iHealthtech@NUS

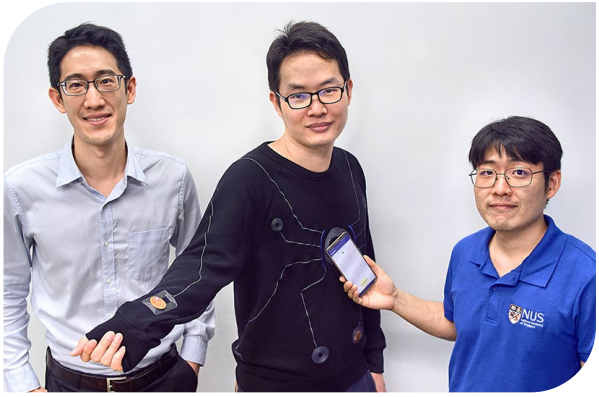
A newsletter of Institute for Health Innovation & Technology | November 2020 | Issue #5

In the News

iHealthtech-NUSMed Joint Workshop ▼

The iHealthtech-NUSMed Infectious Diseases Joint Workshop organised by the NUS MED Infectious Diseases Translational Research Programme (ID-TRP) on 24 September brought together 16 experts from the domains of engineering, science and medicine to discuss the latest developments in infectious diseases research and translation and brainstorm ideas targeted for potential interdisciplinary collaboration. Arising from this joint workshop, a new seed grant to promote collaborative research in infectious diseases has been announced.

Photo credit: NUS Yong Loo Lin School of Medicine



◄ Smart Suit Wirelessly Powered by a Smartphone

We are increasingly more conscious in the understanding of our health and vitality through, e.g., heart rate, step count, calorie burned, oxygen level measurements, etc. To obtain this information, we need different electronic gadgets, such as a smartwatch or an oximeter. However, there is still a limit for what these gadgets can do. Recently, iHealthtech Asst Prof John Ho and his research team have developed a smart suit that can measure posture and running gait that were previously only possible in a clinical setup. Notably, the smart suit is able to maintain its lightweight and stretchability even with attached sensors that are powered by a smartphone! With this innovation, athletes can push the limits of their performance by studying their current shortcomings through the data provided by the smart suit.

New System to Profile Telomeres in Less Than Three Hours

Telomeres are the repetitive DNAs that protect our genetic material, and they are prompt to degrade as we age, or to have abnormal lengths due to cancers. The STAR (Single Telomere Absolute-length Rapid) assay is developed by iHealthtech Asst Prof Cheow Lih Feng and his research team to determine the lengths of telomeres through massive parallel processes. The new technique can shorten the time for telomere profiling and simultaneous gain access to vital information through the distribution of their lengths. A promising result using the novel method in neuronal tumour prognosis, such as for neuroblastoma, has been validated in a clinical trial at the KK Women's and Children's Hospital.

Visit Our Revamped Website for More Interesting News Content!

Our website has an updated refreshing new look! We are committed to give our readers the latest news on our people, research and innovation. Visit our website at www.ihealthtech.nus.edu.sg as well as follow us on our social media (LinkedIn, YouTube, Facebook and Twitter) to keep an up-to-date information about our institute!

New Ability to Sense in Future Smart Robots ▶

It is easy for human to grab any object of different hardness or shape. The communication between our brain and the senses on our hand prevents the slippage and the damage of the thing that we are holding. However, this is a complicated task for robots. To tackle this challenge, iHealthtech Asst Prof Benjamin Tee and Asst Prof Soh from the NUS School of Computing have developed an electronic skin and a sensory integrated artificial brain system to mimic human neural networks on robots. The team has also adopted the Intel's Loihi neuromorphic research chip for their new robotic system.

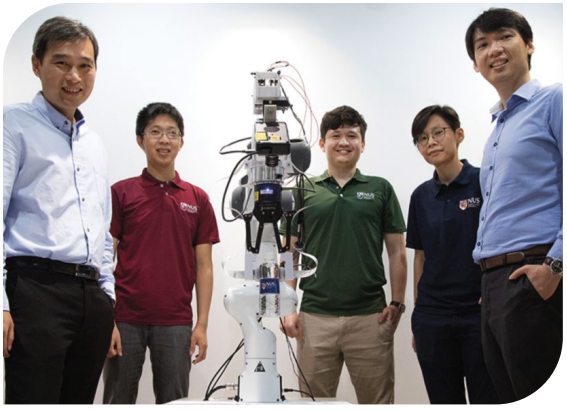


Photo credit: NUS

◀ Epidax, a Portable On-Site Diagnostic System to Fight COVID-19

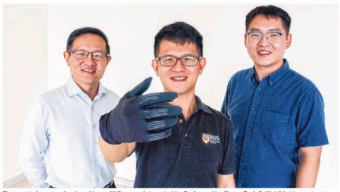
Current COVID-19 diagnosis involves Polymerase Chain Reaction (PCR) test that must be conducted in a centralised laboratory. The process is costly and time consuming. iHealthtech Prof Lim Chwee Teck and his research team has developed Epidax, a fast and portable micro-PCR point-of-care diagnostic system that can enable on-site testing at a local clinic, a nursing home, or the airport. This Epidax diagnostic test can take 30 minutes to promptly identify infected individuals and help to quickly contain the disease.

