Appendix: CUHK's award-winning projects

	Awards	Principal investigator and team members (Department)	Project title	Project description
1	Gold Medal with Congratulations of the Jury	Professor Michelle Wang Dan, Professor Rocky Tuan Sung-chi (School of Biomedical Sciences, CUHK; Institute for Tissue Engineering and Regenerative Medicine, CUHK; Center for Neuromusculoskeletal Restorative Medicine, InnoHK) Professor Patrick Yung Shu-hang, Dr Samuel Ling Ka-kin (Department of Orthopaedics and Traumatology, CUHK; Center for Neuromusculoskeletal Restorative Medicine, InnoHK) Dr Rao Ying, Mr Huang Ruijia (School of Biomedical Sciences, CUHK) Dr Marianne Lauwers, Dr Zhang Yuyue, Dr Zhong Zhenyu, Mr Harry Cheung Hoi-pan (Center for Neuromusculoskeletal Restorative Medicine, InnoHK) Professor Elmer Ker Dai-fei (Department of Biomedical Engineering, PolyU) Professor Xu Chenjie, Mr Leng Fang (Department of Biomedical Engineering, CityU)	Advanced sports care: first-gen ECM biotechnologies	The team is at the forefront of sports medicine, specialising in tendon repair and disease management. Its comprehensive suite of solutions encompasses advanced diagnostics, effective treatment options and state-of-the-art drug screening platforms, addressing a variety of orthopaedic conditions and advancing sports care for healthy ageing. 1. Microneedle bioelectronic devices facilitate pain-free, minimally invasive, real-time detection of tendon injury biomarkers, providing valuable insights into disease progression and treatment effectiveness. 2. A first-in-class mRNA therapy offers localised, sustained release with tendon-specific bioactivity, surpassing traditional growth factor treatments for superior tissue regeneration. 3. A tendon-on-a-chip system revolutionises disease modelling and drug screening, enhancing therapeutic outcomes.
2	Gold Medal	Professor Jonathan Choi Chung-hang, Dr Han Ruifang, Dr Ho Lok-wai (Department of Biomedical Engineering, CUHK)	Small gold nanoparticles for alleviating skin inflammation	This invention is a gold nanoparticle that can reduce chronic skin inflammation. Smaller than 15 nm in diameter, the nanoparticle has a 3-nm gold core and a shell of polymer strands modified with octadecyl chains that promote entry to skin cells. Upon topical delivery, the nanoparticle penetrates the skin barrier, enters epidermal cells and treats skin inflammation as effectively as steroids without wrinkling, retention in organs or subchronic toxicity, for 90 days post-application. This is the first self-therapeutic gold nanoparticle for skin inflammation. The nanoparticle

				prototype passes the six-month accelerated stability test, and the chemical process for synthesising gold nanoparticles at a 5-L volumetric scale is in place. The team plans to commercialise the nanoparticle as a GMP cosmetic-grade skincare product for mild or moderate indications, backed by investors, industrial partners, patient groups, manufacturing associations and two patents, from China and the US.
3	Gold Medal	Professor Pauline Lui Po-yee, Professor Patrick Yung Shu-hang (Department of Orthopaedics and Traumatology, CUHK)	A breakthrough discovery in tendinopathy treatment: the world's first injectable fatty acid-binding protein 4 inhibitor-loaded hydrogel	The BMS309403-loaded GelMA hydrogel is a groundbreaking, minimally invasive therapy that effectively addresses tendinopathy caused by overuse and ageing. At present, there is no effective treatment for this condition. The team has uncovered a previously unknown fatty acid-binding protein 4 (FABP4) upregulation that fuels the destructive cycle of inflammation and pain in tendinopathy. Leveraging this insight, it developed the BMS309403-loaded GelMA hydrogel, specifically targeting and inhibiting the overactive FABP4 responsible for triggering inflammation and erroneous differentiation of tendon stem cells. This innovation disrupts the vicious circle perpetuating tendon pain. The team's engineered solution redirects tendon stem cell fate, suppresses inflammation, restores natural healing within tendons and alleviates pain. The sustained release of BMS309403 through GelMA hydrogel reduces injection frequency and drug dosage. The innovation holds promise for supporting regeneration and alleviating walking pain for millions affected by this incapacitating condition. In addition to this award, the invention has been recognised with a gold medal at the Silicon Valley International Invention Festival and a silver medal at the International Exhibition of Inventions Geneva.

