



2021-22

KNOWLEDGE TRANSFER OFFICE
ANNUAL REPORT

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EXECUTIVE SUMMARY

The Knowledge Transfer Strategy at **Hong Kong Baptist University (HKBU)** is a continuation of our last year's efforts in providing significant knowledge transfer impacts to the society in the strategic areas of (1) **health, Chinese medicine, and drug discovery**; (2) **science, technology, artificial intelligence (AI) and big data** and (3) **art, culture, and creative media** by leveraging HKBU's strengths in arts and sciences. This Annual Report will summarise the key achievements for the fiscal year July 2021 – June 2022, and highlight our contributions in **healthcare** and **creative arts and art-tech**.

In this reporting year, HKBU has successfully secured over HK\$560 million in research funding with over 40 new projects winning matching support from the Research Matching Grant Scheme. HKBU has filed 28 invention patents, of which 24 were granted. Currently, the University has 108 active licenses of our inventions and IPs. HKBU has received a total income of HK\$660,115,729 from knowledge transfer activities via the provision of research and business services, and generated an income of HK\$3,364,560 from our intellectual property. Our University has 38 spun-off companies and held 126 entrepreneurship activities with 7,110 students participated in these. Our faculty has presented 490 public lectures / symposiums / exhibitions and speeches to a community audience, and 44 of performances and exhibitions of creative works were held. Furthermore, 182 of our staff were engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies.

We will share three **impact cases** namely on HKBU helping **combating the COVID-19 pandemic** by integrating our strengths in traditional Chinese medicine (TCM), modern mental healthcare, and communication innovations; **major developments in traditional Chinese medicine** such as HKBU being entrusted to operate the flagship Chinese Medicine Hospital, establishment of the Centre for Chinese Herbal Medicine Drug Development (CDD) under the InnoHK initiative, and research breakthrough in regulatory mechanism and new drug target for obesity; and **creative designs** for use in a portable ergonomic Landing Chair in China's Manned Space Programme, used by the taikonauts of the Shenzhou-13.

In **health, traditional Chinese medicine and new drug development**, research advancements and collaborations with various partners have put forward initiatives such as scheme on stroke prevention and rehabilitation, smart Chinese medicine technologies, application and commercialisation initiatives, for its promotion and internationalization. Other impactful life science innovations in treating cancers, colitis, obesity, and prevention of drug-resistant bacteria are also under way.

In **creative arts and art-tech**, HKBU's long pioneering research and developments in visual arts, music, and film have led to the establishment of the School of Creative Arts with effect from 1 July 2022, which will synergise HKBU's expertise and to serve as a unique, solid platform to advance arts and culture. Our Academy of Visual Arts also collaborated with the Hong Kong Palace Museum in designing and installing five art tech installations which will be exhibited starting July 2022. Many of these innovations are empowered by enabling technologies such as AI, big data, and blockchain, allowing for interdisciplinary and multidisciplinary technology developments. Impactful innovation, initiatives and activities will be expected in the coming year in both knowledge transfer and nurturing of next-generation creative arts talents.

Based on breakthroughs in AI, HKBU developed a privacy-protecting technology which has been incorporated into the contact tracing mobile app LeaveHomeSafe. Our researchers have also applied AI in developing advanced semiconductor materials. Projects in developing user-controlled secure data sharing and analytics with blockchain and trusted computing technologies were initiated.

We hope that this report can visualize the many impacts made by HKBU in the community and our dedication in fostering global collaborations to benefit the global community, and hope our readers will get to appreciate the milestones achieved throughout our knowledge transfer venture.

IMPACT CASES

As a caring institution and a leading research university in Asia for the world, HKBU has taken on a major role in helping the community combat COVID-19 throughout the pandemic period. Significant advancements are also seen in traditional Chinese medicine and creative arts. This year we highlight three cases to elucidate HKBU's endeavour and impacts to the community.

Impact Case 1 – Combating COVID-19 with Holistic Support for the Community

1ST

in Hong Kong



To provide free and holistic traditional Chinese medicine prevention and treatment service to COVID-19 patients, close contacts and carers



> 60,000

Doses distributed since 2020

"HKBU Chinese Medicine Immunity Enhancement Remedy" for frontline medical staff, elderly homes, day-care centres, schools, and underprivileged families to combat COVID-19



> 42,000

Persons served as of June 2022

Online consultations provided through "HKBU Chinese Medicine Telemedicine Centre Against COVID-19"



> 100
homes served

Delivered services to elderly homes referred by the Hospital Authority

2,497
elderlies served

To home-based elderlies served by St. James' Settlement



As of 1 June 2022, provided remote consultations and medicine delivery to elderly homes and to home-based elderlies.

Kai Tak Holding Centre

Responsible for operating

1/3 Beds



Another 1/3 Beds

were provided with Chinese medicine prescription service



Appointed by the Social Welfare Department of Hong Kong Government as one of the operators of the 1,200- bed Kai Tak Holding Centre.

Established a transdisciplinary project "Overcoming Vaccine Hesitancy in Hong Kong" to help inform authority in better formulating effective communication strategies to overcome COVID-19 hesitancy in Hong Kong.



> 8 Million

Downloads of AI-enhanced LeaveHomeSafe mobile app

Set up a "COVID-19 Misinformation Fact-checking Hub" to debunk COVID-19 related fake news.



COVID-19 transmission model attracted

385,000

Views

90,000

Downloads

1.3 Million

Views on YouTube

Built a foundational transmission model to evaluate the efficacy of containment measures against the COVID-19 pandemic.

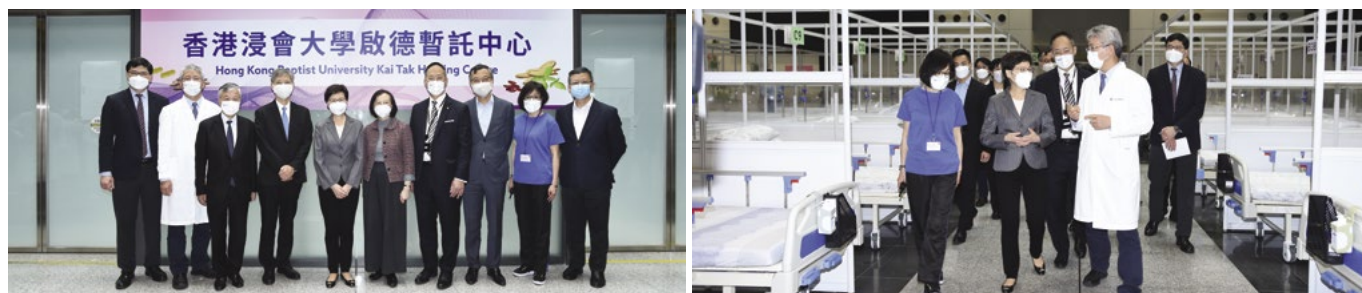
4 HKBU spin-off companies

Number of HKBU technology spin-off companies providing products or services to combat COVID-19.



At HKBU we bring to life the concept of "prevention is better than cure". We are the first higher education institution in Hong Kong to take such an integrated approach to treating COVID-19 patients and to combat COVID-19. We include the key initiatives in this section while there are other developments against COVID which can be found throughout this report.

HKBU was appointed by the Social Welfare Department of the HKSAR Government as one of the operators (looking after 393 beds) of the Kai Tak Holding Centre (the Centre), which houses elderly COVID-19 patients with mild symptoms who have been discharged from the hospitals of the Hospital Authority, and residents of elderly care homes who need to be quarantined after assessment. The School of Chinese Medicine (SCM) has dispatched a Chinese medicine team, which comprises 11 Chinese medicine practitioners, to provide Chinese medicine treatment services to the elderly residing in the Centre with the sponsorship of the Food and Health Bureau. They joined hands with the on-site doctors and pharmacists, as well as the care workers from the Mainland, to take care of the other medical and pharmaceutical needs of the elderlies. In addition, HKBU provided a Chinese medicine prescription service for the Centre's another 393 beds which are operated by the Haven of Hope Christian Service, providing patients with more diverse treatment options.



