

# FLINDERS UNIVERSITY DEFENCE RESEARCH

**FORGING POWERFUL PARTNERSHIPS**



*Image courtesy of the Department of Defence*

## INTRODUCTION

One of Australia's most progressive and innovative institutions, Flinders University has earned an international reputation for research that tackles real-world challenges and explores some of the truly fundamental questions of our time.

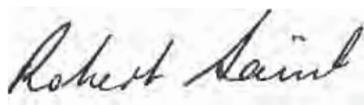
As host to a suite of flagship national research centres, Flinders is engaged with universities and research institutes in Australia and around the world, bringing together the finest minds to develop new technologies and practical solutions.

This is particularly evident in our impressive expertise in defence research and innovation. Our location in Adelaide, South Australia, places us at the heart of Australia's defence industry.

Working alongside some of the world's foremost defence and technology companies ensures that our research is real-world tested, ready for commercial application and able to make a difference.

Enterprising collaborations with government and industry partners mean Flinders graduates are work-ready and able to make an immediate impact in the sector.

Flinders University defence research – forging powerful partnerships, growing defence knowledge.



**Professor Robert Saint AM**  
**Deputy Vice-Chancellor (Research)**



*Professor Robert Saint AM, Deputy Vice-Chancellor (Research)*

## FLINDERS UNIVERSITY: A GLOBAL FOCUS ON REAL-WORLD SOLUTIONS

**Flinders University is a globally focused, locally connected institution that exemplifies education and research excellence. Ranked in the top two per cent of the world's universities\*, Flinders offers a world-class education and has a proud reputation for high quality student experience.**

We offer more than 150 undergraduate and almost 300 postgraduate courses, as well as higher degree research supervision across all disciplines.

We are a progressive and innovative institution that is bridging the gap between learning and earning through initiatives such as the Flinders New Venture Institute, which connect students, business and industry to drive entrepreneurial growth.

Flinders has a strong and growing research profile with 90 per cent of our research ranked at or above world class by Excellence in Research for Australia (ERA 2015), with research funding around A\$80m annually.

Flinders University's defence and maritime research centres are based at the Bedford Park and Tonsley campuses, in the heart of South Australia's technology and manufacturing industries. The new Flinders at Tonsley innovation hub co-locates Flinders students and researchers in areas such as engineering, medical devices and nanoscale technologies, alongside some of Adelaide's biggest businesses, to create the new products and processes of the 21st century.

### **South Australia: The Defence State**

Adelaide, South Australia, is Australia's national centre of naval shipbuilding and sustainment, and the confirmed location for Australia's next generation Future Submarines and Future Frigates. South Australia is also the nation's centre of systems engineering, systems integration and defence electronics. South Australia is a national hub for airborne maritime surveillance and weapon system testing and evaluation, and has a rapidly growing innovation ecosystem space. South Australia has a large skilled workforce that has been established over many years, including for building and sustaining armoured fighting vehicles.

### **Defence SA**

Partnering with defence, industry and academia to advance South Australia as the centre of expertise in defence science and research is a key priority for the South Australian Government.

**To find out more about the South Australian Government's activities in defence, visit: [defencesa.com](http://defencesa.com)**

\*Academic Ranking of World Universities 2016

# RESEARCH STRENGTHS

## **Maritime Engineering, Control and Imaging**

The Flinders Centre for Maritime Engineering, Control and Imaging (CMECI) has substantial experience in a broad range of areas. These include the design of autonomous vehicles, mission planning, state estimation and tracking, navigation in GPS-denied environments, robotics, control systems, signal processing, instrumentation, and embedded systems. CMECI's particular research strengths are in autonomous marine vehicles and autonomous aerial vehicles, and the centre is currently collaborating with industry partners in these areas.

Researchers at CMECI are currently working with industry to investigate and improve:

- launch and recovery of autonomous marine vehicles
- robotic inspection – autonomous mission planning, simultaneous localisation and mapping techniques for inspection of confined spaces such as submarine and ship ballast tanks
- antifouling materials for submarine sonar arrays – developing and characterising the acoustic properties of new antifouling compounds
- battery technology and battery modelling techniques for large submarine-based battery systems
- computational fluid dynamics modelling of marine structures – drag analysis and propulsion systems
- non-destructive health monitoring techniques
- advanced marine composite materials
- novel optical fibre-bragg-grating sensors
- smart structures

## **Nanoscale Science and Technology**

Working in collaboration with forensic and analytical sciences, the Flinders Institute for Nanoscale Science and Technology is investigating ways in which nanotechnology can be applied to create revolutionary solutions to real-world problems. These include:

- highly sensitive chemical sensors and bio-sensors
- energy generation and storage
- corrosion protection and enhanced functionality of surfaces through ultrathin and high-density, oriented polymer coatings
- antifouling coatings
- water treatments for reusable potable water
- marine composites and structures
- additive manufacturing

## **Centre of Expertise in Energetic Materials**

The Centre of Expertise in Energetic Materials (CEEM) represents an exciting combination of the synthetic and characterisation capabilities of Flinders University, where researchers work together with the Defence Science and Technology Group and industry partners. The centre conducts fundamental and applied research in the field of energetic materials, with a focus on defence and national security, including material synthesis and formulation, analysis, ageing, detonation behaviour, and detection techniques.

## **Centre for Knowledge and Interaction Technologies**

The Centre for Knowledge and Interaction Technologies (CKIT) tackles the challenges presented by the convergence of human and machine interaction. CKIT contributes to the development of the theory, practice and tools applicable to modern, knowledge-based, data-rich, human-centric systems. The centre's research spans:

- artificial intelligence and language technologies
- cybersecurity
- data mining and conceptual modelling
- simulation and haptics
- human-computer interaction
- resilient networks and distributed computing

## **Australian Industrial Transformation Institute**

The Australian Industrial Transformation Institute (AITI) is a national leader in industry and workplace innovation research, working closely with Australian manufacturing companies. It is currently investigating industry development opportunities for Australian companies arising from maritime defence projects based in South Australia. AITI also hosts the Industrial Transformation Theme of the Innovative Manufacturing Cooperative Research Centre.

## **Tonsley Manufacturing Innovation Hub**

In 2018 Flinders established the Tonsley Manufacturing Innovation Hub as a gateway to Industry 4.0 capability building.

Working closely with the Innovative Manufacturing Co-operative Research Centre, the South Australian and Commonwealth Governments and industry, TMI is working with companies to accelerate the uptake and diffusion of digital and automation technologies in manufacturing across a broad range of sectors.

**Flinders' research capabilities range from psychology to vision, law to resilience. For more information, visit: [flinders.edu.au/research](https://flinders.edu.au/research)**

## INDUSTRY CAPABILITY

Flinders' research with businesses helps to:

- identify capacity and capability
- support workplace change processes through monitoring and evaluation
- model local economic and employment impacts of investment
- map supply chains and value chains



Flinders' specialist research facilities

## COLLABORATE WITH US

Contact Flinders University today to see how we can build a powerful research partnership with your organisation.

**Tony Kyriacou**  
Defence Partnerships Director

tony.kyriacou@flinders.edu.au  
+61 8 8201 5615 | +61 411 132 690



Autonomous marine vehicles are being developed by the Flinders Centre for Maritime Engineering, Control & Imaging

## FLINDERS PARTNERSHIPS



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