In the Media

THE STRAITS TIMES

NUS team working on wireless glove for work, play

Researchers use sensor tech developed for biomedical purposes to find new applications



The smart glove was developed by an NUS research team led by Professor Lim Chwee Teck (left). With him are two team members, Dr Yeo Joo Chuan (wearing the glove) and Dr Yu Longteng. PHOTO: NATIONAL UNIVERSITY OF SINGAPORE

Lester Wong

Doing all these and more could one day be possible with a smart thickness of a strand of hair and are filled with a conductive liquid a computer or gaming console via Bluetooth and has a battery life of oped in 2017 for biomedical purposes such as measuring the pulse

Page B8, 22 August 2020

zaobao sg

国大研发冠病速测盒 一小时即可得知结果

新加坡国立大学研究团队研发出能快速检测冠病的便携式检测盒，从采集鼻液样本到检测结果出炉只需约一小时，相信是本程只需约一小时，不但能少处理样本的步骤，还能患等候时间。

研究团队进行对比

Page 5, 14 July 2020

THE STRAITS TIMES

'Spider-Man suit' can track posture, temperature, fatigue

NUS researchers tap smartphone to power suit and display data from sensors in outfit

which are able to support up to six sensors at the same time.

I started with the jumper.

ningstance.

High variability would indicate possible fatigue and over-exertion.

Finally, I looked at my spinal posture.

I changed into the dry-fit tee, which has a small pocket on its right sleeve where the phone is placed.

A sensor chip was stuck onto the back of my neck to facilitate easy demonstration.

As I bent my neck repeatedly, the app continuously tracked and recorded my movements.

Ideally, the suit should be used to monitor one's posture

Page B11, 19 September 2020

Awards & Honours

Prof Lim Chwee Teck elected as Fellow of the Singapore National Academy of Science

Prof Lim Chwee Teck has joined a list of outstanding scientists as Fellow of the Singapore National Academy of Science in recognition of his excellent achievements and contributions in basic research and translational work.

Prof Lim Chwee Teck selected as one of the 1000 Longevity Leaders

The Longevity.International platform profiles 1000 public and private-sector professionals working to grow the Longevity landscape through their efforts in business, science, policy, philanthropy and thought leadership. Prof Lim Chwee Teck is among the 78 Personalities of 1000 Longevity Leaders in the Asia Region. Congratulation to Prof Lim for his achievement in advancing health technology for the betterment of our society!

Asst Prof Gloryn Chia Awarded NRF Fellowship 2020

The National Research Foundation (NRF) Fellowship Scheme is a competitive and prestigious programme for young, talented and aspiring scientists to conduct independent research in Singapore. iHealthtech shares the joy with Asst Prof Gloryn Chia, for being one of the NRF Class of 2020 Fellows. She will lead the research to develop novel vaccines and stem cell therapies for cancer and other human diseases.

Asst Prof Andy Tay Selected as WEF's Young Scientist Class of 2020

iHealthtech Assist Prof Andy Tay has been selected by the World Economic Forum (WEF) to be in its Class of 2020 Young Scientists. The only Singaporean to be selected for the honour this year, he is one of the 25 exceptional researchers from 14 countries across the world recognised for their research at the cutting edge of discovery.

Asst Prof Shao Huilin Wins the MINE 2020 Young Scientist Award

iHealthtech Asst Prof Huilin Shao has won the Microsystems & Nanoengineering Conference 2020 (MINE 2020) Young Scientists Award. Heartfelt congratulations to Huilin for her achievement!

Selected Publications

Wu, X.; Zhao, H, Natalia, A.; Lim C. Z. J.; Nicholas R. Y. Ho, Chin-Ann J. Ong, Melissa C. C. Teo, Jimmy B. Y. So, Huilin Shao, Exosome-templated nanoplasmonics for multiparametric molecular profiling. ***Science Advances***, (2020).

Jain, S., Cachoux, V.M.L., Narayana, G.H.N.S., Beco, S., D'Alessandro, J., Cellerin, V., Chen, T., Heuzé, M.L., Marcq, P., Mège, R-M., Kabla, A.J., Lim, C.T., Ladoux, B. The Role of Single-cell Mechanical Behaviour and Polarity in Driving Collective Cell Migration. ***Nature Physics***, (2020).