Since Hong Kong's first wave of the COVID-19 pandemic, HKBU has also:

1. Been giving out the "HKBU Chinese Medicine Immunity Enhancement Remedy" prescribed by the School of Chinese Medicine (SCM) to boost the immunity of the public against viral infection. Since 2020, nearly 60,000 doses have been sent to frontline medical staff, elderly homes, day-care centres, schools, and underprivileged families.
2. Assembled a transdisciplinary team of experts and support personnel to provide Chinese medicine services to patients, close contacts, and care workers. All items, including consultation, medicine, and postage, have been made free of charge thanks to **a generous HK\$10 million donation from Tencent Charity Foundation**.
3. Set up an integrated hub called the "Chinese Medicine Telemedicine Centre Against COVID-19" to handle appointments and drug delivery matters. By pulling all its resources, HKBU managed to build this centre, as well as the platform to facilitate online registration, in just two weeks. The online consultation service, which is designed to cater 1,000 patients per day, has served more than 42,000 patients, close contacts, and care workers to date. The online consultation service was launched in February this year to target asymptomatic COVID-19 patients under quarantine. Practitioners from the School of Chinese Medicine diagnosed patients and prescribed medicine through video calls on WhatsApp, while a medicine dispensing system dispatched medicine orders to patients.
4. Partnered with the Hong Kong Association of Gerontology to extend our holistic traditional Chinese medicine remote consultation and medicine delivery (from our SCM), and mental health support services (from our Faculty of Social Sciences) – the "Emotional Support Team", with the use of music therapy (from our Department of Music) – "Sonic Balm" to serve more than 100 elderly homes in Hong Kong. The University has also offered their services to staff members of St. James' Settlement who have been providing care services to 5,200 elderlies. Over 2,497 elderlies under the St. James' Settlement programme were also served by HKBU.
5. Provided teachers, and students from our Bachelor of Nursing (Hons) programme at the School of Continuing Education to help relieve the pressure on the frontline medical staff. Some students were assisting staff to administer vaccinations and collect specimens, others were supporting the professional nursing staff in the Kowloon Bay Choi Wing Road Community Isolation Facility as well as the Kai Tak Holding Centre, and they were helping them provide daily care to the resident elders. At the same time, a call centre was set up on campus to support the Hospital Authority's hotline for infected people pending admission to isolation facilities. Staff and students from the Nursing programme were helping to answer their enquiries, and they were also easing their worries with professional advice.



Impact Case 2 – HKBU Traditional Chinese Medicine to Scale New Heights

Fulfilled SDG:  **Goal 3 Good health and well-being**

1. HKBU selected to operate flagship Chinese Medicine Hospital



HKBU was selected by the Government as the contractor for the service deed of Hong Kong's first Chinese Medicine Hospital (CMH), which will be in Tseung Kwan O. Its construction is expected to complete in 2025 with service to commence in the second quarter of the year.

With the establishment of the CMH, Chinese medicine healthcare service standards in Hong Kong will be raised substantially, and the new hospital will enable more comprehensive disease prevention strategies and treatments for the public. The CMH will establish six major specialist areas, including internal medicine, external medicine, gynaecology, paediatrics, acupuncture and moxibustion as well as orthopaedics and traumatology, and numerous centres for special diseases will be set up. Complemented by the University's close collaborative relationship with the Chinese Medicine Clinics

cum Training and Research Centres in the 18 districts and the Chinese medicine industry, the CMH will help to promote the development of specialist Chinese medicine services in Hong Kong.

On the training of Chinese medicine talent, the CMH will become a practicum base for Chinese medicine and pharmacy students from universities and other training bodies in Hong Kong, and it will offer greater flexibility for the nurturing of industry professionals.

Moreover, the CMH's clinical trials facilities will facilitate research and the development of more effective Chinese medicine drugs and therapies, enhance Hong Kong's standards in Chinese medicine clinical research, and thus improve the competitiveness of Hong Kong's Chinese medicine pharmaceutical products regionally and even internationally. The CMH will also facilitate cross-disciplinary collaboration in the Greater Bay Area, and among the Belt and Road countries and the global community; collaborations between Chinese medicine and the professional disciplines of Western medicine, nursing, and physiotherapy to enhance disease prevention and treatment standards; and the strengthening of collaborations between the Government, industry, academia, and research bodies to expedite knowledge transfer. A short video detailing the development of Traditional Chinese Medicine and the Hong Kong CMH can be viewed at <https://www.youtube.com/watch?v=kio93WnxFOI>.

2. HKBU establishes Centre for Chinese Herbal Medicine Drug Development as part of the InnoHK initiative to enhance the creation of novel Chinese medicine drugs in Hong Kong



HKBU has established the Centre for Chinese Herbal Medicine Drug Development (CDD), which is equipped with comprehensive and cutting-edge facilities that can enhance Hong Kong's ability to develop novel Chinese medicine (CM) drugs according to market demands. It will also standardise and internationalise the development of CM drugs, and nurture talent for the industry. The Centre is currently working on two novel CM drug research projects that focus on chronic constipation and inflammatory bowel disease, respectively.

Located within the Hong Kong Science Park, the CDD was established with funding from the InnoHK initiative under the Innovation and Technology Commission of the HKSAR Government. The Centre's vision is to translate traditional CM wisdom into pharmaceutical products with the best global partners using international standards.

3. Study uncovers fullness regulatory mechanism and drug target for obesity





Obesity is a global health epidemic that raises the risk of developing life-threatening conditions such as diabetes and heart disease, but despite its prevalence worldwide and in Hong Kong, there are few effective drugs on the market.


However, a new study led by Dr Xavier Wong Hoi-leong, Assistant Professor of the Teaching and Research Division of the School of Chinese Medicine (SCM), and Professor Bian Zhaoxiang, Tsang Shiu Tim Endowed Chair of Chinese Medicine Clinical Studies and Director of the Clinical Division of SCM at HKBU have identified a promising potential drug target for the management of obesity, as they found that a proteolytic enzyme called membrane-type 1 matrix metalloproteinase (MT1-MMP) plays an important role in the regulatory mechanism that underpins the sensation of fullness, or satiety. The research findings were published in the journal *Nature Metabolism*.

With the application of a specific neutralising antibody that inhibits MT1-MMP, significant improvements in metabolic parameters including food intake, glucose tolerance and body weight were observed in obese mice. The results suggest that MT1-MMP is a potential therapeutic target that could be used in the development of innovative drug treatments for obesity.

Impact Case 3 – Design Innovation: Product Design for China Space Explorations

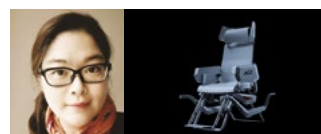
Fulfilled SDGs:  **Goal 9 Industry, innovation and infrastructure**

 **Goal 3 Good health and well-being**

 **Goal 11 Sustainable cities and communities**

Assistant Professor Anna Lai-yin Qin, who joined the Academy of Visual Arts (AVA) in 2021, focuses on collaboration between creative design and innovative technology by applying Design Knowledge to technology-driven projects to optimise market values of technological innovations, and vice versa, to apply novel technology in creative designs.

Recently, she collaborated with Shenzhen ND Industrial Design (design house) and the Astronaut Centre of China for the third time on equipment design. The Landing Chair - a portable ergonomic chair, is one of the key tools used by the astronauts while landing on



Earth from space flight missions to provide immediate support to their musculoskeletal system deterioration conditions during venue transfer. Qin as the chief designer of the 1st generation Landing Chair for spacecraft Shenzhou-10, optimises the 3rd generation (for Shenzhou-13) from ergonomics, materials and engineering, and aesthetics for a better overall experience from both the users' and audiences' perspectives. The latest generation was first published on 16 April 2022 during live streaming of the return. To further translate the users' personal experience into data visualisation as intangible cultural heritage, she will embed human and environmental data collection features into the next generation of landing chairs.

In addition to landing chairs, Qin is in parallel working on an injector design for outer space applications with Professor Zhang Ge and his team from the School of Chinese Medicine.



HKBU DEDICATED TO INNOVATIVE HEALTHCARE

Social impact and support for community

In addition to our many dedicated efforts in combating COVID-19 in Hong Kong, we have also provided many innovations in healthcare to the Hong Kong community.

BOC–HKBU Chinese medicine community scheme offers free rehabilitation services to low-income stroke patients

HKBU and the Hong Kong Sheng Kung Hui (HKSCH) Welfare Council have received a generous donation from the Bank of China (Hong Kong) (BOCHK) for the three-year "BOC–HKBU Chinese Medicine Community Stroke Prevention and Rehabilitation Scheme". The Scheme provides free Chinese medicine rehabilitation treatments to 500 eligible low-income stroke patients, and it also offers free preventive treatments and tracking assessments to 1,200 people who have a medium to high risk of having a stroke.



Under the Scheme, experts from SCM will form treatment teams and formulate a six-month treatment programme for stroke patients. Patients will receive free Chinese medicine, acupuncture, and massage treatments two to three times a week, up to 72 times in total. SCM will arrange for Chinese medicine practitioners to visit the patients, or alternatively, the practitioners will invite them to receive their treatments at the elderly centres of the HKSCH Welfare Council. Furthermore, the Scheme will provide counselling and support services for older stroke patients and their family members.

