The University of Hong Kong
Technology Transfer Office

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The University Technology Transfer Company

TechXfer

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WHAT'S IN THIS ISSUE

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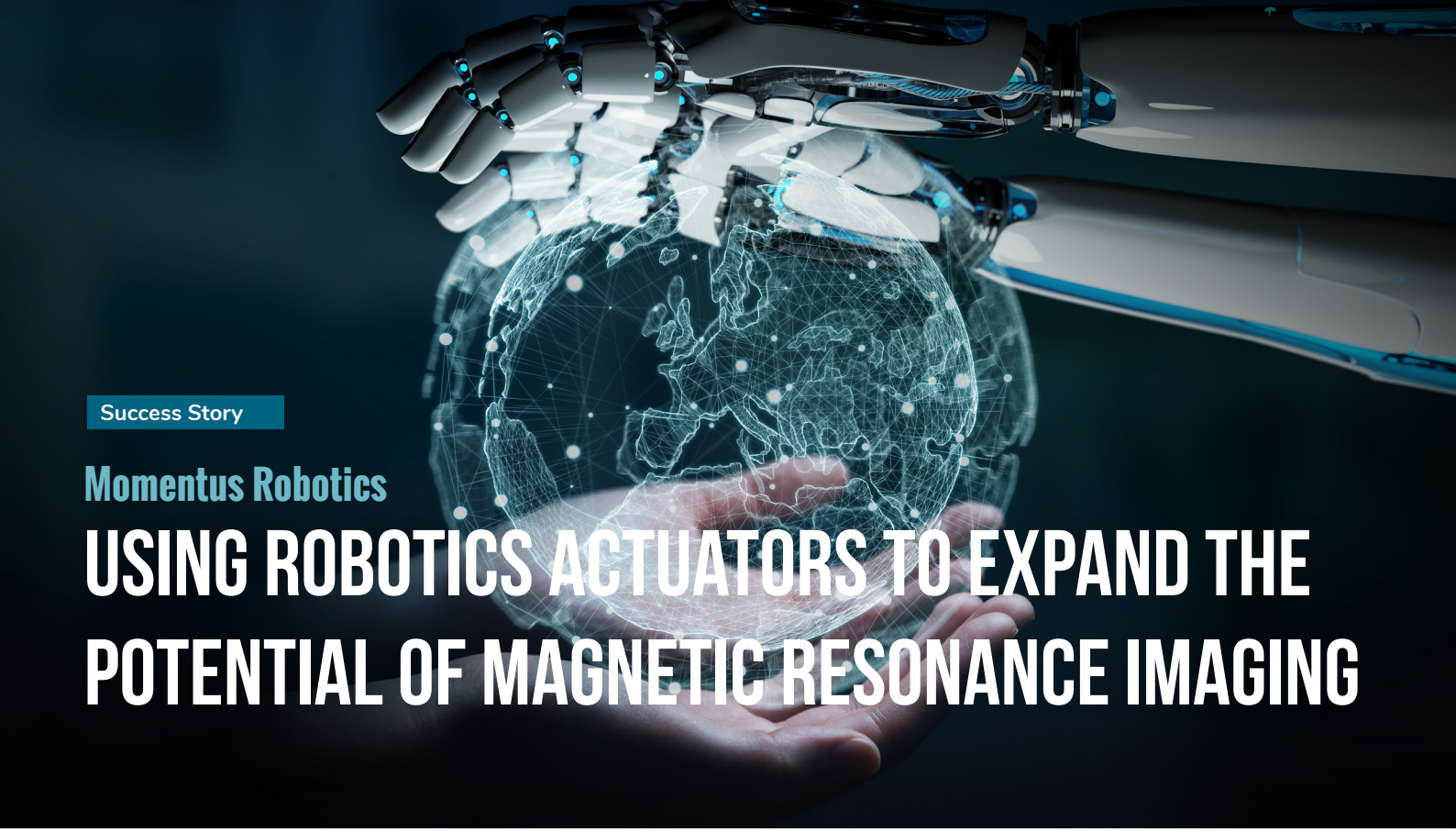
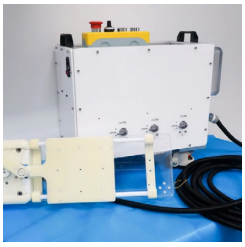


