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Solving tomorrow's defence issues now

Collaborations across Australia are critical

TONY LINDSAY

Australia has a proud history of scientific endeavour and is recognised as a leader in fields from engineering and computer science to physics, space science, materials science and molecular biology.

It was partly Australia's reputation for world-class research that inspired Lockheed Martin to select Melbourne as the location for its first multidisciplinary research and development laboratory outside the US.

Nearly three years since that decision, the Science, Technology, Engineering Leadership and Research Laboratory (STELaRLab) is now fully established and committed to being a trusted partner for defence and national security R&D and championing our sovereign defence science capability.

Currently, STELaRLab supports multiple honours, masters, doctoral and postdoctoral R&D programs, and is engaged in six research collaborations with five universities nationally.

The Lab also supports Lockheed Martin's wider R&D investments in Australia, which since 2012 has resulted in more than 30 projects across 15 universities.

From space situational awareness to space operations, analysis of complex multi-domain operations, automated information extraction and interpretation, hypersonics and beyond — our Australian research collaborations are assisting Lockheed Martin to solve the problems of tomorrow, today.

An example is our foundational partnership with the University of Adelaide's Australian Institute for Machine Learning (AIML).

STELaRLab researchers are collaborating with University of Adelaide researchers and AIML students on next-generation machine reasoning for automated information processing and decision support — tackling the fundamental issues of trusted autonomy, developing techniques to enable machines to understand and respond to complexity and novelty in their environment, and improving the way humans and machines interact with each other via natural dialogue and concepts of shared intent.

While STELaRLab is predominantly a defence and national security laboratory, many of the technologies we explore also have civil applications.

A terrific example is Curtin University's collaboration with Lockheed Martin Space.

This work resulted in advanced image processing algorithms that enable the detection of space objects using commercially available cameras, at a level previously only attainable by telescope-based systems.

With the ability to survey large portions of the night sky instantaneously, detect and track space objects at very large distances, and report back the observations in near real-time, all at a fraction of the cost of existing technologies, FireOPAL has the potential to radically disrupt the field of space object tracking, ultimately creating a safer space environment.

Of course it's not just the universities — our partnerships extend to direct relationships with Australian defence manufacturers in the form of collaborations to secure funding for research projects, as well as STEM-oriented education initiatives (such as student-led innovation forums and women in engineering events) to engage and inspire the engineers of tomorrow.

I am often asked why Australia is so important to Lockheed Martin's global research endeavours. Our deep alliance with the US aside, to me the answer lies in a combination of geopolitical circumstance and the high standard of Australian researchers.

The sheer scale of Australia's geography, combined with the increasingly advanced capabilities available to potential adversaries in our region, necessitate our reliance on defence technologies at the absolute cutting edge.

We have foundational capacity, but we need to sustain emphasis on developing sovereign defence capabilities today, to assure the nation's security for tomorrow.

This puts the work we do at STELaRLab into perspective and sharpens our focus.

In advancing the understanding of critical enabling technologies we are already playing a key role in ultimately defining the capacity of Australia's future force.

For example, as more 5th-generation capabilities such as F-35s, future submarines, Aegis-enabled warships and space-based assets come online, work undertaken by our researchers will enable these assets to be seamlessly integrated into a joint force and be efficiently sustained through their operational lifetime.

One of the exciting aspects of working in Lockheed Martin is that, no matter whether it's underwater, in outer space, or anywhere in between, somewhere among our 47,000 engineers worldwide there'll probably

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be a team who work a related problem.

That means we have the potential to leverage that knowledge so that the Australian taxpayer's dollars are spent advancing capability, not reinventing it.

For our part, STELaRLab remains focused on working with our partners in the innovation community to solve the hard technology challenges that will ensure Australia's security into the future.

Dr Tony Lindsay is director of the STELaRLab.

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