In addition, SCM clinics and the HKSCH Welfare Council's elderly centres will set up health management stations for stroke patients, with SCM offering training to suitable older people who can then go on and serve as Chinese medicine senior ambassadors for stroke prevention. Around 1,200 older people with a moderate to high risk of stroke will be referred to the HKSCH Welfare Council's elderly centres to undergo a one-year preventive treatment programme and follow-up assessments.

HKBU invents novel cell sensor for rapid and low-cost screening of drug-resistant bacteria

A research team led by Dr Ren Kangning, Associate Professor of the Department of Chemistry has developed a novel cell sensor with a barcode-like micro-channel structure that enables rapid and low-cost screening of drug-resistant bacteria. The invention could potentially be used on a large-scale in resource-limited situations such as frequent safety screenings of water, food, and public facilities, as well as urgent surveys of massive samples during an infectious disease outbreak, particularly in developing countries.



The test results of the "barcode" cell sensor were consistent with those conducted with conventional antimicrobial susceptibility testing (AST). The test can be completed in three hours, which is much faster than conventional AST that requires 16 to 24 hours for results.

The research team has filed a patent application for the invention, and they plan to develop it into a portable AST instrument.

HKBU joint research reveals that gut microbial enzymes reactivate triclosan which induces colitis



A HKBU collaborative research study has revealed that certain gut microbial enzymes mediate the reactivation of triclosan (TCS) from its inactive glucuronide metabolite. TCS is an antimicrobial agent commonly used in a wide range of consumer products, and it is associated with the development of colitis. A research team co-led by Professor Cai Zongwei, Chair Professor of the Department of Chemistry and Director of the State Key Laboratory of Environmental and Biological Analysis at HKBU; Professor Matthew R Redinbo from the University of North Carolina at Chapel Hill; and Professor Zhang Guodong from the University of Massachusetts Amherst conducted a research study based on the hypothesis that certain gut microbial enzymes act on TCS-G in the gut, leading to the reactivation of TCS and the subsequent development of colitis.

The research results have been published in *Nature Communications*, an international scientific journal.

HKBU research reveals that bisphenol S exposure may promote breast tumour progression and increase cancer risks



A study led by Prof Cai Zongwei, Chair Professor of the Department of Chemistry and Director of the State Key Laboratory of Environmental and Biological Analysis, has revealed that different degrees of exposure to bisphenol S (BPS), an industrial chemical widely used in paper products and plastic containers, are associated with the growth and deterioration of breast tumours in a mouse model.

The research team found that a low dosage of BPS induces faster tumour growth, and a high dosage of BPS may ultimately lead to deterioration of the tumour. Through comparing the distribution of lipids and proteins in the BPS-exposed mice groups with those observed in human breast cancer tissue samples, the team deduced that exposure to BPS will increase the risk of breast cancer in humans.

Commercialisation and industrial collaboration

Working with China Resources Enterprise Limited to promote the modernisation and internationalisation of Chinese medicines



HKBU has signed a Memorandum of Understanding (MOU) with China Resources Enterprise Limited (CRE) to jointly promote the modernisation and internationalisation of Chinese medicine. Under the MOU's collaboration framework, the two parties signed a Letter of Intent to explore the establishment of the HKBU-CRE Joint Innovation Centre on Smart Chinese Medicine.

The collaboration between HKBU and CRE aims to build on Hong Kong's status as the nation's connecting window and bridge with the international community. The initiative also hopes to integrate the strengths of both parties to jointly promote the standardisation, modernisation, and scientific development of Chinese medicine, so that Chinese medicine will be more widely accepted by the international community. In addition, this will enable Chinese medicine to further contribute to the safeguarding of human health. CRE will invest funding of up to HK\$50 million and offer market demand and industry knowledge, industry resources as well as management experience to drive relevant collaboration projects.

HKBU establishes COVID-19 Chinese Medicine Diagnostic and Treatment protocol for local and Mainland TCM industry

Furthermore, with its extensive experience of diagnosing and treating COVID patients over the past two years, and with reference to treatment protocols and the mainland's clinical experience, our School of Chinese Medicine has established a clinical pathway and compiled the "COVID-19 Chinese Medicine Diagnosis and Treatment Protocols for Hong Kong". This covers the Chinese medicine approach to the prevention of COVID-19, as well as the treatment and rehabilitation of patients with mild to moderate cases of the disease. Given the unique climatic environment of Hong Kong and our body constitutions, our Chinese medicine experts have established a protocol that considers the special local features. The protocol aims to standardise HKBU's clinical treatments for COVID-19 and provide an operational reference for the Chinese medicine sector. Our professors and clinicians are in close collaboration with the local and Mainland TCM industry to share our expertise in treating COVID-19 patients in Hong Kong.

Researchers join the effort to overcome vaccine hesitancy and debunking COVID-19 fake news in Hong Kong

The COVID-19 vaccination drive in Hong Kong began in February 2021. However, despite the government providing vaccination for its residents for free, till 13 July 2021, only about 26.9% of the city's population has been fully inoculated, which is way below the globally accepted level for attaining herd immunity. The Hong Kong SAR government has introduced several incentives for all vaccinated residents including relaxation of social distancing norms, organising lucky draws with the business sector and rewarding vaccinated government employees with vaccination leave. Despite this, the pace of vaccination has not gained momentum.



In response to this challenge, HKBU's School of Communication is contributing to a new initiative aimed at supplying decision-makers with timely evidence-based insights. In collaboration with the Department of Computer Science, the HKBU-funded "Overcoming Vaccine Hesitancy in Hong Kong" project will share the findings of various studies being conducted on vaccine hesitancy, to help authorities formulate more effective communication strategies. The interdisciplinary team would publish weekly reports on research related to vaccine hesitancy. Amid the fifth wave of COVID-19 outbreak in Hong Kong, HKBU Fact Check launched the "COVID-19 Misinformation Fact-checking Hub" (<https://factcheck.hkbu.edu.hk/covid19-hub/>). It aggregates debunking information from different local fact-checking organisations and provides a one-stop information inquiry service for the public.

Mainland and international collaboration

Physicists at HKBU have built a foundational transmission model to evaluate the efficacy of containment measures against the COVID-19 pandemic

In February 2020, Professor Leihan Tang and Dr Liang Tian in the Department of Physics started an epidemic modelling project together with their international collaborators and former students from HKBU. The aim of the project was to profile the infected population at different stages of disease progression based on clinical data, and to evaluate the associated transmission capacities. Upon careful calibration of the model, quantitative evaluation of various control measures to inform decision-makers and the public became possible. The main results of their research were disseminated on 16 March 2020 through the preprint archive arXiv.org. The work is now in print in Nature Communications dated 19 February 2021. A related evidence review on the efficacy of facemasks through an international collaboration was published in Proceedings of the National Academy of Sciences USA on 26 January 2021; whose preprint version attracted more than 385,000 views and 90,000 downloads worldwide.

Since their work was first posted, it has attracted broad attention from many parts of the world. Evaluation of the efficacy of mask wearing was used in several public health initiatives by health agencies, institutions, and media outlets. The mask model was featured in a YouTube video that registered 1.3 million views (<https://www.youtube.com/watch?v=Y47t9qLc9I4>). Even with countries gradually recovering from the pandemic, the model can still play an important role. For example, by tracing regional spread of the disease and associated social contact patterns, the model can help decision-makers dynamically evaluate the effectiveness of their policies and make timely adjustments for better outcomes.

HKBU CULTIVATING ART TECH & CREATIVE ARTS IN HONG KONG

As a leading liberal arts research university in Asia for the world, HKBU is at the forefront of supporting Hong Kong's development into an East-meets-West centre for international cultural exchange. We shall leverage our unique research strengths in creative media and practice to deliver the many research impacts in this area to the world.



Art Tech installations

In the Hong Kong Palace Museum curated by HKBU AVA Chair Professor.



Product designs

Product designs by HKBU AVA professor used in China Manned Space Programme.

HKBU professor composed a futuristic experience in a coming together of film, laser display and live musical performance in **The Once and Future** Art Tech performance for the 2022 Singapore International Festival of Arts.



Social impact and support for community

Towards the Establishment of the School of Creative Arts



The HKBU School of Creative Arts (SCA) will be established from 1 July 2022. To further augment human creativity in the world of arts, this School will nurture the next generation of creative talent for Hong Kong and contribute to the city's development as a creative arts hub for China and the world. The planning work into establishing this School of Creative Arts started from the beginning of academic year 2021-22.

The School of Creative Arts will be comprised of three constituent academic units, namely the Academy of Film, Academy of Music, and Academy of

Visual Arts. By integrating related talent and resources of the University, it will be a place where great minds in the creative arts and technology can meet, and it will provide HKBU with a strong platform to advance the arts and culture, as well as art-tech, in Hong Kong and the region.

