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Defence • DSO building up SAF's technological edge

Fifty years since it was formed by the late Dr Goh Keng Swee to provide the Singapore Armed Forces (SAF) with an edge in electronic warfare, DSO National Laboratories has become indispensable to the SAF and helped overcome many of its strategic vulnerabilities through science and technology, Defence Minister Ng Eng Hen said yesterday.

The national defence research and development organisation has steadily built up the SAF's technological edge to help the SAF exceed what it is naturally able to do given Singapore's small size and limited manpower, Dr Ng said at an exhibition to celebrate DSO's golden jubilee.

The exhibition, which is open only to staff and select guests, demonstrates DSO's innovations in fields such as cryptography, cyber security, miniaturised electronics, artificial intelligence (AI) and unmanned systems.

For instance, DSO has since last year been using AI to automatically detect digitally altered videos of people, or deepfakes, by picking up poorly rendered fine details such as hair, or unnatural lip movements.

It is also developing tools to overcome potential weaknesses in AI systems – for example, when an autonomous vehicle is fooled by markings on the ground and takes a wrong turn.

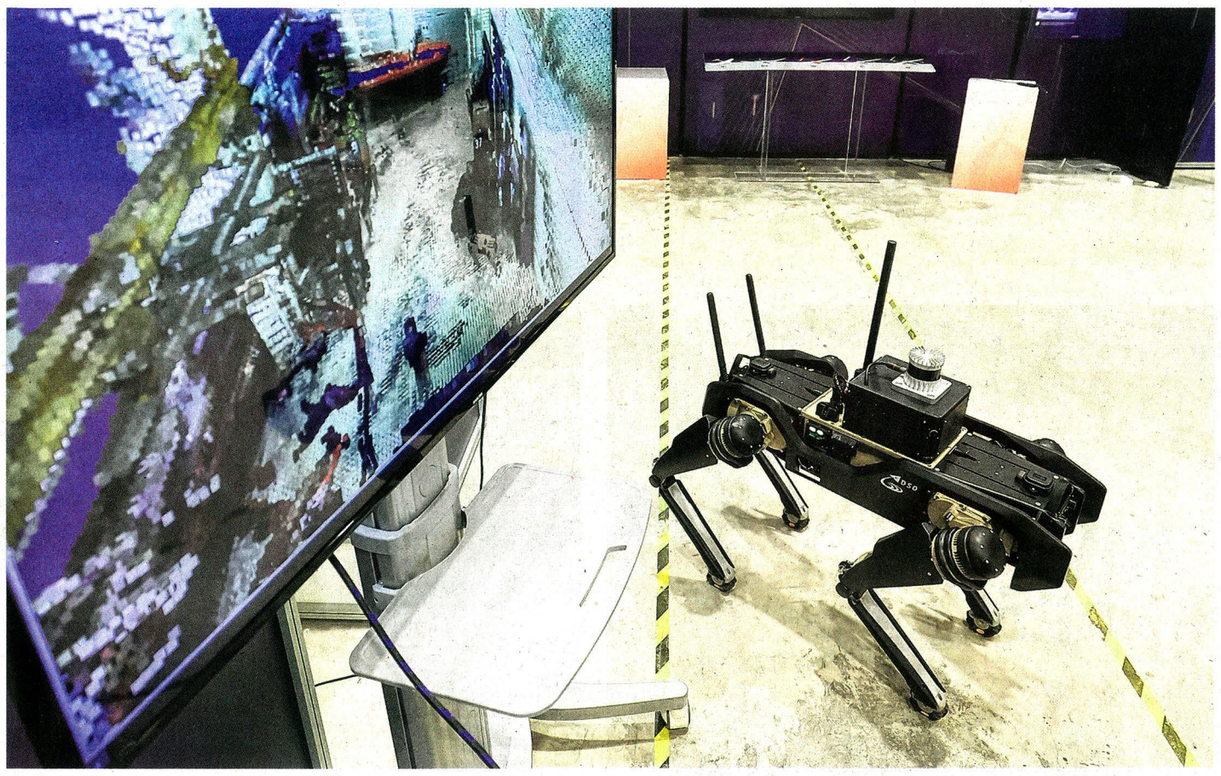
DSO also showcased its homegrown technologies that are embedded within systems to make them smarter and more robust.

These include a cryptography chip five times smaller and less power-intensive than commercial products.

It can be customised to provide enhanced security for a wide range of devices.

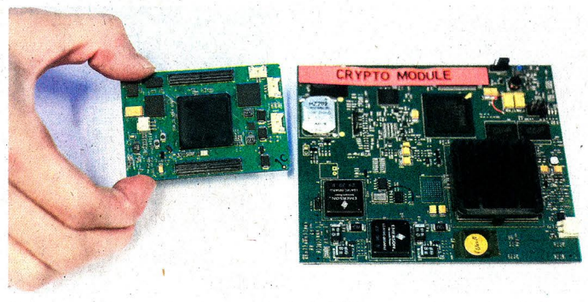
Dr Ng said DSO will also play a crucial role in the new Digital and Intelligence Service – the SAF's fourth arm – slated to be inaugurated by the end of the year.

SEE THE BIG STORY • A5



Harrier, a robot that can manoeuvre through tight spaces and narrow corridors, and even climb stairs, on show at DSO National Laboratories' 50th anniversary exhibition at the DSO Complex near Kent Ridge. The robot will be used to conduct surveillance in urban environments. ST PHOTOS: GAVIN FOO

Unmanned aerial vehicle Veloce 60 on display yesterday at the exhibition, which is open only to staff and select guests.