Success Story

Momentus Robotics

USING ROBOTICS ACTUATORS TO EXPAND THE POTENTIAL OF MAGNETIC RESONANCE IMAGING

Already widely used as a high-level diagnostics tool, magnetic resonance imaging (MRI) can also play a highly important role in surgeries to treat serious medical conditions including heart rhythm disorders, Parkinson's disease and many types of cancers. Until recent years, this valuable potential use of magnetic resonance (MR) has not been possible due to the confined space of the machine alongside the powerful magnetic field that prohibits the use of standard robotic components in its vicinity. Now, new technology has been developed in the form of hydraulically powered MR-safe actuators that can provide a high-performance and low-noise solution. The application of these MR-safe actuators will give surgeons the ability to perform surgeries remotely with high precision while being provided critical information of the body from the MRI machine.



(Left: MR-safe motion platform with controlling console; Right: motion platform inside MRI room)

MRI has several key advantages. It is totally non-invasive, free from harmful ionizing radiation, provides high quality imaging of soft tissue that can be used to create 3D roadmaps for planning and guidance of treatment and, critically, it can also provide real-time monitoring of the surgical process. The developed MR-safe actuators have zero negative impact on imaging quality, allowing simultaneous real-time imaging even while moving. This is made possible thanks to completely metal-free construction.

ABSTRACT

Robotic actuators can now be used to safely extend the capabilities of magnetic resonance imaging (MRI) to perform demanding surgeries with robotic precision. The actuators can provide surgeons with the ability to perform surgeries remotely while giving them an enhanced view of critical areas of the body.

Dr. Ka Wai Kwok (centre), Associate Professor in the Department of Mechanical Engineering, HKU, with team members Justin Ho (left) and Alan Tang (right) at the HKSTP-HKU iAXON incubation centre.

The actuators are available in a range of off-the-shelf models with different configurations. They can also be customized to meet the needs of individual customers' specifications. Beyond surgery, the actuators have been utilized in an MR-safe motion platform for simulating patient respiration in the treatment planning of MRI-guided radiotherapy.

The technology was developed by the research team led by Dr Ka Wai Kwok, Associate Professor of the Department of Mechanical Engineering at the University of Hong Kong. They have launched the company Momentus Robotics to bring the invention to the market. The new company is part of the Technology Start-Up Support Scheme for Universities (TSSSU) and is also a member of the Incu-tech programme supported by the Hong Kong Science and Technology Park (HKSTP). In 2020, Dr Kwok won the Actuators 2020 Young Investigator Award in recognition of his contribution to the field of MR-based actuation technologies, and also the IROS Toshio Fukuda Young Professional Award for his contribution to the advancement of MRI-guided robotic systems.

The HKUTTO office assisted with the patent application and helped to commercialize the technology. The TSSSU@HKU programme for HKU start-ups—which Momentus won in 2019—was organized by the TTO. The MR-safe actuators developed by Momentus Robotics won a silver medal award this year at the Geneva 2021 International Exhibition of Inventions, an event for which TTO played a key organizing role for the HKU community.

Project video:

LATEST PATENTS FILINGS

30 Mar 2021 – 28 Apr 2021

IP00945 Prof HUI Shu Yuen Ron; EEE (TW application filed on 30 Mar 2021)
Dimming Method and Circuit for Light-Emitting-Diode (LED) Systems driven by Passive LED Drivers

IP00947 Prof Kwok-Yung Yuen; Microbiology (PCT application filed on 31 Mar 2021)
Identification of nsp1 gene as the target of real-time RT-PCR using nanopore whole genome sequencing

IP00802 Prof YAM Wing-Wah, Vivian; Chemistry (CN application filed on 1 Apr 2021)
Compositions and Methods for Detection of Amyloid Fibrillation and Plaque Formation

IP00931 Prof LI Xuechen; Chemistry (US regular filed on 1 Apr 2021)
Anti-Bacterial Calcium-Dependent Antibiotic (CDA) Analogs and Methods of Treating Bacterial Infections

IP01013 Prof. HUI Shu Yuen; EEE (US regular filed on 5 Apr 2021)
A Bridgeless Single-Stage Single-Inductor Multiple-Octput (SIMO) AC-AC Converter Topology

IP00905 Prof WONG Sze Tsai Alice; School of Biological Sciences (PCT filed on 6 Apr 2021)
Utilization of Nuclear P70 S6 Kinase for the Diagnosis, Prognosis and Treatment of Cancer

IP00925 Dr FENG Shien-Ping; ME (US regular filed on 8 Apr 2021)
Stretchable Ionic Hydrogel with High Thermopower For Low-Grade Heat Harvesting