Hu, B.; Berkey, C.; Feliciano, T.; Chen, X.; Li, Z.; Chen, C.; Amini, S.; Nai, M. H.; Lei, Q. L.; Ni, R.; Wang, J.; Leow, W. R.; Pan, S.; Li, Y. Q.; Cai, P.; Miserez, A.; Li, S.; Lim, C. T.; Wu, Y. L.; Odom, T. W.; Dauskardt, R. H.; Chen, X., Thermal-Disrupting Interface Mitigates Intercellular Cohesion Loss for Accurate Topical Antibacterial Therapy. ***Advanced Materials***, (2020).

Lin, R.; Kim, H-J.; Achavananthadith, S.;, Kurt, S. A.; Tan, S. C. C.; Yao, H.; Tee, B. C. K, Lee, J. K. W.; Ho, J. S., Wireless Battery-free Body Sensor Networks Using Near-field-enabled Clothing. ***Nature Communications***, (2020).

Lim, S. B.; Menon, N. V.; Lim, C. T., Microfluidic Tools for Probing Micro-culprits. ***EMBO reports***, (2020).

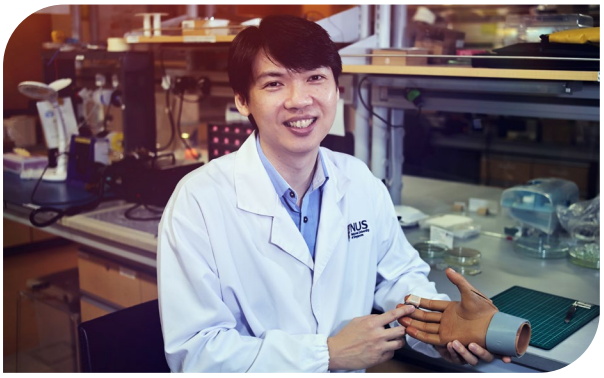
Tan, Y. J.; Godaba, H.; Chen, G.; Tan, S. T. M.; Wan, G. X.; Li, G. J.; Lee, P. M.; Cai, Y. Q.; Li, S.; Shepherd, R. F.; Ho, J. S.; Tee, B. C. K., A Transparent, Self-healing and High-kappa Dielectric for Low-field-emission Stretchable Optoelectronics. ***Nature Materials***, (2020).

Latest Grants

1	Asst Prof Catherine Ong	enVision: molecular switches for rapid and sensitive detection of 2019-nCoV	Feb 2020 - Aug 2021	1.5 years	NUSMed Post-Doctoral Fellowship
2	Asst Prof Shao Huilin	Direct detection of COVID-19: Integrating molecular switches with automated microfluidics	Aug 2020 - Jul 2021	1 year	NMRC
3	Asst Prof Gloryn Chia	Engineering personalized cancer vaccines using pluripotent stem cells-derived red blood cells as artificial antigen presenting cells	Apr 2020 - Mar 2025	5 years	NRF Fellowship
4	Prof Lim Chwee Teck	A Point-of-care Rapid Antigen Test Kit for the Detection of SARS-Cov-2 Infection (ID MOH-000445-01)	Aug 2020 - Jul 2021	1 year	NMRC

Health Innovation at iHealthtech

iHealthtech as a base for translating impact to patients



Benjamin Tee Chee Keong, President's Assistant Professor, and Principal Investigator, iHealthtech

Benjamin has bagged many accolades under him as a rising young scientist in Singapore and at the international stage. He was selected as one of the 2019 World Economic Forum Young Scientist, 2017 Top Young Outstanding Persons Award by Junior Chamber International, 2016 President's Young Scientist Award, TR35 list of 2015 Innovators Under 35 by MIT Technology Review.

In one of the highlights of CNN International Tomorrow's Hero series, Benjamin recalls the scene of Luke Skywalker's robotic hand in the Star Wars series that has sparked his curiosity and imagination. He was seven-year-old back then when the idea slowly germinated into creating electronic skin that can feel and sense, and therefore react to stimuli like ordinary people do. His research in electronic skin work also featured in BBC World News.

Benjamin's research of electronic skin, stretchable and self-healing materials are parts of his larger ambition to develop new materials, devices and systems to address patient's needs and for technological advances in human-machine interactions, robotics and biotechnology. His works have been published in high impact journals such as Nature Materials, Nature Electronics and Science Robotics.

Besides being an avid innovator, Benjamin also hopes to impact lives through translating technologies from bench to bedside. In 2015, Benjamin co-founded the start-up company Privi that develops a drug-free product to relieve the pain of haemorrhoid patients that received US FDA clearance. He is also in the midst of translating the several advanced flexible, stretchable electronic sensors and technologies developed by his laboratory.

"When I was very younger, I had wanted to become a doctor to help patients, but curiosity and imagination steered my career path into becoming a scientist. My research in electronic skins could be very useful for telemedicine as well as patients who have lost their limbs because of illnesses, accidents or wars, to regain their sense of touch. My research work in iHealthtech enables me to collaborate with clinicians to achieve the goal. For these reasons, I feel that I have fulfilled both my aspirations to become a doctor and a scientist," said a cheerful Benjamin.