Other innovations at the showcase include DSO's crypto chip module (left), seen here in comparison with a commercially available crypto module.

Harrier (front), a robot that can be used for surveillance in urban areas, at DSO National Laboratories' 50th anniversary exhibition. ST PHOTO: GAVIN FOO

Focusing on technology to help tackle digital threats

DSO National Laboratories will bank on its head start in artificial intelligence (AI), data analytics and cyber-security research as it gears up to support the Singapore Armed Forces (SAF) in dealing with threats in the digital domain.

In an interview yesterday, DSO chief executive Cheong Chee Hoo said the capabilities needed by the new Digital and Intelligence Service, or DIS, are not new.

"What is important now is that there is more mission focus. Which means that we will have to do more," he told reporters during a media tour yesterday of the defence research and development organisation's 50th anniversary exhibition.

Mr Cheong said: "In the 1980s, when you mention AI, you will never get supported in your work. But this is what DSO is about, because we really forward-invest in people. We have been looking at AI since the 1980s.

"We're using AI, natural language, as well as image and signal processing to detect deepfakes. So in terms of AI, we not only use it to prevent (threats), we also make sure that whatever we do is robust."

Deepfakes refer to digitally altered media that can be used to spread false information.

There is growing demand for talent in the digital domain, Mr Cheong noted, but one advantage DSO has over other employers is how it contributes to national defence.

"Besides having that sense of purpose, the kind of work we do is very challenging, exciting, and also impactful... That's our value proposition to the younger people in the digital area," said Mr Cheong, 54, who has been CEO since 2016.

Other than doing more outreach via channels such as social media, DSO also brings in 150 to 200 interns from universities every year – mainly from engineering and computer science backgrounds – to allow them to experience working in DSO.

And they solve real problems that engineers and scientists in DSO actually do, he added.

On talent retention, Mr Cheong disclosed that the average length of service in DSO is about 15 years, up from 13 reported in 2017.

The average attrition rate over the last three years is about 3.5 per cent for research scientists and engineers. This is also lower than the 4 per cent reported five years ago.

DSO hires only Singapore citizens due to the sensitive nature of its work.

Asked whether DSO is working on other emerging technology, such as blockchain, cryptocurrency and the metaverse, Mr Cheong said this will depend on potential capabilities that such technology can deliver for the Ministry of Defence and the SAF.

Blockchain, particularly the idea of distributed ledgers, could be useful, he added, and this is something DSO has been thinking about.

"Cryptocurrencies, less so. I don't think we will spend effort to mine Bitcoin," he said.

Lim Min Zhang

DSO marks golden jubilee with defence tech showcase

Minister says agency is indispensable to SAF and Mindef, represents a 'cutting edge'

Lim Min Zhang
Assistant News Editor

The proliferation of digitally altered videos of people, such as deepfakes, has seen scientists at DSO National Laboratories devise tools to automatically detect them when they are used.

Since last year, the team has been employing artificial intelligence (AI) technology to pick up signs that may not be perceptible to humans.

These signs include poorly rendered fine details such as hair, or unnatural lip movements.

DSO AI scientist Terence Neo, 26, said there is a need to develop tools to detect such fakes across various platforms and identify falsified media.

"When used by malicious actors, such manipulated media can be used to misinform and polarise public opinion," he added.

The AI tool to detect such fakes is among defence technology projects that DSO is showcasing at its 50th anniversary exhibition at the DSO Complex near Kent Ridge.

The event is open only to staff and select guests. Other innovations at the week-long exhibition include those in the fields of unmanned systems, cryptography, cyber security, and miniaturised radio frequency and electronics.

Defence Minister Ng Eng Hen said yesterday that DSO is indispensable to the Singapore Armed Forces (SAF) and the Ministry of Defence (Mindef).

"It represents, in so many areas, a cutting edge without which we would be at a serious disadvantage because of our constraints of manpower and space," he told reporters at the opening of the exhibition.

DSO has about 1,600 research scientists and engineers working across the land, sea, air, space and cyber domains.

It traces its history to 1972, when three engineers were tasked by then Defence Minister Goh Keng Swee with studying electronic warfare.

Traditionally secretive about much of its work, DSO aims to provide the SAF and Mindef with cutting-edge technology, to overcome Singapore's constraints of a small population and geographical size.

PLAYING A VITAL ROLE

It represents, in so many areas, a cutting edge without which we would be at a serious disadvantage because of our constraints of manpower and space.

DEFENCE MINISTER NG ENG HEN, on DSO National Laboratories, which traces its history to 1972.

The organisation has helped develop airborne radars, underwater vehicles for sea mine detection, and capabilities against chemical, biological, radiological and nuclear threats.

Dr Ng said DSO will play a crucial role in the new Digital and Intelligence Service – the SAF's fourth arm, which is slated to be inaugurated by the end of the year.

The DSO AI team said that it is working on making its systems more robust.

Potential weaknesses include how an autonomous vehicle can be fooled by markings on the ground and take a wrong turn.

An automatic target detection system powered by AI may also miss a high-value target because of stickers or patches that are stuck on it.

Said Mr Neo: "These robust models need to be developed in-house because this is an emerging field, with almost no commercial solutions at this stage."

He added that commercial solutions may also contain intentional vulnerabilities that can be exploited.

In the field of robotics, work started last year on a four-legged robot to manoeuvre through tight spaces and narrow corridors, and even climb stairs.

The robot will be used to conduct surveillance in urban environments.

Called Harrier, the robot resembles a dog and can generate three-dimensional maps indoors in real time without the need for prior maps of the area.

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