportunities that PolyU offers.

As a student ambassador, Dora has some personal advice for prospective students from Central and East Asia:

> Hang out with locals and stay open to new experiences,

he says, urging them to make the most of every moment in the vibrant, global journey that defines PolyU.

Nurturing Tomorrow's Interdisciplinary Visionaries

In the quiet corners of the natural world, a masterclass in professional versatility is unfolding. The beaver, often dismissed as a mere builder of dams, is in fact nature's premier "interdisciplinary engineer". By instinctively managing water flow, beavers create ponds that filter pollutants and establish vital habitats, making them the perfect mascot for interdisciplinary study.

Image generated with AI

This multi-hyphenate professional simultaneously serves as a hydrologist, architect, and project manager. Through niche construction, beavers transform simple streams into productive wetlands where entire ecosystems thrive. This mirrors the modern professional: a visionary who understands the whole pond, and creates value by connecting individual domains to improve the overall social ecosystem.

Nurturing "human beavers"

Professor Daniel Shek, Associate Vice President (Undergraduate Programme) and Dean of the College of Undergraduate Studies (CUS) at PolyU, believes the beaver story illustrates the importance of interdisciplinary education which PolyU is enthusiastically advocating. Flagship initiatives include the new Bachelor's Degree Scheme in Interdisciplinary Studies (BDSIS), launched at the beginning of the 2025/26 academic year.

Professor Shek emphasises that, in an increasingly complex world, future leaders require more than just technical expertise; they need a robust toolkit of interdisciplinary knowledge and diverse skill sets. He notes that a deep understanding of human needs and aspirations is essential for navigating the challenges of tomorrow. Furthermore, as information and knowledge become easily accessible anywhere and anytime, self-learning skills are more critical than ever.

> Equipping students with these self-learning capabilities is a core mission of PolyU's Education 4.0 initiatives, ensuring graduates remain agile even as Generative AI disrupts traditional repetitive and white-collar careers. The goal to nurture 'human beavers' has never been more important. //
>
> Professor Daniel Shek

BDSIS students have the opportunities to meet with PolyU's senior management regularly for guidance and care.

BDSIS: A bespoke path for the global elite

The rise of advanced technology often creates ethical or social dilemmas that data or technical competence alone cannot solve, such as the life-and-death ethics governing self-driving car algorithm developments. Consequently, the BDSIS programme is designed to train future leaders who possess wisdom and judgement, rooted in a deep understanding of human behaviour and the social systems that sustain our world. Positioned as one of PolyU's most prestigious and flexible programmes, it is reserved for top-performing students from both local and international backgrounds.

Professor Alan Lau, Associate Dean of CUS and Programme Leader of BDSIS, highlights the programme's profound personalisation, noting that its uniqueness begins the moment a student joins the PolyU family. Rather than being ushered into a rigid, pre-defined major, students are met by specialised colleagues from CUS to engage in deep discussions regarding their aspirations.

These diagnostic sessions uncover what a student truly wants to achieve, allowing the University to help them co-create a bespoke, tailor-made curriculum. Current combinations chosen by the cohort range from integrating the technical rigour of artificial intelligence (AI) with the strategic depth of fintech, to interpreting the human-centric world of hospitality through the lens of psychology and personal behaviours.

To ensure these elite students reach their full potential, each individual is assigned a Personal Academic Mentor—typically an accomplished senior professor or a renowned scholar. This one-on-one guidance is supplemented by regular, direct communications with PolyU's senior management, including the President and Vice Presidents.

The programme's resources go significantly beyond standard offerings, including two years of guaranteed on-campus residential housing and participation in the Undergraduate Research and Innovation Scheme (URIS).
A prestigious initiative, URIS aims to nurture the next generation of intellectuals by providing funding and support for high-level research, and effectively placing BDSIS students at the frontier of academic inquiry from day one. This vision has already attracted a vibrant, international cohort, with top-tier applications from Chinese Mainland, Romania and Canada.

The journey of He Xiaoxian, a student from Zhejiang, reflects this purpose-driven model of education. Initially attracted by the freedom to explore, Xiaoxian has learned to treat applied mathematics, physics, engineering, and design as an integrated system. Under the guidance of Professor Shek, she has transitioned from merely learning subjects to understanding the meaning of "knowledge transfer", applying chemical engineering to waste management, and using computational models to simulate social behaviour. She recalls from her mentorship sessions that good research should lead to a change in one's way of thinking, highlighting the programme's success in fostering a truly interdisciplinary mindset.

Xiaoxian collected personal stories from local elders in Yunnan, and created digital avatars to preserve their precious memories.

Architecture: The interdisciplinary design of the future

While BDSIS fosters broad systemic thinking, the Architectural Studies Programme applies this interdisciplinary rigour to the physical world. The new Department of Architecture, scheduled for launch on 1 July 2026, will be the final piece of the puzzle. Sitting within the Faculty of Construction and Environment, it will join other building and real estate-related departments to provide a holistic view of the built environment.

Professor Tris Kee, Associate Professor and Programme Leader for Architectural Studies, emphasises that under PolyU's approach, students do not view buildings solely as artistic statements; they learn that a structure must be both aesthetically pleasing and functional for real-world use.

Crucially, this interdisciplinary teaching ensures that graduates are not limited to traditional roles, but are equipped to become curators, stage designers, or digital space strategists. The curriculum treats architecture as high-level training in problem-solving, rather than just another discipline that involves drawing.

The new interdisciplinary programmes of architectural studies will adopt advanced technologies and innovation to cultivate students' critical thinking and a research spirit in architectural design.

Under the banner of PolyU Education 4.0, the programme has deeply integrated AI as a creative partner across five different levels. They range from sparking conceptual inspiration and automating repetitive parameters to accelerating visualisation work, providing faster feedback, and navigating the digital ethics of creation. Professor Kee added, "By delegating minor, repetitive tasks to AI, students are freed to engage in the complex critical thinking that the modern world demands, effectively propelling our learning and teaching to the next higher level."

In a testament to its innovation, PolyU is already planning new programmes integrating AI and Architecture as a direct response to the pulse of the industry. This forward-looking focus has sparked a 125% increase in undergraduate applications for the upcoming academic year, attracting bright minds from Kazakhstan, Belarus, Myanmar, Indonesia, and India.

For international student Annabelle Wibowo from Indonesia, the programme is the perfect bridge between mathematical logic and artistic imagination. She explains that students can acquire both technical knowledge and aesthetics from the programme. This experience is bolstered by interactions with professionals at the Hong Kong Shenzhen Bi-City Biennale of Urbanism\Architecture (UABB).

Similarly, local student and dedicated urban sketcher Yolanda Tam echoes the sentiment that architecture is about solving human problems. While she embraces cutting-edge tools like AR/VR and Building Information Modeling, she remains a staunch advocate for the "hand-made", noting that building physical models helps students truly understand structure and stability in ways digital tools alone cannot.

During their first year, study trips to Guangzhou and Zhongshan deepened students' appreciation for the social responsibilities of the architect. These experiences reinforced the principle that great design must be both functional and responsive to the community it serves.

Shaping a more thoughtful world

The common thread running through BDSIS and the new Department of Architecture is the belief that the most pressing problems of our time cannot be solved by one discipline alone. Whether it is an interdisciplinary student using computational models to simulate behaviour, or an architecture student designing a functional, tech-enhanced pavilion, PolyU is training a generation that is not constrained by traditional boundaries.

By fostering an interdisciplinary environment fuelled by AI and digital transformation, PolyU nurtures a generation of ecosystem engineers. Beyond simply building the digital and physical systems of tomorrow, these individuals are trained to look through a broader lens, ensuring they have the foresight to understand how every innovation impacts the equilibrium of the whole pond.

As the University prepares for continued innovation in pedagogy, it remains committed to the idea that innovation is born at the crossroads of different fields. In other words, it is ensuring that PolyU graduates lead the way in shaping a more resilient, innovative, and human-centric future.

Annabelle Wibowo (left) and Yolanda Tam (right) took part in the student-led installation exhibited at UABB and subsequently showcased on the PolyU campus.

Innovation in Our DNA, Impact Everywhere

Thousands of votes cast for PolyU research stories underscored the community's strong resonance with our innovative spirit

At PolyU, innovation is not an aspiration but a way of being. It is sustained by a deep-rooted research culture that values intellectual discipline, curiosity and purpose, and by a shared commitment to turning knowledge into outcomes that matter to society.

The inaugural "PolyU Top 10 Research & Innovation Stories of the Year" campaign was held in March 2026 to highlight the most significant advances in 2025 that embody the University's motto, "To learn and apply, for the benefit of mankind". More than 7,700 members of the public and the PolyU community took part in the voting exercise. Together with the assessments of a professional judging panel, ten outstanding projects were selected as awardees.