Furthermore, the School's capacity to fuel the development of the creative arts will be substantially strengthened with the expected completion of the Jockey Club Campus of Creativity in 2024, which will feature state-of-the-art facilities for a comprehensive range of creative arts disciplines.

HKBU teams adds art installations for more interaction in Hong Kong Palace Museum



Photo source from HKSAR Government

The Hong Kong Palace Museum (HKPM) was officially opened on 2 July 2022. HKBU team led by Professor Jeffrey Shaw, Chair Professor of Academy of Visual Arts, took two years to design five art installations for the HKPM. The HKBU team has transformed poems into a visual representation of the dream for the audience, but from a different "perspective". Another installation is based on Giuseppe Castiglione's famous painting of One Hundred Horses, which is brought to the HKPM with reference to the real-life appearance of horses. By linking the past with the present through new media, the museum would provide a different experience from that of the Forbidden City in Beijing or Taipei. Through participating in the design of exhibition hall and incorporating multimedia elements, HKBU hopes to create a unique experience in appreciating the cultural relics from Beijing. It also demonstrates how art tech can be applied to increase the enjoyment of traditional cultural relics.

Commercialisation and industrial collaboration

HKBU to build platform technologies for symbiotic creativity – sharing latest works in progress



As part of the HK\$52.8 million RGC Theme-based Research Scheme research project led by HKBU entitled "Building Platform Technologies for Symbiotic Creativity in Hong Kong", the AI scientists and artists created at HKBU will be trained to set itself up as an intelligent helper in the artistic creation process. Equipped with the ability to create content, cooperate with humans and harness its emotions, the AI artist will offer audiences a brand-new art experience—a symbiotic opera with music co-created with humans in an environment enhanced by the immersive Extended Reality (XR) technology. It will also appear in other collaborative art projects and activities such as a music and art biennale that will be launched between 2024 and 2026.

The research team has been closely collaborating with their partners at **Huawei, Microsoft, SenseTime** and **Opera Hong Kong**, as well as Yale University, the University of Cambridge, Imperial College London, Tsinghua University, the University of Hong Kong and City University of Hong Kong, to develop platform technologies for symbiotic creativity, providing unlimited art content for humans, including an art data repository, an AI creative algorithm system, a research theatre, a digital art and policy network, and some unique and creative application projects, to usher in a new era of art technology. Their first deliverable will be an AI co-developed symphony orchestrate performance that will be presented in the 2022 HKBU Symphony Orchestra Annual Gala Concert in July 2022. They will also be sharing their work in the "Human, Machine, Art, Creativity: An International Symposium" to be held in August 2022.

Bringing history of the short but significant *Battle of Hong Kong* to life

Older Hong Kong residents often talk about the terrible "three years and eight months" during WWII and the hardships that people suffered during the Japanese occupation. Leading up to the fall of Hong Kong was an 18-day conflict known as the Battle of Hong Kong (8-25 December 1941), and a new interactive map developed by researchers from the Department of History is shedding light on the clash.



The battle remains the most significant military event to have ever taken place on Hong Kong soil in modern times, as more than 2,000 soldiers and around 4,000 civilians were either killed or wounded. Eight decades have gone by, and today, many Hong Kong people find it hard to visualise and comprehend what occurred during the war. Dr Kwong Chi-man, Associate Professor of the Department of History, has a solution.

Dr Kwong received a grant from the Quality Education Fund (QEF) to develop an electronic interactive historical map about the battle that can be used in Hong Kong schools. The researchers behind the map hope to stimulate students' interest in learning about history and maps, while promoting the study of history in society.

The team spent two years researching, analysing primary sources, and collecting first-hand historical materials, with the support of HKBU's Knowledge Transfer Office and the University Library's Digital and Multimedia Services Section. The Chinese and English versions of the map were first launched online in August 2021, and the team is now working on designing teaching resources for teachers, which will show them how to use the map with students in the classroom. A mobile version, which is optimised to fit on the screens of smart devices, is also readily available.

One innovative and notable feature of the map is the use of the Historical Geographic Information System (HGIS) to overlay the wartime maps of the British and Japanese forces on a Google Map. As such, users can see the overall picture of the battle, marked with the distribution of the fighting forces at different points in time, locations of relevant military sites around Hong Kong, and first-person stories.

By combining digital technologies and historical content, viewers can freely interact with the different categories of information, and they can explore the battle's timeline and experience historical events in a way that goes beyond the traditional textual dimension. To recognise Dr Kwong's contributions to the digital humanities, he and his team won the top prize in the Best DH Data Visualization category at the Digital Humanities Awards 2021.

Mainland and international collaboration

HKBU forum explores next-generation art technologies

HKBU held the Next-Generation Art Technologies Forum on 31 August 2021, bringing together experts from industry, academia, and government to discuss the fusion of science, technology and art, and the opportunities opened up by the new era of Art Tech.

The Forum, conducted in hybrid mode, was co-organised by the Cameron Pace Group – China, a 3D technology and production company led by renowned movie director James Cameron; the École Polytechnique Fédérale de Lausanne (EPFL) of Switzerland; and the School of Creative Media at City University of Hong Kong.



The inaugural Next-Generation Art Technologies Forum in Hong Kong

Mr Alfred Sit Wing-hang, Secretary for Innovation and Technology, and Mrs Cherry Tse Ling Kit-ching, Permanent Secretary for Home Affairs of the Government of the HKSAR, were the Forum's guests of honour.

Professor Alexander Wai, President and Vice-Chancellor of HKBU, said that in the past, art and technology tended to be in different domains, but technology has assumed an increasingly important role in assisting artists not just to produce their existing works but also to create new art works and forms.

A futuristic performance for the 2022 Singapore International Festival of Arts



HKBU's Department of Music Professor Eugene Birman has composed the score for *"The Once and Future"*. This is an Art Tech film, musical, performance hybrid project directed by Yeo Siew Hua, winner of Locarno's top prize in 2018 with *"A Land Imagined"*, which was shown at the 2022 Singapore International Festival of Arts (SIFA). Edson Sidonie's Buenos Aires-based Bikini Films and Roger García's General Film Services in the US have teamed for this multi-platform project which was made as a feature, opera, and laser performance show.

Live performances came courtesy of musicians from the Berlin Philharmonic Orchestra, forming the Zemin! Ensemble Berlin. Young vocalist Anandi Bhattacharya gave voice to the Artificial Intelligence, who guided the audience through this philosophical journey and multi-sensorial experience whose laser light sculptures help bringing to life the film on screen.

ELEVATING AI TECHNOLOGY FOR IMPACT

HKBU's AI-enhanced technology adopted by LeaveHomeSafe

The artificial intelligence (AI)-enhanced technology developed by researchers from HKBU has been incorporated into the latest version of LeaveHomeSafe, a contact tracing mobile app launched by the Government.

Powered by our BU-Trace novel AI algorithm, LeaveHomeSafe can now utilise the built-in accelerometer in mobile phones to automatically record the time when users get out of a taxi. The app does this by monitoring the motion patterns of users, and it doesn't require them to tap on the screen.

The BU-Trace system was awarded The Best Paper Award by the International Workshop on Mobile Ubiquitous Systems and Technologies earlier this year, and it was recently shortlisted for the Technological or Digital Innovation of the Year in the Times Higher Education (THE) Awards Asia 2021.

HKBU Physics scholar collaborates with international materials scientists to leverage AI in semiconductor innovation

Dr Alvin Yuanyuan Zhou, Assistant Professor in the Department of Physics, in a joint effort with Dr Mahshid Ahmadi (University of Tennessee – Knoxville, USA), Dr Sergei V. Kalinin (Oak Ridge National Laboratory, USA) and others, co-proposes a novel methodology and innovative workflow, which can leverage artificial intelligence (AI) to innovate semiconductor technologies. This group of high-profile international scientists calls for the urgency in automatising the conventional, repetitive, experimental operations of semiconductor fabrication by introducing robotic setups, and meanwhile, optimising machine learning algorithms for AI-to-human handover. This article is now published in *Joule* (Impact Factor: 41.248), the flagship journal in energy science for Cell Press.

HKBU-led Secure Data Sharing and Analytics Research Project to develop new blockchain and trusted computing technologies

A secure data and analytics research project led by HKBU has been granted HK\$6.7 million by the Collaborative Research Fund (CRF) of the Research Grants Council (RGC) in the 2021-22 exercise. The collaborating institutions are City University of Hong Kong, The Hong Kong Polytechnic University and the Hong Kong University of Science and Technology.

