



Capturing Research Value with Application

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PolyU's Vision

- Be a leading university that excels in professional education, applied research and partnership for the betterment of Hong Kong, the nation and the world




Research and Development Strategies





Benefits of Collaborative Research

University

- Additional research resources
- Sharing of knowledge and experience
- More practical, viable, and high impact research output


Industry

- Potential for innovation
- cost-effectiveness
- Enhance competitiveness

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Mastering of Information

- Community needs
- Economy, local and global market trends





*PolyU is a place where
innovation meets application*




Advanced Fiber Bragg Grating Railway Monitoring System

- An award-winning fiber optic sensor technology based system to monitor operating condition and structural health of tracks and train cars
- Monitor rail track vibration, temperature of bogies' critical components, strain of critical structures of rail carriages and number of axles
- Sense multiple points with a single optical fiber that can span 100km





Advanced Fibre Bragg Grating Railway Monitoring System

Features of FBG

- Non-corrosive, Immune to EMI and RFI
- Long-distance monitoring
- Multifunctional – one system measures different types of measurands
- Safe to use in hazardous and flammable environments
- Wavelength-encoded sensing information, giving self referencing capability
- Reflective sensors that provide inherent redundancy and thus enhance system reliability





Advanced Fibre Bragg Grating Railway Monitoring System

Implementations

- The systems have been installed in several parts of the **high-speed rail** across the mainland; along the **East Rail** and **West Rail** lines; and will soon be installed in the **Airport Express** and **Light Rail** Lines







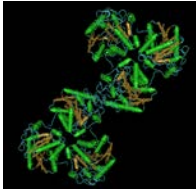
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A Breakthrough Against Cancer

- Arginine is an essential amino acid for growth of cancer cells
- Deprivation of arginine induces cancer cells death but it is well tolerated in normal cells

We have developed

- A novel, engineered multi-potent drug which depletes arginine from the blood
- It can inhibit proliferation of multiple cancer types including drug-resistant liver cancer and breast cancer

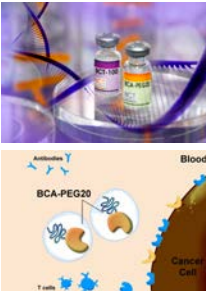


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A Breakthrough Against Cancer

- Arginase is a naturally occurring enzyme that is capable of depleting arginine in the blood circulation, but it has a very short half-life
- Based on a proprietary production method, Homogeneous BCA-PEG20 is generated using site-specific mono-pegylation of BCA mutant, which has a much longer circulating half-life
- BCA-PEG20 is a safe and effective drug as it converts arginine to ornithine and urea, which cause less drug resistance and toxicity



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A Breakthrough Against Cancer

- The 1st drug developed in HK that has reached the stage of clinical trial
- It is now at **clinical trial phase II** at the Queen Mary Hospital
- Won **International Awards**
- Published in top scientific journals
- Received cancer research funds from various bodies, including ITF and industry partners



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Exoskeleton Hand Robotic Training Device

- An award-winning rehabilitation device specially made for stroke patients to actively recover their hand functions by using exoskeleton robot with muscle signals



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Exoskeleton Hand Robotic Training Device

- It motivates users to actively interact with the system during the task-related training regime
- For stroke or brain injury patients
- Portable design suitable for hand function task training
- Intention driven using electromyography (EMG) signals
- Assist activities of daily living
- Assist hand opening and closing functions

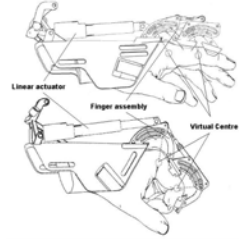


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Exoskeleton Hand Robotic Training Device

- It is made up of an **embedded controller** and a **robotic hand module**
- Linear actuator is used to drive each finger movement
- It allows much flexibility as each finger assembly can be adjusted to fit for different finger length
- A motor control box capable of individual control of the 5 linear actuators for hand opening and closing
- Based on the two EMG signals to control the hand opening and closing tasks (in trigger mode)



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Exoskeleton Hand Robotic Training Device

- Successfully licensed to a local company
- Provide clinical services at the **Jockey Club Rehabilitation Engineering Clinic** at PolyU campus
- Conducting trials at hospitals



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Space Programs - International

- “Space Holinser Forceps” were developed for use at the former **MIR Space Station** in 1995
- “Mars Rock Corer” was developed for the **Mars Express Mission** in 2003



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Space Programs - International

- “Soil Preparation System (SOPSYS)” were developed for **Sino-Russian Phobos-Grunt Mission** in 2011





Space Programs - National

- Designed and developed the work clothes for staff at control center of **China National Space Administration**
- Collaborate with the **China Astronaut Research and Training Center** to investigate the impact of microgravity on astronauts’ health







Space Programs - National

- PolyU is now collaborating with the **China Academy of Space Technology (CAST)** to
 - develop the “**Camera Pointing System**” for Lunar exploration
 - establish a **Joint Laboratory in Precision Engineering** for Space Applications



- These are only a few of our practical and viable research outputs that have been transferred to the community