"Each achievement reflects our researchers' rigorous, truth-seeking spirit and courage to break new ground," said Professor Christopher Chao, Senior Vice President (Research and Innovation). "By bridging original discoveries with real-world applications, these projects improve lives, enable industrial upgrading, and contribute to the global innovation landscape."

Winning projects span five strategic research areas

The inaugural selection of winning projects was drawn from a short list of 20 remarkable research and technology translation stories announced in 2025. They spanned five strategic research areas, including artificial intelligence (AI) and data science, life sciences and healthcare, environment and sustainability, materials science, and smart cities.

01

Materials science

Taking aim at dangerous ice

Ice can be a serious safety hazard, but eliminating it usually involves hard manual labour and expensive machinery. Taking their cue from nature, a PolyU research team led by Professor Wang Zuankai, Associate Vice President (Research), Kuok Group Professor in Nature-Inspired Engineering and Chair Professor of Nature-Inspired Engineering, and Professor Yao Haimin, Associate Professor of the Department of Mechanical Engineering, developed a solution that imitates the mechanism that fungi use to shoot out spores during reproduction. The result is a special elastic surface dotted with tiny spring-like pillars, which capture energy from a water droplet as it freezes and expands, then catapults the slippery ice away before it has a chance to accumulate. What's more, no external power source is required!

This ingenious approach promises to improve the lives of billions of people living in, or travelling to, countries where temperatures fall below zero. Potential applications include everything from roads and roofs, to aircraft, wind turbine blades, and overhead cables that carry vital power to communities in the world's coldest communities.

The team's research paper titled "Freezing droplet ejection by spring-like elastic pillars" was featured in *Nature Chemical Engineering*.

02

Environment and sustainability

Exploring how melting ice and rising sea levels could inundate coastal cities

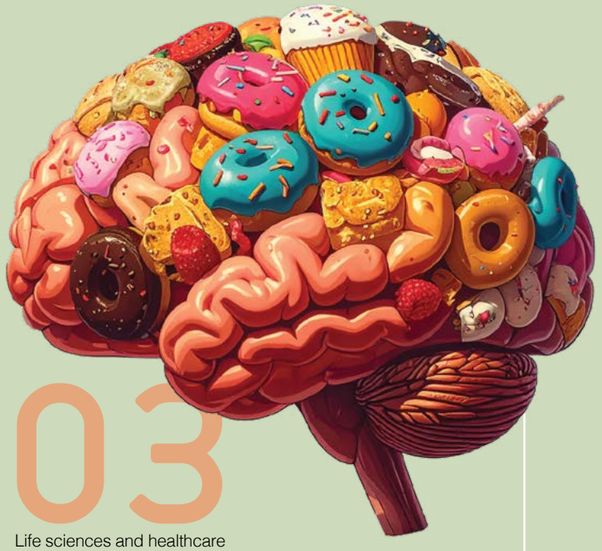
If Greenland's three-kilometre-thick ice sheet melted completely, sea levels could increase by up to seven metres and inundate coastal regions where approximately 40% of the world's population lives.

In collaboration with an international research team, Professor Chen Jianli from the Department of Land Surveying and Geospatial Science and Research Institute of Land and Space has made important progress in exploring how ice movement affects global sea levels.

The team pioneered the use of the Greenland GPS Network (GNET), coupled with satellite gravity measurements from NASA's Gravity Recovery and Climate Experiment, to gain vital insights. The findings reveal that current models, derived from regional climate projections, may have significantly overestimated water retention and underestimated snowmelt runoff.

"Our research will contribute to achieving accurate model performance for warmer years, aiding in the projection of ice-sheet behaviour and its impact on sea-level in the coming decades," said Professor Chen.

The research has been published in the peer-reviewed scientific journal *Nature*.



03

Life sciences and healthcare

Weight management could be key to preserving brain health

The ageing global population is seeing increasing levels of neurodegenerative diseases. While these conditions currently lack a cure, research by Professor Qiu Anqi of the Department of Health Technology and Informatics could prevent them as long as possible.

Based on analysis of over 500,000 UK Biobank participants, the research reveals a link between persistent and increasing obesity and greater impairment in brain structure and cognitive function. The good news is that long-term weight management could be one of the keys to preserving brain health.

"There has been a notable rise in neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease, and others. This research proposes that maintaining long-term weight control can contribute to improved brain health," said Professor Qiu.

The team plans to adopt a "multiomics" approach to explore the biological pathways that influence both brain and body health. The research entitled "Long-term obesity impacts brain morphology, functional connectivity and cognition in adults" was published in *Nature Mental Health*.

04

Life sciences and healthcare

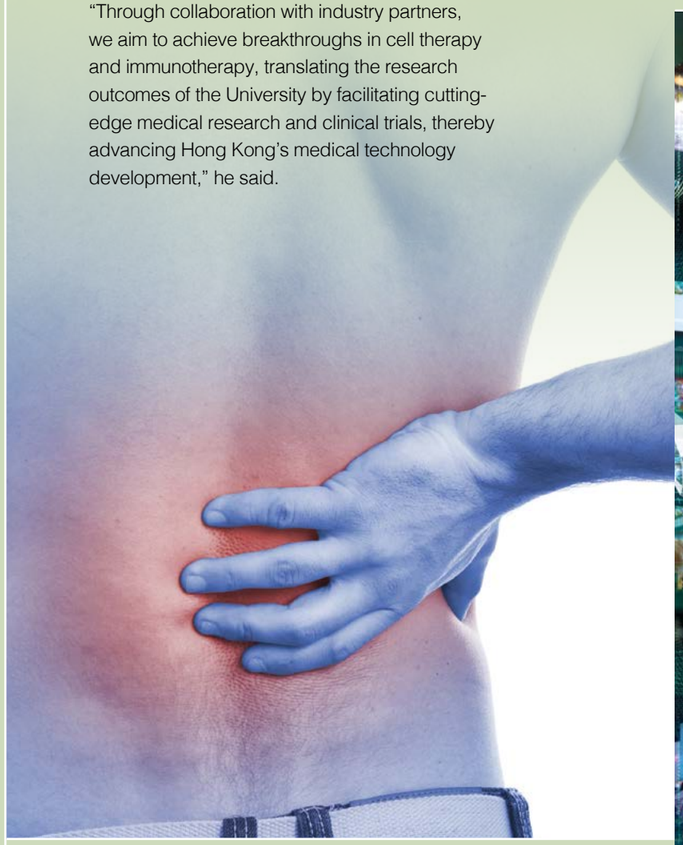
Advanced Therapy Product Lab offers hope for spinal cord injury patients

More than 15 million people around the world live with spinal cord injuries. PolyU's recently launched Advanced Therapy Product Laboratory is offering patients new hope, through clinical research into immunotherapy, cell therapy, gene therapy and regenerative medicine.

The University is planning to manufacture cell therapy products. These will be complemented by post-surgery support leveraging the expertise of the Department of Rehabilitation Sciences, making PolyU the only local university to offer a one-stop solution from treatment to rehabilitation.

Professor Larry Chow Ming-cheung, Head of the Department of Applied Biology and Chemical Technology, sees significant potential for the production of advanced therapy products in Hong Kong, and the city's development into an international health and medical innovation hub.

"Through collaboration with industry partners, we aim to achieve breakthroughs in cell therapy and immunotherapy, translating the research outcomes of the University by facilitating cutting-edge medical research and clinical trials, thereby advancing Hong Kong's medical technology development," he said.



05

Materials science

Setting a new milestone in solar energy performance

Two-terminal perovskite/silicon tandem solar cells outperform single-junction designs in power-conversion efficiency (PCE), but interface limitations hinder wider use. PolyU researchers developed a bilayer passivation strategy, achieving a record 33.89% PCE.

Professor Yin Jun, Assistant Professor of the Department of Applied Physics, and his research team combined advanced material design and a device optimisation strategy to overcome long-standing efficiency barriers. In addition to record-breaking efficiency, the cells also deliver significantly improved long-term stability.

"Our research is driven by the vision of breaking traditional efficiency barriers in solar cells. By integrating advanced materials like perovskites with established silicon technologies, we harness the best of both worlds to redefine solar cell performance," said Professor Yin.

The multidisciplinary approach not only showcases the tremendous potential of photovoltaic technology, but also lays a solid foundation for the development of renewable energy.

Conducted in partnership with LONGI Green Energy Technology Co. Ltd and Soochow University, the groundbreaking findings have been published in the international journal *Nature*.

06

AI and data science

Accelerating generative AI-assisted video analysis

AI technology is evolving rapidly. But AI models still struggle with a task that comes naturally to any moviegoer—making sense of videos longer than about 15 minutes.