Titled "User-controlled Secure Data Sharing and Analytics with Blockchain and Trusted Computing Technologies", the project focuses on developing new blockchain and trusted computing technologies to enable user-controlled data sharing, searches, and analytics. For instance, sharing medical records with relevant stakeholders, can improve the quality of patient care, reduce insurance fraud and enhance scientific research. However, users are often reluctant to share their data today because of privacy concern and lack of incentive, and data sharing needs to comply with privacy laws and regulations. To achieve secured data sharing, most current systems take the server-centric data sharing approach, and data is collected into a centralised database in the cloud for secured data storage and sharing. However, with growing cyber security threats, those cloud systems cannot fully address security and privacy concerns. Cloud security breaches are common even in big companies, such as Apple's iCloud, Instagram and Facebook. The new solution will fundamentally change the way we share data today.

PROMOTING ENTREPRENEURSHIP

HKBU spin-off companies contribute to combat COVID-19

Over the past two years, the COVID-19 pandemic has imposed a tremendous impact on society as well as on the daily lives of individuals. HKBU spin-off companies were encouraged by the results of the research and developed a wide range of services and products from preventive measurement, advancement on rapid test reagents and social support relieving people's emotional distress.

Cathay Photonics Limited invented a robust coating to inactivate microbe

Professor Cheah Kok Wai, Dr Elizabeth K. S. Law Endowed Professor in Advanced Materials and Chair Professor of the Department of Physics, invented sapphire thin film coated and founded Cathay Photonics Limited. Adding anti-microbial function to their anti-scratching sapphire coating. This would show a robust coating on most surfaces. The coating can actively inactivate any air-borne or vapour borne viruses and bacteria. This would reduce the risk of infection. The coating is aimed to be robust against daily normal handling so that the anti-microbial function would not degrade and need daily re-coating.

HK-Dtech Limited invented a high Accuracy Solution for COVID-19 Detection

Dr Chan Chi Fai, Post- Doctoral Research Fellow, Department of Chemistry, Faculty of Science, co-founder of HK-Dtech Limited has developed an invention of high-performance fluorescent nano- molecules. This NanoBright technology is a HK-Dtech solution to improve the sensitivity in detection of biomarkers. COVID-19 rapid tests are widely used to screen the population, but the sensitivity of the test is low. Their research improves COVID-19 rapid tests by increasing the sensitivity and quantified the targeted analyte - this is the contribution of their new technology in combating COVID-19. Other than COVID-19 rapid test, the company has been developing a range of rapid testing kits, the main goal of this new technology is to replace the fluorescent molecules on the market.

Bright-Dtech™ technology enhances the detection of nucleoprotein due to its high specificity and sensitivity given by the time-resolved fluorescence signal. Bright-Dtech™ based lateral flow assay obtained with a plate reader in the time-resolved fluorescence. Fluorescence signal is visible from 250pg/mL to 1000pg/mL. Clear and consistent control lines are visible.

Online Companion Limited and iCounseling International Company Limited ease social anxiety

Under the influence of the COVID-19, the prevalence rate of anxiety and depression Hong Kong people has reached a very high level, affecting people's life in various aspects. Two HKBU spin off companies from the Faculty of Social Sciences launch projects on online counselling platform to help Hong Kong people with social anxiety disorder:

Dr Pan Jiayan, Associated Professor of Department of Social Work, recently founded Online Companion Limited and launched the EASE Online Project to help people with social anxiety through an online counselling platform using cognitive-behavioural therapy. The programme includes cognitive-behavioural therapy techniques, case demonstration videos, and virtual reality technology to simulate different social situations for exposure therapy.

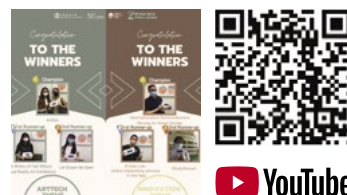
Dr Daniel Young, Associated Professor of Department of Social Work, co-founded iCounseling International Company Limited with the research team from Department of Social Work, HKBU in providing high-quality online counselling services. iCounseling International Company Limited launched a campaign, named "\$1 Emotional First Aid Kit to Fight Against Epidemic" (「\$1 防疫情緒急救包」), which provides people with a self-learned online module that is accessible at any time anywhere to help people relieve their emotional distress during the epidemic.

HKBU nurturing entrepreneurship

HKBU Ideas Galore!

To promote entrepreneurship in Art Tech and innovation, HKBU has launched the HKBU Ideas Galore! initiative. HKBU Ideas Galore! provides a chance for HKBU researchers and students who are working on ideas that are Art Tech or innovation, to showcase the world their research findings and solutions to real-world problems in a three-minute video.

Winning teams who have demonstrated absolute devotion to their Art Tech and Innovative ideas were given cash prizes and a chance to admit to the Science Park Ideation Programme. All videos of the finalists have been uploaded to HKBU INSPIRE YouTube channel.



Technology Startup Support Scheme for Universities (TSSSU)

The Technology Startup Support Scheme for Universities (TSSSU) supported 20 start-up companies since 2014 to commercialise their research and development results. In 2021-22, eight start-up companies were awarded the funding, totalling to HK\$8 million. These spin-off companies are:

- | | |
|--------------------------------------|--|
| 1. BP Innomed Limited | 5. HK-Dtech Limited |
| 2. CP2Joy IT Company Limited | 6. iCounseling International Company Limited |
| 3. Crimson Vision Technology Limited | 7. LuminMed Limited |
| 4. Herpap Biotech Limited | 8. MIND and Tech Limited |

Entrepreneurship Education Initiatives

In the reporting year, HKBU has also carried out the following entrepreneurship education initiatives, which are well received by our budding entrepreneurs:

- | | |
|--|--|
| 1. O2O Entrepreneurship Training Platform Programmes | 6. UC Berkeley "Berkeley Method of Entrepreneurship (BMoE) Online Bootcamp (Fall 2021) |
| 2. BEST Networking - Start嘢! | 7. Start-up Hackathon 1.0 創業黑客松 |
| 3. BEST Ambassador Programme 2021-2022 | 8. Dean's Cup Business Innovation Gymnasium (BIG) 7.0 |
| 4. Entrepreneurship Seminar Series | 9. mini Business Innovation Gymnasium (mini BIG) |
| 5. Start-up Semester Programme 2021-2022 - Study Abroad at UC Berkeley | 10. Young Creative Entrepreneur (YCE) Award 2022 |

At least 3201 participants at HKBU have benefited from the above initiatives.

Over the same period, at least 47 participants from HKBU also took part in the following entrepreneurship initiatives wherein three HKBU teams won fundings of up to HK\$100,000.00 each from Cyberport, and six teams won fundings of up to HK\$100,000.00 each from HKSTP:

1. The Cyberport University Partnership Programme (CUPP) 2021-2022
2. Cyberport Creative Micro Fund (CCMF)
3. HKSTP Ideation Programme
4. HKSTP Techathon 2022
5. JUMPSTARTER IdeaPOP! 2022

AWARDS AND ACHIEVEMENTS

Two HKBU inventions shine at Special Edition 2022 Inventions Geneva

Two HKBU Inventions won the Silver Medal in this year's online special edition of the International Exhibition of Inventions of Geneva (Geneva Inventions Expo) - Special Edition 2022 Inventions Geneva Evaluation Days – Virtual Event held from 17 - 20 March 2022. This year, about 800 inventions from 25 countries and regions were judged on the online platform. The two winning HKBU inventions are:

Skin Whitening, Anti-aging and Skin Care Product

Invented by Professor Zhang Hongjie, Director and Professor, Teaching and Research Division, School of Chinese Medicine. The invention is a specific class of natural compounds in a well-known Chinese medicine. The product not only gives skin whitening effect but can also protect skin against the damages caused by UV irradiation. It is now available on the market, and has been well received from the consumers.

Phytonutrient-based Remedial Fluid for the Management of Hypertrophic and Keloid Scars

Invented by Dr Siu Wai Tsang, Research Assistant Professor, Teaching and Research Division, School of Chinese Medicine. The invention is a series of phytonutrient-based remedial fluids, which can be used as a general topical agent or complemented with a nano sprayer for the management of raised scars. The product developed from this technology is a safe, non-invasive and convenient approach to suppress hypertrophic and keloid scars.

HKBU patent won High Value Patent Portfolio Contest 2021

The 3rd Guangdong-Hong Kong-Macao Greater Bay Area (GBA) High-Value Patent Portfolio Contest 2021 attracted 902 participants from a wide variety of enterprises, higher education institutions and R&D institutes this year. HKBU patented invention entitled "Sapphire thin film coated substrate" from Professor Cheah Kok-wai, Dr. Elizabeth K. S. Law Endowed Professor in Advanced Materials and Chair Professor in Department of Physics, won the Excellence Award. The GBA High Value Patent Portfolio Contest aims to promote the exchanges and collaborations of technological innovation and entrepreneurship between Mainland China, Hong Kong and Macao.

