

# Keeping tabs on shipboard personnel

An innovative system has been developed that provides real-time automatic location and safety status for all personnel on naval vessels.



The advent of inexpensive miniaturised electronic systems has made possible the use of radio tagging technology for a range of purposes such as security access management, monitoring of inventory stock and tracking of goods shipments.

Defence's Capability and Technology Demonstrator (CTD) Program has demonstrated the possibility of applying this technology in a naval context as a way of knowing which persons are on board at any given time and their whereabouts on the upper decks. DSTO and Navy recently conducted a demonstration on board the decommissioned amphibious support ship, HMAS *Kanimbla*.

The system under review, called Naval Automated Personnel Tracking (NAPT), was developed over the past four years by the Australian company, Blue Glue Pty Ltd, with CTD Program support.

## Radio frequency ID tag

The NAPT system consists of wearable extremely low-power radio frequency

identification tags plus an Ethernet network of custom-designed radio receivers, lasers and infrared sensors connected to a database.

The radio system performs the functions of confirming identity and location onboard with an accuracy of a few metres. The NAPT tags have a range of up to 50 metres and are equipped with a five-year battery.

"The tags are programmed to automatically emit pulse transmissions at 1.5 second intervals, sending data that identifies the tag wearer," explains CTD Program Office Director Dr Alan Hinge. "Each tag transmits its unique identity within a small transmission period to reduce interference with other tag transmissions."

The NAPT receivers are placed at specific locations around the ship, enabling tag transmissions to be captured whenever anyone embarks, disembarks, is located on the upper decks or in hazard areas below decks. Tag transmissions received by the system are rapidly processed to produce data records featuring the unique identification

code of each tag wearer, time of transmission, tag age, location and signal strength of every transmission received.

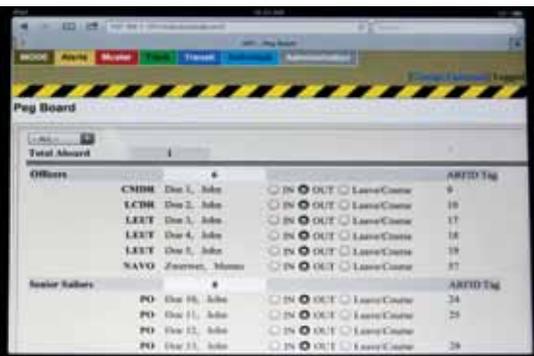
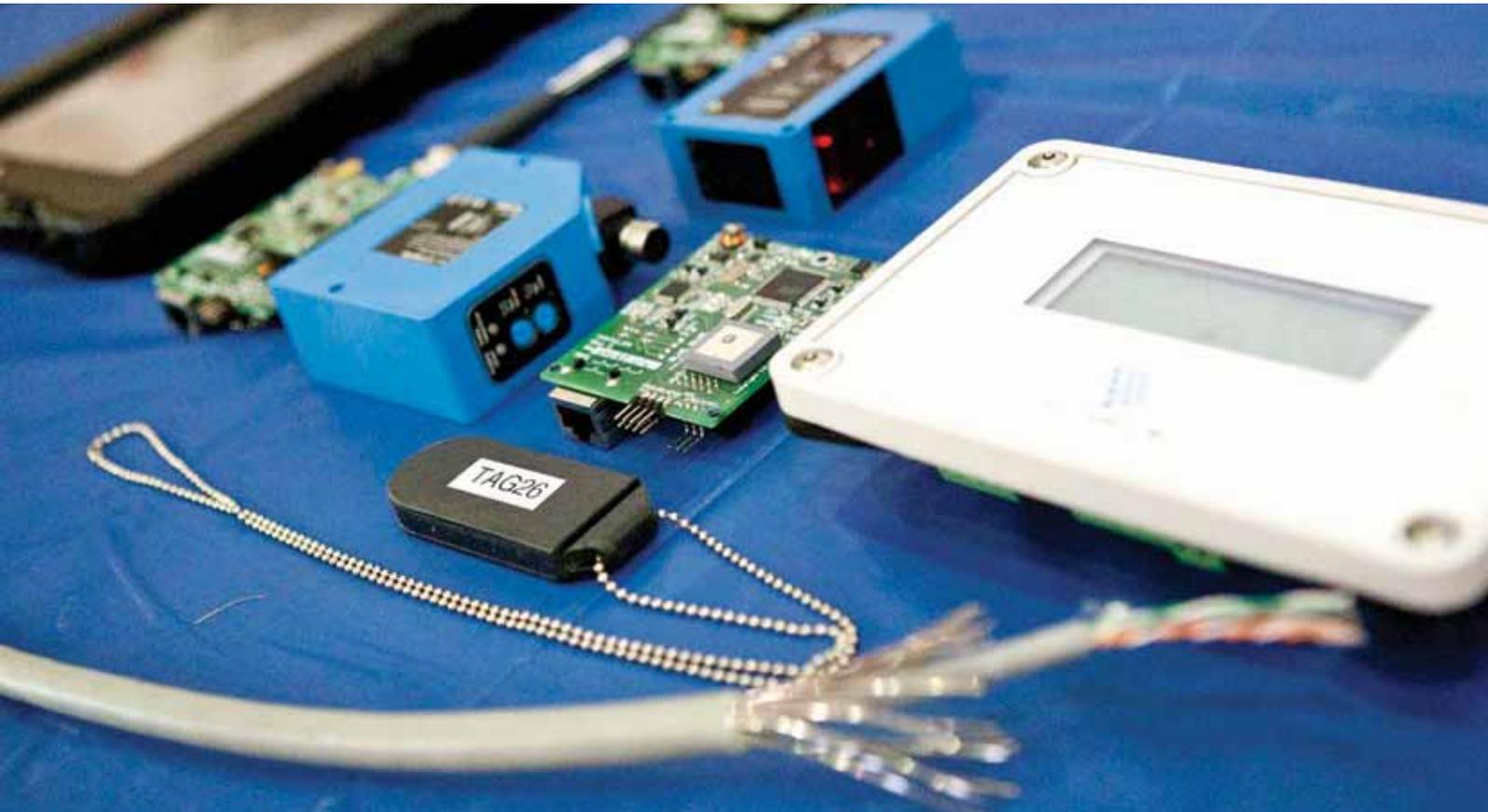
## Additional monitoring with light