Now Professor Chen Changwen, Interim Dean of the Faculty of Computer and Mathematical Sciences and Chair Professor of Visual Computing, is changing the rules. His novel video-language agent called VideoMind enables AI models to analyse and answer questions about long video content by emulating the way people think.

According to Professor Chen, the human brain uses approximately 25 watts of power when watching and understanding videos, which is about a million times less than a supercomputer with equivalent computing power. VideoMind overcomes the performance limitations of AI models in video processing, and also serves as a modular, scalable, and interpretable multimodal reasoning framework.

"We envision that VideoMind will expand the application of generative AI to various areas, such as intelligent surveillance, sports and entertainment video analysis, video search engines and more," he said.

07

Life sciences and healthcare

Chinese medicine extract promises new treatments for Alzheimer's and other diseases

Found in traditional Chinese medicines (TCM), the compound tetrandrine is known for its potent antiviral, anti-inflammatory and anti-cancer properties. However, the precise mechanism of action remains unclear.

Using a photoaffinity probe and other advanced tools, PolyU researchers have discovered that tetrandrine actually works by blocking the transport of sphingosine and inhibiting calcium channels. The research opens new avenues for drug discovery and treating diseases caused by calcium imbalance, including neurodegenerative disorders like Alzheimer's and Parkinson's, as well as certain metastatic cancers.

Professor Ben Ko Chi-bun, Associate Professor of the Department of Applied Biology and Chemical Technology and his team have also developed a technology platform to facilitate studies of natural product biology, and enable researchers to identify the molecular targets of other natural compounds, particularly those derived from TCM.

The findings have been published in *Nature Communications*, in a paper titled "Tetrandrine regulates NAADP-mediated calcium signalling through a LIMP-2-dependent and sphingosine-mediated mechanism."

08

AI and data science

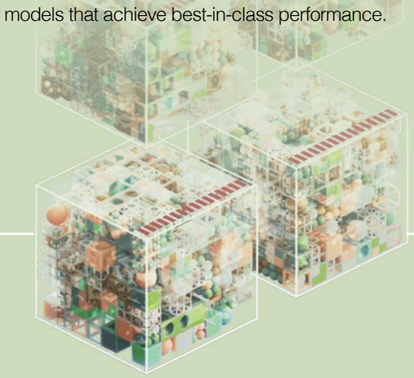
PolyU is reshaping AI training and integration

In less than a year, the new PolyU Academy for Artificial Intelligence (PAAI) has already achieved milestones in Generative AI (GenAI) research.

Under the leadership of Professor Yang Hongxia, Executive Director of PAAI, Associate Dean (Global Engagement) of the Faculty of Computing and Mathematical Sciences, and Chair Professor of Generative Artificial Intelligence of the Department of Computing, PAAI is pushing the boundaries of training with a novel collaborative GenAI paradigm known as Co-GenAI, which significantly lowers resource requirements. Removing resource barriers like graphics processing units monopolies will pave the way for a more inclusive environment that enables global institutions to participate in AI research.

"Ultra-low-resource foundation model training, combined with efficient model fusion, enables academic researchers worldwide to advance GenAI research through collaborative innovation," Professor Yang said.

PAAI has also demonstrated the potential of its training pipelines in applications across specific domains, including state-of-the-art medical foundation and cancer AI models that achieve best-in-class performance.



09

Materials science

Commercialising ultra-efficient solar cells

PolyU researchers investigating the latest perovskite/silicon tandem solar cells (TSCs) believe that their energy conversion efficiency could be significantly increased from the current maximum of approximately 34% to around 40%. They hope to accelerate the commercialisation of the technology through industry-academia-research collaboration, in line with the Nation's strategic plan of carbon peaking and neutrality.

The team made up of distinguished scholars, including Professor Li Gang, Sir Sze-yuen Chung Endowed Professor in Renewable Energy and Chair Professor of Energy Conversion Technology, and Professor Yang Guang, Assistant Professor, both with the Department of Electrical and Electronic Engineering, has already published a review article entitled "Towards efficient, scalable and stable perovskite/silicon tandem solar cells" in the international journal *Nature Photonics*.

"While lab-scale devices have shown impressive efficiency advancement, further efforts are needed to improve their reliability, including minimising efficiency losses from small-area devices to large-area modules," said Professor Li.

"By providing a stable supply of high-efficiency renewable energy, we aim to deliver green and reliable power support for high-energy-consuming industries," added Professor Yang.

10

Materials science

Hong Kong's first chip-based quantum network

Quantum technology is reshaping the global landscape, with profound implications for computing and cryptography. As quantum computing threatens existing encryption and data security, governments worldwide are advancing new solutions to address the emerging cybersecurity challenges of the quantum era.

PolyU has achieved a breakthrough by successfully conducting a cybersecurity test on the world's longest optical fibre quantum network, built utilising a quantum chip platform.

"Our quantum communication encryption is grounded in the principles of quantum mechanics: since quantum states cannot be cloned, it is theoretically almost impossible to crack," said Professor Liu Ai-Qun, Director of the Research Institute for Quantum Technology and Chair Professor of Quantum Engineering and Science of the Department of Electrical and Electronic Engineering.

"This small yet mighty quantum chip has the potential to safeguard Hong Kong's digital financial system and its reputation as an international financial hub, making it a critical asset for our Nation's economic development," he said.

A popular project just missed the top ten

Among the nominated stories, three projects proved overwhelmingly popular, winning the highest number of votes from members of the public. The only one that missed the top ten is the research by a team at the School of Fashion and Textiles that is pioneering smart and sustainable personal cooling technologies to combat extreme heat, which causes nearly half a million deaths a year.

The latest developments include:

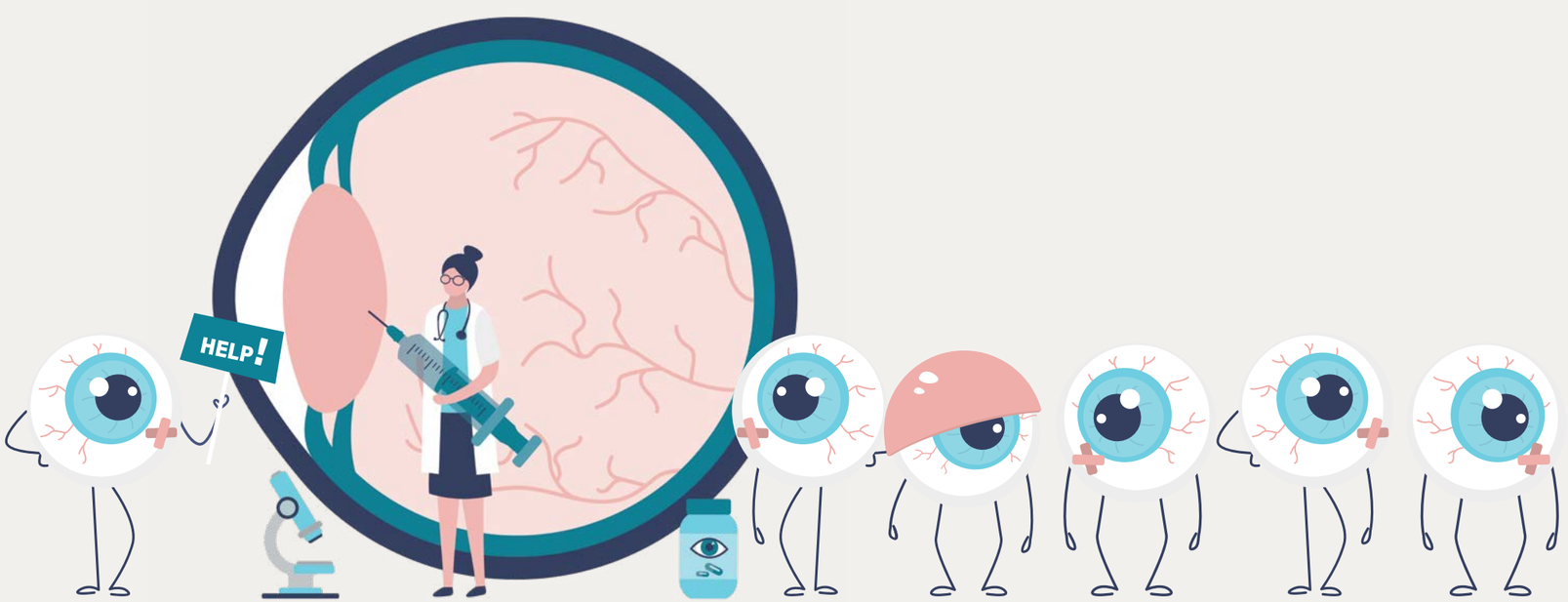
- iActive™ intelligent sportswear uses low voltage-driven artificial "sweat glands" to keep the skin dry and remove sweat up to three times faster than peak human sweating.
- Omni-Cool-Dry™ is a breathable fabric that reflects solar and ground radiation and emits mid-infrared body heat, lowering skin temperature by about 5°C compared to conventional fabrics.
- Thermo-adaptive Soft Robotic Clothing keeps the inner surface 10°C cooler than conventional insulating garments even when the exterior temperature reaches 120°C.
- SweatMD is an all textile, non-invasive wearable that uses skin-friendly sensing yarns to send health insights, like fatigue indicators and dehydration alerts, to a smartphone.