LOOKING AHEAD

The reporting year of 2021-22 has been a year of continued pandemic challenges for both Hong Kong and HKBU. Nonetheless, this has also been a year of renewed focus and dedication to our strategic areas. In addition to our current efforts, HKBU has recently launched the **Institute for Innovation, Translation and Policy Research (ITPR)**, which is set out with the vision to support the university in pioneering innovation, technology translation, and innovation policy development. ITPR will provide all-rounded business development, scientific, and policy research support for the University to respond to the challenges and opportunities worldwide and also specifically under the aegis of the Hong Kong SAR Government's top policy priority on innovation and technology development. We envisage HKBU to become a significant contributor towards the development of Hong Kong into "an international innovation and technology hub" and "a hub for arts and cultural exchanges between China and the rest of the world".





2021-22

KNOWLEDGE TRANSFER OFFICE
ANNUAL REPORT ANNEXES

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In this Annexes we shall further present a number of impactful outreach and activities from HKBU, as well as the list of patents granted and our key performance indicators.

School of Chinese Medicine launches online consultation and medicine delivery services



The Clinical Division of the School of Chinese Medicine at Hong Kong Baptist University (HKBU) has launched the online consultation and medicine delivery services that aim to provide patients with more convenient and diversified consultation arrangements. The services can save transportation time for patients and reduce the risk of infection, as they do not need to commute to the clinics in person for medical consultations during the COVID-19 pandemic.



The online consultation service is suitable for non-acute patients and is available to current patients of the HKBU Mr & Mrs Chan Hon Yin Chinese Medicine Specialty Clinic and Good Clinical Practice Centre (Kowloon Tong clinic) and the HKBU – Jockey Club Chinese Medicine Disease Prevention and Health Management Centre.

The new services are easy to use. Patients can make an appointment with the clinics' Chinese medicine practitioners by phone. They can then use the video call function of the mobile messaging application WhatsApp to undergo a remote consultation with the Chinese medicine practitioner at the reserved time. The medicine prescribed by the Chinese medicine practitioner will then be delivered to a designated location specified by the patient.

Jockey Club Mus-Fit Action effectively helps middle-aged and older people adopt healthy lifestyles



The Jockey Club Mus-Fit Action project has helped middle-aged and older people adopt healthy lifestyles since its inauguration in 2019. Survey results show that over 99% of the project's exercise class participants agree or strongly agree that they are having more fun and are more willing to exercise.

With the support of the Hong Kong Jockey Club Charities Trust, the project was launched by the Dr Stephen Hui Research Centre for Physical Recreation and Wellness (CPRW) at HKBU in collaboration with the Department of Orthopaedics and Traumatology at The Chinese University of Hong Kong. It concluded with a closing ceremony on 30 October 2021.

Since its inauguration in 2019, the Jockey Club Mus-Fit Action project has involved approximately 100 non-governmental organisations (NGOs) in community activities, and it has offered more than 260 exercise classes to around 2,500 people aged 50 or above.

HKBU and Hospital Authority Co-organised an AI in Healthcare Webinar on Blockchain and Healthcare Applications



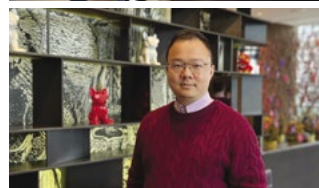
In celebration of the 60th Anniversary of the Faculty of Science, the Department of Computer Science has collaborated with the Institute of Health IT (IHIT), Hospital Authority, to launch the IHIT x HKBU AI in Healthcare Webinar series to explore how AI can be incorporated to revolutionise a wide range of healthcare services.

In the fifth Webinar "Blockchain and Healthcare Applications" held on 10 Aug 2021, Professor Jianliang Xu, Associate Head and Professor, Department of Computer Science, presented how to facilitate healthcare applications with the latest technology of Blockchain. The webinar attracted over 200 participants and they were excited to exchange their thoughts on this hot topic.

Finding effective ways to debunk misinformation online

The Internet today is a vast space overloaded with information for quick consumption. Many people seek information from online media sources every day, but this habit comes with the risk of getting exposed to false information, fabricated arguments, and fake news, especially about COVID-19 – an evolving disease that is still relatively new in human history. Fact checking and debunking are therefore considered necessary to correct and clarify misinformation.

A research project by Dr Zhang Xinzhi, Assistant Professor of the Department of Journalism, is currently examining the fact-checking and debunking practices of professional communicators (such as health journalists, the public health sector, and professional organisations) on social media, and evaluating the effectiveness of these clarification and debunking messages during the COVID-19 pandemic using an experimental design.



"I am interested in the factors influencing the success or failure of fact-checking messages by professional communicators, against the backdrop of what is known as 'information disorder' on social media," says Dr Zhang, a researcher on how people receive, process, and engage with public information on digital media and how AI, digital media platforms, and big data technologies are changing news production and content delivery.

Titled "Why fact-checking fails? Factors influencing the effectiveness of corrective messages countering misinformation on social media: A comparison of Hong Kong, the United States, and the Netherlands", the project examines evidence of communication breakdown in three regions, and it studies the current practices of misinformation clarification and debunking messages, and why fact-checking and debunking messages may backfire and fail to overturn misinformation.

Supported by the General Research Fund, the project is expected to be completed by August 2022. The research team comprises Dr Zhang and four other co-investigators based in Europe and North America. This global cross-disciplinary team includes experts in computational social science, computer-human interaction, and sociolinguistics.

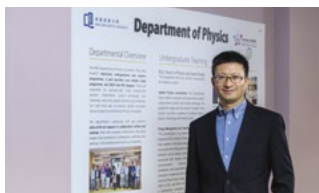
The team have been utilising several sources to triangulate the research questions, including public reports from fact-check centres and their social media platforms, posts and announcements by government and public health sectors, news articles and journalists' public social media posts, in addition to comparative online survey experiments in Hong Kong, the United States and the Netherlands.

A particular focus has been placed about COVID-19. "We would like to find out the reasons and factors for the acceptance or denial of COVID-related debunking messages. Are the messages being communicated transparently, coherently, logically and in the right language?" To answer these questions, Dr Zhang and his teammates are using several online experiments to test several hypotheses on how the "message factors" (the use of language and logic, the source and its credibility, and distribution mechanisms) and the "psychological factors" (readers' psychological orientation) would affect people's attitudes and behavioural responses to digital content.

The project's final findings will help government authorities, media organisations, journalists and technology companies design more effective messages and communication strategies to provide the public with correct and verified information, especially in the health domain.

Interdisciplinary research at HKBU reveals stress related brain reconfiguration

A key study on changes in brain networks under stress was recently published in the Proceedings of the National Academy of Sciences (PNAS). The interdisciplinary research was conducted by teams of Professor Changsong Zhou from the Department of Physics and Dr Rongjun Yu from the Department of Management at HKBU, with Dr Rong Wang, Hong Kong Scholars Program, and Dr Shanshan Zhen, Research Assistant Professor, Department of Management, as major collaborators. Dr Zhou and Dr Yu are also members of the System Health Lab, one of the HKBU's six transdisciplinary research labs.



How the brain responds to acute stress has always been a major area of scientific interest. Previous research has mainly focused on the activation of specific brain areas under stress, or based on modules at a single level. In this project, the researchers examined stress-induced functional reconfiguration based on hierarchical modules using a within-subject design. To induce stress, participants were asked to describe themselves to the experimenter while being video recorded, before being instructed to rapidly perform an arithmetic subtraction task. Afterwards, participants entered the 3T MRI machine, where they undergo resting-state scanning and a series of cognitive-control tasks. Saliva samples were collected throughout the experiment. Saliva cortisol concentration was used as a physiological marker of stress level, while performance in the cognitive-control task was to indicate behavioural responses to stress. The study shows that in response to an acute social stressor, the brain can dynamically maintain a more integrated and less

segregated state. Such changes in brain networks are associated with elevated cortisol levels and improved cognitive-control performance. The findings have theoretical and clinical implications for stress-related psychiatric disorders.

The research findings were published in PNAS: <https://www.pnas.org/doi/10.1073/pnas.2204144119>

The System Health Lab unites HKBU's research strength and provides multidisciplinary research collaboration in the basic disciplines such as mathematics, physics, chemical biology, together with the applied disciplines like physiology and medicine, geography, social sciences and communications, to explore the behavioural and wellbeing functioning mechanisms of complex systems including life, environment, human society and web media. This cross-disciplinary research platform is the first of its kind in China and promises great impact to the communities. HKBU has recently purchased a 3T MRI scanner, EEG, and other related neuroscience devices in association to the System Health Lab.