IP01013 Prof. HUI Shu Yuen; EEE (HK short term application filed on 12 Apr 2021)
A Bridgeless Single-Stage Single-Inductor Multiple-Octput (SIMO) AC-AC Converter Topology

IP01013 Prof. HUI Shu Yuen; EEE (CN UM application filed on 12 Apr 2021)
A Bridgeless Single-Stage Single-Inductor Multiple-Octput (SIMO) AC-AC Converter Topology

IP01027 Prof HUANG Lixi; ME (HK short term application filed on 7 Apr 2021)
Mask designs with extra-ordinary breathability, speech intelligibility and transparency

IP00901 Dr WONG, Siu Lun; School of Biomedical Sciences (PCT filed on 14 Apr 2021)
A System For Three-Way Combinatorial Crispr Screens For Analysing Target Interactions And Methods Thereof

IP00803 Dr CHOI Ching Gee; Biomedical Sciences (KR application filed on 14 Apr 2021)
An Improved High-Throughput Combinatorial Genetic Modification System And Optimized Cas9 Enzyme Variants

IP00956 Dr. NEELAKANTAN, Prasanna; Dentistry (Indian Provisional filed on 19 Apr 2021)
Antifungal compound and uses thereof

IP00945 Prof HUI Shu Yuen Ron; EEE (PCT application filed on 21 Apr 2021)
Dimming Method and Circuit for Light-Emitting-Diode (LED) Systems driven by Passive LED Drivers

IP01032 Prof. WANG Yu; Pharmacology and Pharmacy (PCT filed on 21 Apr 2021)
Glycopeptides derived from the collagenous domain mimic the anti-tumor and metabolic functions of adiponectin

IP00829 Dr FENGShien-Ping; ME (US regular application filed on 22 Apr 2021)
Synthesis and application of light management with thermochromic hydrogel microparticles

IP00950 Dr. YAM, Wai Ping Judy; Pathology (US regular filed on 22 Apr 2021)
Nidogen 1 As A Diagnostic Marker And Therapeutic Target Of Hepatocellular Carcinoma

IP00925 Dr FENG Shien-Ping; ME (CN application filed on 23 Apr 2021)
Stretchable Ionic Hydrogel with High Thermopower For Low-Grade Heat Harvesting

IP00611 Prof YAM Wing-Wah, Vivian; Chemistry (US continuation filed on 22 Apr 2021)
Luminescent Tetradentate Gold(III) Compounds for Organic Light-Emitting Devices and Their Preparation

IP00992 Dr. SU, Yuxiong; Denistry (US Provisional filed on 26 Apr 2021)
Development of a Novel Fibula Malleolus Cap: The Last Piece of the Puzzle in Computer-Assisted Jaw Reconstruction

IP00952 Prof. YUEN, Kwok Yung; Microbiology (PCT filed on 28 Apr 2021)
Multiple Epitope-based Vaccine Against COVID-19

IP00951 Prof. POON, Leo Kit Man; School of Public Health (PCT filed on 28 Apr 2021)
Use of SARS-CoV-2 viral proteins for developing serological tests of COVID-19

IP00922 Dr LEE Sang Hoon; Civil Engineering (PCT filed on 28 Apr 2021)
Fast and error-tolerant algorithm for generating second-level space boundaries from Industry Foundation Classes (IFC) Building Information Models (BIMs)

RECENT EVENTS

HIEBS X HKUTTO WEBINAR

On April 30, HIEBS (Hong Kong Institute of Economics and Business Strategy) and HKUTTO co-organized a webinar on the topic: Contextualizing ABDCI in the Greater By Area. ABDCI stands for Artificial Intelligence, Big Data, Cloud Computing and 5G/IOT.

Techshow Exhibition Hall Preview

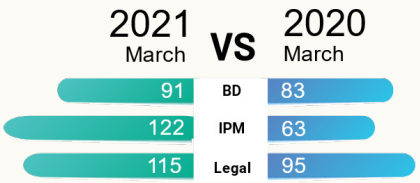
ONGOING TTO TECHSHOW ONLINE EXHIBITION

HKUTTO organised a new virtual techshow to introduce HKU start-ups and their technologies to the public. The show, which started on April 19 and continues until May 18, has already attracted more than 500 attendees from around the world including leading commercial firms such as Livzon Pharma Group, Huawei, Merck Group, Roche, Pfizer, J&J Innovation, Goldman Sachs as well as public sector organisations including InvestHK, HKTDC, HKSTP and the Construction Industry Council. The show is an opportunity for HKU communities to showcase their frontier technology and entrepreneurship, particularly in the fields of engineering, science, biotech and including the COVID-19 vaccine, and boost opportunities for commercialisation.