4	Gold Medal	Professor Liao Wei-hsin, Dr Liao Hongpeng, Dr Hugo Chan Hung-tin, Mr Muhammad Rumi Wasir, Mr Lee Pak-ho, Mr Onuoha Chika (Department of Mechanical and Automation Engineering, CUHK)	Lightweight low-cost cross-joint assistive exoskeleton	This next-generation wearable exoskeleton directly addresses urgent market needs: labour shortages from an ageing workforce, widespread musculoskeletal injuries and the lack of accessible daily-assistive devices. Unlike traditional exoskeletons that are heavy, expensive and complex, it features lightweight, affordable, modular multi-joint assistance, enabling broad adoption in both industrial environments and daily life. The cross-joint exoskeleton delivers coordinated assistance to the arms, back and legs, providing effective support for construction, logistics, caregiving and mobility, and significantly reducing injury risks and physical fatigue. Its unique hybrid drive, modular architecture and AI-powered adaptive control ensure comfort, intuitive use and personalised support. This innovation transforms exoskeletons from niche, professional equipment into practical everyday tools, empowering users to work and live more healthily, safely and efficiently.
5	Gold Medal	Professor Choy Kwong-wai, Professor Dong Zirui, Professor Cao Ye, Professor Matthew Chau Hoi-kin, Professor Leung Tak-yeung, Professor Yvonne Kwok Ka-yin, Mr Yang Zhenjun (Department of Obstetrics and Gynaecology, CUHK)	Methods for detecting absence of heterozygosity by low-pass genome sequencing	This is an advanced DNA analysis method that identifies missing genetic variation, known as absence of heterozygosity (AOH), in the human genome. AOH is an important genetic marker linked to diseases including cancer. This method is applicable to shallow read-depth next-generation sequencing data, providing highly accurate results while saving analytical time and reducing costs. It enhances genetic diagnostics and research by offering an efficient alternative to traditional tests for AOH detection. The technology has been implemented for clinical diagnosis and the patent has been licensed to commercial companies for genomics research.

6	Gold Medal	Professor Song Xu, Dr Ding Junhao, Dr Winston Ma Wai-shing, Dr Qu Shuo, Dr Ye Haitao, Mr Mo Haoming, Mr Hu Zongxin, Mr Niu Tianxiao (Department of Mechanical and Automation Engineering, CUHK) Professor Yang Yi-Jian, Dr Zheng Xiaoping (Department of Sports Science and Physical Education, CUHK)	Mass customisation of breathable lightweight hip protectors for older people via automatic inverse design and 3D printing	Hip fractures represent the most serious fall-related injury risk for older people. Consistent use of hip protectors is key to reducing this risk but traditional designs are often bulky, thick, non-breathable, expensive and limited in size, frequently deterring older adults from wearing them due to discomfort and inconvenience. Addressing these issues, the team has developed a new generation of breathable, lightweight protectors specifically for seniors. Using 3D-scan-based inverse design and AI-automated lattice generation, this approach enables 3D printing of protectors with an optimised, lightweight structure. This minimises weight and cost while maximising comfort. Easily attachable to trousers, these protectors effectively reduce the risk of hip fractures from falls. Their breathable, lightweight design is particularly well-suited to elderly individuals living in hot and humid climates.
7	Gold Medal	Professor Patrick Tang Ming-kuen, Dr Max Chan Kam-kwan, Dr Philip Tang Chiu-tsun, Dr Zhang Qi (Department of Anatomical and Cellular Pathology, CUHK)	EDC-T: an AI-driven promising immunotherapy for solid cancers	Cancer is one of the leading causes of death worldwide. However, only a limited number of patients with solid tumours response well to the available treatments, including the latest forms of immunotherapy. Using AI-assisted single-cell bioinformatics, the team discovered a novel T-cell subset in the solid tumour “EDC-T”. It shows superior anticancer activities against solid tumours, including those resistant to conventional chemotherapy and T-cell-based immunotherapy. The team successfully developed a virus-free system to mass-produce EDC-T cells from human peripheral blood, representing a safe and effective immunotherapy for solid cancers.
8	Gold Medal	Professor Anna Tsang Chi-man, Professor Lo Kwok-wai, Dr Alex Li Yongshu, Dr Wu Qian, Dr Wong Bo, Dr Leung Heman Hei-man (Department of Anatomical and Cellular Pathology, CUHK)	Tumour-homing aptamers for targeted delivery of chemodrugs to nasopharyngeal carcinoma	This invention presents a novel targeted therapy for Epstein-Barr virus (EBV)-driven nasopharyngeal carcinoma (NPC). The team developed tumour-homing DNA aptamers that selectively bind to the oncogenic proteins on EBV+ NPC cells and are rapidly internalised. The core innovation is the

