Appendix

CUHK awarded projects in the 15th International Invention Fair in the Middle East

	Awards	**Principal investigator and team members (department)**	**Project title**	**Project description**
1	Gold Medal with the Congratulations of the Jury and WIPO National Award for Inventors	Professor Li Zheng, Professor Philip Chiu Wai-yan, Dr Yip Hon-chi, Mr Chan Wai-shing and Mr Sun Yichong (Department of Surgery)	System and Method for Endoluminal Tissue Manipulation	Gastrointestinal (GI) cancer is one of the cancers with the highest incidence and mortality worldwide. Endoscopic submucosal dissection (ESD) is an advanced endoscopic surgery used for the non-invasive treatment of early GI cancers, allowing for organs to be preserved and improving cure rates. In current ESD procedures, surgeons use a single instrument through a flexible endoscope to perform tissue dissection. The instrument moves along with the endoscope's view, resulting in technical complications and a long learning curve. This invention proposes a novel endoscopic magnetic countertraction system and method that can achieve dynamic tissue traction within the gastrointestinal tract. Compared to conventional ESD, this system provides surgeons with a "second hand" during surgery, which enables more flexible manipulation during ESD procedures, reducing surgical difficulty, shortening surgery time and enhancing surgical safety.
2	Gold Medal with the Congratulations of the Jury and Special Prize Awarded by UNESCO	Professor Siew Ng, Professor Francis KL Chan, Dr Oscar Wong Wing-ho and Dr Raphaela Iris Lau (Department of Medicine and Therapeutics)	A Novel Synbiotic Formula (SCM06): Modulating Gut Microbiome to Alleviate Sensory Hypersensitivity and Anxiety in Children with Autism Spectrum Disorder (ASD)	The novel synbiotic formula SCM06 is an effective microbiome-based solution to enhance the mental and digestive health of children. SCM06 was scientifically formulated based on faecal metagenomics and clinical data from CUHK. A pilot study in Hong Kong showed that SCM06 could significantly alleviate symptoms of anxiety, sensory hypersensitivity and functional abdominal pain in children with autism spectrum disorder (ASD).

3	Gold Medal with the Congratulations of the Jury	Professor Choy Kwong-wai, Professor Dong Zirui, Professor Cao Ye, Professor Matthew Chau Hoi-kin and Mr Yang Zhenjun (Department of Obstetrics and Gynaecology)	Methods for Detecting Absence of Heterozygosity by Low-Pass Genome Sequencing	This invention is an advanced bioinformatics analytical method to detect absence of heterozygosity (AOH) in next-generation sequencing (NGS) data. The method can be applied in molecular genetic diagnostics and genomics research. AOH is an important marker of imprinting diseases caused by uniparental disomy. It can also inform autozygosity through identity by descent, which is more prevalent in certain regions of the Middle East, with implications regarding increased propensity to autosomal recessive disorders. This method uses low-read-depth NGS data to save cost and shortens analytical time. This pipeline empowers NGS-based cytogenomics analysis as an alternative approach to chromosomal microarray analysis. Independent on the NGS platform, it is applicable for reanalysis of existing NGS datasets. It has been adopted by the Hong Kong Hospital Authority as a clinical genetic diagnostic service.
4	Gold Medal with the Congratulations of the Jury	Professor Chen Benmei and Professor Chen Xi (Department of Mechanical and Automation Engineering)	Unmanned Systems and AI Empowered High Performance Urban Environment Digitization and Management	This invention shows the pathway of Unmanned Aerial System (UAS) applications in the smart built environment with a focus on AI-based, fully autonomous data collection, 3D reconstruction, target of interest evaluation and systematic management of as-built information with BIM/GIS based digital-twin platforms. There are two aspects to its core technology: 1) Development of a software framework for single/multi-drone applications covering task management, motion planning, dynamic control, environment perception, visualisation and interaction with users. 2) Integration of UAS, AI and digital platforms for urban environment inspection, monitoring and management. The invention can not only enhance built asset management

				efficiency and accuracy but also reduce labour costs and safety hazards during multi-scale indoor and outdoor environment inspection and monitoring.
5	Gold Medal	Professor Qin Ling, Professor Xu Jiankun and Mr Xu Shunxiang (Department of Orthopaedics and Traumatology)	Bioactive Hydrogel, Preparation Method and Application Thereof	In recent years, there has been vigorous development of polymer hydrogels due to their unique properties, such as low modulus, high water content and excellent biocompatibility, as well as the ability to flexibly design and control their chemical structure, mechanical properties, bioactivity, processability and more. They have been extensively researched, especially in tissue engineering, drug delivery and encapsulation, and wearable sensors. Organic-inorganic composite hydrogels exhibit unique advantages in improving mechanical and biological properties. However, further exploration is needed to expand the range of inorganic active components in composite hydrogel systems, increase the content of inorganic active components to broaden the application scenarios and effectiveness of materials and meet clinical translation requirements. Leveraging the advantages of flexible design and control of hydrogels to develop a series of bioactive composite hydrogels with controllable gelation time, adjustable physical properties from flexible to rigid and autonomously designed biological properties is crucial. These hydrogels are expected to be applied in different tissue regeneration and repair pathological models, particularly in the regenerative repair of infectious tissues, with significant clinical value and social significance. This invention relates to the field of medical biomaterial technology, involving a kind of bioactive composite hydrogel. It provides a method for preparing such hydrogels using polyethylene glycol reactive ester, amino compounds and inorganic bioactive ingredients as reaction raw

				materials. It also shows how these hydrogels can be used for drug delivery and tissue repair and regeneration.
6	Gold Medal	Professor Ngai To, Dr Chong Hio-lam and Mr Yuen Chun-bong (Department of Chemistry)	EcoShield: Bacterial Cellulose for a Sustainable Future	Introducing Ecoshield, a ground-breaking Bacterial Cellulose (BC) packaging that sets a new standard for sustainability, far surpassing single-use plastics and leather. It uses rapidly growing bacteria to produce exceptionally strong cellulose from tea and sucrose in just two weeks. This innovative material exhibits outstanding mechanical and barrier properties, effectively safeguarding contents from moisture, oxygen and UV radiation without the use of toxic solvents. Shapeable and available in a range of colours, its transparent and durable composition closely mimics glass and plastic. Ecoshield biodegrades completely in soil within five months, dramatically reducing environmental impact. By addressing the increasing demand for sustainable packaging solutions, Ecoshield provides businesses with a competitive marketing edge and appeals to environmentally conscious consumers.