60th Anniversary Distinguished Lecture Series by Faculty of Science



The Faculty of Science hosted a Distinguished Lecture Series featuring 10 lectures between July 2021 and June 2022 (28 lectures in total starting from Feb 2021). The lectures were given by prominent international scholars with latest discoveries and new insights in their fields, and they facilitated intellectual exchange between the HKBU community and the leading scholars in a diverse range of science disciplines. The lectures covered a wide range of scientific topics related to environmental science, sustainable development, energy, artificial intelligence and machine learning. They examined how scientific research and development has had an impact on our livelihoods and the environment. The lecture series successfully held physically and online and attracted more than 2,600 teachers, students and alumni.



The speakers, who are top-notch scientists in their respective fields, came from renowned academic bodies from different parts of the world, and they included Professor Shu Chiwang from Brown University, Professor Milind Tambe from Harvard University, Professor Steven Chu from Stanford University, Professor Rao Zihe from Tsinghua University, and Professor Vivian Yam Wing-wah from The University of Hong Kong.

Greater Bay Area intellectual property forum in Art Tech and Healthcare Innovations



The Knowledge Transfer Office and the University Library of Hong Kong Baptist University, Faculty of Law of the University of Hong Kong, Research Services and Knowledge Transfer Office of University of Macau and Intellectual Property Department of the Government of the HKSAR jointly organised the annual flagship event - Intellectual Property Forum Greater Bay Area (GBA) 2022 on 26 and 27 May 2022. The aim of the event was to provide intellectual property (IP) rights education to faculty, students, and the publicity, as well as

to answer questions on copyright issues and patent protection in Greater Bay Area.

The online forum, with the theme "Empowering your IP knowledge on Art Tech and Health Care" this year, attracted over 257 faculty members, students, librarians, researchers, and administrative staff from local, Macau and GBA higher education institutions, as well as entrepreneurs and industrial leaders.

To cater for the participants from Greater Bay Area, Knowledge Transfer Office invited Inter-Link – which is formed by a group of HKBU students from the Department of Translation, to provide simultaneous interpretation in Putonghua in this forum.

Director of the Intellectual Property Department, the Government of the HKSAR; and Vice Rector (Administration) of the University of Macau were invited to provide opening speech of the Forum on the first day of the forum.

Six speakers also shared their insights on various issues relating to copyright, trademarks, and patent protection. They include Miss Gigi Chung and Mr Joseph Yeung, Senior Solicitor of the Intellectual Property Department, the Government of the HKSAR; Dr Oliver Lutze, a qualified European & German Qualified Patent Attorney of Spruson & Ferguson (Beijing) Limited; Professor Yuanjia Hu, Associate Professor of Institute of Chinese Medical Sciences, University of Macau; Mr Joerg Sosna of Spruson & Ferguson (Hong Kong) Limited and Professor Alice Lee, Associate Professor of the Faculty of Law, the University of Hong Kong. Apart from the expert talks, participants also had a chance to raise questions to the speakers on specific topics relating intellectual property via online chat box.

PATENTS GRANTED IN THE REPORTING YEAR

In the reporting year of 2021-2022, a total of 24 invention patents have been granted to different inventions by our innovative researchers. A table listing the details of our granted invention patents are as follows:

No.	1
Patent Title	Skin-protection composition containing Dendrobium-based ingredients
Jurisdiction	China
Filing Date	2017-10-26
Application No.	CN 201780069402.9
Date of Patent	2022-03-22
Patent No.	ZL 201780069402.9
Inventor(s)	Hongjie ZHANG, Siu Wai TSANG, Yu ZHU
School/Faculty	School of Chinese Medicine
No.	2
Patent Title	Skin-protection composition containing Dendrobium-based ingredients
Jurisdiction	Japan
Filing Date	2017-10-26
Application No.	JP 2019-524017
Date of Patent	2022-04-01
Patent No.	JP 7051843
Inventor(s)	Hongjie ZHANG, Siu Wai TSANG, Yu ZHU
School/Faculty	School of Chinese Medicine
No.	3
Patent Title	Skin-protection composition containing Dendrobium-based ingredients
Jurisdiction	Malaysia
Filing Date	2017-10-26
Application No.	PI 2019002612
Date of Patent	2021-09-22
Patent No.	MY-187342-A
Inventor(s)	Hongjie ZHANG, Siu Wai TSANG, Yu ZHU
School/Faculty	School of Chinese Medicine

No.	4
Patent Title	Skin-protection composition containing Dendrobium-based ingredients
Jurisdiction	Taiwan
Filing Date	2017-11-07
Application No.	TW 106138517
Date of Patent	2021-07-11
Patent No.	TW I 732967
Inventor(s)	Hongjie ZHANG, Siu Wai TSANG, Yu ZHU
School/Faculty	School of Chinese Medicine
No.	5
Patent Title	Uses and Development of Neurodefend for Treating neurodegenerative Diseases
Jurisdiction	China
Filing Date	2019-03-15
Application No.	CN 201910197461.5
Date of Patent	2022-01-28
Patent No.	ZL 201910197461.5
Inventor(s)	Min LI, Ashok IYASWAMY, Siva Sundara Kumar DURAIRAJAN, Senthilkumar KRISHNAMOORTHY, Huan ZHANG, Sravan G.S. SREENIVASAMURTHY
School/Faculty	School of Chinese Medicine
No.	6
Patent Title	Uses and Development of Neurodefend for Treating neurodegenerative Diseases
Jurisdiction	United States Of America
Filing Date	2018-12-14
Application No.	US 16/219,976
Date of Patent	2021-11-09
Patent No.	US 11167000
Inventor(s)	Min LI, Ashok IYASWAMY, Siva Sundara Kumar DURAIRAJAN, Senthilkumar KRISHNAMOORTHY, Huan ZHANG, Sravan G.S. SREENIVASAMURTHY
School/Faculty	School of Chinese Medicine

No.	7
Patent Title	Bladder Cancer Photodynamic Therapeutic Agents with Off-On Magnetic Resonance Imaging Enhancement
Jurisdiction	Australia
Filing Date	2019-04-03
Application No.	AU 2019249628
Date of Patent	2021-11-25
Patent No.	AU 2019249628
Inventor(s)	Ka Leung WONG, Wai Kwok WONG, Ho Fai CHAU
School/Faculty	Faculty of Science
No.	8
Patent Title	Multi-modal bioprobe for bladder cancer imaging and photodynamic therapy
Jurisdiction	China
Filing Date	2017-09-29
Application No.	CN 201780062324.X
Date of Patent	2021-09-17
Patent No.	ZL 2017 8 0062324.X
Inventor(s)	Ka Leung WONG, Wai Kwok WONG
School/Faculty	Faculty of Science
No.	9
Patent Title	Method of use of diterpenoid derivatives as anticancer agents
Jurisdiction	China
Filing Date	2017-09-26
Application No.	CN 201780054194.5
Date of Patent	2021-09-17
Patent No.	ZL 2017 8 0054194.5
Inventor(s)	Hongjie ZHANG, Man Shing Ricky WONG, Lei GUO, Siu Wai TSANG, Kanglun LIU
School/Faculty	School of Chinese Medicine

No.	10
Patent Title	作為抗病毒劑的密瘤殺
Jurisdiction	China
Filing Date	2018-11-05
Application No.	CN 201811306320.4
Date of Patent	2022-01-28
Patent No.	ZL 201811306320.4
Inventor(s)	Hongjie ZHANG
School/Faculty	School of Chinese Medicine
No.	11
Patent Title	Design and synthesis of porphyrin materials for highly efficient organic photovoltaics
Jurisdiction	China
Filing Date	2017-06-29
Application No.	CN 201780052005.0
Date of Patent	2022-01-25
Patent No.	ZL 201780052005.0
Inventor(s)	Xunjin ZHU, Song CHEN, Wai Yeung WONG, Wai Kwok WONG
School/Faculty	Faculty of Science
No.	12
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomaterials
Jurisdiction	Switzerland
Filing Date	2017-05-23
Application No.	17802132.5
Date of Patent	2022-03-16
Patent No.	EP3464568B1
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	13
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomatrices
Jurisdiction	China
Filing Date	2017-05-23
Application No.	CN 201780031011.8
Date of Patent	2021-09-03
Patent No.	ZL 201780031011.8
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	14
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomatrices
Jurisdiction	Germany
Filing Date	2017-05-23
Application No.	17802132.5
Date of Patent	2022-03-16
Patent No.	EP3464568B1
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	15
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomatrices
Jurisdiction	European Procedure (Patents)
Filing Date	2017-05-23
Application No.	17802132.5
Date of Patent	2022-03-16
Patent No.	EP3464568B1
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	16
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomatrices
Jurisdiction	France
Filing Date	2017-05-23
Application No.	17802132.5
Date of Patent	2022-03-16
Patent No.	EP3464568B1
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	17
Patent Title	Growth Factor-Free Proliferation and Differentiation of Neural Stem Cells on Inorganic Extracellular Nanomatrices
Jurisdiction	United Kingdom
Filing Date	2017-05-23
Application No.	17802132.5
Date of Patent	2022-03-16
Patent No.	EP3464568B1
Inventor(s)	Kin Lam YUNG, Zhifeng HUANG, Nga Ping LUI
School/Faculty	Faculty of Science