"Collectively, these innovations form an AI ready ecosystem: sensors quantify physiology, models predict cooling demand, and intelligent clothing actuates targeted responses. Integrating textile sensors, fibre-based coolers, and on-body energy harvesters has the potential to enable self-sustained cooling," said team leader Professor Shou Dahua, Limin Endowed Young Scholar in Advanced Textiles Technologies and Associate Professor, School of Fashion and Textiles.

The research was published in a peer-reviewed paper in the journal, *Science*, entitled "Sustainable personal cooling in a warming world".

Increasing community-wide understanding

The campaign has deepened community-wide understanding of PolyU's research excellence and innovation capabilities, and brought well-deserved recognition to the University's dedicated researchers. Professor Chao is confident that the campaign will continue to shine a spotlight on the latest achievements, and progress in fostering a dynamic research ecosystem that transforms bold ideas into impactful solutions. "In doing so, we will support Hong Kong's development as an international innovation and technology hub and help shape a better future for the world," said Professor Chao.



Researchers Plan Next-generation AI Co-pilot to Tackle Eye Doctor Shortage

Eye care is facing a growing crisis, with too many patients and too few specialists

By 2050, over 500 million people worldwide will face moderate to severe vision impairment or complete blindness. That includes Hong Kong, which is seeing growing pressure on ophthalmology services as the population ages. Chronic diseases such as diabetic retinopathy require constant screening and monitoring. But a shortage of specialists is leading to longer waiting times at clinics, and increasing the risk of permanent vision loss.

To address this challenge, PolyU researchers are planning the development of "EyeAgent 2.0", a next-generation clinical-grade ophthalmic artificial intelligence (AI) co-pilot system. Rather than replacing doctors, the proposed system is designed to support clinicians in diagnosis, treatment planning, follow-up management, and clinical documentation, with the aim of improving efficiency and consistency in eye care.

Building on earlier success

The planned EyeAgent 2.0 project builds on the team's earlier EyeAgent 1.0, which integrated multiple sources of medical information, including ophthalmic images and clinical text, to support diagnostic reasoning. Pilot feedback from hospitals in Hong Kong and the Chinese Mainland has encouraged the team to further develop the system into a more advanced, clinically oriented AI platform.

Towards a more advanced clinical AI platform

EyeAgent 2.0 is envisioned as a more advanced system, trained and validated using large-scale real-world longitudinal, multimodal clinical data from leading ophthalmic centres across different regions. These datasets are expected to include not only diverse imaging modalities—such as fundus photography, optical coherence tomography, angiography, and visual field testing—but also time-series clinical records that capture disease progression and treatment responses over time.

The goal is to move beyond single time-point analysis and develop an AI co-pilot capable of supporting longitudinal clinical reasoning across the entire patient journey—from initial assessment and diagnosis to treatment planning, disease monitoring, progression prediction, and adaptive follow-up decision-making.

Collaboration, not replacement

The development of EyeAgent is grounded in a philosophy of human-AI collaboration, where AI is designed to augment—rather than replace—clinical expertise. Professor He Mingguang, Chair Professor of Experimental Ophthalmology and Henry G. Leong Professor in Elderly Vision Health at the School of Optometry, and Director of the Research Centre for SHARP Vision, emphasises that clinicians will remain central to all stages of decision-making.

When successfully developed and validated, EyeAgent 2.0 is expected to support clinicians by streamlining routine processes, such as patient data integration and clinical documentation, while also enhancing clinical consistency and decision-making efficiency. This will enable doctors to focus more on complex case management, patient interaction, and higher-level clinical judgment.

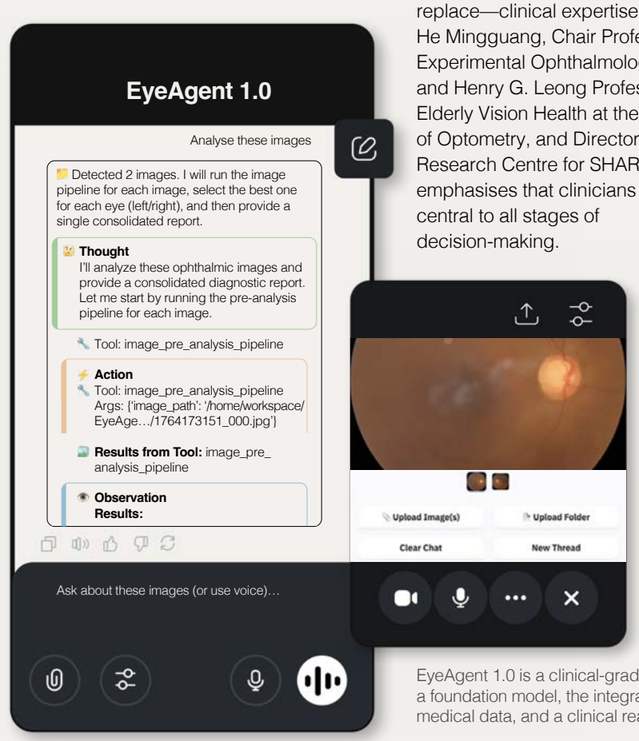
> Our goal is to develop EyeAgent 2.0 into a clinical-grade AI co-pilot that can eventually meet SaMD (Software as a Medical Device) regulatory requirements. We aim to incorporate diverse clinical data for training and validation, and to test the system in real-world clinical settings.

Professor
He Mingguang

Path to real-world impact

The team is seeking government funding to support the full development and validation of EyeAgent 2.0. The proposal includes system development, clinical validation, local piloting, and the eventual expansion to the Guangdong–Hong Kong–Macao Greater Bay Area, as well as other regions in the Chinese Mainland and overseas markets.

EyeAgent 2.0 represents PolyU's ambition to advance interdisciplinary innovation in healthcare. When successfully developed, the system will demonstrate how human expertise and AI can work together to deliver more efficient, accessible, and sustainable eye care.



EyeAgent 1.0 is a clinical-grade AI co-pilot system featuring a foundation model, the integration of 50 types of multimodal medical data, and a clinical reasoning simulation framework.

Advancing National Priorities through Innovation, Education and Connection

PolyU leverages its scholarly strengths and international standing to support the Nation's academic and sci-tech ascent on the global stage

In March 2026, China unveiled a new national blueprint that will shape how the country innovates, grows and competes over the coming years. The 15th Five-Year Plan is not just another policy document—it is a high-octane roadmap towards a "Beautiful China". Instead of just chasing raw growth numbers, the focus has shifted to high-quality development.

PolyU researchers and engineers have provided pivotal support for the Nation's multiple space missions.

At the core of the Plan lies a powerful idea: the deep integration of education, science and technology, and talent development. Universities are called upon to become engines of innovation—linking research breakthroughs to industrial needs and cultivating people who can turn ideas into impact. This is where PolyU steps firmly into the spotlight—translating academic excellence into tangible national value, and linking international academia with China's development priorities.

Reaching for the stars: aerospace and aviation innovations

China's ambition to become a leading space power is one of the most visible expressions of its technological rise. The national aerospace roadmap aims to establish China as a space science power and to advance the development of a robust commercial space ecosystem.

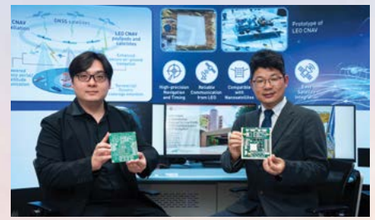
For more than three decades, PolyU has been a trusted research partner in this journey. Perhaps the most iconic contribution came through the Chang'e lunar exploration programme. In collaboration with the China Academy of Space Technology (CAST), PolyU led the development of the Surface Sampling and Packing System for Chang'e 5, enabling China's first lunar sample return in 2020. Four years later, the University once again played a crucial role in Chang'e 6, the world's first mission to collect samples from the far side of the Moon—an unprecedented scientific achievement.

PolyU's expertise also extended to China's first Mars mission, Tianwen 1. From topographic mapping and landing site selection to advanced instrumentation, PolyU researchers contributed decisively to one of the most complex planetary missions China has ever undertaken.