PROGRESS UPDATE

In March 2021, BD cases numbered 91, up from 83 in the same month in 2020. The legal team opened 115 cases from Feb 24-Mar 30, a big increase from the 95 launched in 2020. The IP management team handled 122 cases in March 2021, almost double the 63 handled last year.

TOTAL ENGAGEMENTS AND CASES HANDLED



TECHNOLOGY COMMERCIALISATION

List of technologies licensed in March 2021

Item	IP Type	Faculty	Leading Professor
Modified Bacteria and their Uses thereof for the Treatment of Cancer or Tumor	PCT Application No. PCT/CN2013/000528 US Patent No. 9,127,284 PRC Patent No. ZL201380023412.0 EP Patent No. 2844736	Medicine	**Prof. Jiandong Huang**
Surgical Instrument with Flexible Steerable Segment	US Provisional Application No. 63/141,613	Engineering	**Prof. Ka Wai Kwok**

Top 3 revenue-booked IPs in March 2021

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Modified Bacteria and their Uses thereof for the Treatment of Cancer or Tumor	PCT Application No. PCT/CN2013/000528 US Patent No. 9,127,284 PRC Patent No. ZL201380023412.0 EP Patent No. 2844736	Medicine	**Prof. Jiandong Huang**
Versitech e-Form	Software	Versitech	/
Method And Apparatus For Time-Resolved Ultrasound Flow Vector Imaging And Its Dynamic Visualization	US Application No. 14/544,048 EP Application No. 14864864.5 PRC Application No. 201480073606.6 EP Div Application No. 17159471.6 US Application No. 15/445,582	Engineering	**Dr. Alfred GH YU**

TRANSFERRING YOUR NEW TECHNOLOGIES INTO BUSINESS OPPORTUNITIES

POLICY STIPULATION

The latest policy stipulates that the net receipts arising from the exploitation of an Invention are shared among the University, the relevant faculty/department and the inventor(s) in the ratio of 1/3 : 1/3 : 1/3. It aims to encourage the researchers at HKU not only to excel in academic performance but also to apply their technology for the benefits of mankind with an impressive reward.

HOW TO APPLY:

4 PHASES FOR RESEARCH PROJECTS

Phase 1: Initial project negotiation

1. PI will negotiate with their collaborator(s) and confirm a project proposal which includes the scope, budget and duration of the project.
2. PI will negotiate with their collaborator(s) and prepare a draft agreement (Agreement templates are available at the website of the Research Services (RS): http://www.rss.hku.hk/contracts/contractresearch/templates.).

Phase 2: Endorsement from department/ faculty

3. PI will submit the project proposal, the draft agreement, and the information form/ grant application form to their department/ faculty to seek an approval (The information form for research/consultancy agreements is available at:http://intraweb.hku.hk/local/rss/tto/researchor-consultancy-agreements-form.doc).
4. After obtaining the approval, PI will submit the project proposal, the draft agreement, and the information form/grant application form to the Research Service (RS).

Phase 3: Financial legal/IP review

5. The RS will distribute the project proposal and the draft agreement to the Finance and Enterprises Office (FEO) for financial review and to the Technology Transfer Office (TTO) for legal review.
6. If there is any financial/legal issue, the FEO/TTO will inform PI through the RS. PI will negotiate with their collaborator(s) on the financial/legal issue until it is settled.

Phase 4: Signature and document archiving

7. After consolidating the settled project proposal and the agreement, the RS will proceed to the signature process.
8. After duly performing the signature process, the RS will assign the RCGAS number(s) for opening the project account(s) and archiving all the documents.

ABOUT US

About HKUTTO
The Technology Transfer Office (TTO) is committed to maximising the impact of research through technology transfer at both the institutional and industrial levels. TTO works closely with researchers at HKU to commercialise their inventions through professional consultation on business development, legal advice and assistance, as well as patent application filings. Your inventions will not benefit society unless they are mass produced.

About Versitech
Versitech Limited is the commercial arm of HKU. Versitech negotiates, executes and manages commercial business contracts and agreements on behalf of the University.

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