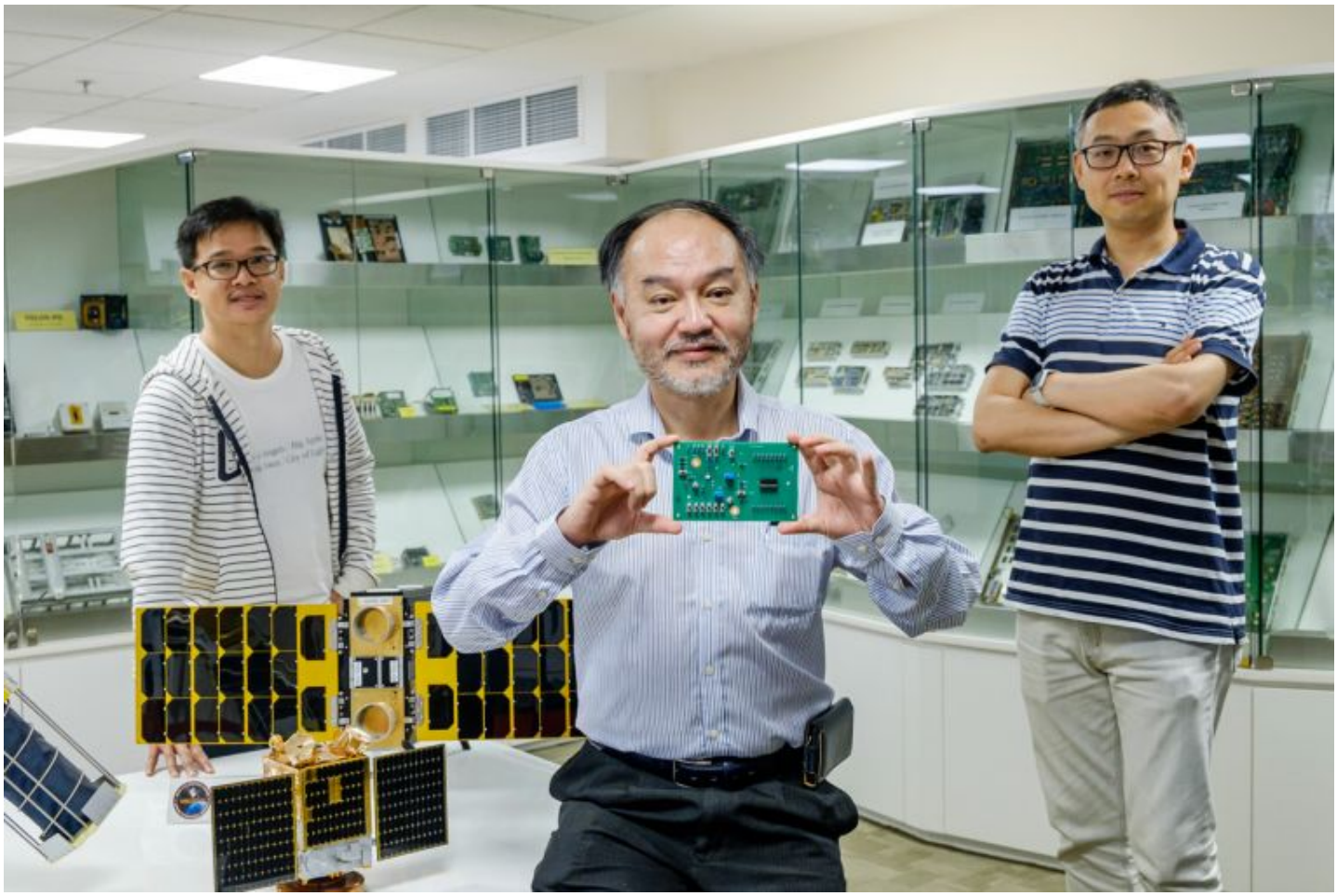
NTU researchers invent new cost-saving chip to protect satellite electronics from radiation in space



Prof Joseph Chang (centre) holding the new ZES smart chip, with other co-founders Dr Chong Kwen Siong (left) and Dr Shu Wei. PHOTO: NTU

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SINGAPORE - A group of six researchers at Nanyang Technological University (NTU) has invented a new hardware which promises to reduce costs for electronics used in satellites by up to 1,000 per cent and improve protection for them in space.

Known as the Latchup Detection and Protection (LDAP) chip, it was launched by Zero Error Systems (ZES) on Tuesday (Oct 20), a Singapore start-up which was incubated at NTU.

The chip works by detecting radiation and shutting down electronics so that they are not damaged by it. The current industry practice is to "harden" or protect the entire set of electronics from radiation, a process which is very expensive.

Installing the chip sidesteps this aspect by simply turning off the circuit until the radiation has passed.

"It's like having somebody to open and close an umbrella when it rains instead of paying for a giant shelter over the whole area," said a spokesman for NTU.

The LDAP chip will also allow for consumer-grade electronics, such as those in smartphones or tablets, to be used in space instead of outdated technology which is still used because it has been found to be reliable or specially produced for space.

The team was led by Professor Joseph Chang from NTU's school of Electrical and Electronic Engineering and has been working on the product for six years.

"This technology will increase the reliability, availability and cost-effectiveness of launching and keeping satellites in space," said Prof Chang.

"By using our LDAP chip, satellite manufacturers are now able to employ the latest consumer-grade electronics, such as those used in mobile phones, to build satellites."

Singapore's pivot towards investment in the space industry began in 2013 with the creation of the Office for Space Technology and Industry (OSTin), an Economic Development Board (EDB) programme that comprises multiple government agencies.

Since then, Singapore-based companies have launched multiple satellites including the the first locally made commercial microsatellite called TeLEOS-1 in 2015.

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In Tuesday's NTU statement, ZES also announced that it has secured $2.5 million in seed funding from investors such as Airbus Ventures, a global player in the space industry.

Dr Tang Pen San, co-founder and managing director of ZES said the new funding will enable the start-up to quickly scale up its operations and work with international customers to deploy their products into space and other applications, including self-driving vehicles with high levels of autonomy.

"Being able to use consumer-grade electronics is a game changer for the New Space industry," Dr Tang said.

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"Besides reducing the cost substantially, state-of-the-art consumer-grade devices like AI chips and high-performance Field Programmable Gate Arrays - an integrated circuit that can be reprogrammed for different applications after

manufacturing - will also enhance the functionalities and performances of these new satellites."

The LDAP chip looks set to make it into space next year, and has already been installed as part of the radiation-protection circuitry in three pico-satellites built by the Kyushu Institute of Technology in Japan, for three countries - Japan, Paraguay and the Philippines.