In 2026, PolyU reached another milestone closer to home. Researchers from the Department of Aeronautical and Aviation Engineering (AAE) successfully developed and launched Hong Kong's first low Earth orbit (LEO) communication navigation integrated satellite payload, known as LEO CNAV. Carried into orbit aboard the Yuxing 3 No.05 satellite from the Jiuquan Satellite Launch Centre in Gansu, the payload is now undergoing in orbit testing—marking a historic step for Hong Kong's participation in satellite technology and space applications.

PolyU's aerospace engagement goes beyond missions. As a major local partner of the Centre for Space Manufacturing Technology under the InnoHK research clusters, the University will contribute expertise in advanced manufacturing and materials science, supporting breakthroughs in space technology.

In April 2026, PolyU further strengthened Hong Kong's role in the national aerospace ecosystem by co-hosting the China Space Conference "Flying to Deep Space" International Forum—the first such event held in Hong Kong. Bringing together national agencies, international experts and industry leaders, the forum fostered global exchange and strengthened the Greater Bay Area's position in aerospace innovation.



The "LEO CNAV" research team is led by Professor Wen Chih-yung, Chair Professor of Aeronautical Engineering of AAE. Professor Xu Bing, Assistant Professor (right) and Dr Wang Tianqi, Research Assistant Professor (left), serve respectively as the satellite payload designer and the person-in-charge of system integration and testing.

Image generated with AI

In aviation, PolyU is equally committed to serving national priorities. The COMAC-PolyU Research Institute for Large Aircraft, co-estabished in 2024 with the Commercial Aircraft Corporation of China (COMAC), supports innovation across aircraft design, digital engineering and advanced manufacturing—contributing to China's goal of building world-class commercial aircraft.

To further its excellence in aerospace and aviation innovation, the University will establish the PolyU Aerospace Research Academy (PARA) this year. PARA will bring together interdisciplinary expertise with industry and international partners to advance frontier research, cultivate high-level talent and accelerate technology transfer. Through close collaboration, PARA will enhance innovation capacity in civil aviation, space technology and advanced manufacturing, supporting national aerospace strategies and global competitiveness.

Artificial Intelligence: From algorithms to applications

Artificial intelligence (AI) is a pillar of China's digital transformation—and one where PolyU is moving at full speed.

Launched in 2025, the PolyU Academy for Artificial Intelligence (PAAI) serves as a new powerhouse for AI research and applications. Instead of focusing on generic tools alone, PAAI emphasises domain-specific AI models, embedding intelligence into fields such as healthcare, engineering and industry operations. In doing so, PolyU contributes to Hong Kong's emergence as a hub for Generative AI and federated learning, while supporting the national AI strategy.

On the Chinese Mainland, PolyU's AI engagement is both targeted and impactful. In Huizhou, the University partnered with the local government to establish the Artificial Intelligence Research Centre under the PolyU-Daya Bay Technology and Innovation Research Institute. The Centre leverages PolyU's strengths in data science and intelligent algorithms to support Huizhou's smart industrial transformation—deepening Hong Kong–Mainland technology integration.

Meanwhile, in Beijing's Chaoyang District, PolyU's Creative Technology Centre (Beijing) has become a focal point for industry–academia cooperation. Focusing on AI and the metaverse, the Centre supports talent development, student exchange, technology incubation and pilot application—accelerating the journey from laboratory research to market adoption. It also promotes global collaboration between Beijing and Hong Kong.

The unveiling ceremony for The PolyU Creative Technology Centre (Beijing) marks a major step forward in HK-Beijing collaboration across various aspects of creative technology.

Enabling the Low-Altitude Economy

China's rapidly emerging low-altitude economy (LAE)—spanning drones, urban air mobility and autonomous systems—is another frontier where PolyU contributes impactful solutions.

PolyU researchers are advancing technologies that underpin LAE development, from Unmanned Aerial Vehicles communication systems and high precision positioning to next-generation wireless networks. In 2024, the University established the Research Centre for Low Altitude Economy to advance interdisciplinary research that drives technological advancements in the field.

In October 2025, the University organised the International Low-Altitude Economy Summit, bringing together local, Chinese Mainland and overseas representatives from government, industry, academia and research sectors to exchange insights on LAE policy, innovation, industry development, and urban applications, while showcasing cutting-edge technologies.

A strategic partnership with China Tower Corporation exemplifies PolyU's translational approach. By combining research strengths with real infrastructure, the collaboration accelerates innovation in LAE and next-generation networks while nurturing high calibre technology talent.

Recently, PolyU has taken this engagement a step further by launching a Joint Laboratory with Tianlu Flying-auto. Focused on electric vertical takeoff and landing aircraft, the lab targets applications such as high-rise firefighting and smart city logistics. Using Hong Kong's Regulatory Sandbox, technologies are being tested across the city's islands and dense skyline.

Addressing the International Low-Altitude Economy Summit, PolyU Council Chairman Dr Lam Tai-fai (centre) said PolyU will leverage its strengths in interdisciplinary research and education to help the entire Greater Bay Area seize the opportunities in the emerging field.

Transforming healthcare through medicine-engineering integration

Healthcare innovation is a central pillar of China's long-term development strategy, particularly in response to an ageing population. PolyU contributes by translating engineering breakthroughs into clinical solutions through deep collaboration with leading Chinese Mainland institutions.

One of the most striking recent breakthroughs is PolyU's all-acoustics brain–computer interface (BCI) system, offering a non-invasive approach to treating Parkinson's disease and other neurological disorders. Using precise ultrasound neuromodulation, the system represents a new frontier in neurotechnology. Clinical research has begun in collaboration with Huashan Hospital in Shanghai and Zhujiang Hospital of Southern Medical University, linking PolyU's engineering innovation with the Chinese Mainland's clinical expertise to accelerate translation from research to therapy.

Recently, PolyU has partnered with Qiangnao Technology to roll out an exciting programme to bring Qiangnao's world-leading core technologies in intelligent bionic hands and bionic knee joints for the configuration and amputees' use in Hong Kong, with the University providing local implementation, promotion, and scientific research support. The collaboration will drive the integration of scientific research and clinical application, facilitating the practical transformation of cutting-edge medical technology to tangible benefits for the disabled community.

Furthermore, PolyU's partnerships with overseas institutions allow researchers in China to tap into global expertise, while helping PolyU contribute to the Nation's ambitions in technology and health. With Stanford Medicine, PolyU has established the PolyU-Stanford Joint Collaboratory for Longitudinal Deep Omics to advance medical research. Discussions with the University of Toronto are paving the way for a new Joint Research Centre on Healthy Ageing and AgeTech to promote the development and application of gerontechnology, and enhance the quality of life and care for older adults.

The All-Acoustics BCI System is developed by Professor Sun Lei (left), Professor of the Department of Biomedical Engineering and Director of the Research Centre for Non-invasive Brain Computer Interface at PolyU, and Professor Qiu Zhihai (right), a PhD graduate of the department. The System presents a promising new therapeutic approach for Parkinson's disease.

Advancing Carbon Neutrality

The Nation's Plan seeks to deepen the clean-energy transition by embedding climate and energy targets into national development. It aims to secure energy supply, support technological leadership, and guide China towards carbon peaking by 2030 and eventual carbon neutrality.

PolyU is actively supporting this vision through several initiatives. In partnership with the Hong Kong University of Science and Technology, PolyU launched the State Key Laboratory of Climate Resilience for Coastal Cities, focusing on early-warning systems, infrastructure resilience, and urban sustainability.

Specialised centres such as the Research Centre for Resources Engineering towards Carbon Neutrality, the Research Institute for Smart Energy, the Research Institute for Artificial Intelligence of Things, and the PolyU Research Centre for Intelligent GRID and Energy Technologies are developing green technologies and solutions. By harnessing interdisciplinary expertise, these units advance low-carbon materials, waste valorisation, smart energy systems, AI-driven efficiency, and resilient urban planning.

Together, PolyU's efforts are making tangible contributions towards China's strategic goals in climate action, clean energy innovation, and sustainable urban development.

Matching research excellence with industry needs

Beyond laboratories, PolyU has long believed that research excellence achieves its highest value when it meets real world needs.

PolyU's collaboration with ANTA, China's leading sportswear company, showcases how academic research can reshape everyday products. Through the PolyU–Jinjiang Technology and Innovation Research Institute, researchers work with ANTA on sports technology, textile science and intelligent wearables—strengthening China's ambition to become a global sports powerhouse.

The collaboration extends into advanced robotics. At the PolyU-Nanjing Technology and Innovation Research Institute, PolyU joined forces with ANTA and Unitree Robotics to establish a Humanoid Robot Sports Science Joint Research Base. By using robots to simulate human movement, the partnership enables more precise sports equipment testing and performance analysis.