				Aptamer-drug conjugate (ApDC), which functions as a precision delivery system for chemotherapeutics like 5-fluorouracil (5FU). This approach directly addresses the critical limitations of systemic chemotherapy – nonspecific toxicity and severe side effects. In vivo results demonstrate a transformative benefit: a 12-fold lower dose of 5FU achieved effective tumour suppression when it was delivered via ApDC, compared to traditional methods. This signifies a paradigm shift towards highly effective, targeted chemotherapy with drastically reduced off-target toxicity, offering a new standard of care for NPC patients.
9	Silver Medal	Professor Chen Benmei, Professor Chen Xi, Dr Cao Haosen, Mr Shao Jingheng, Mr Wang Pei, Mr Huang Yijun (Department of Mechanical and Automation Engineering, CUHK)	Embodied AI driven cooperative multi-UAV search and rescue	In Hong Kong, numerous hiking emergencies occur in environments where locating victims visually is challenging, creating serious risks to human life and placing heavy demands on rescue resources. To address this challenge, the team proposed a novel multimodal search and rescue system that leverages the coordination of multiple UAVs to autonomously locate missing people in complex terrain. Each UAV carries an on-board base station capable of locating individuals through IMSI-based methods or by deriving their likely position from uplink radio signals. These radio-derived estimates establish an initial search range to guide cooperative UAV deployment. Complementing this capability, airborne optical sectioning penetrates canopy cover to reveal hidden ground features, with vision models aiding in potential victim detection. Use of a large language model (LLM) further enhances adaptive path planning by semantically integrating multimodal inputs. By combining radio localisation, optical sensing and LLM-driven adaptation, the system substantially improves rescue efficiency and reliability in inaccessible environments.
10	Bronze Medal	Professor Megan Ho Yi-ping, Dr Cheng Guangyao, Dr Ma Siying, Mr Kuan Chit-yau, Mr Ho Chun-lung, Ms Liao Yangjun	Ultrafast photothermal ddPCR system based on plasmonic	Droplet digital PCR (ddPCR) offers absolute nucleic acid quantification with high sensitivity. However, the relatively slow thermal ramping (2-4 °C/s max) on

		(Department of Biomedical Engineering, CUHK)	fluorosurfactant	traditional thermocyclers limits the overall sample-to-answer time, which typically exceeds two hours. The team's invention addresses this by using light for ultrafast thermocycling of droplets stabilised by a patented plasmonic fluorosurfactant, which acts as an efficient light-to-heat converter. It has developed a light-driven thermocycler using green LEDs to heat droplets at 14.2 °C/s (max) and complete 30 PCR cycles within 15 minutes.