The NAPT laser and infrared systems provide a capability for hard-line monitoring of intrusions into high-risk areas.

The infrared and laser sensors are triggered and intrusions into a hazardous area reported when a person steps through a beam of infrared or laser light. An intrusion interrupts light reception by the relevant sensor. These entry detection systems can operate effectively over spans of up to 1.8 metres for infrared beams and 10 metres for laser.

The systems were applied in the trial to alert intrusion into specific radio hazard areas on the upper decks. A laser sensor was also used to demonstrate the technology's ability to confirm hatch-closed status to millimeter accuracy – a vital concern for ship damage control and survivability with this depending on complete hatch closures to prevent the ingress of water or fire.

James Canterbury, Director of Blue Glue Pty Ltd (left, holding a NAPT radio receiver), with RAN staff Commander Menno Zwerwer (centre, holding NAPT tag) and Commodore Rob Elliott.



### Automated tracking

During the trial, the NAPT system recorded on an electronic pegboard the arrival or departure of personnel from the ship through use of their Defence ID cards. The manufacturer's number on these was read by

presenting the card to an electronic reading device, similar to those in use on security doors. This action automatically updated the NAPT system electronic peg board about the embarkation status of each person.

The NAPT radio receivers fitted on the upper decks were installed at locations less than 30 metres apart, meaning that personnel on the upper decks were always in monitoring range. With two or more receivers normally receiving the same tag transmission, the location of the tag was determined by assessing the relative strength of signal at each receiver. In this manner, the position of personnel on the upper decks could thereby be monitored and mapped continuously.

When personnel left the upper decks to enter the superstructure, the NAPT radio receivers tracked their change of position and they were logged by the system as being in a safe location. No monitoring was undertaken inside the superstructure other than for purposes of conducting a 'muster' below decks and monitoring hazardous areas.

As well as radio hazard (RADHAZ) monitoring, the technology can be applied to include monitoring of personnel assembling at mustering points, preparation of boarding parties, helicopter operations and shipboard emergencies such as damage control exercises.

### Emergency alert

Enhancing the safety of personnel onboard, NAPT also has the capability to provide immediate 'man overboard' alerts to the ship's command within the space of a second or two. Such accidents could involve a person falling from the vessel onto a wharf or into water.

In both cases, transmission reception ceases immediately and causes the system to report the emergency event with details of its last known location of the individual on the upper deck, time of incident and ship's GPS location.

During the shipboard trials on HMAS *Kanimbla*, the technology was shown to work well and met all contracted CTD target performance measures. The Department of Defence Capability Development Group will now consider further development of the technology, possibly leading to transition into service with Navy.

"The system would considerably benefit the operation of the large Canberra class Landing Helicopter Deck vessels being acquired by Defence, which will involve personnel contingents of crew and troops numbering in the thousands," says Dr Hinge. □

Top: NAPT system components.  
Left above and below: NAPT system screen displays.