In June 2025, PolyU signed a strategic cooperation agreement with Huawei Cloud, focusing on AI driven innovation, technology commercialisation and startup incubation. Leveraging Huawei's global cloud ecosystem, the partnership accelerates the deployment of PolyU's research achievements worldwide, strengthens talent development and supports startups in expanding into overseas markets.

Sustainable mobility is another national priority—and one where PolyU's materials science and engineering expertise plays a key role. In collaboration with Shanghai NIO, PolyU launched a joint initiative on next-generation electric vehicle battery technologies. A flagship project focuses on ultrathin, lightweight composite current collectors for lithium ion and future solid state batteries, aiming to improve energy density.

PolyU's partnership with China Railway Electrification Engineering Group (CREEG) further demonstrates its research impact. A strategic cooperation agreement signed in 2025 led to the establishment of a joint research laboratory in Beijing, with an aim to establish a global hub for rail transit innovation and a model for industry-academic integration. Supporting China's "Transportation Powerhouse" strategy, the collaboration also focuses on cultivating high calibre engineering talent.

Collectively, these partnerships show how PolyU connects research excellence with industry needs, turning technological trends into solutions that affect millions of people.

Linking learning, innovation and talent

Education remains the foundation of PolyU's national engagement—but it is education designed for impact.

The Master of Technology Entrepreneurship (MTE) programme is a prime example. Aspiring tech leaders spend at least half of their studies at PolyU before undertaking immersive placements at one of PolyU's Mainland Translational Research Institutes (MTRIs) across the country. There, academic learning meets marketing opportunities, preparing graduates to turn cutting-edge technologies into globally competitive startups.

Beyond entrepreneurship, PolyU is strengthening the research-talent pipeline through a growing network of Dual PhD Degree Programmes, which allow doctoral students to train under joint supervision and graduate with degrees from PolyU and partner universities. Recent agreements with leading Chinese Mainland universities, including the Beijing Institute of Technology and Shanghai Jiao Tong University, mark a significant step in nurturing high-level scientific talent aligned with national priorities, while maintaining strong global standards.

Complementing formal programmes is the International Future Challenge (IFC)—PolyU's large scale innovation competition held across Hong Kong and Chinese Mainland cities. Integrating education, research translation, incubation and investment, the 2025 Challenge attracted over 700 teams worldwide. Winning teams gain access to funding pathways, pilot adoption opportunities and incubation at MTRIs—extending innovation beyond the campus.

Anchoring all these initiatives are PolyU's MTRIs. Acting as regional innovation hubs, the MTRIs align PolyU's research strengths with local industrial and societal needs, nurture startups emerging from the MTE and IFC, and serve as gateways for PolyU technologies to reach global markets. By proving success in China's diverse and demanding environment, PolyU innovations are better positioned for international adoption.

Through PolyU's MTRIs established in major cities across the Chinese Mainland, the MTE programme enables students to implement entrepreneurial projects and transform innovative ideas and cutting-edge research into successful startups.

Connecting China with the world

In an increasingly interconnected world, PolyU plays a unique role in China's journey towards greater academic internationalisation. Positioned at the crossroads of East and West, the University acts as a two-way bridge—linking China's researchers with world-leading institutions, while helping global partners engage more closely with China's dynamic innovation ecosystem.

Since the first official visit of the institution to renowned universities in the Chinese Mainland in 1978, PolyU has gradually developed strong links with the Nation, featuring a wide-reaching network of strategic importance. On this strong foundation, PolyU has helped shape international collaboration at a broader scale. It co-founded and leads several global alliances, including the International Strategic Technology Alliance, which links 31 renowned universities in China and the world in fostering applied R&D and technology transfer.

Along the Belt and Road (B&R), where China places growing emphasis on its innovation-led development through academic exchange, joint research and talent cultivation, PolyU has established the Faculty of Business Belt and Road Centre, driving policy research, digital economy dialogue, and industry engagement. To foster exchange and collaboration among energy professionals and scholars, the University has been providing a global stage for the "Belt and Road Advanced Programme in Power and Energy" since 2018. It also offers funding and mobility schemes, including the PolyU B&R Network Initiative Scheme and K.C. Wong Visiting Fellowships to promote academic exchange.

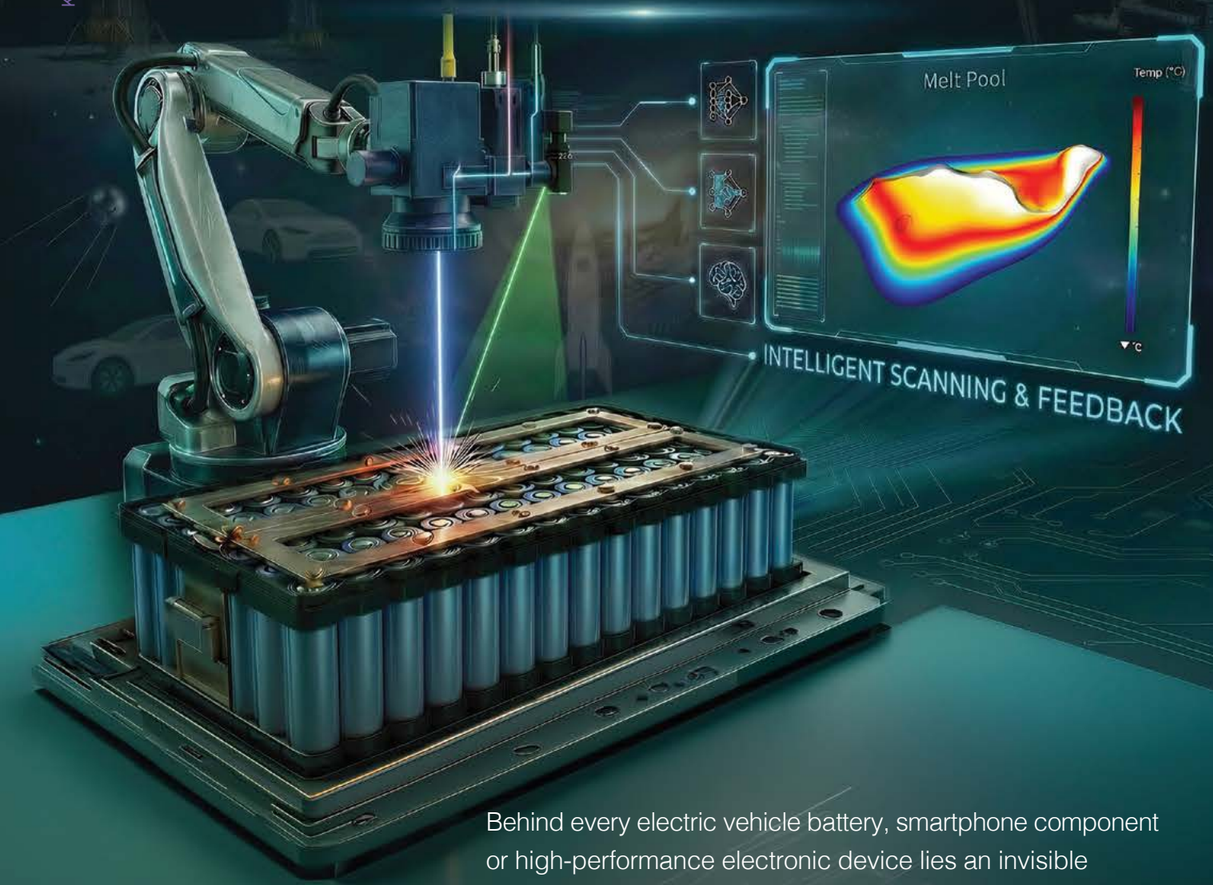
Furthermore, PolyU helped initiate the founding of the University Social Responsibility Network (USRN), a global alliance of 24 leading universities, including Peking University and Sichuan University. Serving as the Chair of USRN's Executive Committee and hosting its Secretariat, PolyU demonstrates leadership in steering societal impact in China as well as globally through research, student engagement, and capacity building.

PolyU has built one of Hong Kong's strongest international academic networks. Today, the University works with more than 390 partner institutions across over 45 countries and regions, supported by over 600 international collaboration agreements.

Together, these efforts show how PolyU goes beyond traditional academic roles. By connecting research with industry, education with talent, and China with the world, the University is helping turn the aspirations of the 15th Five-Year Plan into tangible outcomes—supporting sustainable, innovation led development for the Nation and beyond.

Welding with Vision

PolyU's IntraSpect™ "industrial eye" redefines precision manufacturing



Behind every electric vehicle battery, smartphone component or high-performance electronic device lies an invisible challenge: how to weld metals perfectly, every single time.

