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New \$20m project by British and Singapore researchers to improve healthcare cyber security



NTU's Professor Liu Yang (left) and Imperial College London's Professor Anil Anthony Bharath will lead the research. ST PHOTO: AZMI ATHNI

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SINGAPORE – Hackers targeting life-saving healthcare devices like pacemakers is not just science fiction, but could become reality in the not-so-distant future as medical devices become more connected.

To prepare for such scenarios and more, scientists from Imperial College London and Nanyang Technological University (NTU) will embark on a \$20 million programme to improve the cyber security of medical devices.

The four-year In-Cypher project is the first research programme under a research and innovation centre in Singapore by Imperial College London, its maiden innovation centre overseas. Both the programme and centre were launched on Jan 8 at Eden Hall, the British High Commissioner's residence.

Other than developing better ways to protect implantable active devices, such as pacemakers, In-Cypher also aims to secure the data protection of connected wearables and healthcare systems, as more personal data is being collected and stored with the advent of personalised medicine.

The research will involve applications for a range of devices such as continuous glucose monitors, smart electronic skin patches and activity monitors. Imperial's Professor Anil Anthony Bharath and NTU's Professor Liu Yang will lead it.

There are currently no statistics on the overall number of cyber attacks in the world, in part due to confidentiality policies of various countries' medical systems, said Prof Liu, who is from NTU's School of Computer Science and Engineering.

"But what is certain is that as medical devices and systems develop towards networking and intelligence, the number of cyber attacks they suffer is increasing year by year. Although there are no statistics on the frequency of cyber attacks, there are studies on the increased mortality caused by attacks," said Prof Liu.



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Research has shown the rate of US patients who died within 30 days of being admitted to hospital or received surgery increased by 0.4 per cent because of cyber attacks on medical devices and systems in that country, he said.

A focus of the In-Cypher project is to protect existing medical devices that will be used for a long time.

Such devices are typically expensive, have strict software and hardware safety restrictions, and have update speeds slower than consumer electronics. The programme's researchers will be designing a special watchdog mechanism that can monitor the operating status and safety of the relevant devices in real time, said Prof Liu.

"For new devices that are not yet on the market, this project can provide a new software and hardware framework, which will undoubtedly greatly help the security of new devices," he added.

Other than healthcare cyber security, the new research centre, called Imperial Global: Singapore, will also undertake research projects in areas such as pandemic preparedness, climate, the transition to net zero, and artificial intelligence.

Singapore was chosen to host the British university's first overseas research centre due to its strong history of collaboration.

The centre's partners include NTU, National University of Singapore (NUS), Singapore Management University, the National Centre for Infectious Diseases and the Agency for Science, Technology and Research.

Imperial Global: Singapore will be based at the Campus for Research Excellence and Technological Enterprise located in NUS. Imperial hopes to open more of such centres in the United States, Africa and India.

Professor Hugh Brady, president of Imperial College London, said the new research centre should eventually involve several hundred Imperial researchers spanning the fields of medicine, engineering and business.



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“What we will be looking to do over the coming year particularly is to have intensive discussions with other academic partners within the Singapore ecosystem to understand what their priorities are and how we can work collaboratively together,” said Prof Brady.

“We are very open, not just to academic collaborations, but equally collaborations with other knowledge institutions and industry,” he added.

Prof Brady said that the British university hopes the Singapore-based centre will enable Imperial to expand activity in the region such as entrepreneurship programmes, start-up accelerators and student placements.

British High Commissioner to Singapore Kara Owen said: “In September 2023, our two prime ministers committed to work together in science, innovation, research and technology to develop solutions to tackle global challenges and drive economic growth, and to safeguard our future

security and bolster economic prosperity.

“This partnership could not be a better example of what they meant: a long-term partnership commitment, fusing academic and research excellence with the innovation of our private sectors on a critical issue for our people.”

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