



While You Were Sleeping: 5 stories you might have missed, Oct 28



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DSO scientists tackling threats in real world and cyberspace swiftly



The decontamination lab at DSO's high containment facility, a demonstration of indoor drone mapping (above) and a solid state drive containing the BIOS verifier seen on a tour of projects at the DSO National Laboratories last Thursday. ST PHOTO: KUA CHEE SIONG

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DSO's cutting-edge work includes reducing time needed to identify unknown substances

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Lim Min Zhang (mailto:mzlim@sph.com.sg)

An unattended package in Shenton Way is discovered and found to be radioactive. Police have set up a safety cordon, disrupting activity in the Central Business District.

In such scenarios, scientists at defence research organisation DSO National Laboratories can be called upon to identify the substances, and they have developed processes to cut the time needed to do so.

For instance, identifying the exact nature of nuclear material plutonium now takes just six hours, less than 10 per cent of the original three days required. For radioactive substances like thorium, the time taken to nail down an identity has been reduced from six hours to one.

"We recognised that five to six hours is not acceptable, as our ground responders are out there waiting for an answer on what the substance is," said Dr Pong Boon Kin, 44, head of the nuclear forensics laboratory.

These processes for the testing of radiological and nuclear samples are being developed at DSO, which also conducts the testing and verification of chemical and biological samples at its high containment facility.

It is one of 19 similar facilities worldwide designated by the Organisation for the Prohibition of Chemical Weapons, and the only one in South-east Asia.

Some innovations

High containment facility:

- Built in 1998 and costs \$2 million to maintain each year
- Preparation and decontamination labs are made entirely out of stainless steel, which is non-porous, to allow for fast and easy decontamination in cases of accidental spillage

BIOS verifier:

- Works by extracting files from the BIOS chip for analysis
- Also being researched is a verifier to detect malware in graphic and network cards

Crypto chip:

- Akin to a digital lock that secures the communications of military hardware such as drones
- Has anti-tampering protection that can detect tampering much earlier than commercial chip technologies
- Uses up to five times less power than a commercial chip with similar processing speed

Drone-mapping technology:

- Using multiple drones to perform real-time 3D mapping autonomously
- Can be used without Global Positioning System
- Uses fish-eye cameras, possibly paired with different types of sensors such as Light Detection and Ranging or Lidar sensors
- Able to map unknown areas, such as indoor enemy territory, quickly and with minimal manpower

Voice recognition technology:

- Potential applications include being able to identify someone making a bomb threat on the phone by comparing his voice with those in a database
- Needs at least 10 seconds worth of speech data, otherwise performance will start to degrade
- Makes use of the fact that each voice is unique, in terms of factors such as shape and size of vocal chords

Lim Min Zhang

The facility was among several projects showcased by DSO in a rare media tour last Thursday.

Set up in 1972 as the Electronics Test Centre and renamed in 1977 as the Defence Science Organisation, DSO was corporatised and acquired its current name in 1997.

While its primary goal is to support national defence as the technology partner of the Singapore Armed Forces (SAF), the 45-year-old organisation also develops technologies that protect national security.



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Its largely invisible work takes place at the DSO Complex in Science Park Drive, which officially opened in April and features a floor area of 69,000 sq m across two eight-storey buildings. It has more than 1,800 staff, and spends more than \$250 million in research every year.

Another pioneering project is a BIOS verifier, which is able to detect malware that is stealthy enough to reside in a computer's BIOS, or the firmware that boots up when a computer is turned on.

Malware planted in a computer's BIOS allows the attacker to take control, accessing files and recording the victim using the computer's webcam, for instance.

Commercially available anti-virus software is typically installed in a computer to protect applications and the operating system from malware infections, but it is unable to detect those hiding in places such as the BIOS, said Mr Yap Chun Beng, 45, the principal research engineer at the information division.

On its future plans, DSO chief executive Cheong Chee Hoo said it would work with the SAF to develop leading-edge capabilities in areas such as data analytics, artificial intelligence and robotics to deal with threats in both the real world and cyberspace.

"The next 45 years will not change our mission and how we achieve it. DSO will need to continue to be at the leading edge of technology," he added.