Even a microscopic defect too small for the human eye to see can weaken a joint, shorten a product's lifespan, or trigger costly failures down the line. In a world increasingly built on advanced manufacturing, this problem has enormous consequences for safety, sustainability, and competitiveness.

IntraSpect™ is designed to eliminate this industry pain point by ensuring defect-free welds. Developed by a PolyU research team, led by Professor H.C. Man, Dean of the Faculty of Engineering, Cheng Yick-chi Chair Professor in Manufacturing Engineering and Chair Professor of Materials Engineering, and Professor Wen Xiewen, Assistant Professor of the Department of Industrial and Systems Engineering, the third-generation, intelligent in-situ laser melt pool monitoring technology represents a genuine breakthrough in high-end precision manufacturing.

Proactive prevention reduces waste

Advanced manufacturing relies heavily on laser-based welding processes, which are fast, flexible, and ideal for high-value applications. However, they are also notoriously difficult to control. When a laser melts metal, the intense light and thick vapour hinders visibility into the so-called "melt pool"—the tiny, molten zone which directly influences the quality of a weld. Manufacturers typically inspect welds after production, discarding defective parts and absorbing any losses. But this reactive approach wastes materials, increases energy consumption and creates quality concerns. And these issues ripple through supply chains in a wide range of industries, including electric vehicles, electronics, and aerospace.

IntraSpect™ tackles this challenge head-on by enabling manufacturers to monitor and control the welding process in real time, rather than fixing problems after the fact. By integrating high-frequency optical tomography with a multi-modal AI engine, IntraSpect™ creates what engineers describe as an "industrial eye", which is capable of seeing through metal vapour. It captures micron-level, three-dimensional images of the melt pool as the welding is actually happening. This allows defects, such as porosity and incomplete fusion, to be detected and corrected instantly before they can become expensive failures.

> IntraSpect™ transforms reactive post-process inspection into proactive prevention, dramatically reducing scrap rates while significantly enhancing production efficiency and product reliability.
>
> Professor H.C. Man

For manufacturers, the benefits reach far beyond quality control. Real-time prevention reduces waste, improves energy efficiency and accelerates production—directly supporting sustainability goals and high-quality industrial growth.

From laboratory breakthrough to factory floor

The appeal of IntraSpect™ lies not just in its sophisticated technology, but also in its readiness for real-world deployment. Designed with industrial environments in mind, it matches the performance of top-tier global solutions at roughly half the cost, and delivers a return on investment in less than a year.

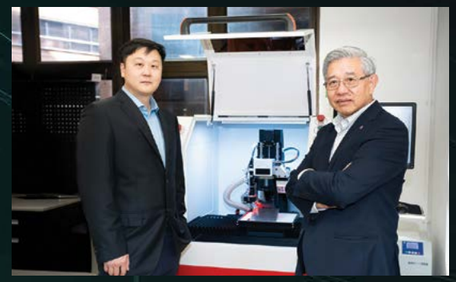
This makes the technology particularly attractive for fast-growing industries, such as new-energy vehicles and electronics manufacturing, where margins are tight and scale matters. Instead of relying on expensive imports, manufacturers can adopt a locally developed solution that meets global standards while delivering immediate business value.

In the long term, the technology has additional potential for extension to medical devices, aviation, aerospace, and other sectors with extremely stringent welding quality requirements.

A RAISe+ winner

IntraSpect™ exemplifies PolyU's commitment to integrating academia, industry and research for societal benefit. Developed in close collaboration with industry partners, the technology is designed for seamless adoption on production lines, accelerating the translation of research into real-world applications. It reflects how university innovation can respond directly to industrial needs, strengthening manufacturing capability while remaining globally competitive.

In April 2026, IntraSpect™ received funding under the third round of the HKSAR Government's Research, Academic and Industry Sectors One-plus (RAISe+) Scheme, recognising its strong commercial and societal potential. The support will drive wider deployment, deeper industry collaboration and stronger technology transfer, enabling higher welding quality, reduced waste and more sustainable industrial growth.



The IntraSpect™ project is led by Professor H.C. Man (right) and Professor Wen Xiewen.

RAISe+

Launched by the HKSAR Government in October 2023, RAISe+ aims to unleash potential of local universities in transformation and commercialisation of R&D outcomes, and facilitate relevant collaboration among the Government, industries, universities, and research sectors. Each project can receive funding support of up to HK$100 million.

Self-guiding Robot Reinvents Power Generators Inspection

An award-winning project addresses industry pain points, offering electricity providers a way to minimise disruptive downtime and save time, money, and manpower

Image generated with AI

The boundary between a university classroom and the high-stakes industry front line is becoming increasingly blurred. For Professor Tam Hwa-yaw, Chair Professor of Photonics of the Department of Electrical and Electronic Engineering and Associate Director of the Photonics Research Institute, the ultimate goal of academia is no longer confined to the laboratory or a published study. Instead, he envisions a seamless integration of cutting-edge research, hands-on education, and real-world knowledge transfer for commercialisation.

By bringing his students out of the lab and into the heart of the industry, Professor Tam is proving that undergraduates can be more than just learners; they can become entrepreneurs who eradicate the pain points in global infrastructure. A cornerstone of this vision is the team's latest award-winning innovation: a baffle-compatible autonomous robot designed for power generator inspection. This project was jointly developed by PolyU and CLP Power Hong Kong Limited (CLP), representing a strategic collaboration aimed at addressing the specific operational and maintenance challenges faced by CLP in ensuring a stable and reliable power supply for Hong Kong.

Professor Tam Hwa-yaw
- Chair Professor of Photonics, Department of Electrical and Electronic Engineering
- Associate Director, Photonics Research Institute

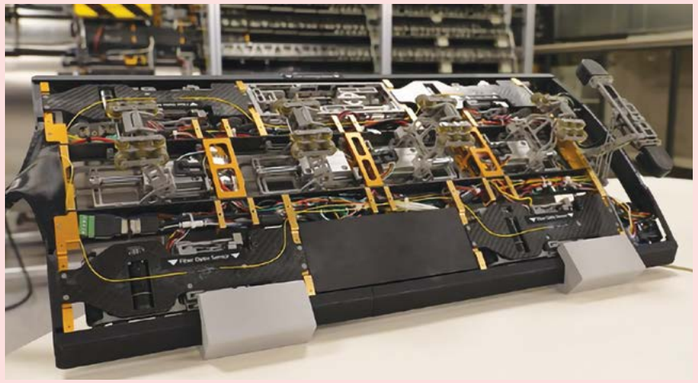
Revolutionising power generator inspection

Power reliability is the lifeblood of modern society. According to the U.S. National Energy Technology Laboratory, generator issues account for 14% of power plant equipment failures. Traditionally, the maintenance process is a high-stakes, labour-intensive operation that involves extracting a generator rotor weighing as much as 50 tons to perform a detailed inspection. This conventional procedure presents significant hurdles, and introduces substantial operational hazards. Furthermore, the process demands extreme accuracy, as any lack of precision during the manoeuvre can cause serious structural damage to the generator. Consequently, these complexities mean the entire maintenance cycle typically takes approximately 40 days to complete.

Professor Tam's team recently unveiled an ingenious, self-guiding robot capable of inspecting the interior of electrical generators without dismantling them. It can shorten the maintenance cycle by a week, which means big savings in time, money, and manpower. It also eliminates potential health and safety hazards for technicians working in extremely tight spaces that sometimes measure a metre or less.

Entitled "Revolutionising Power Generator Inspection: The Baffle-compatible Autonomous Robot", the project won the Thailand Award for the Best International Invention & Innovation and a Gold Medal at the 51st International Exhibition of Inventions Geneva.

It was one of 32 PolyU innovations that received 37 different accolades—a remarkable achievement that demonstrates the University's research excellence and global influence on the frontier of technology development.



The award-winning autonomous robot is designed for power generator inspection.

Cutting downtime and eliminating human error

At just 36mm thick, the new low-profile robot is slim enough to slip through the gap between the stator body and the rotor assembly. A rotating launch platform, mounted on the generator's retaining ring, positions the robot around the interior, and moves it precisely from one inspection slot to the next.

Retractable legs and wheels, and an autonomous mobility system enable it to navigate the internal baffles, the complex structural dividers inside a generator, and winding passages that were previously inaccessible to anything but a full dismantling of the rotor. Furthermore, the system is designed with high-stakes environments in mind. It includes continuous position tracking and a fail-safe retrieval mechanism, ensuring that the robot can be recovered under any conditions, preventing it from becoming an "internal defect" itself.