No.	18
Patent Title	Method For Index-based and Integrity-assured Search in a Blockchain
Jurisdiction	United States Of America
Filing Date	2020-03-25
Application No.	US 16/828,982
Date of Patent	2022-03-22
Patent No.	US 11,283,616
Inventor(s)	Jianliang XU, Ce ZHANG, Cheng XU
School/Faculty	Faculty of Science

No.	19
Patent Title	Portable Far-UVC Laser System
Jurisdiction	Hong Kong
Filing Date	2021-04-14
Application No.	HK 32021029340.5
Date of Patent	2021-08-20
Patent No.	HK 30041807
Inventor(s)	Kok Wai CHEAH, King Fai LI
School/Faculty	Faculty of Science

No.	20
Patent Title	Tunable laser materials comprising solid-state blended polymers
Jurisdiction	Taiwan
Filing Date	2020-12-08
Application No.	TW 109143316
Date of Patent	2022-06-01
Patent No.	TW I 766470
Inventor(s)	Kok Wai CHEAH, Yi JIANG
School/Faculty	Faculty of Science

No.	21
Patent Title	Nano Bi-Material Electromagnetic Spectrum Shifter
Jurisdiction	Hong Kong
Filing Date	2019-01-08
Application No.	HK 19100274.6
Date of Patent	2021-07-16
Patent No.	HK 1257912 B
Inventor(s)	Kok Wai CHEAH, Suet Ying CHING
School/Faculty	Faculty of Science

No.	22
Patent Title	Sapphire Thin Film Coated Substrate
Jurisdiction	China
Filing Date	2017-09-27
Application No.	CN 201780061301.7
Date of Patent	2022-03-15
Patent No.	ZL 201780061301.7
Inventor(s)	Kok Wai CHEAH, Wing Yui LAM, Yu Wai CHAN
School/Faculty	Faculty of Science

No.	23
Patent Title	Multi-mode photodetectors and methods of fabricating the same
Jurisdiction	Japan
Filing Date	2019-10-08
Application No.	JP 2019-185194
Date of Patent	2021-12-17
Patent No.	JP 6995814
Inventor(s)	Furong ZHU, Zhaojue LAN
School/Faculty	Faculty of Science

No.	24
Patent Title	Multi-mode photodetectors and methods of fabricating the same
Jurisdiction	United States Of America
Filing Date	2019-10-04
Application No.	US 16,592,793
Date of Patent	2022-05-10
Patent No.	US 11,329,239
Inventor(s)	Furong ZHU, Zhaojue LAN
School/Faculty	Faculty of Science

PERFORMANCE MEASURE - KEY PERFORMANCE INDICATORS

Performance Indicators	2020-21	2021-22
Number of patents filed in the year (with breakdown by country and type)	Jurisdiction	Jurisdiction
	9 (US)	12 (US)
	4 (CN)	3 (CN)
	4 (PCT)	5 (PCT)
	3 ^{N1} (HK)	1 (HK)
	1 (EP)	1 (EP)
	3 (TW)	1 (FR)
	1 (AU)	1 (IT)
	1 (JP)	1 (MY)
	1 (IN)	1 (TH)
	2 (SG)	1 (SG)
	4 (GB)	1 (ES)
	3 (DE)	
	2 (FR)	
	2 (CH)	
	1 (AT)	
	2 (BE)	
	1 (IE)	
	1 (IL)	
	1 (LU)	
	1 (MC)	
	2 (NL)	
	1 (PL)	
	2 (SE)	
	1 (CA)	
	Type	Type
	19 (A61)	13 (A61)
	2 (A62)	7 (C07)
	1 (B29)	2 (C12)
	20 ^{N1} (C07)	5 (G01)
	2 (C12)	1 (H01)
	1 (C40)	
	3 (G01)	
	5 (H01)	

Performance Indicators	2020-21	2021-22
Number of patents granted in the year (with breakdown by country and type)	Jurisdiction	Jurisdiction
	9 (US)	3 (US)
	3 (CN)	8 (CN)
	5 (HK)	2 (HK)
	3 (EP)	1 (EP)
	3 (DE)	1 (DE)
	3 (GB)	1 (GB)
	2 (TW)	2 (TW)
	1 (JP)	2 (JP)
	3 (FR)	1 (FR)
	2 (CH)	1 (CH)
	1 (KR)	1 (MY)
	2 (SG)	1 (AU)
	1 (AT)	
	2 (BE)	
	1 (IE)	
	1 (IT)	
	1 (LU)	
	1 (MC)	
	2 (NL)	
	1 (PL)	
	2 (SE)	
	1 (ES)	
	1 (CA)	
	Type	Type
	23 (A61)	10 (A61)
	1 (B32)	1 (C07)
	1 (C02)	6 (C12)
	14 (C07)	1 (G06)
	1 (G01)	6 (H01)
	2 (G06)	
	9 (H01)	
Number of licenses granted	103 ^{N1} (Royalty)	108 (Royalty)

Performance Indicators		2020-21	2021-22
1	Income generating from intellectual property as defined in Common Data Collection Format	HK\$1,376,400	HK\$3,364,560
2	Expenditure involved in generating income from intellectual property rights	HK\$2,035,795	HK\$2,031,945
3	Number of economically spin-off companies ^{N2}	31	38
4	Number of collaborative researches, and income thereby generated ^{N3}	20 HK\$12,051,766	15 HK\$7,696,799
5	Number of contract researches (other than those included in "collaborative researches" above), and income thereby generated ^{N4}	114 HK\$78,932,023	129 HK\$435,477,132
6	Number of consultancies, and income thereby generated ^{N5}	83 HK\$39,556,218	81 HK\$55,819,966
7	Number of student contact hours in short courses or e-learning programmes specially tailored to meet business or CPD needs ^{N6}	622,160	579,223
8	Number of equipment and facilities service agreements, and income thereby generated ^{N7}	100 HK\$2,408,205	90 HK\$3,164,008
9	Income received from CPD courses ^{N8}	HK\$153,717,969	HK\$161,121,832
	Total income from knowledge transfer via the provision of research and business services (i.e. collaborative research, contract research, consultancies & continuing professional development) Item (4)+(5)+(6)+(9)	HK\$284,257,977	HK\$660,115,729
10	Number of public lectures / symposiums / exhibitions and speeches to a community audience	441	490
11	Number of performances and exhibitions of creative works by staff or students	60 ^{N9}	44
12	Number of staff engaged as members of external advisory bodies including professional, industry, government, statutory or non-statutory bodies	178	182
13	Number of performances and exhibitions of creative works, public lectures, symposia, exhibitions and speeches per hundred academic staff	135	148
14	Number of entrepreneurship activities ^{N10}	185	126
15	Number of student participation in entrepreneurship activities ^{N10}	10,611	7,110

Notes:

Some of the KT performance indicator data previously reported in the HKBU KT Annual Report will now be found under Domain 3 of the University Accountability Agreement (UAA) as sector-wide performance measures (PMs) and institution-specific key performance indicators (KPIs) data.

N1 The data of 2020-21 was amended due to late reporting of patent applications between HKBU and other institutions (lead parties) or patent agent.

N2 Company that has been established by staff, graduates or students and is now operationally independent of the university. It includes all spin-off companies that were funded by HKBU Technology Start-up Support Scheme for Universities (TSSSU).

N3 Actual income received for collaborative research refers to the income received during the particular financial year.

N4 Actual income received for contract research refers to the income received during the particular financial year.

N5 Income from consultancy refers to the income received during the particular financial year. Consultancy income for 2021-22 includes HK\$45.2m attributed from KT income received from the Beijing Normal University-HKBU United International College.

N6 The student contact hours are defined to be the number of enrollments multiplied by the number of contact/course hours.

N7 This number includes data from Jockey Club Creative Arts Centre (JCCAC) and the Academic Community Hall.

N8 The CPD courses are now defined to include award-bearing and credit-bearing programs (both in and outside HK) for learners already in work who are undertaking the course for purpose of professional development/ upskilling/ workforce development, in addition to short term non-credit bearing training programs.

N9 The data of 2020-21 was amended due to clarification from the data source.

N10 Data are collected from all units at HKBU. The data includes both in-person and online activities.

