List of funded CUHK researchers and projects

1. **Professor Zhang Li, Professor in the Department of Mechanical and Automation Engineering at CUHK**
   Project title: AI-assisted Microrobotic Platform for Minimally Invasive Interventions

   Professor Zhang Li's project grant falls under topic "Using artificial intelligence to address imminent challenges in health care", one of the STG's five designated research themes. It aims to apply AI to miniature robots for minimally invasive surgical interventions. It will address the challenges of integrating AI and microrobotics research, including control, imaging, performance in dynamic physiological conditions and appropriate autonomy for intervention. The advanced technology and the outcomes from this joint research project will significantly contribute to Hong Kong, particularly in the emerging field of AI and miniature robots for minimally invasive medicine.

   The project team consists of engineering experts and medical professionals from CUHK, the University of Hong Kong, City University of Hong Kong, The Hong Kong Polytechnic University, Nanyang Technological University Lee Kong Chian School of Medicine, and the Swiss Federal Institute of Technology (ETH) Zurich. The team will work together to deliver: (1) an integrated deep-learning-based AI control strategy for environment-adaptive morphological control of microrobot collectives in physiological environments; (2) a human-scale magnetic actuation system integrated with real-time imaging tools for robust in vivo tracking and tele-operation of microrobot collectives; (3) an AI-based control scheme for autonomous and intelligent navigation of microrobot collectives in vivo with high adaptability in physiological environments; and (4) a microrobotic Interactive Virtual Surgical Platform (μbot-IVSP) for human body simulation, pre-operative microrobotic intervention evaluation and tele-operation practice.

2. **Professor Liu Renbao, Professor in the Department of Physics at CUHK**
   Project title: Diamond-based Multi-modal Quantum Sensing of Nanomagnetism

   Professor Liu Renbao's project grant falls under Advancing Emerging Research and Innovations Important to Hong Kong, one of the TRS's four designated research themes. It aims to serve the needs of Hong Kong in quantum technology, re-industrialisation and broadening the economic base. The grant falls under Advancing Emerging Research and Innovations Important to Hong Kong, one of the TRS's four designated research themes. Quantum sensing uses quantum mechanics for high-precision measurement and has a wide range of applications, including nano-magnetometry, nano-thermometry, bio-sensing, mechanical sensing and navigation. It also has the capability to simultaneously measure multiple parameters.

This project will develop diamond-based multi-modal quantum sensing and apply it to the study of magnetisation in nanomaterials. The study of magnetic nanomaterials is important to basic science, especially in condensed matter physics and materials science, and can lead to a broad range of applications, such as information storage; quantum memory; mechano-magnetic transducers; and non-contact magnetic readout of the thermal, structural and mechanical properties of nanomaterials. However, it is extremely challenging to study nanomagnetism, due to the requirements of high sensitivity and spatial resolution from the sensors and the complications from the interplay of thermal, mechanical, magnetic and structural effects. Diamond-based multi-modal quantum sensing is particularly.