The compact and efficient unit integrates a number of inspection tasks, including:

- Visual inspection: to inspect ventilation ducts for oil stains, foreign objects or any other physical defects using a camera
- Electromagnetic core imperfection detection: to induce a controlled magnetic flux in the motor core to detect any shorted laminations
- Wedge tightness test: to assess the tightness of coils by tapping the wedges to ensure the integrity of the generator

"Using a robot to perform all of these essential inspections inside a fully-assembled generator speeds up the process, reduces costs, and cuts downtime," says Professor Tam.

For example, the tightness test is traditionally done by hand, with technicians hammering on the wedges, and making a judgement call based on the resulting sound and their own experience. PolyU's new robot does not use a standard hammer. Instead, it features a novel mechanism that launches a metal ball at the wedge and measures both the impact and rebound velocities to assess the wedge's tightness.

"All data are recorded by the robot and analysed scientifically. The potential for human error through inexperience is eliminated. Additionally, the robot carries a fibre-optic condition monitoring system that continuously assesses the health of critical components. This provides early indication of component condition trends, supporting proactive maintenance and enhancing generator reliability," he says.

Cultivating the Next Generation of Entrepreneurs

The project team included more than 40 undergraduates from the Engineering Entrepreneurship Club (EEC), who were closely involved in designing and creating the robot.

The slim robot is equipped with designs and mechanisms that enable it to 'crawl over' the baffles and complete the inspection automatically.

The collaboration with CLP allows the PolyU team to test the robot on a real-life size generator.

Professor Tam established the EEC in 2019 to provide students with hands-on experience, develop a practical understanding of industry needs, and inspire their entrepreneurial spirit. Each year, the club brings together roughly 200 students from different backgrounds, who learn to collaborate effectively through activities such as on-campus and international robot competitions.

Enthusiastic EEC member Mr Victor Leung joined the power generator inspection project as a Year-1 electrical and electronic engineering student, driven by a passion for building and assembling robotics. For Victor, the EEC is more than a club; it is a platform that allows him to transition from ideas to hands-on engineering. His commitment was so profound that he continued working on the initiative as a research assistant after graduation, having played a role in nearly every stage of the robot's development—from intricate electronic integration and mechanical design to overall project management.

"The biggest reward in this project has been the improvement of my design and problem-solving skills. Because I was involved in everything from the mechanical hardware to the electronics and management, I gained a holistic view of what it takes to bring a concept to life," says Victor.

Reflecting on the technical hurdles faced during the whole project, he adds: "There were many moments where the challenges seemed insurmountable, but the determination to never give up is what allowed our team to overcome every obstacle. I am incredibly proud to see the final deployment of the robot, and I plan to carry this same resilience into my future career in R&D."

Professor Tam (third from right), Mr Victor Leung (second from right) and the team formed by other EEC members and researchers spent five years successfully developing the robot. To facilitate testing, a generator model was built in the lab according to the specification of a real-life generator.

Building a smarter, healthier, and more sustainable future

Following initial proof-of-concept and successful off-line performance testing at CLP's Black Point Power Station in early 2025, Professor Tam expects to build on this milestone to launch a production-ready version before the end of 2026.

The professor already has another ingenious project in the pipeline. In collaboration with the Aviation Services Research Centre of PolyU, a snake-like, continuum robot system is designed to navigate the hard-to-reach, highly compartmentalised fuel tanks in aircraft. Much like the generator robot, the system helps eliminate dangerous manual operations in hazardous, confined environments, while also saving airlines significant costs by reducing the time aircraft must spend on the ground.

Professor Tam views these projects as the ultimate fruit of industry-academia-research collaboration. By focusing on challenges for which no market solutions exist, PolyU is driving the translation of research into solid benefits for society.

> These projects demonstrate strong potential to address some of the world's most pressing challenges, create a tangible impact for society, and build a smarter, healthier, and more sustainable future.
>
> Professor Tam Hwa-yaw

Through the combination of industrial expertise and PolyU's research excellence, Hong Kong is cementing its role as an international innovation and technology hub. In the process, a new generation of engineers is learning that the most powerful tools aren't just found in textbooks—they are built to solve the problems of the real world.

Human-Robot Collaboration Shaping the Future of Smart Manufacturing

Manufacturing is entering a new era, moving beyond Industry 4.0's focus on smart factories and interconnected machines towards Industry 5.0—the next wave that puts people at the centre, harnessing technology to enhance human creativity, well-being, and sustainability. Central to this shift are collaborative robots, or cobots, reshaping how humans and machines work together.

Image generated with AI

In a sunlit factory, a technician and a humanoid robot collaborate at a shared workbench. Wearing smart glasses, he reviews a 3D holographic blueprint as the robot assembles parts with precision. He suggests an improvement; the robot's AI updates the design instantly. Around them, robots move materials and inspect products via real-time data displays seamlessly together.

In this futuristic scene of Industry 5.0, humans and robots join forces to blend creativity and technology to achieve efficient and innovative production. At PolyU, the RAIDS (Research Group of AI for Industrial Digital Servitisation) at the Department of Industrial and Systems Engineering is transforming the ideas into reality.

The dynamic team is led by Professor Zheng Pai, Wong Tit Shing Young Scholar in Smart Robotics and Associate Professor of the Department of Industrial and Systems Engineering, who was awarded the Young Engineer of the Year Award 2025 by the Hong Kong Institution of Engineers and Young Innovative Researcher Award 2023 by PolyU.

With support from the Excellent Young Scientists Fund by the National Natural Science Foundation of China in 2024, the team pioneers a new generation of human-machine symbiotic collaborative manufacturing systems that combine the adaptability and responsiveness of humans with the precision and stability of machines.

The RAIDS team led by Professor Zheng Pai (front row, centre) in collaboration with Professor Lihui Wang, Professor and Chair of Sustainable Manufacturing at KTH Royal Institute of Technology, Sweden (front row, right)

TeleX provides a practical pathway towards more generalisable embodied intelligence models.

The evolution of robots in industry

Industrial robots emerged in the 1970s during the third industrial revolution, automating repetitive tasks from behind safety barriers. Today, Industry 4.0 connects factories through smart machines, IoT, and big data, enabling real-time communication and adaptation. Modern robots, equipped with AI and advanced sensors, now share workspaces with humans, learning and adjusting instantly to create collaborative, intelligent manufacturing environments.

The RAIDS group leads the transformation towards Industry 5.0. They have recently developed a novel multimodal human-robot interaction and data acquisition system, TeleX, for research and development in industrial embodied intelligence and robot learning.

Advancing fundamental research in human-robot symbiosis

TeleX is a smart, open platform that helps robots learn directly from human actions. It acts like a "super recorder" for human–robot interaction, capturing how people move, see, and feel objects during complex tasks. It combines precise motion tracking, visual sensing, and touch sensitive "robot hands" to synchronously collect multimodal human operation data in complex manipulation scenarios.

Designed for researchers, TeleX tackles a long standing problem in robotics: teaching robots to copy the way humans handle objects. At its core is a learning-based universal end-effector mapping algorithm developed by the team. It helps different robot arms and tools learn directly from multimodal human demonstrations, all through a single, easy-to-use interface. This means robots can learn new skills much faster, without the heavy time and computing costs usually needed to retrain systems for each platform.

TeleX has already been tested in various industrial scenarios on human-robot teamwork, imitation learning, teleoperation, and precision assembly. Industry partners use it to collect large amounts of real human operation data, helping robots learn how to feel, judge, and act more accurately. The long-term goal is an open platform that speeds up the rise of smarter, more human-like robots in future manufacturing.

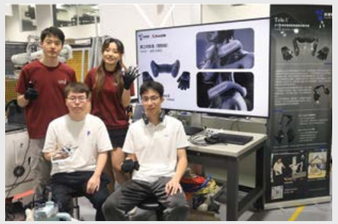
"The global manufacturing industry is shifting towards a human-machine symbiotic paradigm emphasising more flexible automation," Professor Zheng said. "Our research develops a paradigm offering multimodal natural perception, cross-scenario skill transfer and domain foundation-model autonomous execution, so robots are no longer just tools but intelligent agents that can evolve with human operators. This provides smart factories a path beyond pre-programmed automation."

> The future of smart manufacturing is not about machines getting smarter to replace humans, but about creating systems where humans and robots learn, adapt and succeed together to achieve higher productivity and flexibility.
>
> Professor Zheng Pai

Startup to widen impact

With a mission to develop advanced robotics, digitalisation and AI for more natural interactions, efficient collaboration and symbiotic human-machine systems, the RAIDS team under Professor Zheng's leadership has founded CobotAI Limited to commercialise their achievements.

By building a deeply human-centric intelligent manufacturing system and expanding it into more key domains, the PolyU team aims to guide society towards a technology-empowered, empathetic and human-oriented smart era.



Members of the startup team CobotAI

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